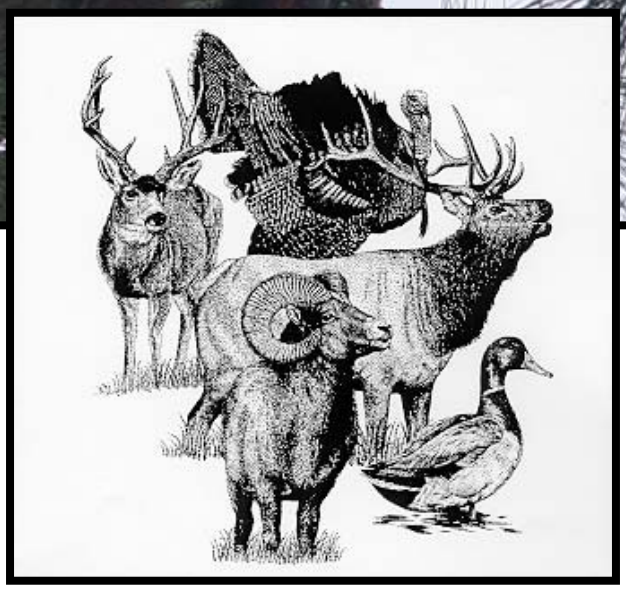
STATE OF WASHINGTON

2005 Game Status and Trend Report



Washington Department of FISH and WILDLIFE

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2005 GAME STATUS AND TREND REPORT

July 1, 2004 – June 30, 2005

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Deer

DEER STATUS AND TREND REPORT: STATEWIDE

Jerry Nelson, Deer and Elk Section Manager

Population Objectives and Guidelines

This report covers the time period July 2004 to June 2005. 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).

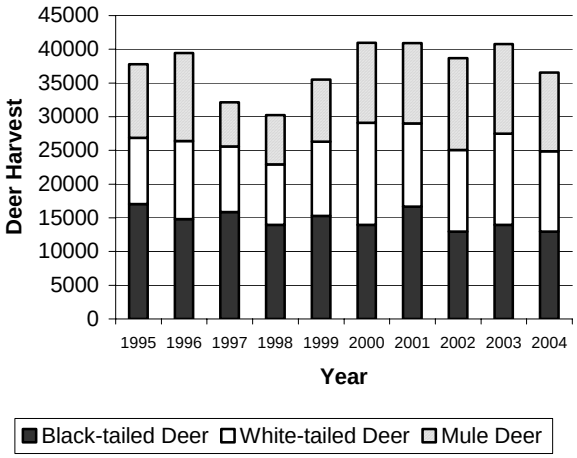

Figure 1. Estimated statewide deer harvest by species for 1995 to 2003 based on hunter report card percentages (1995-2000) or mandatory reporting (2001-2004).

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 4 years at about 12,000 animals per year. From a statewide perspective, antlered white-tailed deer harvest has been relatively stable for the last four years (Table 2).

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 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.

Table 1. Statewide deer harvest for general season and special permit season by weapon type and deer class for 2004. Data represent 85% of actual mandatory reports submitted.

General Season	Antlered	Antlerless	Total
Modern Firearm	26,895	2,021	28,916
Muzzleloader	1,047	844	1,891
Archery	1,783	1,733	3,516
Sub-Total	**29,725**	**4,598**	**34,323**
Special Permits			
Modern Firearm	1,531	3,439	4,970
Muzzleloader	65	185	250
Archery	69	81	150
Grand Total	**31,390**	**8,303**	**39693**

Table 2. Estimates of statewide deer harvest by deer type and class for 2001-2003. Year 2004 represents 85% of mandatory reporting data rather than an expanded statistical estimate.

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
Year 2004*	**Antlered**	**Antlerless**	**Total**
Black-tailed deer	11,119	1,841	12,960
Mule deer	9,024	2,634	11,658
White-tailed deer	8,185	3,730	11,915

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 mandatory report data 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. However, post-hunt buck ratio objectives are just barely being met in Okanogan and Douglas counties.

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. Severe 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, Indian Tribes 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 2004. Harvest figures prior to 2001 may not be completely comparable, as the new system of mandatory reporting did not begin until 2001. The total deer harvest has increased steadily since 2002.

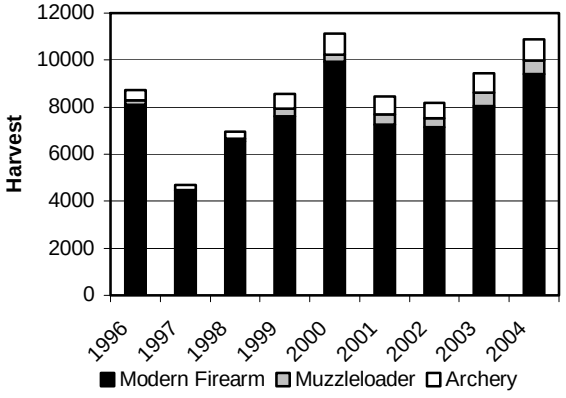

Figure 1. Trend in total deer harvest for GMUs 101-124 from 1996-2004.

Hunter numbers increased moderately after a drop in 2003 (Figure 2), and there has been a steady increase in the kill per hunter day since 2002 (Figure 3).

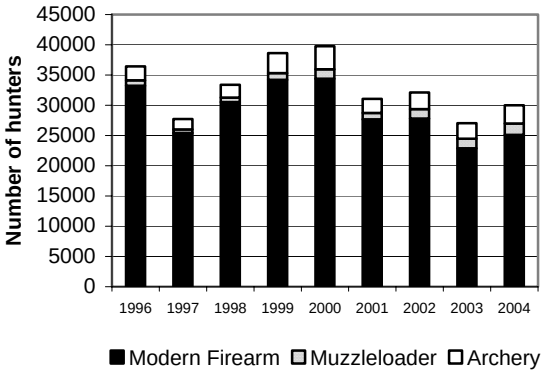

Figure 2. Trend in the number of deer hunters for GMUs 101-124 from 1996-2004.

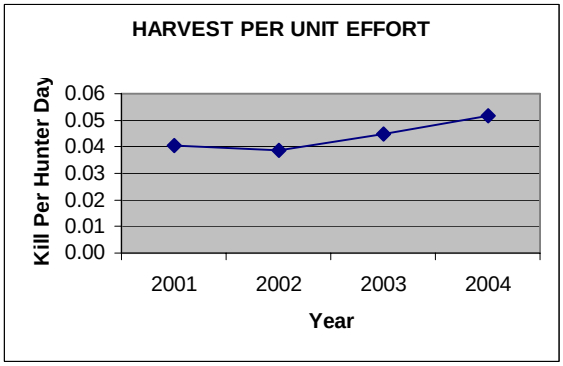

Figure 3. Trend in deer harvest per hunter day for GMU's 101-124 from 2001-2004.

Mule deer bucks legal for harvest have been limited to a three-point (high antler side) minimum since 1997. 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).

Table 1. Mule deer buck harvest trend from hunter reports 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%
2004	13	18	305	336	61%

Table 2 presents the hunter harvest of antlered and antlerless white-tailed deer by Population Management Unit (PMU) for 2004. There was little change in the antlered whitetail buck harvest for 2004 compared to 2003. A total of 6,163 whitetail bucks were taken in GMU's 101-124 during the 2004 season. 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 increased 28% in 2003 and another 20% for 2004. There was insignificant change in the antlerless harvest by archers or muzzleloaders.

There were 1825 antlerless white-tailed deer permits issued for modern firearm hunters within GMUs 101-124 in 2004, a slight (6%) reduction from 2003. There were also "Second Deer Tags" issued for three specific units,GMUs 105 (400 tags), 121 (100 tags), and 124 (400 tags). These Second Deer Tags allowed the permittee to take a whitetail antlerless deer *in addition to their regular deer tag*. These tags provide a supplemental management tool as well as a useful means for increasing hunter opportunity. There was basically no change in the total antlerless whitetail harvest from permits compared to 2003. Many hunters with permits end up not hunting. Of those that hunted, 53% were successful in 2004 vs. 59% in 2003, and 46% in 2002.

The "any white-tailed deer" 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, and modern firearm youth, senior, and hunters with disabilities. These hunts accounted for approximately 71% of the antlerless harvest in northeastern Washington in 2004, the same percentage as 2003.

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 4 years or greater. In 2004 the percentage dropped from 20% to 16 %, which is below the previous 3-year running average of 18% (Figure 3). Buck antler data are also collected from check stations and mandatory hunter reports, including a measure of mature bucks, those with 5 points or more on the high side of their antlers. Both check stations and hunter reports yielded 17% 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).

Table 2. Hunter harvest of antlered and antlerless white-tailed deer by Population Management Unit in 2004.

		Antlerless						Antlerless per
PMU	GMU	Archery	Permit	Y/S/D	Muzzleloader	Total	Antlered	100 Antlered
11	101	49	36	293	32	410	511	80
13	105	4	75	103	0	182	287	63
	108	3	80	75	21	179	350	51
	111	1	19	89	39	148	350	42
	113	4	11	82	70	167	327	51
	117	49	77	180	34	340	1051	32
	121	81	205	375	77	738	1753	42
	124	107	291	303	34	735	1534	48
Total:		**298**	**794**	**1500**	**307**	**2899**	**6163**	**47**

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

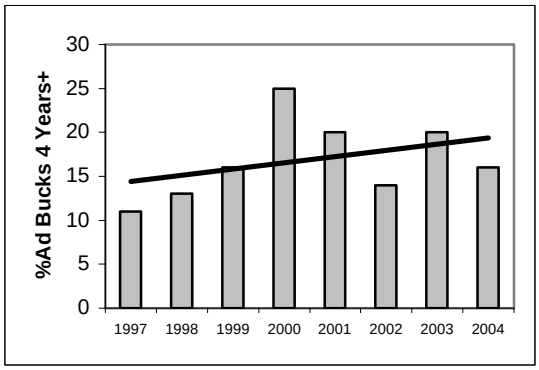

Figure 3. Percent of adult whitetail bucks 4 years and older from hunter check stations for 1997 - 2004.

The percentage of yearling bucks dropped a bit in 2004. All checks combined yielded 41% (*n*=154) yearling white-tailed bucks and 27% (*n*=24) yearling white-tailed does. Fawns made up 38% of the total antlerless harvest checked in 2004, up from 22% in 2003. The mean age of the adult whitetail bucks only (yearlings excluded) was 2.8 years in 2004, down from 3.5 in 2003.

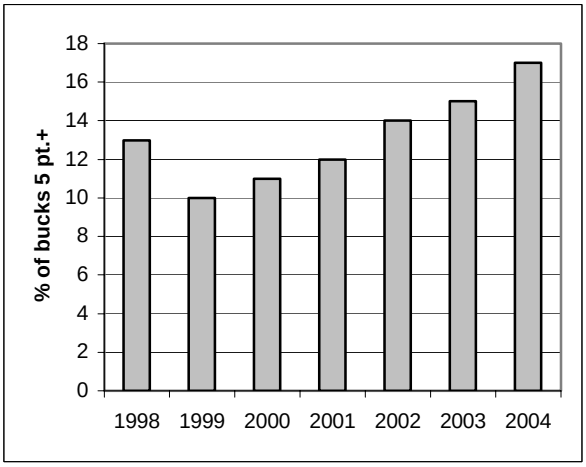

Figure 4. Percent of PMU 13 whitetail bucks 5 point or better from hunter reports, 1998-2004.

Whitetail buck:doe ratios for summer 2004 were 31 bucks per 100 does in PMU 13 (Table 4) vs. 42:100 in PMU 11 (i.e. GMU 101) where there is no late modern firearm season. The fawn ratio for PMU 13 improved from 51 fawns per 100 does in 2003 to 68:100 in 2004. There were 60% yearling whitetail bucks in the August 2004 surveys vs. 58% for the previous 3 year mean.

WDFW and U.S. Forest Service personnel classified 502 mule deer, primarily within western Ferry County (part of PMU 11), during the late summer of 2004. The buck ratio was 30 per 100 does, similar to 2003 at 34:100. The fawn ratio dropped from 66:100 in 2003 to 61:100 in 2004 (Table 5).

Population status and trend analysis

The percentage of yearling whitetail bucks in the 2004 hunter harvest dropped (possibly suggesting there were more adult bucks available) to 41%; this is below the previous 5-year average of 45% (Table 3). The percentage of 5 point or better bucks reported taken by hunters continued to increase in 2004 (Figure 4).

The ratio for antlerless white-tailed deer taken by hunters within PMU 13 increased from 41 antlerless per 100 antlered in 2003 to 47:100 in 2004. The actual antlerless harvest increased 8%, nearly all of which came from the Y/S/D "any whitetail" group which resulted in 255 more antlerless being taken for 2004 (Table 2).

The mule deer buck harvest in GMU 101, the district's only significant mule deer unit, has increased each of the last three years. Since season structures have not changed this logically reflects an increasing population trend. With fawn ratios above 60:100 over the last two years, we should continue to see stable or increasing mule deer numbers.

The late summer whitetail fawn ratios in our major whitetail units (PMU 13) improved significantly for the 2004 summer with 68 fawns per 100. There was no change in the whitetail pre-season buck ratio, which remained at 31 bucks per 100 does in 2004 (Table 4, PMU 13).

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

PMU	*Year*	August		September	
		Sample Size	Bucks per 100 Does	Sample Size	Fawns per 100 Does
11	2000	207	38	99	74
	2001	241	35	311	50
	2002	190	35	328	63
	2003	113	47	228	69
	2004	47	42	207	74
13	2000	1033	30	803	65
	2001	1185	29	720	57
	2002	955	22	779	55
	2003	1064	31	927	51
	2004	1244	31	925	68

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
2004	30:100	61:100	502

Disease and Predators

WDFW continues to test harvested deer statewide for Chronic Wasting Disease (CWD); and many deer have been included in the sample from throughout northeast Washington. No deer have tested positive for CWD through 2004.

Cougar populations in northeast Washington were exceptionally high in the middle to late 1990's but hunter harvests and special hound hunting opportunity to reduce populations for protection of property and human safety 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 slow 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.

Mule deer populations have increased. 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. White-tailed Deer Control (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 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+
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%
2004	38	67%	85	36%	41%	17%	17%

Management conclusions

Mule deer populations continue to improve. The mule deer buck harvest has increased in the Colville District by 85% from 2001 to 2004 (343 to 634 bucks for GMU's 101-124) and by 77% just within GMU 101 (190 to 336 bucks). During the same period, the percentage of 4 point or better mule deer bucks has increased steadily from 45% to 61% for GMU 101 (Table 1).

There was basically no change (down 1%) in the 2004 whitetail buck harvest in the primary whitetail units (PMU 13). 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 steadily increased in PMU 13 from 10% in 1999 to 17% for 2004 (Figure 4). Another possible indication of less harvest pressure on the buck population is the decline in the percentage of yearlings checked from 47% to 41%. The ratio of antlerless to antlered whitetails killed has increased from 36:100 in 2002 to 47:100 in 2004 for the Colville District. There was an 8% increase in the total antlerless whitetail kill for the district from 2003 to 2004. The sample of does field-checked was small (*n*=24) but the percentage of yearlings dropped from 36% in 2003 to 27% in 2004. This suggests a much lower harvest rate on does than bucks, at 41% yearlings.

The improved whitetail fawn ratio in 2004 (68:100) should mean more deer available for the 2005 hunting season. Winter losses were minimal. The 2004 winter was exceptionally mild even though there was considerable snow depth early in the winter. The snow fell as dry powder and much of it melted by mid-winter. The weather remained dry and mild from February into spring.

DEER STATUS AND TREND REPORT 2005: 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 landowner tolerance 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) and to maintain healthy buck:doe:fawn ratios while minimizing agricultural damage from deer.

Hunting Seasons

The Game Management Units (GMUs) 127 through 142 make up 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 white-tailed deer harvested in PMU 14 and slightly more mule deer harvested in PMU 15.

A 3-point minimum regulation on antlered white-tailed and mule deer applies to modern firearm, archery and muzzleloader hunters in PMUs 14 and 15. Antlerless opportunity is offered to all user groups in varied GMUs.

WDFW offers a nine-day modern firearm season (October 16-24) for mule deer and white-tailed deer, and a twelve-day late white-tailed buck hunt (November 8-19), as well as permit opportunities.

Archers are offered both early and late hunting seasons. Archery hunts for mule deer run September 1-30 in GMU 127 with a 3-point minimum, in GMU 142 with 3-point minimum or antlerless. GMUs 130-139 have a 3-point minimum September 1-15, and a 3-point minimum or antlerless from September 16-30. For white-tailed deer, the season extends from September 1st to the 30th under a 3- point minimum or antlerless regulation. A late archery season is open in GMU 127, and hunters can take mule deer, white-tailed 3-point minimum or antlerless deer.

Muzzleloader hunts are offered in GMUs 133 and 142 in the early season (Oct. 2 – 8), and GMUs 130 and 139 in the late season (Nov. 20-Dec. 8).

Harvest trends

Harvest trends for PMUs 14 and 15 show slightly different patterns over the past four years. Harvest in PMU 14 has increased every year since 2001, while harvest in PMU 15 peaked in 2002 and declined in 2003 and 2004. (Table 1). Hunter numbers declined from 1996 to 2000, but have been increasing slightly from 2001 to 2004 (Table 2).

Hunter success rates for each GMU vary over time (Table 3). In 2001 GMU 142 had the highest hunter success rate, but by 2004 it had the lowest in both PMU 14 and 15. Because the number of hunters in GMU 142 was increasing during the same time period, the decline in success is attributed to a decline in the number of available deer.

Harvest of white-tailed bucks has increased since the implementation of the November late buck hunt. Harvest data show a trend of increased hunter take during the past four years in PMU 14. Using an average of the previous 3 years buck harvest in 2004 was higher in PMU 14 and lower in PMU 15. In 2004 hunter success was lower than most previous years in all GMUs (Table and 3).

When deer population trends are increasing and deer are shown to be impacting commercial agricultural operations, harvest pressure is increased on the antlerless segment of the population through youth/senior/disabled/AHE seasons, antlerless permits and second deer tags.

Surveys

Deer in PMU 14 and 15 have been surveyed by both ground and aerial methods. Recently, available resources have impacted WDFW's ability to conduct some surveys. 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 of doe to fawn ratios and thus, productivity for the year. Bucks are often difficult to survey because of their nocturnal behavior and the hunting pressure of the late buck seasons. As a result, the post-season buck:doe ratio figure is probably a conservative measure of composition when available.

Pre-season white-tailed deer ratios in 2004 averaged 23 bucks: 100 does: 82 fawns, a decrease for bucks and fawns compared to 2002 (Tables 4 and 5). Pre-season mule deer ratios in 2004 declined from 2003 to 29 bucks: 100 does, however, fawns numbers increased slightly from 54 to 58 fawns:100 does. Post-season aerial surveys were not conducted during 2003 due to budget constraints. Pre-season surveys were conducted during August and September 2003.

Population status and trend analysis

Populations of both species are stable under our current management strategies. 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 PMUs 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 and central Adams County. The cumulative effects of several years of drought may also be contributing to seasonal impacts by reducing habitat quality.

Habitat quality and quantity remain relatively constant throughout PMUs 14 and 15. Conversion of natural habitats to agriculture occurred in past decades, but represent minor changes today. Gains have been made in deer habitat with enrollment of agricultural acres into the Conservation Reserve Programs. Habitat loss do to development continues to occur in GMU 127 with the redistribution of urban populations outward into rural settings. Current habitat conditions support existing populations, however, an extended drought in these PMUs have resulted in increase stress, reduced productivity and possibly, increased mortality across sex and age classes. Another year of EHD/Bluetongue mortalities in GMUs 127, 130 and 139 in 2004 caused decreased local white-tailed deer numbers. As with previous outbreaks of the disease in District 2, drought conditions were coincident with white-tailed deer mortality. There are some indications of mule deer moving into the areas which were formerly primarily occupied by white-tailed deer but had high white-tailed EHD mortalities. If resources permit, it would valuable to conduct intensive surveys in these 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 the 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, however, due to the vulnerability of bucks to harvest in the open habitat of GMUs 127-142, close monitoring of 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 overharvest.

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 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 impacts in 1998, 1999, 2003 and 2004 in both PMU 14 and 15, it will be necessary to monitor the white-tailed deer populations in this area carefully. Because of landowner requests and the productivity of these herds, 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.

Table 1. Antlered and antlerless harvest in PMU 14 and 15.

	PMU 14		PMU 15	
Year	Antlered	Antlerless	Antlered	Antlerless
1996	1098	520	1162	497
1997	1438	155	2106	169
1998	962	229	1048	185
1999	1228	347	1432	209
2000	1561	472	1774	346
2001	1195	295	1543	358
2002	1391	252	1639	344
2003	1395	383	1451	501
2004	1493	386	1371	467

Table 2. Comparison of hunter numbers by year by GMU.

		Game Management Unit					
	Year	127	130	133	136	139	142
No. of Hunters	1996	1696	1864	3614	1804	3470	2718
	1997	2202	2531	3593	2376	3645	2537
	1998	1693	2727	3093	2412	2598	1860
	1999	2337	2664	3460	2670	2671	2064
	2000	2234	3189	3290	2272	3146	2227
	2001	1717	1785	2049	1192	2054	2135
	2002	1679	2099	2199	1256	2230	2584
	2003	1635	2069	2228	1207	2201	2482
	2004	1850	2208	2595	1399	2358	2738

Table 3. Percent hunter success by GMU.

	Game Management Unit					
	127	130	133	136	139	142
1996	15	21	27	20	20	22
1997	23	21	21	20	29	39
1998	17	13	17	14	18	22
1999	18	17	20	14	24	30
2000	29	18	24	15	31	36
2001	28	29	24	28	35	39
2002	30	28	26	33	32	33
2003	37	32	35	30	37	34
2004	29	28	27	30	30	26

Table 4. Deer surveys results, Central District, PMUs 14 and 15.

		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	*	*	*
	2004	57	119	115	*	*	*
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	*	*	*
	2004	54	231	189	*	*	*

* No post-season survey.

Table 5. Deer sex and age composition ratios for 1999, 2002, 2003 and 2004.

		(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	*
	2004	29:100:58	*
White-tailed Deer	1999	44:100:87	16:100:122
	2002	24:100:50	*
	2003	36:100:87	*
	2004	23:100:82	*

* 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

The mule deer (*Odocoileus hemionus*) population has declined slightly along the breaks of the Snake River, due to lower fawn production/survival, and antlerless harvest levels. Mule deer populations in the mountains are still depressed. White-tailed deer populations have also decreased slightly, due to EHD outbreaks and antlerless harvest. Another EHD outbreak occurred in August-Sept. of 2004, resulting in significant mortality of white-tailed deer in areas along the Tucannon and Walla Walla rivers.

Hunting seasons and harvest trends

The general buck season 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) prior to the regulation. Mandatory hunter reporting replaced the Hunter Questionnaire for determining the deer harvest in 2001, which should improve the accuracy of harvest data. From 1994-03 the District-3 buck harvest averaged 2,328 bucks/year, and compares favorably with the 1985-89 (pre three-point) average of 2,340 bucks/year. The 2004, harvest of 1994 bucks was 14% below the 1994-2003 average (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 fluctuated between 8,695 and 10,082. Modern firearm (MF) hunters harvested 2,758 deer in 2004; 1,811 bucks and 947 antlerless deer. Over the last 3 years, 47% of the modern firearm mule deer buck harvest was four point or larger. General season MF hunters had a success rate of 23%.

Muzzleloader (ML) 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 2004 that number increased to 684 hunters. The muzzleloader deer harvest increased from 41 deer in 2000, to 257 deer in 2004. Muzzleloader hunters harvested 114 bucks and 143 antlerless deer in 2004. Over the last 3 years, 54% of the muzzleloader mule deer buck harvest consisted of bucks 4 point or larger. Muzzleloaders have enjoyed the highest success rate of all user groups over the last five years, averaging 37% for the general seasons.

Archery hunter numbers are fairly stable, averaging 993 hunters over the last five years, with 1,090 participating in 2004. From 2000-2004, archers harvested an average of 224 deer per year in the Blue Mtns, with an average success rate of 23%. In 2004, archery hunters harvested 219 deer, 69 bucks and 150 antlerless deer. Over the last 3 years, the archery mule deer buck harvest has consisted of 53% 4 point or larger.

General primitive weapons seasons occur before the modern firearm general season, which is an obvious advantage for harvesting larger mule deer bucks. In addition, archery hunters are allowed to hunt mule deer bucks during the late season (rut). Based on antler point data from the last 3 years, the mule deer buck harvest for primitive weapons averaged 54% 4 point or better, while MF hunters averaged 47%.

Species composition of the harvest changes little from year to year, with the 2004 buck harvest consisting of 59% mule deer and 41% 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. Over the past few years, hunting opportunity for antlerless white-tailed deer was increased in an effort to reduce and stabilize the population in specific units.

From 1994-2003, the antlerless harvest averaged 975 per year. A total of 2,500 general anterless permits along with 210 special late whitetail hunt permits were issued in 2004. The general season antlerless harvest consists of archery, muzzleloader, plus an antlerless white-tailed deer general season for Senior, disabled, and youth hunters.

The permit controlled harvest, and general season

antlerless harvests totaled 1,240 antlerless deer, which is 27% above the 1994-2003 average; 683 permit harvest, 557 general seasons. Antlerless deer were harvested at a rate of 62 antlerless per 100 bucks. The harvest on antlerless white-tailed deer has increased, with 98 antlerless deer harvested per 100 bucks. The overall success rate for antlerless permits was 46%, with general permits (any antlerless deer) averaging 54%, and "whitetail only" permit success averaging 35%. Approximately 29% of the antlerless permit holders did not hunt.

Surveys

Both aerial and ground surveys are used to determine pre- and post-season herd composition. Pre-hunt surveys were conducted from the ground, and resulted in 638 mule deer classified.

Post-hunt surveys were conducted from the ground and air, with 2,363 mule deer classified (Table 3). December fawn to doe ratios ranged from 42-51 fawns/100 does and averaged 50 fawns/100 does. The buck to doe ratio increased slightly to 14 bucks/100 does, which is still below the minimum management objective listed in the Game Plan (15 bucks/100 does).

Late summer/fall drought over the last few years had a negative impact on fawn production and survival. Severe winter conditions in 2003-2004 were especially tough on mule deer populations in the lowland areas, where snow accumulated to 18 inches in early December and stayed on the ground until late January. In southeast Washington, snow rarely stays on the ground in the lowlands for more than a few days. Snow conditions combined with poor forage conditions contributed to increased fawn mortality.

Weather patterns improved in 2004 with adequate fall rains and mild winter conditions. Fawn survival improved significantly in 2004-2005.

Population Status and Trend

Mule deer populations in the lowlands and along the Snake River have declined, but are still at good levels.

The white-tailed deer population is doing well in the foothills, but an EHD outbreak in 2004 reduced the population in localized areas along the Tucannon and Walla Walla rivers.

Lower fawn survival over the last few years, combined with increased hunting opportunity has resulted in lower post-season buck to doe ratios that are below management objectives. Lower fawn production and survival over several years is a significant factor contributing to lower post-season buck ratios, because a high percentage (70%) of the bucks surviving the hunting season are yearlings. However, increased hunting opportunity also has a negative impact on buck survival. Post-hunt mule deer buck ratios in 2004 increased slightly (Table 3) to 14 bucks/100 does, but is still below the minimum management objective listed in the Game Management Plan. The average post-hunt buck ratio for mule deer averaged 13 bucks/100 does between 2002-2004, compared to 25 bucks/100 does in 2000 and 2001. 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 19 bucks/100 does since 1992 and appear to be stable.

Habitat Condition And Trend

Summer-fall drought has occurred during three consecutive years (2001-2003), and had a negative impact on the mule deer population. Weather patterns in 2004 were better, with adequate fall green-up and mild winter conditions. 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 factor in maintaining deer populations in the farmland into the future.

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 have declined. Mule deer populations in the mountains are considerably below management objective, but are improving slowly.

Fall drought over a three-year (2001-2003) period resulted in lower fawn production and survival for mule deer in the arid lowlands and along the breaks of the Snake River. Fawn production/survival improved in 2004.

The quality of bucks harvested under the three-point program has improved, compared to the era when hunters could harvest "any buck". Since 1992, the percentage of mule deer bucks harvested with four or more antler points averaged 50%. The white-tailed buck harvest has averaged 20% five point or better. Public support for the three-point regulation is excellent, due to the quality of the bucks harvested, and good hunter success rates.

A combination of conditions, such as lower fawn production/survival caused by drought, and stable harvest has likely resulted in reduced overall buck survival and lower post-season buck ratios for mule deer.

Improving fawn production and survival in 2004 and 2005 should increase the number of yearling bucks in the mule deer population, which should also improve post-season buck to doe ratios. However, harvest will need to be managed carefully to increase buck survival to management objective.

If the post-season mule deer buck ratio remains below the minimum management objective in 2005-2006, adjustments in hunting season length may be necessary to increase buck survival and bring post-season buck to doe ratios into compliance with the management objectives listed in the Game Management Plan.

Table 1. Deer harvest summary, 1990-2004, Blue Mtns.

Year	Antlered	Antlerless	Total	Mule deer % ≥ 4 point*	Antlerless deer:100 Antlered
1990	1209	771	1980	34%	64
1991	1317	1088	2405	38%	64
1992	1588	875	2463	47%	55
1993	2012	766	2778	50%	38
1994	2231	1252	3483	46%	56
1995	1451	930	2381	43%	64
1996	2332	816	3148	52%	35
1997	2418	768	3186	51%	32
1998	2366	591	2957	54%	25
1999	2484	791	3275	53%	32
2000	2750	827	3577	50%	30
2001	2399	1127	3526	50%	47
2002	2599	1150	3749	47%	44
2003	2254	1497	3751	50%	66
2004	1994	1240	3233	48%	62

Note: % ≥ 4 point calculated from harvest under 3 point regulation.

Table 2. Late Whitetail Permit Hunt Summary, Modern Firearm & Muzzleloader, Blue Mtns. WA.

Year	No. Permits	Bucks	Does	Total	Hunter Succ.	%Harvest ≥ 5 pt.*
1991	120	48	22	70	68%	24%
1992	140	62	24	86	58%	18%
1993	140	66	22	88	69%	22%
1994	200	68	49	117	69%	18%
1995	200	74	18	92	56%	16%
1996	200	74	14	88	56%	21%
1997	220	79	17	96	66%	24%
1998	175	57	14	71	63%	20%
1999	175	62	10	72	59%	20%
2000	260	82	26	108	68%	17%
2001	210	76	10	86	56%	18%
2002	210	82	11	93	59%	17%
2003	210	93	13	106	57%	17%
2004	210	69	16	85	52%	22%

Table 3. Post-hunt mule deer surveys 1989-04, Blue Mtns., Washington

	Bucks					Per 100 Does
Year	Ad.	Yearl.	Doe	Fawn	Total	F:100:B
1989	6	23	790	234	1053	30:100:4
1990	15	111	1358	544	2028	40:100:9
1991	17	133	943	455	1548	48:100:16
1992	40	153	1231	431	1868	35:100:17
1993	45	119	995	559	1718	56:100:17
1994	20	163	879	381	1443	43:100:21
1995	43	69	693	264	1069	38:100:16
1996	51	85	993	697	1826	70:100:14
1997	47	157	822	489	1515	60:100:25
1998	81	117	705	460	1363	65:100:28
1999	72	180	1316	796	2364	61:100:19
2000	8	20	98	52	178	53:100:29
2001	71	109	876	471	1529	53:100:21
2002	77	158	1651	581	2465	35:100:14
2003	34	70	979	467	1550	48:100:11
2004	85	112	1440	719	2363	50:100:14

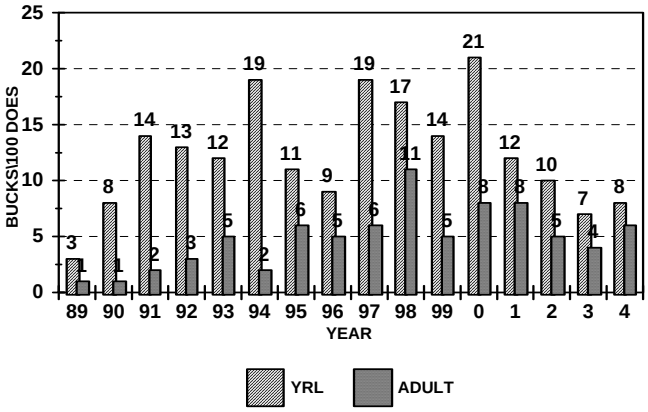

Figure 2. Post-hunt Mule Deer Buck/Doe Ratio.

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 14-day general modern firearm season continued in 2004, closing on October 29, the latest ending date in many years. "Any-deer" permits for youth, disabled, and senior permits continued, but permit numbers were reduced in an attempt to boost fawn production following a severe drought year. Hunter numbers increased somewhat in the Okanogan District in 2004, 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.

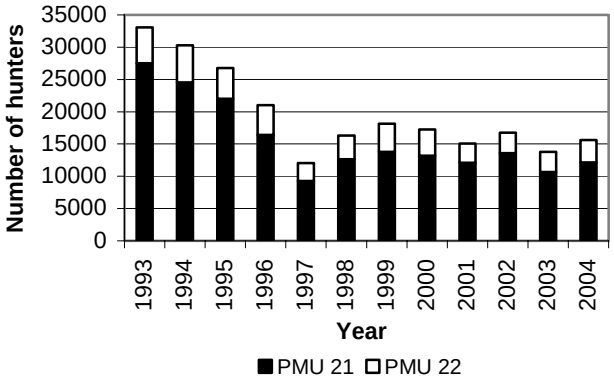

Figure 1. Trend in number of hunters, PMUs 21-22, 1993-2003.

As a result, harvest and hunter success continued to improv in 2004 reaching a 10-year high (Figures 2 & 3), despite reductions in youth/senior/disabled permits. Antlerless harvest remained modest at 418 animals.

WDFW Check station personnel surveyed 1,093 hunters and examined 77 deer in 2004 (Table 1). Staff collected samples to test for chronic wasting disease and DNA samples from carcasses when possible.

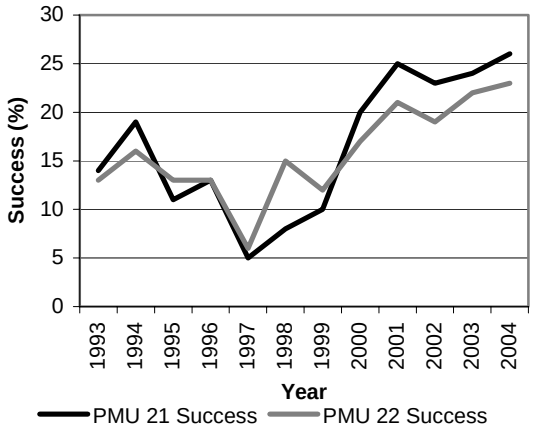

Figure 2. Success in PMUs 21 & 22, 1993-2004.

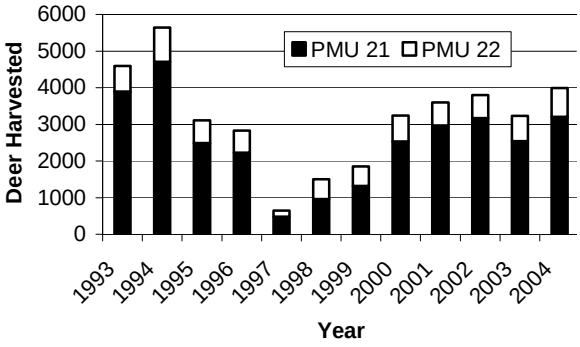

Figure 3. Harvest in PMUs 21 & 22, 1993-2003.

Tribal input

Harvest 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).

Table 1. Chewuch Check Station Results.

	Deer Type				
Year	Bucks	Antlerless	Total	Hunters	%Success
1993	48	--	147	2,410	6
1994	--	--	160	1,994	8
1995	--	--	36	1,388	3
1996	24	0	75	1,247	6
1997	3	0	5	729	1
1998	30	0	33	980	3
1999	48	0	53	1,414	4
2000	69	0	72	1,250	6
2001	106	39	133	1,314	10
2002	54	45	99	1,265	8
2003	71	6	77	840	9
2004	72	5	77	1,093	7

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 or 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 over 4,000 mule deer during helicopter surveys in PMU 21 in early December 2004 (Table 2). The counts yielded overall buck:doe and fawn:doe ratios of 14:100 and 80:100 respectively. Ratios show a small rebound in productivity (Table 3), attributable to improved summer forage as drought conditions eased. Conversely, buck ratios continue to fall and are now below management minimums. Further declines are expected this season with the continuation of the 14-day season. Significant season setting changes will likely be needed for the upcoming 3-year package to comply with Game Management Plan objectives.

Table 2. Post-season population composition counts from 2004, by area. F:100:B is fawns and bucks per 100 does.

	Bucks					
Area	≥3 pt	<3 pt	Doe	Fawn	Total	F:100:B
Methow	76	148	1614	1356	3194	84:100:14
Okanogan	19	43	472	320	854	68:100:13
Total	95	191	2086	1676	4048	80:100:14

During hiking surveys in late March and early April 2005, biologists classified 2,365 mule deer in PMU 21 (Table 4) and observed a fawn:adult ratio of 44:100. This improvement in recruitment mirrors the observed improvement in productivity (Table 5).

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 not longer available, and no recent reliable population estimates have been calculated.

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.

	Buck Antler Class						
Year	≥3 pt	<3 pt	Subt	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
2004	95	191	286	2086	1676	4048	80:11:14

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. An overall gradual decline in mule deer numbers is evident. For roughly the last 20 years, 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 than white-tailed deer. In reality, it is likely that mortality for mule deer can be partitioned to additive components and compensatory components depending upon winter mortality and other mortality factors. 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.

Table 4. Spring population composition counts from 2005, by area for PMU 21. F:100A is fawns per 100 adults.

Area	Adult	Fawn	Total	F:100A
Methow	1354	618	1972	46:100
Oka	289	104	393	36:100
Total	1643	722	2365	44:100

Several years ago, qualitative observations from land managers, biologists, and long time residents, as well as harvest figures, suggested 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 eight 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. Survey and harvest data from the last few years indicates fawn production and recruitment may have plateaued, suggesting the herd may be at or near carrying capacity.

Unlike mule deer, white-tailed 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 had not been 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.

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 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; however, recently ratios have again declined below the management minimum, likely in response to the lengthened general hunting season.

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
2005	1643	722	2365	44:100

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 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, particularly in the Methow Valley, where development pressure is extreme.

In recent years, wild fires burned over 150,000 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, domestic livestock 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, coupled with reduced tolerance for deer damage 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 and successful biological controls.

Like weeds, the threat from development pressure remains is intense and still accelerating, constantly consuming and fragmenting existing tracts of winter range. This problem is county-wide 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, particularly as land prices escalate. More aggressive growth management planning is needed if critical private lands are going to continue to play an important role in deer conservation.

After years of more aggressive road management that benefited deer and other wildlife, new developments may reverse this positive trend. The USFS is receiving considerable pressure to expand off-highway vehicle opportunities, which could potentially increase the amount and distribution of motorized use on the Forest. In addition, the status of existing USFS roadless areas is being revisited nationally, which could potentially result in reduced roadless acreage locally. Increases in motorized use and roaded forest land would result in some habitat loss and degradation, and would likely increase illegal harvest and disturbance of deer.

Summer forage quantity and quality has improved with the easing of drought conditions the last two summers, and deer productivity and recruitment have shown improvement accordingly. Improving population parameters have also been aided by mild winters.

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 several years ago after a series of severe winters, but have now rebounded nicely, fueled initially by high productivity and recruitment, and aided by conservative hunting seasons. Most recently, herd growth has reached a plateau, suggesting the herd may be reaching carrying capacity. More aggressive antlerless harvest may be needed to maximize productivity and minimize overuse of seasonal ranges. Even so, a gradual long-term population decline will likely continue if chronic reductions in habitat quantity and quality are not stopped.

The recent extension of the general hunting season and corresponding later closure date has pushed buck:doe ratios below the management minimum of 15:100. The percentage of bucks that are $\geq$ 3-point in post-season surveys is also declining. Reductions in buck harvest, beyond what can be achieved with changes in permits, will be needed to improve escapement and meet Game Management Plan guidelines. Also, goals for post-hunt buck age ratios need to be identified and defined.

White-tailed 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 harvest on private lands, where white-tailed deer tend to concentrate.

DEER STATUS AND TREND REPORT: REGION 2
PMU 21 – GMU 243
PMU 23 – GMUs 248, 254, 260, 262, 266, 269
PMU 26 – GMUs 244, 245, 246, 247, 249, 250, 251

Beau Patterson, District Wildlife Biologist
Tom McCall, Wildlife Biologist

Population objectives and guidelines

The vast majority of deer in the Wenatchee District are mule deer, although there are a few whitetails. Management objectives for Population Management Unit (PMU) 23, Douglas, are to maintain the mule deer population within social tolerances and the post-hunting season minimum objective of 15 bucks:100 does. Management objectives for PMU 26, Chelan, are to maintain deer populations in balance with winter forage, limit conflicts with agriculture, and maintain the post-season minimum objective of 15 bucks:100 does. Composition surveys, harvest and population modeling, and end of winter browse observations are used to monitor population progress toward objectives. One GMU in the district, 243, is a part of the Methow PMU. This GMU lost most winter-range shrub habitat to wildfire in 2001 and 2002; deer numbers are expected to remain low until habitat recovers.

Hunting seasons and harvest trends

The 2004 deer hunting seasons were comparable to 2003, but still very conservative compared to seasons prior to 1997. All general seasons are restricted to the harvest of 3-point minimum bucks. In addition, there were any deer permit harvest opportunities in several GMUs for youth, senior and disabled hunters. Deer season began with September early archery. The modern firearm and muzzleloader high buck season ran from September 15-25 in a portion of GMU 243 and in GMUs 244 and 249. Early muzzleloader season was open in six GMUs for seven days in early October. The early modern firearm season was open 9 days in October in the Douglas GMUs, and 14 days in Chelan County GMUs. Early archery hunting was open in September for 30 days in most GMUs, and late archery hunting was open in 2 GMUs in late November and early December, a reduction from 3 GMUs in 2003. There were no general late muzzleloader or modern firearms seasons.

Limited-entry, special permit hunting was offered for all user groups. One hundred eighty-five November modern firearms any buck permits were offered in six GMUs, thirty-five December muzzleloader any buck permits in two GMUs, and 330 November-December archery any buck permits in three GMUs (310 of which replaced the general archery season in GMU 247). One hundred twenty-five antlerless permits were issued in GMU 251, in addition to 115 any deer permits for youth, senior and disabled hunters, during the general season timeframe. Three hundred seventy-five antlerless modern firearms permits and 200 muzzleloader antlerless permits were offered in Douglas County (compared with 700 antlerless modern firearms permits and 300 muzzleloader antlerless permits in 2003); however muzzleloader antlerless opportunity was under subscribed and only 189 permits were issued. In addition, 230 any deer permits were issued in Douglas County GMUs for youth, senior and disabled hunters.

District-wide, buck harvest reached at least a 7-year low in 1997, and has increased each season since. Buck harvest for the Chelan PMU in 1997 was the lowest on record (Fig. 1), and has since increased annually. The reduction in harvest was caused by the following factors: severe winter of 1996, Tyee and Dinkelman fires (affected PMU 26), short modern-firearm hunting season, and 3-point minimum regulation. Conservative hunting seasons have been maintained since 1997. Harvest in the Chelan PMU has steadily increased since 1997; Douglas PMU harvest has been more variable during this same timeframe.

The deer population in Chelan County is predominantly migratory (89% based on a radio-collared sample of does), and is typically widely dispersed during the modern firearm season in mid-October. Forty-three percent of the bucks observed in Chelan County during post-hunt surveys in 2004 were legal (3 point +) bucks, equal to 2003 but below the 52% legal bucks observed in 2002. While it appears harvest rates on legal bucks are increasing, this is still a high rate of legal buck escapement, suggesting relatively low harvest rates. Chelan PMU buck harvest has increased dramatically; the 2004 harvest of 1,217 bucks is a 491% increase from the low harvest of 248 bucks in 1997.

The Douglas PMU harvest decreased dramatically from 1996 to 1997, but increased through 2002. Harvest increased every year from 486 in 1997, to 1,348 in 2002, and has since declined. Total Douglas PMU harvest in 2004 was 967 deer, comprised of 721 bucks and 246 antlerless deer. While some of this decrease is likely due to reduced participation and changing from general to permit only youth, senior and disabled hunting, it appears deer numbers have also decreased, as have landowner complaints. Antlerless harvest opportunities were therefore reduced for 2004.

All Chelan PMU data support an increasing trend. From 1997 to 2004, the Chelan buck kill nearly quintupled (248 to 1,217). Chelan's buck harvest in 2004 increased 26% from 2003, but is still only 55% of the 1992 harvest of 2,206 bucks (Figure 1). The 1992 buck harvest level may not be attained with the 3-point restriction, even when populations recover to the 1992 level.

The number of deer hunters in the Wenatchee District declined dramatically from 21,082 in 1992, to 6,438 in 2001. General season hunter numbers in 2004 were 8,881, a 12% increase from 2003 (Figure 2). Hunter numbers declined in the Douglas PMU, and increased in the Chelan PMU. These trends are expected to continue in 2005.

Vehicles kill a large number of deer each year in the Wenatchee District, based on data collected by the Department of Transportation. More deer are killed in Chelan County than Douglas County because the mountainous terrain forces migratory deer to lower elevations in the winter to avoid deep snow. Deer kill peaks in winters with deep snow accumulation at lower elevations.

Surveys

Both helicopter and ground surveys are used to monitor population composition. December surveys are done after deer have begun concentrating on winter range but before most antlers are dropped. These surveys are used to monitor post-hunt buck and fawn ratios relative to does. Ground surveys are conducted during the month of March, after most winter weather but before dispersal, to monitor fawn:adult ratios as an index to survival.

In the Douglas PMU, observed postseason ratios were 15 bucks and 74 fawns per 100 does (n=821). In the Chelan PMU, observed postseason ratios were 27 bucks and 83 fawns per 100 does (n=1,506). Adult (age 2+) bucks comprised 40% of Douglas bucks and 58% of Chelan bucks, while yearling (age 1+) bucks comprised 60% and 42% of observed bucks in Douglas and Chelan respectively. Pooled spring fawn:adult ratios of 69:100 (n=1,241) indicate extremely high fawn survival during the 2004-2005 winter.

Population status and trend analysis

Deer population status is quite different between the two PMUs that make up the Wenatchee District. The deer population in the Douglas PMU was reduced by the severe winter of 1996-97. However, winter conditions for these deer have been mild since this time, and the population quickly recovered. In addition, there have been significant habitat enhancements associated with the Conservation Reserve Program that have been beneficial for deer. Seasons from 2001-2003 were designed to reduce deer, and this objective appears to have been met. As a result, 2004 seasons were more conservative, with reduced harvest opportunities for antlerless deer. In

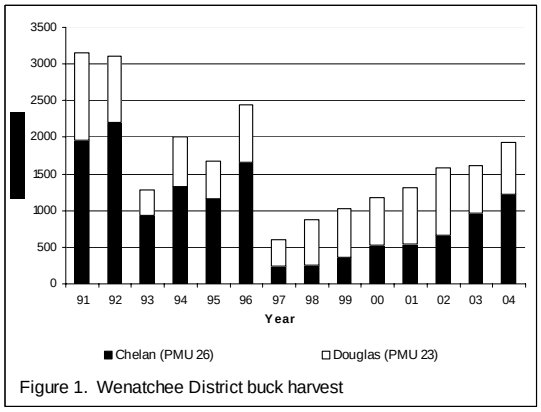

Figure 1. Wenatchee District buck harvest

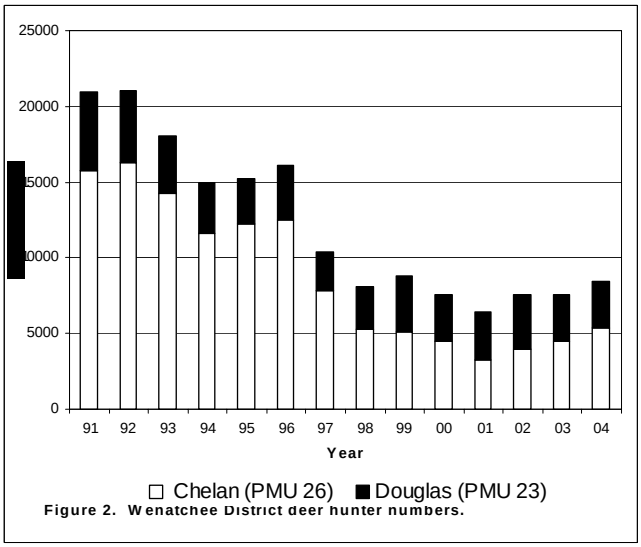

Figure 2. Wenatchee District deer hunter numbers.

the Chelan PMU, conservative seasons since 1997 have allowed this population to steadily increase.

In Douglas and Chelan PMUs, there was little harvest of antlerless animals from 1997 to 2000 (range 0-40). The average yearly antlerless harvest from 1992 to 1996 was 233 in Douglas and 441 in Chelan. The 2002 antlerless harvest in Douglas, 426, is the highest in at least 11 years; the 2004 antlerless harvest was near the 1992-1996 average. Antlerless harvest in 2004 was reduced to 246 in the Douglas PMU, through reduction of antlerless opportunity permits. Antlerless deer harvest in Chelan is still extremely restricted; 47 antlerless deer were harvested in 2004.

The Chelan PMU was severely impacted by the 1994 Tyee fire, which severely burned a large portion of the winter range, greatly reducing browse. In addition, the winter of 1996-97 was severe. As a result of lost habitat and winter weather, the deer population within the Chelan PMU declined, but is now increasing rapidly, based on the increase in the number of bucks harvested, increasing postseason buck:doe ratios, and high mature buck representation postseason despite increasing harvest. Informal observations of winter range shrub conditions suggest deer use of available forage is rapidly increasing, and population growth rate will likely slow as winter habitat carrying capacity is approached. Antlerless deer harvest should be significantly increased, to slow population growth, protect winter range, and provide more harvest opportunity. The Chelan PMU has a deserved reputation for producing large numbers of mature bucks, and many hunters express interest in maintaining the high quality of bucks in this PMU.

Buck post-season composition data suggest hunting pressure is truncating the buck age structure in the Douglas PMU. Although hunting pressure is reduced in some locations due to the predominance of private lands, low numbers of 3+ aged bucks post-season suggest hunters are able to kill the majority of larger bucks in the PMU due to high visibility and ease of physical access to most areas. By contrast, the high proportion of older-aged bucks in the Chelan PMU support perceptions that many deer are unavailable for harvest under the current, early modern firearms general season structure.

POP-II (Fossil Creek Software, v. 1.2.11) models have been created for both the Chelan and Douglas PMUs. The Chelan model simulation aligns well with observed data and is considered a reliable indicator of trend. Model simulations indicate this herd nearly quadrupled between spring 1998 and spring 2005. Historically, the Chelan PMU has supported much higher hunter numbers and harvest, and there is potential for some additional future herd growth without negatively impacting habitat. The Douglas model aligns less precisely, indicating further modeling and/or data needs, and is interpreted cautiously; however, the simulation supports harvest trends and field observations that suggest rapid recovery following 1997, and a slight decrease from 2001 to 2003.

Habitat condition and trend

Wildfires have negatively impacted deer winter range in Chelan County for several years since 1994, but in some areas deer are now benefiting due to increased quantity and quality of forage. However, shrub recovery has been slow in some winter ranges. The Manson GMU in particular has been severely impacted by the 2000 Rex Creek fire and 2001 Deer Point fire, which collectively consumed over 100,000 acres and have severely reduced winter browse. This herd segment is likely to be depressed for several years until shrub browse recovers. The Douglas population is more dependent upon agricultural crops (especially alfalfa and wheat) during winter than the Chelan population.

The human population is increasing by nearly 2 % per year within the Wenatchee District. Residential and orchard development associated with this population growth continue to reduce winter range throughout the district. In 1967, Chelan County supported a harvest of 5,180 deer; it is unlikely the deer population will ever again sustain this level of harvest.

Management conclusions

Buck age structure in the Chelan PMU will require close monitoring in the future to avoid dramatically reducing buck numbers and age structure. We can probably meet buck escapement goals under the current season structure in Chelan without the 3-point regulation, because in most years many of the bucks do not move down to lower elevations where they are vulnerable to harvest until after the general modern firearms hunting season. However, the 3-point restriction is very popular with a large segment of the public, and is often credited for the large numbers of older, mature bucks seen on winter ranges. Consistent retention of this regulation for mule deer may also improve compliance with hunting regulations. It will be necessary to phase in increased antlerless hunting opportunities as well. However, this population can be

strongly regulated by winter conditions, and is susceptible to weather-related declines.

There is considerable sportsman interest in managing the Chelan PMU for trophy quality. Consideration should be given to managing this population for a minimum postseason escapement of 25-35 bucks:100 does.

With the more open habitat conditions in Douglas, the 3-point regulation is working well and has increased buck escapement. Prior to the implementation of the 3-point restriction in Douglas, buck escapement was low, estimated between 6-10 bucks:100 does. There are, however, concerns about the long-term ramifications of poor recruitment of older age bucks, as it appears most bucks are still being harvested by 3.5 years of age. Due to the open nature of this PMU, it is unlikely that age structure truncation can be avoided under general modern firearms season structure.

Model simulations of the Douglas PMU have been hampered by insufficient, inconsistently collected postseason composition data. Additional helicopter composition survey resources would help address this shortcoming; currently, limited resources are prioritized in favor of the Chelan PMU, due to the majority of public land in this PMU and resulting unrestricted public access. Additionally, interchange between the Douglas population and the population to the south, PMU 25 (primarily in GMU 272), may be so extensive that PMU 23 does not function as a closed population. If additional, consistent efforts to classify deer in PMU 23 do not result in improved alignment of simulations with observed data, a marking study may be necessary to quantify interchange between these PMUs.

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 2004 (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 20 permits (Nov. 16-30).

All units except 290 had a nine-day general modern firearm buck season in 2004 (Oct. 16-24). In GMU 290, 15 permits were issued for a 15-day modern firearm any deer hunt (Nov. 1-15).

In 2004, 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. 2-8) 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 2004. A total of 350 permits for anterless only and buck or anterless were available in 2004.

Special seasons and regulations were in effect in PLWMA 201 (contained in GMU 272). The deer hunting season for PLWMA 201 in 2004 was Sept. 1-Oct. 15 and Oct. 25-Dec. 31. Hunting was by permit only. There were 182 permits available.

In the 2004 season, 2411 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, increased by 5% in 2004 compared to 2003.

Hunting conditions during the 2004 general modern firearm season were not optimum. Rain during opening weekend likely reduced the number of hunters afield and their success.

Overall hunter success (all weapons) in the four GMUs combined was 30% and was slightly higher than that of 2003 and higher than the 10-year mean of 1994-2003 (Table 1). Highest hunter success (53 %) was in GMU 290, a limited-entry, permit-only area.

Buck harvest in the four units combined was 637 in 2004 and increased 7% from that of 2003 (593 bucks) and was higher than the 1993-2003 mean of 594 bucks (Table 1). Fifty-six percent of the buck harvest in the four units was from GMU 272, 38 % from GMU 284, 3 % from GMU 278, and 3 % from GMU 290.

In GMU 290, 13 of the 15 modern firearm any deer permittees reported harvesting 12 bucks. The five muzzleloader hunters harvested three bucks. Thirteen of the 20 archery permittees hunted in the GMU and reported harvesting one buck. Twenty of 50 anterless permittees hunted to harvest 11 deer.

Antlerless harvest in the four units has fluctuated annually, primarily as a result of the number of permits issued. The mean 10-year (1995-2004) harvest of antlerless deer in the four units combined was 162 (range, 42 to 256).

Archers harvested 46 deer in the four GMUs in 2004 for 6% of the total harvest. In 2004,

muzzleloader hunters accounted for 3 % of the deer harvest in the four GMUs.

The four Columbia Basin GMUs produced 10 % of the buck harvest in Region 2 in 2004. Hunter success in the four Columbia Basin GMUs was 30 % compared to 21 % 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 from late Oct. through early Jan.. In PLWMA 201 (an intensively managed cooperative of approximately 44,000 acres), no counts were made in 2004.

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 2004, the post-hunt survey was made by 35 volunteers. The 2004 post-hunt herd composition survey of GMU 284 was made from an airplane.

The 2004 post-hunt herd composition survey in GMU 284 was made on Jan. 10, 2005. A total of 778 mule deer were classified. The buck:doe:fawn ratio was 14:100:61 and 61% of the bucks observed were adults.

From late Oct. 2004 through early Jan. 2005, 706 mule deer were classified in that part of GMU 272 outside PLWMA 201 (Table 2). Post-hunt ratios were15 bucks and 48 fawns/100 does. Approximately 40 % of the bucks were judged to be adults. The buck:doe ratio increased considerably from that of 2003. The percent of adult bucks increased but the fawn:doe ratio decreased from that of 2003.

During the Dec. 11, 2004 post-hunt herd composition survey, 404 deer were classified in GMU 290 with 42 bucks and 44 fawns per 100 does (Table 3). There is no current estimate of herd size within the 250 square mile GMU 290.

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 increased substantially in 2004. The 1980 harvest was 112 bucks compared to the 2000 harvest of 416 bucks. In 2004, 358 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 2245 in 2004. 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. In 2004, the harvest dropped to 18 bucks.

Post-hunt buck ratio in GMU 272 in 2004 was 15 bucks per 100 does and just met the minimal objective of 15:100. The post-season buck ratio in GMU 284 was 14 bucks per 100 does in 2004 and was slightly below the minimal objective of 15:100. Post-hunt buck ratio in GMU 290 in 2004 was 42 bucks per 100 does and was well above the management goal of 30 bucks per 100 does.

Habitat condition and trend

The winter of 2004-05 was moderate in terms of temperature and the amount and duration of snow cover in all GMUs. Winter conditions in all GMUs likely 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 2004-05, these short-stature foods were available to deer most of the winter Although no formal surveys were made, winter mortality appeared to be very light in all GMUs.

Three major changes in habitat have occurred in the Columbia Basin in the last 20 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, and ornamental trees and shrubs. In recent years, some dryland wheat farmers in GMU 284 have complained that deer introduced weeds into their cropland.

Orchard tree damage and damage to alfalfa haystacks are the most serious types of damage to private property in the Columbia Basin, 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 especially 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 2004-05, 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. The post-hunt buck:doe ratio in GMU 272 and 284 has declined in the past few years to barely acceptable levels and adjustments to harvest may be needed.

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, 278, 284, and 290 from 1993-2004.

	Harvest			Hunter	
Year	Buck	Doe	Total	Success	Number
1993	373	169	542	0.23	2,389
1994	455	134	589	0.21	2,774
1995	296	114	410	0.19	2,173
1996	745	172	917	0.27	3,403
1997	629	189	818	0.24	3,477
1998	594	42	636	0.24	3,477
1999	616	219	835	0.24	3,965
2000	831	241	1,072	0.25	4,329
2001	686	256	942	0.30	3,160
2002	721	223	944	0.31	3,053
2003	593	77	670	0.29	2,289
2004	637	87	724	0.30	2,411

Table 2. Post-hunt mule deer herd composition in GMU 272 from 1993-2004.

				Total	Adult	Per 100 Does	
Year	Bucks	Does	Fawns	deer	Bucks (%)	Bucks	Fawns
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
2004	63	435	208	706	40	15	48

Table 3. Post-hunt mule deer surveys in GMU 290, 1995- 2004.

Year	Bucks	Does	Fawns	Total deer	Adult bucks (%)	per 100 Does	
						Bucks	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
2004	88	210	93	391	64	42	44

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 population goals for mule deer (Odocoileus hemionus) 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 buck escapement objective is ≥15 bucks 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 and 2004. 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 2004, but were still below the 10-year average and about 50% below the highs in the early 1990's. A severe winter in 1996-97 reduced deer numbers and a 3-point restriction was implemented. Deer populations have rebounded, but hunters have been slow to return. Success rates in other parts of eastern Washington have been much higher than in Region 3. The increase in 2003 and 2004 was probably also due to increased opportunity for all user groups.

Harvest has steadily increased since 1997 and was above the 10-year average, but below the harvest from 1970-1996 (Table 2). Hunter success has been above average the last 4 years. Antlerless harvest increased with more opportunity for all user groups.

Table 1. Number of deer hunters and success rate in Region 3, 1986-2004.

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
2004	11,677	1,069	4,024	16,770	13
'94-03 avg	14,057	394	3,799	18,216	9
'93-02 avg	15,444	411	4,095	19,950	8

Surveys

In December of 2004, portions of PMU 32 and 33 were surveyed via ground (Table 3). The purpose of the December surveys was to estimate fawn and buck ratios. Buck ratios were above objective in both PMUs. Fawn ratios were near or below desired levels. The survey results should be viewed with caution. The December survey area may not be representative of the population, especially the buck portion that is somewhat segregated from does and fawns. Positively identifying all the fawns and small spike bucks in a large group of deer can be difficult. The reported buck and possibly fawn ratios are probably minimal estimates due to these difficulties.

Aerial population surveys of PMU's 35 and 36 were conducted in April 2005 (Table 4). The surveys were only the second attempt to index population in the PMU's 35 and 36. Stratification of units was preliminary and

may need some refinement in years to come. The lack of snow and mild weather influenced the number of deer on the typical winter range.

Population status and trend analysis

Results of population surveys are given in Table 4. In 2005, estimates for PMU 35 were within the range seen in 2003 while fewer deer were seen in PMU 36. It is unlikely deer population have declined since 2003 in any PMU given the mild winters as surveys suggest. In spring 2005, deer were dispersed outside the normal survey area because of lack of snow. The temperatures were also unseasonably warm, causing deer to be in cover more than normal. In the highest density unit of PMU 36, there was a pack of dogs in the process of killing a calf elk. The dogs may have had a negative bias on the survey.

In the short-term, there will a learning curve on surveys in terms of stratification of units and morning .vs evening flights. The numbers generated are valuable as a base index.

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. All PMU's have buck ratios at or above the goal of 15 bucks per 100 does.

Habitat condition and trend

There is little data on the historic or current condition of the deer range. Fires probably negatively impacted woody browse during the 1980s. Cheat 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 given the bias in surveys. The current spring surveys are a good start, but will need to be refined. The spring surveys have given a good baseline for determining minimal populations and provide good justification for levels of antlerless harvest.

Fawn production fluctuates naturally, and little can be done to increase it given available resources. There are potential negative biases in the survey, especially if fawns exhibit good growth.

The current hunting season structure has helped increase buck ratios to the objective, but decreased harvest and the number of deer hunters participating. The hunters that have stayed in Region 3 are enjoying higher success rates than in recent years. There is probably additional opportunity that can be provided late in the season after deer have migrated toward winter range.

Table 2. Deer harvest by PMU in Region 3, 1970-2004.

	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
2004	633	157	540	200	155	40	148	59	140	69	1,616	525
10 yr avg.	505	59	471	55	160	15	148	31	135	15	1,419	175

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
2004	32	1095	42	16
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
2004	33	1050	46	20
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

Table 4. April Population Surveys

PMU	2003 Estimate	2004 Estimate	2005 Estimate	2003 Index	2004 Index	2005 Index
32	6315 ± 669	5462 ± 505	NA	2727	2726	NA
33	5049 ± 666	5067 ± 1065	NA	2564	2630	NA
35	1221 ± 133	NA	1191 ± 123	494	NA	522
36	1662 ± 94	NA	1482 ± 127	1376	NA	1019

DEER STATUS AND TREND REPORT: REGION 4
PMU 41- GMU 410
PMU 43- GMU 407
PMU 45- GMUs 418, 426, 437

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 at least 15 bucks:100 does.

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 Fraser River basin lower carrying capacity for deer in affected units. GMU 426 is a high elevation area situated well into the Cascade Mountain range. Extremely low human population, limited road access, and severe geography characterize this unit. This eastern-most unit differs 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 407-437.

The statewide total for deer hunters during the 2004 season was 146,411. This is an increase from the 133,832 hunters documented for the 2003 season in Washington State. The number of deer hunters in Region Four increased slightly from 2003 to 2004, but has declined 50 percent over the last 5 years from 15,962 hunters in 1999 to 8,065 hunters in 2004. The total number of Region Four deer hunters in 2003 was 6,985. Region Four deer harvest for the 2004 general and special permit hunts combined was 1,833 animals (Table 1), an increase from the 2003 total of 1,707 deer harvested.

Table 1. 2004 deer harvest by hunting method in Region Four.

Harvest	Modern Firearm	Archery	MZL	Total
Antlerless	104 (75.9%)	10 (7.3%)	23 (16.8%)	137
Antlered	1379 (81.3%)	254 (15.0%)	63 (3.7%)	1696
Total	1483	264	86	1833

Black-tailed deer harvest in GMUs 407 – 437 during the 2004 season totaled 1,282 animals. Antlerless harvest for the 2004 season totaled 113 animals (9 percent) with antlered harvest totaling 1,169 animals (91 percent). While the number of hunters in GMUs 407 and 410 has fluctuated since 1999, the number of deer harvested has remained fairly stable from 1999-2004 (Figures 1 and 2). In GMUs 418, 426 and 437, hunter success has increased from 6% in 1999 to 18% in 2004 with more deer harvested in 2004 compared with any of the previous 5 years (Figure 3).

The proportion of deer harvested in 2004 within GMUs 407-437 (1,282 animals) as compared to the statewide harvest for the 2004 season (44,543 animals) indicates that these northern Region Four GMUs represent 2.9% of the statewide total harvest. This number is consistent with the 2.9% of the statewide total harvest that came from GMUs 407-437 in 2003.

Reported tribal harvest in GMUs 407-437 for the 2004 season totaled 119 animals (65 antlered and 54 antlerless). GMU 418 (Nooksack) accounted for approximately 57% of the total tribal deer harvest reported in GMUs 407-437 during the 2004 season.

Surveys

In the past, herd composition surveys were not conducted in GMUs 410-437 due to low deer population densities and equally low hunter

distribution and numbers. However, islands in GMUs 410 and 407 support higher densities of deer, which can be easily viewed foraging in fields at dawn and dusk. A survey effort was initiated in 2004 to gather data on deer density trends and herd composition on vehicle-accessible islands in San Juan County and on Guemes Island in Skagit County. The survey was conducted by driving standardized routes on the islands in the mornings and evenings during mid-July. A total of 512 deer were observed during the morning and evening counts: 168 bucks, 224 does, 96 fawns, and 22 unclassified deer. Unclassified deer were not included in the herd composition results. The majority of the deer (473) were seen in the evening; morning surveys were discontinued due to lack of deer encountered.

Table 2. July 2004 evening deer densities.

Island	Miles Driven	Total Deer	Deer/Mile
Guemes Island	28	46	1.64
San Juan Island*	47	25	0.53
Lopez Island	53	120	2.26
Orcas Island	76	187	2.46
Shaw Island	29	95	3.28

*Incomplete survey coverage

Table 3. Herd composition during July 2004 road counts.

	Buck Antler Class						
Island	Spike	2 pt	3+ pt	Total	Doe	Fawn	Buck:Doe:Fawn
Guemes Island	3	11	1	15	26	5	58:100:19
San Juan Island	6	1	0	7	12	5	58:100:42
Lopez Island	18	22	0	40	47	25	85:100:53
Orcas Island	34	21	8	63	79	35	80:100:44
Shaw Island	19	12	3	34	35	23	97:100:66

Hair loss syndrome continues to be prevalent throughout the mainland GMUs in north Region Four and has been confirmed in the island habitat of GMU 410 where it was previously thought to be absent. In spring 2004, deer displaying hair loss symptoms were observed on the islands of San Juan and Shaw. A survey conducted on Shaw Island in April 2004 found a hair loss affliction rate of 33% overall. Fawns had the highest affliction rate at 75%, followed by bucks (25%) and does (12%). Lice were collected from three deer on San Juan Island, and all three deer carried the exotic species of louse *Damalinia cervicola* believed to cause hair loss syndrome. One of the deer, a yearling, exhibited loss of hair over the rib cage, which is common to hair loss syndrome deer. Other parasites found on the three deer were the common deer ked and a tick normally found on rodents.

Chronic Wasting Disease (CWD) sampling efforts in 2004 were increased due to mailings sent to previously successful hunters and a rifle drawing for hunters that promptly notified WDFW after harvesting a deer so that a sample could be taken. A total of 172 samples from GMUs 407-437 were tested and all were negative for CWD. CWD remains undocumented in GMUs 407-437.

Population status and trend analysis

Survey methodology is currently being developed for assessing deer density trends in San Juan County and Guemes Island in Skagit County (GMUs 410 and 407). Survey protocol will be finalized after a 3-year trial period, after which surveys will be repeated on a 3-5 year basis. These surveys were initiated in 2004; therefore, information on population trends is not yet available.

The only evidence of population status and/or trends in the mainland GMUs 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 2004.

San Juan County (GMU 410) continues to experience high deer damage problems associated with agricultural lands and residential properties. Deer/vehicle collisions remain high 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 has been conducted to quantitatively define current habitat condition or 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. Finalize 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 through targeted surveillance of sick or emaciated adult deer.
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.

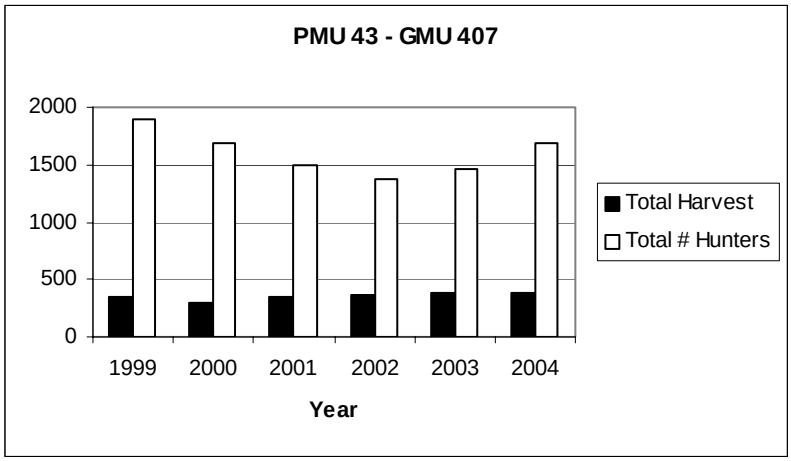

Figure 1. Deer harvest and number of hunters in PMU 43, 1999-2004.

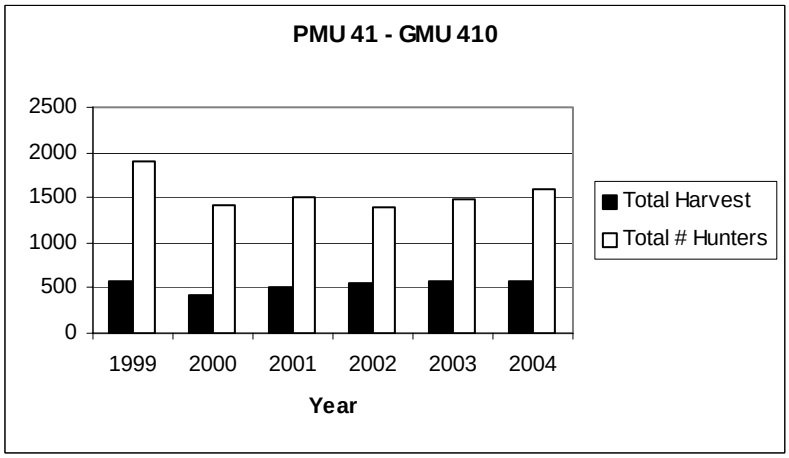

Figure 2. Deer harvest and number of hunters in PMU 41, 1999-2004.

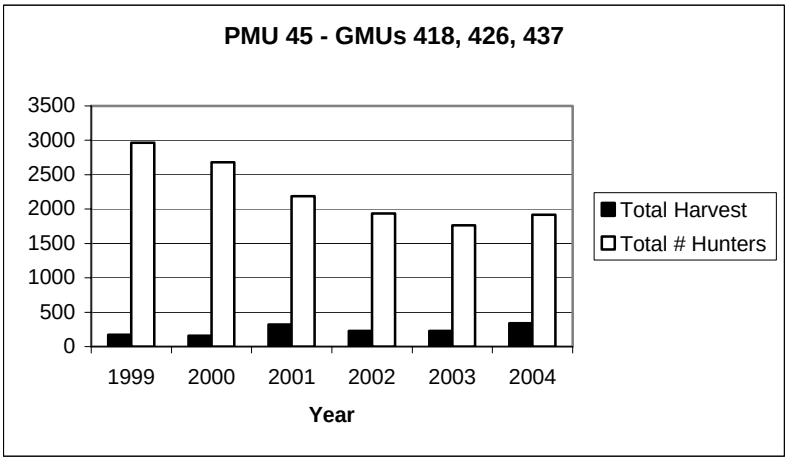

Figure 3. Deer harvest and number of hunters in PMU 45, 1999-2004.

DEER STATUS AND TREND REPORT: REGION 4
PMU 44 – GMU 454
PMU 48 – GMU 466, 485
PMU 47 – GMU 460

RUSSELL LINK, District Wildlife Biologist *and* 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 to ensure long-term population persistence.

Precise population estimates for GMUs 454 and 466 are unavailable. Mandatory hunter reports since 2002 are used to monitor deer population trends and hunting regulations.

Population objectives for GMU 460 are to maximize harvest opportunity and maintain the post-hunt buck composition ratio at a minimum 15:100 does. Past post-hunt composition ratios fell below the desired 15:100 ratio. This coupled with high yearling mortality based on check station data prompted closure of this unit to late buck hunting. Data collected from 1984 to 1996 showed an average of 46 % (range 35-57 %) of the yearling harvest occurred during the four-day November late season.

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 along with tribal harvest data in order to make the best assessment of population trends.

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

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.

Buck harvest in GMU 466 has moved back and forth indicating possible extrinsic factors in harvest rather than population changes (Figure 2). 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.

GMU 460 has been managed under an any buck legal strategy for more than 30 years. Harvest has varied over this period, averaging about 460 deer per year from 1984 to 1998. Over the last eleven years, 1994-2004, an average of 264 deer per year have been harvested (Figure 4). However, since 1998 the total deer harvest per year has remained well below the average. The late buck season closure in 1998 certainly contributed to the 41 % decline in total buck harvest compared to 1997. Total deer harvest during the late season over the 1984-1997 period averaged about 41% (range 24-52 %) of the total harvest. Harvest has declined from 1998 to 2003 with buck take declining by more than 50% over the last 5 years (Figure 4). While archers and modern firearm buck take has declined in this time period, 2004 has shown a resurgence in the modern firearm harvest.

Data collected from check stations showed >71% and >85% of deer checked to be yearling (1.5 years) in 1997 and 1998 respectively. Similarly, during 1999 about 72% of deer checked were yearlings. This exceeds harvest guidelines and likely contributed to the low buck:doe ratios observed during post season composition counts in 1996 and 1997 (Table 2). Hunter check station results for 2000 recorded only 46% yearling deer. The post-hunt buck:doe ratios for these years are below the recommended level of 15:100 (WDFW 2003). The 1998 post-hunt count (18:100 buck:doe ratio) reflects the first post-hunting season count since implementing the closure of the 4-day late buck season. Post-hunt composition in 1999 was similar at 16.3 bucks per 100 does. However, the decline in the fawn: doe ratio (49 to 100) is a concern. In 2000 pre and post-hunt ratios continued to decline (Tables 1 and 2). Higher branched buck ratios may be confounded by the small sample of does classified, (n=21).

Table 1. Preseason Deer Composition Survey Results from Helicopter in GMU 460

Year	Fawn	Spike	Branch Buck	Total Buck	Total (N)
1995	67.0	8.3	6.0	20.0	114
1996	61.5	19.2	3.8	23.0	48
1998	72.0	14.0	2.3	16.3	83
1999	71.7	12.8	10.3	23.0	76
2000	51.0	11.4	0.0	11.4	57
2001	No	Data			

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.

In 2001 only a post-season survey was flown in GMU 460. More recent check station data provide little additional opportunity to gauge deer numbers due to low numbers of animals checked. Beginning in 2002 a new mandatory reporting requirement for deer was implemented to provide essential harvest information to game managers. In 2003 both pre and post season composition flights resulted in classifying only 25 and 20 deer respectively. One buck was seen on the pre-season and only two bucks were seen on the post-season flight. The extremely low sample size does not allow us to calculate meaningful ratios from the data. In addition the scarcity of deer seen on these flights carried out under the same historic protocols, raises concerns over a continued and apparent decline in deer numbers. Further restrictions on antlerless hunting were instituted for 2004 with archery season remaining buck only.

During a 3-year buck mortality study to determine
mortality sources yearly survival rates (Sept 1999-Sept 2001) were 0.519 with legal harvest the leading cause of mortality (Bender et al. 2003). Predation was the second leading cause in addition to malnutrition that may predispose animals to predation. Bender et al. (2003) further demonstrated that the late buck season accounted for substantial additive mortality. The closure of the late buck season in 1998 appeared effective in increasing postseason buck escapement and increasing late buck season ratios. Other factors including parasitism, low fawn production and habitat quality may all contribute to current population dynamics of GMU 460s deer herd and its apparent decline.

Table 2. Postseason Deer Composition Survey Results from Helicopter in GMU 460

Year	Fawn	Spike	Branch Buck	Total Buck	Total (N)
1996	62.5	3.7	8.5	12.2	144
1997 [a]	51	6.6	0	6.6	71
1998 [b]	59	4.9	13.1	18	108
1999	49	7.0	9.3	16.3	71
2000	33	3.0	19. 0	23.8	35
2001	55	0	5	5	68

[a] (flown 1-9-98)
[b] (flown 11-11 thru 12-14, 98)

Hunting seasons and guidelines, regulations and hunter pressure

While hunting seasons have remained basically

unchanged over the last 10 years in GMU 460, the most significant change was to eliminate the traditional four-day late buck season in November of 1998. While this appeared to have minimal effect on overall hunter numbers in 1998 compared to 1997 (Figure 5), it did reduce overall harvest as expected. However, the overall trend in hunter numbers for the years 1994-2004 show a general and continued decline (Figure 5). The 5-year average for 1994-1998 period was 3,009 hunters compared to 1,386 for the period 1999-03. This reflects a notable decline of about 54% percent. Access fees have increased over time and may contribute to lower number of hunters. In addition many long-time hunters of this unit have expressed their belief in a precipitous decline in deer numbers.

Population status and trends

Based on limited, primarily anecdotal information, deer in GMU 454 have exhibited little change. GMU 485/466 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 (prior to 2004-05 season) 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.

In GMU 460 and beginning in 1996, black-tailed field surveys documented a hair loss syndrome that affects deer during the late winter and early spring surveys. It appears this has negatively influenced deer survival and recruitment, particularly fawns. Over a three-year period Bender and Hall (2001) reported rates of "hair-slip syndrome" in fawns as 55, 74, and 46 % from 1999-2001. Effects of hair-slip syndrome are still not completely understood with further research needed to understand the relative contribution of hair-slip to black-tailed deer productivity among other factors.

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.

The significant majority of GMU 460 is managed for timber production. Annual timber harvests create a mosaic of seral stages that can be beneficial to deer. Openings of 1 to 10 years exist that provide a good forage base as well as riparian corridors protected by Forest and Fish rules. The forest stands in these corridors provide older age classes that diversify habitat and help intercept snow during harsh winters; this may provide deer access to forage in these sites and serve as travel corridors. In 2003-2004 an apparent increase in timber harvesting in the Snoqualmie Forest portion of the GMU may provide an increased forage base for deer over time. In addition in 2004 King County announced the purchase of development rights on the King County portion of the Snoqualmie Forest (app. 90,000 acres). This will protect a large area of commercial forest as open space and de facto deer habitat, yet without additional research into the relationship between current conditions and deer populations habitat quality will remain in question.

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.

In GMU 460 continue the late buck season closure and measure response by monitoring post-hunt buck:doe ratios. Additional research looking at productivity, herd age structure, forage availability and forest management practices as well as new methods to evaluate herd composition and estimate population would provide vital information in understanding the future outlook of deer in North Puget Sound and implications of industrial forest management on herd dynamics.

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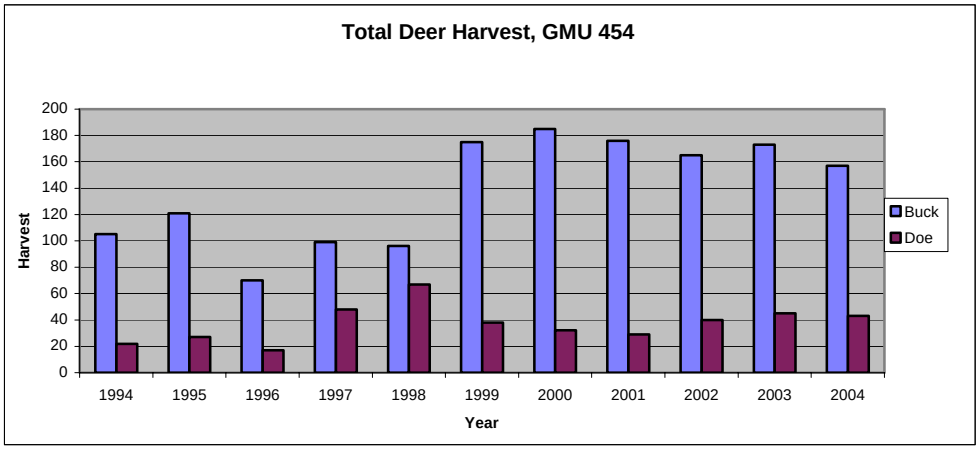

Figure 1. Annual deer harvest in GMU 454, 1994-2004.
*2004 harvest reflects uncorrected raw data reported from hunter report

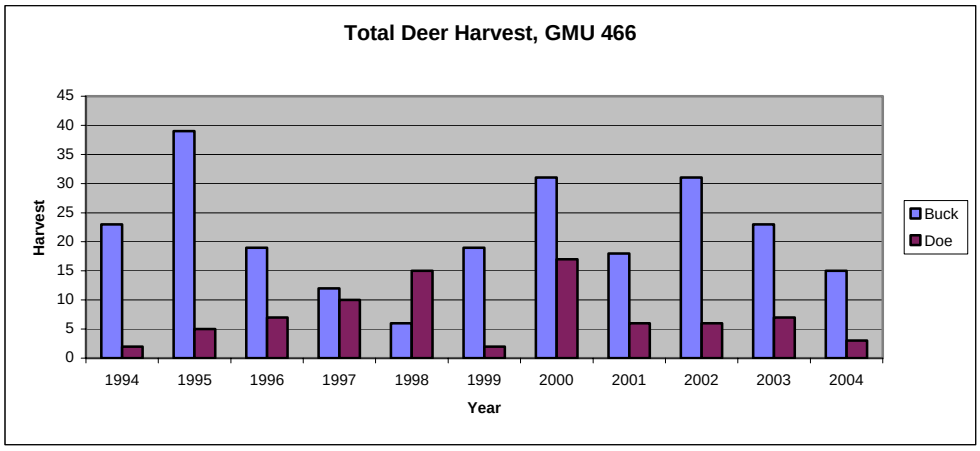

Figure 2. Annual deer harvest in GMU 466, 1994-2004.
*2004 harvest reflects uncorrected raw data reported from hunter reports

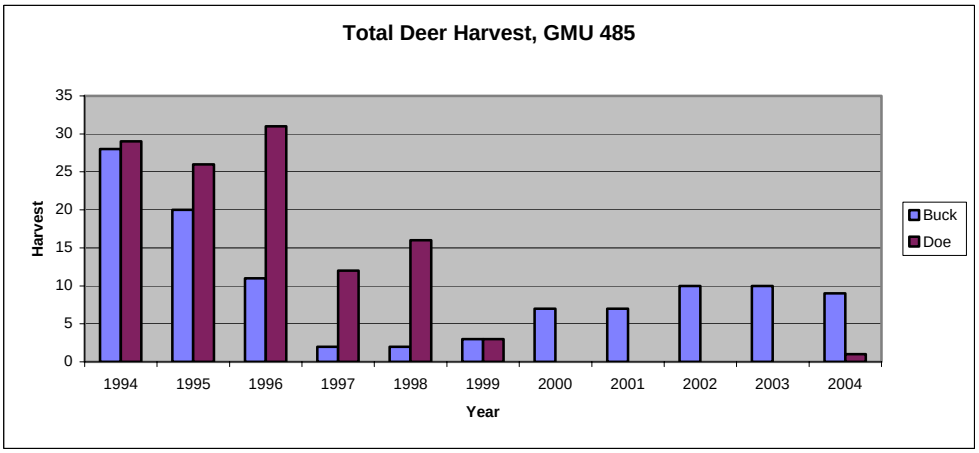

Figure 3. Annual deer harvest in GMU 485, 1994-2004.

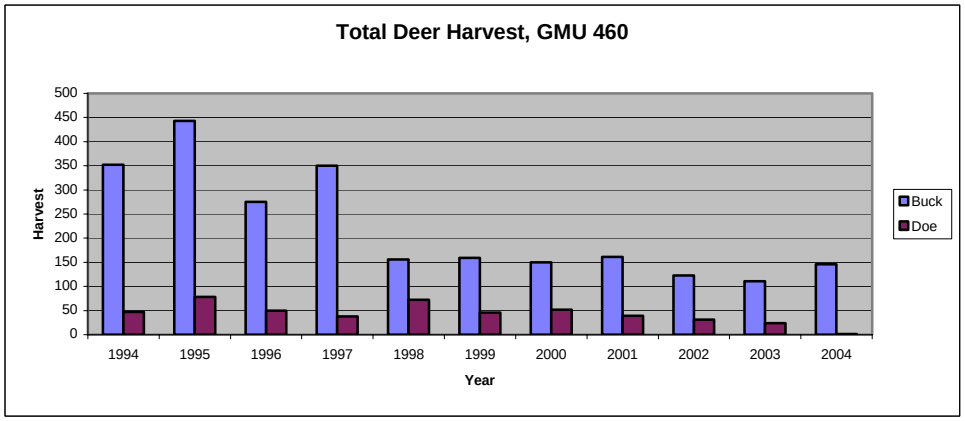

Figure 4. Annual deer harvest, GMU 460, 1994-2004, general season and special permit combined.
*1997 was last year of late buck hunt.
*2004 1st year of buck only archery hunt

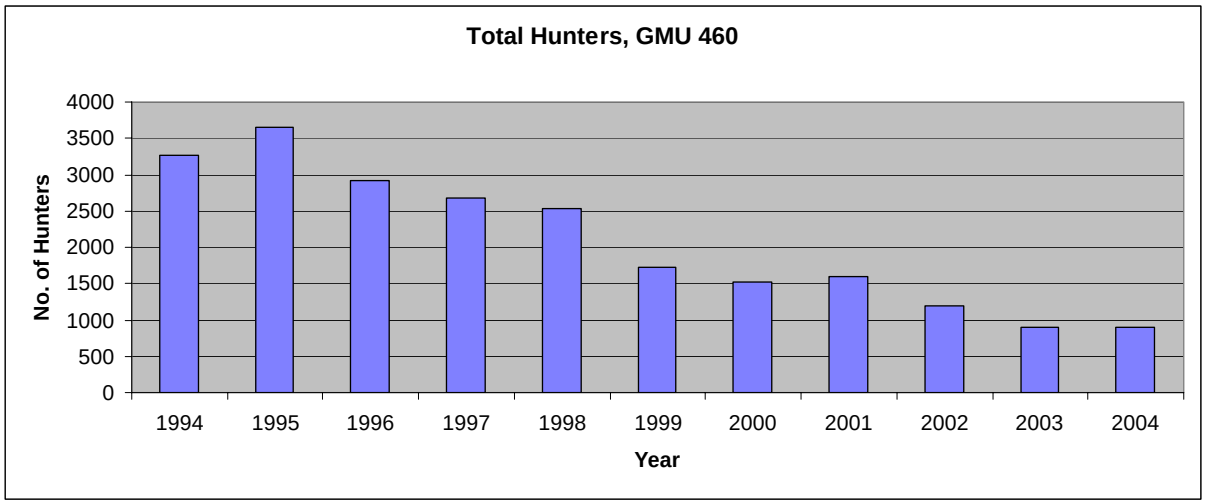

Figure 5. Number of deer hunters, GMU 460, 1994-2004, general season and special permit combined.

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 bull harvest for 85% of the mandatory reporting data for the 2004 general season and special permit season combined in eastern Washington was slightly over 1,700. Western bull harvest seems to have stabilized. The bull harvest for 85% of the mandatory reporting data for the combined 2004 general season and special permit season was over 2,500. Improvements in harvest levels since the 1990s are likely 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.

Table 1. General season bull elk harvest in Regions 1, 2, and 3 (eastern) and Regions 4, 5, and 6 (western). Year 2004 represents 85% of mandatory reporting data.

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
2004*	1,263	2,446

The 85% of the reported statewide elk harvest for both the general season and special permits combined in 2004 was 6,688 elk (Table 2).

Table 2. Statewide elk harvest 1991-2003 for general season and special permit combined by antlered and antlerless class. Year 2004 represents 85% of mandatory reporting data.

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
2004*	4,276	2,412	6,688

The general season elk hunter success rate for all weapon types in 2004 was 10.8%. General season success rates by weapon type were 10.7 % for modern firearm, 10.1 % for archery, and 12.5 % for muzzleloader.

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 in February of 2005. 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 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 450 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 for October of 2005.

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, Umatilla, 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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ELK STATUS AND TREND REPORT 2005: 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 population for a sustained yield, a variety of recreational, educational and aesthetic purposes including hunting, wildlife viewing and photography, and lastly, to preserve, protect, manage and enhance elk and their habitats (Wash. Dept. of Fish and Wildlife 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 2004 general elk hunting seasons for Game Management Unit (GMU) 127-142 were as follows:

- Modern Firearm - Oct. 30-Nov. 7, Any elk
- Archery - Sept. 8-21, Any elk
- Late Archery (GMU 127) - Nov.20-Dec. 8, Any elk
- Muzzleloader - Oct. 2-8, Any elk
- Late Muzzleloader - Nov. 20-Dec. 8, Any elk
- Advanced Hunter Education (AHE) Master Hunters only - Dec. 9-31, Any elk

The current harvest strategies in place are directed to control populations where agricultural damage and nuisance problems from elk have persisted or increased. Recently, however, many 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 since 2001 (Table 1). When looking at these numbers, it is important to consider the switch that occurred in 2001 from hunter harvest estimates coming from a mulit-wave mailing of voluntary hunting activity reports, to a mandatory reporting system. As may be expected, since 2001 with mandatory reporting, reported harvest has been more consistent. In 2004, 194 elk were harvested (Table 1). Sine 2001, the harvest now appears to be less variable and has increased to over 50% more elk harvested in 2004.

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

Year	Antlered	Antlerless	Total	Hunters	Hunter Days	Hunter Success
1991	76	82	158	1330	4795	11.9%
1992	24	40	64	461	2542	13.9%
1993	6	19	25	582	2944	4.3%
1994	40	67	107	1016	3960	10.5%
1995	32	28	60	1107	3758	5.4%
1996	29	106	135	1305	5210	10.3%
1997	25	45	70	735	3563	9.5%
1998	2	19	21	254	661	8.3%
1999	101	103	204	2473	17210	8.2%
2000	75	169	244	2966	10634	8.2%
2001	61	56	117	2674	11380	4.4%
2002	59	53	112	1555	7150	7.2%
2003	61	66	127	1344	6082	9.4%
2004	107	87	194	2264	9892	8.6%

The number of hunters correspondingly increased by over 60% from last year – a year having the lowest number of hunters since 1998. Hunter success of 8.6% is very close to the 14-year average of 8.8%.

Archery hunters became the most successful group in 2004. Both modern firearm and muzzleloader hunter success rates dropped from last year (Table 2).

Table 2. Hunter Success By Weapon

	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%
2004	9.26%	8.45%	8.68%	8.57%
Average	6.16%	8.10%	8.88%	8.09%

In 2003, modern firearm hunters managed a success rate of 10.24% taking 32 bulls and 36 antlerless – 15 more antlerless than in 2002. In 2003, muzzleloader hunters had a success rate of 9.13% taking 23 bulls and 25 antlerless elk. Archery success was lowest that year 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 (Table 3). In 1998, a mark-resight estimate was generated for GMUs 127 and 130 resulting in a minimum estimate of 179 elk.

Composition counts have been conducted only in GMUs 124 and 130 due to limited funds for aerial surveys. The 2004 survey in GMU 130 was made possible by funding from the Turnbull National Wildlife Refuge. Table 3 shows the limited number of elk composition counts conducted since 1999. The management objective in the Game Management Plan is a range of 12 to 20 bulls:100 cows, post-hunt (WDFW 2003). For GMU 130, averaging the data in Table 3, albeit a small and quite variable sample, yields a bull:cow ratio of 21.5, a ratio consistent with WDFW management guidelines (WDFW 2003). Additional funding is necessary to conduct helicopter surveys in 2005-2006 to get more composition counts for the entire Population Management Unit (PMU).

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 indicates a decreasing trend of young (1-2pt) bulls being harvested from the population, with an increasing trend of mature bulls (5+pts) (Table 4.). However, calf ratios from Table 3 indicate an average calf:cow ratio of 36:100, a value that is on the low range of historical data for the Pend Oreille sub-herd (Wash. Dept. Fish and Wildlife 2004). These two indices when taken together could indicate a decrease of available males being recruited into the population.

Habitat condition and trend

The greatest concern for habitat in the past 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 about elk activity. Now, elk habitat degradation due to urban expansion, increased roads, and human disturbance is the highest concern.

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

					Calves	Bulls
Year	GMU	Cow	Calves	Bulls	per 100 Cows	per 100 cows
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
2004	130	211	106	36	50	17

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

Year	1-2 Pt.	3-4 Pt.	5+ 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
2004	20 (38%)	14 (26%)	17 (32%)	51

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 an adequate number of these permits continue to be made available to address landowner concerns.

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 in these more southern GMUs. Elk in these areas are in scattered groups, occupying habitats wherever they can find relative seclusion and safety, frequently being found in Conservation Reserve Program (CRP) plots.

Management conclusions

Data from the last four years indicates a fairly constant, or slightly increasing population level in the district. Additional funding is needed for better herd composition surveys.

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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

JEFFREY A. BERNATOWICZ, District Wildlife Biologist

Population objectives and guidelines

The post-season population objectives for the Yakima elk (*Cervus elaphus*) herd and Colockum elk herds is 9,025-9,975 and 4,275-4,725, respectively. A goal of <350 animals has been set for the Rattlesnake Hills sub-herd. The postseason bull ratio goal is a range of 12 to 20 bulls per 100 cows post-hunt for all herds.

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 that start as early as August 1st and end as late as February 28th.

In 2004, the reported number of elk hunters in Region 3 increased slightly and was above the 10-year average (Table 1). The largest increase was in modern firearm hunters. Historically, hunter numbers may have been overestimated. Since mandatory reporting was implemented in 2001, estimates should be more accurate.

Overall hunter success for each user group was at all-time lows. Bull harvest for both the Colockum and Yakima herds was near average. The low success rates were largely due to more hunters participating and reduced antlerless harvest opportunity available.

Surveys

Post-hunt aerial surveys were conducted in February 2005. 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 was surveyed as a separate area in January.

Observed calf recruitment in both the Yakima and Colockum herds decreased (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 indicate 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 smaller portions of the winter range and are in a clumped distribution, making year-to-year comparisons weak. Light snow pack in 2005 made bulls estimates particularly questionable. However, harvest may be exceeding recruitment of adult bulls. Branch-antlered bull and spike bull harvest and escapement will be monitored for the next few years to determine if this is actually happening. Surveys conducted under average winter conditions will provide a clearer picture of these parameters.

Population status and trend analysis

In February 2005, the Colockum and Yakima herds were estimated at 3,987$\pm$391 and 8,851$\pm$843 (Tables 2 and 3). Estimated populations have generally been decreasing over the last 3 years. Both estimates are below objective. The Yakima herd is probably at objective and the low estimate was probably due to mild winter conditions during surveys. The high antlerless harvest in both herds overt the last 3-5 years is being reduced to increase the elk numbers in the Colockum herd and

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
2004	445	221	1,013	772	23,291	3,789	6,760	33,840	8	7	5	6.5
Mean[a]	428	377	1,012	1,063	21,687	4,720	5,472	31,814	8.7	10.2	8.8	9.0

[a] 10 Year Mean Ending 2004

stabilize the Yakima herd.

If bull harvest is used as an index of population, the Colockum herd has decreased the last 15 years while the Yakima herd is near the historic average. 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 likely more adult cows than surveyed, or a higher number of calves per cows surveyed, or a combination of the two 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 2001-2004 has resulted in an increasing population. Surveys in January estimated 672$\pm$7 elk.

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. When cattle were not present in 2003, photo records show forage availability increased.

Colockum winter range forage quality is likely decreasing. 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 remaining grasses are typically dry during the winter and have low digestability.

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 stage 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 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 2004, 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.

The elk in PMU 34 cause the most significant damage. 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 large reserve borders the agricultural land. When elk do come off, 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. In the Colockum, 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 Colockum elk 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 to measure condition of animals harvested by hunters.

The Yakima herd appears healthy. Hunter opportunity and harvest had been high as the herd was being reduced. Antlerless harvest is now being reduced to stabilize the herd.

Table 2. Colockum elk winter composition 1990-2003.

	Antlerless		Bulls			Ratios (per 100 cows)	
Year	Cow	Calves	Spike	Branched	Total 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
2005[a]	3,084	770	46	86	3,987 ± 391[b]	25	4

[a] 1999-2005 data based on visibilty model
[b] 90% Population Estimate + 90% Confidence Interval

The PMU 34 herd is above the goal of <350 elk, and is expected to continue to grow. Damage payments 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
2005 [a]	6,242	2,013	253	343	8,851 ± 843 [b]	32	10

[a] 1999-2005 data based on visibilty model

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

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

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Population objectives and guidelines

Management objectives are outlined in the North Cascade (Nooksack) Elk Herd Plan (Washington Department of Fish and Wildlife 2002) and include the following:

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 plan (currently greater than or equal to 12 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) 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. 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 GMUs 407 & 437). Reported tribal harvest during 2004 was 5 bulls in GMU 437 and 2 bulls in GMU 407. Non-tribal harvest during the 2004 season was 6 bulls and 3 cows taken in Elk Area 4941 (GMU 437) by either archery or muzzleloader hunters.

There were 7 confirmed poaching violations between July 2004 and June 2005 with 5 elk taken illegally in GMU 418, 1 in 407, and 1 in 437. Other reported sources of human-related mortality include 2 elk-vehicle collisions on Highway 20 and 2 fence mortalities.

Surveys

No herd composition surveys were conducted in 2004. Radio-collared elk were monitored periodically by ground and air. The majority of these augmentation animals have been located near the South Fork Nooksack River in northern Skagit County.

Population status and trends

The North Cascade Elk Herd Plan (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 proposal for developing population monitoring tools for the Nooksack elk herd was completed in April 2005 as part of a cooperative effort between WDFW and the NW Indian Fisheries Commission (McCorquodale et al 2005). The methodology for developing a population-specific sightability correction model requires collaring 10 bull elk, as currently there is only 1 collared adult bull in the herd. The bull capture is scheduled for September 2005. Data for evaluating both sightability correction modeling and mark-recapture approaches will be collected in late winter/early spring when elk are concentrated at lower elevations in larger groups and deciduous trees are leafless.

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 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.

Olympic Resource Management (ORM), which manages commercial forest land in primary summer and winter Nooksack elk range, has closed its road system to the public with the possible exception of mainline access during the hunting season. ORM has also eliminated a motorcycle cross-country racetrack in core elk range. These changes should benefit the Nooksack elk herd by allowing elk to access suitable habitat while reducing human disturbance.

Wildlife damage

Estimates of elk numbers occupying agricultural damage areas has increased moderately and was 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. Continued land acquisitions throughout the Skagit River valley corridor by Skagit Land Trust, Seattle City Light, and the U.S. Forest Service have significantly reduced the overall problem associated with elk use of private lands. In 2004, Seattle City Light purchased two large properties along the Highway 20 corridor and the Skagit Land Trust is working on several more acquisitions. Generally speaking, the magnitude and dispersal of elk related damage complaints associated with commercial crops or grazing has increased considerably along the Highway 20 corridor between the towns of Sedro-Woolley and Concrete. Concrete Municipal Airport, which has not had a problem with elk in the past, had a herd of 35-40 elk feeding along the runway in winter 2004-2005. A commercial orchard owner with a history of elk damage received a $4,560.00 damage payment along with $4,966.00 in fencing supplies to prevent further damage. Elk damage complaints in the traditional problem areas of Acme persist but remain at constant levels.

Augmentation and habitat enhancement

A planned elk translocation from the Mt. St. Helens area in Region 5 to the Nooksack River drainage (GMU 418) in October 2004 was cancelled due to volcanic activity at Mt. St. Helens. The tribes conducted passive trapping in September 2004 and March 2005. Four cows were translocated from Mt. St. Helens to the Nooksack River drainage in September 2004 and 10 elk (8 cows, 2 calves) were moved in March 2005. There were no capture related injuries or mortality. Another tribal passive trapping effort is planned for September 2005. In addition, the elk translocation that was cancelled in 2004 has been rescheduled for October 2005. The overall objective for these combined trapping efforts in 2004 and 2005 is to augment the Nooksack herd with 40-50 additional elk.

The post-release mortality rate for augmentation elk in the Nooksack has been high. Sixteen of the original 42 elk translocated in 2003 (38%) have died. Of the 14 elk moved by the tribes, there has been only 1 mortality (7%). Body fat measurements at time of capture in 2003 indicated that 22% of the animals had estimated body fat levels equal to or less than 2%, which is indicative of an animal in poor health. It is probable that poor physical condition in combination with capture and transport related stress was the direct or indirect cause of the high mortality rate in 2003. 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 Olympic Resource Management in primary winter and summer range areas.
- Establish public viewing areas.
- Evaluate potential habitat in the Skagit River drainage.
- 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 44 – GMU 454
PMU 47 – GMU 460
PMU 48 – GMU 485, 466

RUSSELL LINK, District Wildlife Biologist *and* 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 >50 elk. The North Bend-Snoqualmie herd has grown to an estimated >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).

The Green River elk herd (GMU 485) is a relatively small sub-population of the North Rainier Elk Herd 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 2004 elk population estimate of 200 animals (95% C.I. ±34) may signify an increase over recent years. (Vales unpubl. data 2004).

In 1984 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 (GMU 485) and Stampede elk (GMU 466) 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

Management strategies vary for GMUs 454 and 460. 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. However damage complaints on Christmas Tree and berry farms and human-elk collisions on I-90 are raising concerns in the North Bend area. Harvest for years 1994-2004 in GMU 460 and 454 is presented in Figures 1 and 2, respectively.

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 1997-2003.

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. This was a successful hunt with the tribe and the state each taking one bull, consequent survey flights indicated no change in the bull:cow ratio and the permit allocation of 1 elk each for the tribe and the state was instituted for the 2005 season.

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 6 elk killed (range 3-8/season) between 1999 and 2004 (Figure 3).

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 4, 2004 data not included). 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

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

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.

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.

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).

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.

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.

In GMUs 485 and 466 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 PMU 48. 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

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.

The Green River Watershed (GMU 485) 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 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. Vehicle-elk collisions have caused loss of human life as well as damage to personal property. Expansion of the elk herd in the North Bend area has potential ramifications for vehicular collisions and needs to be further assessed.

Elk in these GMUs 485 and 466 are not a problem to private property and there are no nuisance problems.

Habitat enhancement activities

Past and present work in PMU 48 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 2005. In summer of 2005, $30,000 from the combined sources of the Rocky Mountain Elk Foundation, the Muckleshoot Indian Tribe, BPA, and Tacoma Water was used to continue efforts on reducing Scotch Broom cover and improve forage quality. Over 550 acres have been treated mechanically and/or chemically to improve forage conditions on the range.

In addition Tacoma Water implemented habitat improvement work and elk pasture creation to mitigate the effects of raising the water level of the Howard Hansen Reservoir. These projects in the form of seeded fields and timber thinning cover over 300 acres and will provide valuable winter and summer forage for elk.

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.

In PMU 48 low calf recruitment rates are a concern for this elk herd. Continued low recruitment and the antlerless harvest rate up to 1996 were incompatible. 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 Muckleshoot Tribe occurred. 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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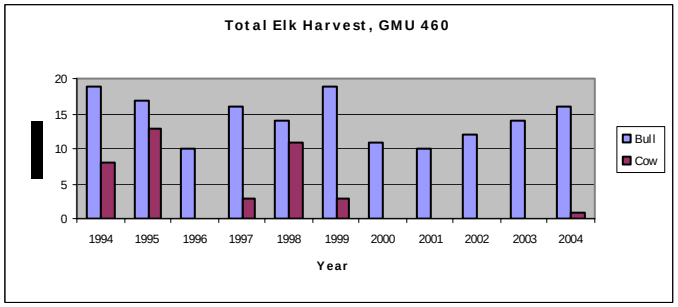

Figure 1. Annual elk harvest, GMU 460, 1994-2004 all weapons combined.

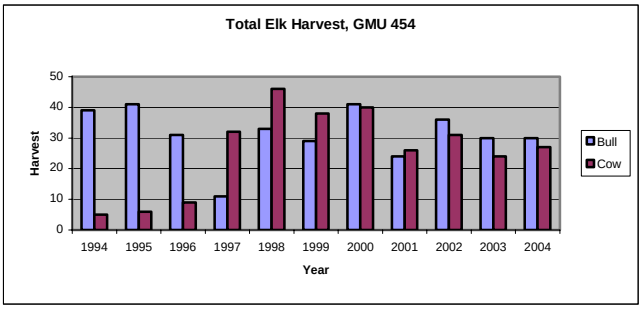

Figure 2. Annual elk harvest, GMU 454, 1994-2004 all weapons combined.

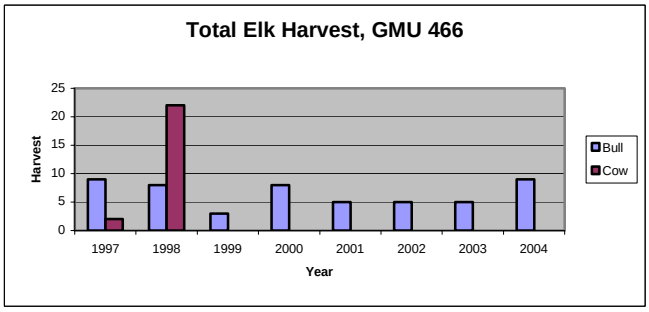

Figure 3. Annual elk harvest, GMU 466, 1997-2004.
*2004 harvest reflects uncorrected raw data reported from hunter reports

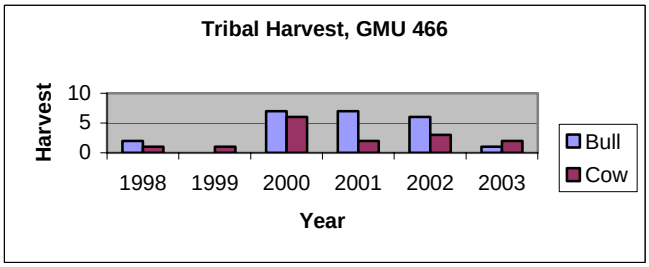

Figure 4. Annual elk harvest, GMU 466, 1998-2003.
*Northwest Inland Fisheries Commission Data

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 2004 hunting season was the second of the 2003-2005 three-year season package. Overall management goals are to increase or maintain elk (*Cervus elaphus*) populations in suitable habitat while addressing localized 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 2004 hunting season the three-point minimum requirement for antlered elk was retained region-wide. A total of 575 either sex or antlerless-only permits were issued to all user groups including Advanced Hunter Education graduates and Persons of Disability. Only 76 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 872 elk, down 15 percent over the previous year. The estimate of the number of elk hunters in Region 6 increased by about 16 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 2004 – 2005 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, 2004 pre-season helicopter elk composition counts were attempted. Poor flying conditions resulted in data being obtained only for the Williams Creek Unit (GMU 673).

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 this survey.

On March 28 and 30, 2005, 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. Annual bull mortality from all sources is estimated from the proportion of yearling males among antlered elk seen during pre-season (fall) surveys. In Region 6 this estimator varies annually but tends to fall between 40-50 percent total annual mortality rate for antlered elk.

Region-wide the harvest of antlered elk decreased to 710 bulls in 2004. This represents a decline of 12 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 108 bulls, a decline of 15 percent over the previous year.

Population status and trend analysis

Harvest figures of legal bulls taken during the 2004 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 2004 season except in damage areas. 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 2004 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 2004 general elk seasons by PMU.

PMU	Antlered harvest	% change from 2003
61	363	-5
62	73	-18
63	70	-12
64	1	-96
65	108	-15
66	45	-23
67	50	-7

Table 2. Results of pre-season elk surveys by GMU (Fall 2004)

		Antlerless		Antlered		Ratios per 100 cows		
GMU	*n*	Cows	Calves	Spikes	Branch	Calves	Spikes	Branch
673	153	88	42	4	19	48	5	22

Table 3. Results of post-season elk surveys by GMU (Spring 2005)

		Antlerless		Antlered		Ratios per 100 cows		
GMU	*n*	Cows	Calves	Spikes	Branch	Calves	Spikes	Branch
648	376	288	60	26	2	21	9	1
673	323	205	82	28	8	40	14	4

Mountain Goat

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.

Population Surveys, Status and Trends

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, various observations of mountain goats have been documented in small, rocky cliff areas in a few places outside of Linton Mountain. The most recent of these included the following reports to the U.S. Forest Service: One mountain goat observed in the North Fork Harvey Creek area in spring of 2005 ; A group of 3 mountain goats observed and photographed near Cato Creek in the fall of 2004 ; and 1 mountain goat seen at Dry Canyon on August 12, 2004 (M. Borysewicz, pers. comm.. 2004 and 2005). 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.

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.

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.

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.

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

Table 1. Survey history of the Linton Mtn. mountain goat herd, 1965-2004.

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
2004	0	0	?	0

[a] Year that seven 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.

habitat on Linton Mountain, but the few goats remaining there now are likely not limited by forage quantity.

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
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 awarded in 2004, and one male goat was harvested.

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 the 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 1999-2004 have been mild.

In July 2004, two adult nannies were collared in the District and one in January 2005, as part of a statewide goat research project. One nanny was collared on Nason Ridge, one in the headwaters of Graham Harbor Creek on the south shore of Lake Chelan, and one along Point-No-Point Creek on the north shore. In the last year all goats have concentrated their activity in 4-5 mi^2 areas near their capture locations. The Nason Ridge nanny spent all of her time on the Ridge during the last year. The Graham Harbor nanny has ranged between Graham Harbor, Graham Mountain, and Pyramid Mountain. The Point-No-Point nanny has been in the vicinity of Point-No-Point Creek, Little Goat Mountain, and Safety Harbor Creek. 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. During last winter, one was near Pinnacle Peak and the other near Bonanza Peak. This is the first time we have documented that the Wenatchee District and Region 4 share goats between areas.

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-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.

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 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 the 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. 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	1	100	3	3	3

Table 3. Mountain goat population composition for Lake Chelan, Chelan County, 1994-2004.

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
2004					
Average	18	96		104	20

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.

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:

1. Preserve, protect, perpetuate, and manage mountain goats and their habitats to ensure healthy, productive populations.
2. 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.
3. Enhance mountain goat populations and manage for sustained yield.
4. For populations to be hunted, a minimum of 50 goats and 25 kids:100 non-kids over a 3-year period.
5. 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 2004, there were 6 permits spread over the 4 units (Tables 1-4). One of the Bumping permit holders did not report. The raffle permit holder also hunted the region. Al1 permit holders who reported were successful.

Surveys

Tables 1-4 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 2004, all surveys were flown in July or early August. Portions of Bumping and Naches/Corral Pass were flown twice.

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 haven't 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. The best we can do is guess at 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 probably declined from historic levels due to over harvest. An extremely light snow pack during the winter of 2004-05 seems to have increased kid production. 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. Since 1997, harvest has been more conservative and the population maybe 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. Approximately 15-20 goats are commonly found on Timber Wolf Mountain, which is closed to hunting. Harvest has likely impacted the population and only recently been reduced. The high kid production in 2004 should help the population rebound.

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 the last 2 years have excluded Davis and Goat Peaks, which have few animals. The current population for the entire area is probably less than 50 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 goat Unit 3-7 Bumping River

Harvest Information					Survey Data			
				Goats				
Year	Permits	Hunters	Harvest	Seen/Hunter	Kids	Adults	Total	K:100
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	1	1	75	16	39	55	41
2005	2				32	66	98	48

Table 2. Summary of harvest and survey information for goat Unit 3-6,4-38 Naches Pass/Corral Pass

Harvest Information					*Survey Data			
				Goats				
Year	Permits	Hunters	Harvest	Seen/Hunter	Kids	Adults	Total	K:100
1989	9	7	4	30	24	94	118	26
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	2	1	5	21	61	82	34
2005	2				40	55	95	73

* Mostly Naches Pass Data ( ) September Survey

Table 3. Summary of harvest and survey information for goat Unit 3-10 Blazed Ridge

Harvest Information					Survey Data			
			Goats					
Year	Permits	Hunters	Harvest	Seen/Hunter	Kids	Adults	Total	K:100
1991					9	22	31	41
1992-95	NO DATA							
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	2	*3	*3	*28	17	63	80	27
2005	2				NO DATA			

* Includes auction/raffle permit hunter

Table 4. Summary of harvest and survey information for goat Unit 3-11 Kachess Ridge

Harvest Information					Survey Data			
			Goats					
Year	Permits	Hunters	Harvest	Seen/Hunter	Kids	Adults	Total	K:100
1991					21	39	60	54
1992					7	18	25	39
1993					14	44	58	32
1994-95	NO DATA							
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
2003	0				No	Survey		
2004	0				8	18	26	44
2005	0				13	23	36	57

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

MIIKE DAVISON, District Wildlife Biologist
JENNIFER BROOKSHIER, Wildlife Biologist

Population Objectives/guidelines

The management objective for mountain goat units in north Region 4 is 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 and 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 GMUs were closed to hunting (GMUs 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

In July 2004, 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 Commission. 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 238 goats were observed (145 adults, 28 yearlings, 60 kids, 5 unknown; Table 1). In the Mt. Baker area, 105 more goats were seen in July 2004 than in the September 2003 survey. Most of this difference came from 117 more goats observed in the East sector (Coleman Pinnacle and Lava Divide blocks) of the survey area in 2004 than in 2003. The kid:adult ratio in 2004 was 35:100, similar to the 37:100 kid:adult ratio in 2003 (the adult category includes yearlings to allow for comparisons between 2003 and 2004 survey data; yearlings were classified as adults in 2003).

Table 1. 2004 mountain goat survey results for the Mt. Baker area.

Block	Total	Adults	Yearlings	Kids	Unknown
Black Buttes	31	19	3	9	0
Heliotrope	0	0	0	0	0
Chowder Ridge	61	35	9	14	3
Sholes Glacier	0	0	0	0	0
Coleman Pinnacle	91	57	9	23	2
Lava Divide	39	24	5	10	0
Church Mountain	9	6	1	2	0
Loomis Mountain	7	4	1	2	0
Total	238	145	28	60	5

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 is to assess the magnitude, extent, and causes for the reported declines in mountain goat populations in Washington. Since 2002, a total of 13 GPS collars, of which 9 are still functioning, have been placed on goats in the Mt. Baker/Mt. Shuksan areas of Whatcom County. The locations from these collars will be used to evaluate movements and habitat use. Collared animals will also provide information to assess sightability bias (i.e. whether or not an animal or group is seen) during population surveys.

Rump fat levels were found to be low in the small number of animals checked in 2003. Blood serum samples collected from 21 goats in 2003 all tested positive for one or more serovars of Leptosporosis. According to Rice (2003), Leptosporosis affects both humans and other animals and varies in the severity of its effects, but can cause abortion in domestic animals and liver damage, kidney failure and internal bleeding

in humans. Nine goats from the Mt. Baker area also tested positive for bovine viral diarrhea.

Population Status And Trend Analysis

The status of mountain goat populations in north Region 4 GMUs is not well documented. The majority of historical information regarding goat numbers and distribution has 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 GMUs were closed to hunting due to declines in harvest and goats reported by permit hunters.

An aerial survey of the Mt. Baker GMUs 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.

The Mt. Baker/Mt. Shuksan mountain goat population is approaching levels where agency managers should begin to consider a harvest strategy; however, a timeline for this process has not been established.

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MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 5
Goat Rocks, Smith Creek, Tatoosh

PATRICK J. MILLER, District Wildlife Biologist
ROBIN S. WOODIN, Wildlife Biologist

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. The Goat Rocks-Tieton River unit probably has the highest goat population in the state of Washington. 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 remove 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 conservative in 2004: 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. In 2004 the season 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 stable mountain goat populations in the three units. Much variability exists, however, in the hunter survey data (See Trends below), and one must use caution in the interpretation of these data. Aerial surveys conducted by WDFW/USFS indicate that mountain goat populations in the Tatoosh unit may be declining (See Surveys below). Most of the goats observed in this unit are actually in the nearby Mt Rainier National Park.

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. The permit levels for Goat Rocks were combined with Tieton River were combined for 2003. Permit levels were reduced by 1 in 2003 to allow for potential raffle or auction hunter harvest outside the permit process. 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 2004 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. Harvest in Goat Rocks was distributed throughout the first month of the any weapon season.

Overall, hunter success in 2004 was slightly up from the previous two years (Table 1). Historically, success rates in the Goat Rocks Unit approach 100%. This was not the case in 2004. Of the six permit holders, four reported taking goats for a success rate of 67 %. 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. The number of goats seen by hunters is also stable.

Since 1993 success rates in Tatoosh have also been stable. 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. The single permit holder in 2004 reported killing a goat.

Surveys

From 1993-97 surveys were concentrated in the Smith Creek Unit. A cooperative project between the Gifford Pinchot National Forest-Cowlitz Valley Ranger 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).

Recently survey coverage has expanded to include all three Mt Goat Units in Region V. Part of this expanded coverage is a portion of a Mt Goat study that is being conducted by WDFW. Funding for these surveys is coming from a variety of sources and may fall to a lower level when

the present study is complete. Part of the study objectives is to estimate sightabilty of goats during aerial surveys. Concern has long been expressed over the portion of the goat population that is observed during a flight and hopefully this study will begin to answer that question.

In 2004, all areas of goat habitat in the Goat Rocks-Tieton River unit were surveyed on the same day. The goal was to provide more through coverage of the combined units.

Population Status And Trend Analysis

Goat populations in Tatoosh seem to be low. In the surveys during 2002-2004 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 kids seen by hunters has been declining in Smith Creek. The survey results from 2004 were higher than recent observations, but that may be due to the increased survey effort associated with the goat study and sightabilty estimate work.

Population status in the Goat Rocks is hopefully on the increase. Survey data from 2004 indicate an increased number of goats, even when the Tieton River unit influence is incorporated The 2004 survey numbers were much higher than the past few years. Knowledge of the 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, their decline 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 meadow (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 to maximize both the consumptive and non-consumptive recreational attributes of these populations. Permit levels for the Tatoosh may be reduced to a minimum level to encourage expansion of the goat population.

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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Bighorn Sheep

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 1
Blue Mountains

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Population objectives and guidelines

The first bighorn sheep population in the Blue Mountains was established on the W.T. Wooten Wildlife Area (Tucannon River) 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; Mountain View, Wenaha, Black Butte, and Asotin Creek herds. The first two populations consisted of California bighorn sheep (Tucannon, Mtn View), but subsequent transplants have consisted of Rocky Mtn bighorn sheep from Hall Mountain in Washington, herds in Montana and Wyoming, and from the Wallowa Mountains in Oregon. Very few California bighorns still exist in the Blue Mountains, 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 Mountain bighorn 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+.

The Hells Canyon Initiative (HCI) was established in 1996, and includes the Washington Dept. Fish & Wildlife, Idaho Dept. of Fish and Game, Oregon Dept. of Fish and Wildlife, U.S. Forest Service, BLM, Nez Perce Tribe (NPT), and the Foundation for North American Wild Sheep. The HCI conducts disease research, develops population survey methodology, conducts transplants, and implements projects designed to improve bighorn sheep habitat. Four bighorn sheep populations in Washington are included in the HCI; Black Butte, Mtn. View, Wenaha, and Asotin Creek.

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.

One raffle permit was authorized by the Fish & Wildlife Commission in 2005 to fund bighorn sheep programs and research in southeast Washington. The permit holder will be allowed to hunt for a ram in the Black Butte, Wenaha, and Tucannon units.

General hunt permits will not be implemented until each bighorn population meets criteria established in the Bighorn Sheep Management Plan.

Treaty hunting by the Nez Perce tribe has 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 the populations never met 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

Table 1. Bighorn Sheep Population Trend and Herd Composition, Blue Mountains 1994-2005 (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
2005	28	121	10	26	46(17)	82	231	250	68:100:23

treaty area to bighorn sheep hunting by tribal members, which is a major step forward in tribal cooperation.

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, supplementing the March helicopter surveys.

Surveys conducted for the five herds in early 2005 resulted in a count of 231 bighorn sheep, 121 ewes, 28 lambs, 82 rams for a ratio of 67 rams and 23 lambs per 100 ewes (Table 1.). Surveys conducted in March of 2005 were not conducted to sightability standards.

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 2004, lamb productivity in the Black Butte, Mountain View, Wenaha, and Asotin herds decreased with lamb ratios of 11, 31, 28, and 31 lambs/100 ewes, respectively. Lamb production in the Tucannon herd is minimal due to the small numbers of ewes in the population; 2 lambs in 2004. 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 slowly, but still remains substantially below the number that existed before the die-off (Table 1).

During the summer of 2005, *Pasturella* pneumonia again resulted in high mortality of lambs in the Black Butte herd. Lamb production/survival in the Asotin herd was also lower than normal. The Wenaha herd faired better, with an August lamb/ewe ratio of 50 lambs/100 ewes.

The Tucannon herd continues to decline due to low ewe numbers and lamb recruitment. This population will not rebound in the near future without a supplemental transplant. In August, 2005, the "School Fire" consumed 51,000 acres in the Tucannon River and Pataha Creek drainages and the entire range of this herd. It appears most of the herd survived, but a survey of this population has not been completed since the fire. The supplemental transplant scheduled for early 2006 will be postponed for at least two years, or until the habitat recovers to a level capable of supporting a healthy population of bighorns.

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. It is too early to determine the impact of the School Fire on the Tucannon range, but it is expected to cause a noxious weed problem during the first 2 –3 years following the fire.

Disease and parasites

Pasturella pneumonia continues to plague three bighorn populations; Black Butte, Wenaha, Mtn. View. The Asotin and Tucannon herds have not been impacted by *Pasturella* pneumonia, but do suffer from scabies. Bighorn populations in the Blue Mtns. have not recovered from the *Pasturella* die-off as quickly as most herds. The slow recovery may be due to constant re-infection from domestic sheep that exist within the herd range of the Black Butte herd. The presence of domestic sheep and goats within and adjacent to bighorn sheep range presents a constant and substantial risk of another major *Pasturella* epizootic.

Other government agencies have encouraged landowners to use domestic goats for weed control. This type of weed control program presents a substantial risk to bighorn sheep populations in southeast Washington.

Two young rams were lethally removed from the Black Butte herd during the summer of 2005, because they came in contact with domestic sheep at a rural residence. Once wandering bighorns have come in contact with domestic sheep/goats, they are removed from the herd because the risk of these bighorns transferring *Pasturella* to the rest of the population is very high.

Scabies (*Psoroptes ovis*) continues to be a problem in all five herds. The Tucannon herd was decimated by a major die-off caused by scabies when it was infected in 1999.

Management conclusions

Three of the five bighorn sheep herds in the Blue Mountains are having difficulty recovering from the *Pasturella* die-off that occurred in 1995-96. The Black Butte, Wenaha, and Mountain View herds are still plagued by periodic pneumonia outbreaks, which result in high lamb mortality. The Tucannon herd escaped the *Pasturella* out-break, but suffered a major die-off after being infected with scabies (*Psoroptes ovis*) in 1999. This herd will not recover without a supplemental transplant. The Asotin herd was not infected by the *Pasturella* outbreak, but has suffered adult mortality due to tribal hunting. Each herd suffers from various

problems that result in mortality of adults and lambs. These mortality factors limit the ability of individual herds to increase in numbers.

Domestic sheep and goats continue to be a major problem for bighorn sheep populations in the Blue Mountains. Some rural landowners acquire domestic sheep and goats to control weeds. This practice poses a severe threat to the Black Butte and Asotin bighorn populations.

The Hells Canyon Initiative has developed an informational pamphlet for landowners, which spells out the risks of contact between domestic sheep/goats and bighorn sheep. The risk of another *Pasturella* outbreak in the bighorn population is substantial unless rural residents can be discouraged from acquiring domestic sheep/goats, or provide pens that prevent contact between domestics and bighorn sheep,.

Bighorn sheep populations in the Blue Mountains do not meet the criteria listed in the Bighorn Sheep Management Plan for establishing hunting opportunity, with the exception of the Wenaha herd. However, poor lamb survival continues to plague the Wenaha herd, and establishing a hunting season warrants caution. In the future, as each herd meets the criteria, hunting opportunities may be offered.

Table 2. Asotin herd population trend and composition counts, 1994-2005, Blue Mtns., Washington.

			Rams				Count	Population	
Year	Lambs	Ewes	Yr.	< 3/4	> 3/4	Total	Total	Estimate	Per 100 Ewes
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
2005	8	26	3	1	6 (0)	10	44	50	38:100:31

Table 3. Black Butte herd population trend and composition counts, 1977-2005, Blue Mtns., Washington.

			Rams				Count	Population	
Year	Lambs	Ewes	Yr.	< 3/4	> 3/4	Total	Total	Estimate	Per 100 Ewes
1977	3	7		2		2	12		29:100:43
1978	3	9		3		3	15		33:100:33
1979	6	12		6	2	8	26		67:100:50
1980	4	13		5	1	6	23		46:100:31
1981	9	17		10	3	13	39		76:100:53
1982	7	10		7	2	9	26		90:100:70
1983	11	17		9	4	13	41		77:100:65
1984	7	31		6	10	16	54		52:100:23
1985	18	34		8	10	18	80		53:100:53
1986	25	33		14	10	24	82		76:100:76
1987	28	46		13	13	26	100		56:100:60
1988	19	56		23	13	36	111		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	18:100:06
1996	2	29	2	1	2	5	36	45	17:100:07
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	76:100:54
2004	9	26	6	4	7 (1)	17	52	57	27:100:35
2005	5	45	3	12	10 (2)	25	75	80	33:100:11

Table 4. Mountain View herd population trend and composition counts, 1974-2005, Blue Mtns., Washington.

			Rams				Count	Population	
Year	Lambs	Ewes	Yr.	< 3/4	> 3/4	Total	Total	Estimate	Per 100 Ewes
1974	5	6		3	0	3	14		50:100:75
1976	3	6		2	1	3	12		50:100:50
1977	5	7		3	2	5	17		71:100:71
1978	6	7		4	2	6	19		86:100:86
1979	6	12		6	2	8	26		67:100:50
1980	9	16		4	6	10	35		63:100:56
1981	12	17		7	8	15	44		88:100:71
1982	11	21		7	7	14	46		67:100:52
1983	7	17		8	2	10	34		59:100:41
1984	10	29		11	8	58	66		66:100:41
1985	13	28		10	5	15	56		54:100:46
1986	15	35		13	7	20	70		57:100:43
1987	20	38		10	4	14	72		37:100:52
1988	6	15		5	2	7	28		47:100:40
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	2	1	0	3	18	18	21:100:07
1997	3	14	1	1	2 (1)	3	21	23	29:100:21
1998	5	12	3	2	2 (1)	7	24	28	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	25	64:100:00
2004	10	14	2	2	3 (1)	7	31	32	50:100:71
2005	4	13	2	5	2 (1)	9	26	30	69:100:31

Table 5. Tucannon herd population trend and composition counts, 1975-2005, Blue Mtns., Washington.

			Rams				Count	Population	
Year	Lambs	Ewes	Yr.	< 3/4	> 3/4	Total	Total	Estimate	Per 100 Ewes
1975	4	7		1	3	4	15		57:100:57
1976	4	9		2	2	4	17		44:100:44
1977	2	10		3	2	5	17		50:100:20
1979	4	10		6	3	9	23		90:100:40
1980	3	13		7	4	11	27		85:100:23
1981	9	14		4	7	11	34		79:100:64
1982	5	17		6	6	12	34		71:100:29
1983	4	20		6	5	11	35		55:100:20
1984	4	23		5	7	12	39		52:100:17
1985	4	20		6	7	13	37		65:100:20
1986	7	18		6	10	16	41		89:100:39
1987	8	20		7	11	18	46		90:100:40
1988	8	21		10	10	20	49		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
2005	2	5	2	1	4 (2)	7	14	14	140:100:40

Table 6. Wenaha herd population trend and composition counts, 1983-2005, Blue Mtns., Washington.

			Rams				Count	Population	
Year	Lambs	Ewes	Yr.	< 3/4	> 3/4	Total	Total	Estimate	Per 100 Ewes
1983	5	10		5		5	20		50:100:50
1984	3	12					15		00:100:25
1985	10	13		3		3	26		23:100:78
1986	10	14		4	1	5	29		36:100:71
1987	13	23		15	6	21	57		91:100:57
1988	17	28		8	7	15	60		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	40:100:38
1996	2	43	4	0	0	4	49	50	09:100:05
1997	4	50	1	7	4	12	62	69	24:100:08
1998	4	27	3	4	8 (1)	15	46	55	56:100:15
1999	12	27	2	4	0	6	45	60	22:100:44
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	75	66:100:53
2005	9	32	0	7	24 (12)	31	72	76	97:100:28

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 from then on. Reconnaissance of the feeding site vicinity was made the first winter, 2003-2004, to assess reaction of the sheep to the loss of the feed source. Few sheep were observed. A reconnaissance survey accomplished the following year on January 6, 2005 documented 27 Bighorn Sheep at the old feeder site. As these sheep are replaced by their progeny, however, we expect the herd to lose its "corporate memory" of winter-feeding, and become less likely to virtually "camp out" at the old feeder site.

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 occasionally mix with the Hall Mountain Herd. The Canadian bighorn sheep have also been surveyed by citizens there each year since at least 1998 at a winter-feeding station near Canada Highway 3. Count totals at this feeder on January 3, 2005 included 6 lambs, 20 ewes, and 9 rams for a lamb/ewe/ram ratio of 30 L : 100 E : 45 R (Woods, pers. comm. 2005).

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 April 27, 2005. Radio signals were received from 2 ewes (Table 2).

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 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. Of the remaining 5 radio-collared sheep, 2 were observed at the Canada Highway 3 Feeder in February 2005 and the other 3 have been monitored by radio telemetry as recently as January and April of 2005 (Table 2). All of the radio collars have been deployed for well over 5 years now, so we expect the batteries to become fully depleted at any time.

On April 15, 2005 we accomplished a helicopter survey of Hall Mountain and observed 21 bighorn sheep including 4 rams, 10 ewes and 7 lambs. We hope to continue periodic helicopter surveys of this population, especially in years that we are unable to obtain a more comprehensive census.

Population status and trend analysis

From the January 2005 feeder site survey and the helicopter survey of April 15, 2005, we know by composite count that there were no fewer than 27 Bighorn Sheep comprising the Hall Mountain Herd as of early 2005. This population includes at least 6 rams, 14 ewes, and 7 lambs. The recruitment of 7 lambs from 2004 that survived over the winter to the end of April 2005 is especially encouraging, and is hopefully indicative of a growing population.

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

Table 1. Population composition counts of Hall Mountain Bighorn Sheep since herd establishment in 1972 to 2005. (Note that the last year of winter feeding was in 2003. Also, 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
2004	No Data	No Data	No Data	No Data				No Data
2005	7	14	6	27				50 : 100 : 43

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 symptomatic of such a bottleneck for the sheep herd.

The U.S. Forest Service owns virtually all of the bighorn sheep habitat. Consequently, there are no immediate threats to habitat quality and quantity. The U.S. Forest Service plans to continue to actively manage winter range habitat with controlled burns as the need and opportunity arises. There are no domestic animals grazing on the portion of the national forest frequented by the bighorn sheep.

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 2002-2003 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 opportunity to avoid and escape predators. A few visits have been 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.

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 2004-2005. 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 winters of 2003-2004 and 2004-2005 were the first full seasons without feeding or close human interaction. There was concern that the sheep would descend on the nearest local residents looking for food. Fortunately that did not happen.

With the loss of our ability to reliably survey sheep at the feeder site each winter, our time and money has now turned to developing new survey techniques and protocol. We lost one year with no survey data. Given the count of 27 bighorn sheep in early 2005, we know that we are dealing with a small herd with probably fewer than 10 rams. We hope to monitor the herd closely over the next few 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. (Five individuals marked with an asterisk have been detected since January 1, 2005.)

Ear Tag Number	Month / Year Radio-Tagged	Sex	Capture Age	Most Recent Status
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 02/10/2005.
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, 04/27/2005.
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	Last observed at Canada Highway 3 Feeder on 02/10/2005.
Lavender 51	01/1999	F	4+	Mortality in March 2000.
* Lavender 52	01/1999	F	4+	Radio signal received near Sullivan Lake, 04/27/2005.
* Lavender 54	01/1999	F	6.5	Radio signal received near Sullivan Lake, 01/05/2005 and observed on the northwest side of Sullivan Lake in July 2005.
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.

* Individual has been detected since January 1, 2005.

BIGHORN SHEEP STATUS AND TREND REPORT 2005: REGION 1
Lincoln Cliffs

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

Population objectives and guidelines

The management objective for the Lincoln Cliffs (Sheep Unit 12) 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).

The 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 Cliffs area, and now, 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.

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
2004	1,311	50	10	9

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, but rose to 1,311 in 2004. Interest in the Lincoln Cliffs herd may be evidenced by the fact that the winner of the statewide auction selected Lincoln Cliffs in both 2003 and 2004 to harvest a ram.

From 1997 to 1999, hunters spent an average of 6 days hunting; from 2001 to 2004 hunters have spent an average of 3.5 days hunting before being successful. This past year while the days/kill for the regular permit hunter rose to 7.0, the auction animal was harvested in just 1 day.

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. However, 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 the radio collaring of thirteen of the 15 sheep translocated in 2003 (Table 2).

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 to supplement the aerial surveys when possible.

Table 2. Lincoln Cliffs bighorn sheep composition counts.

Year	Total Sheep	Rams	Ewes	Lambs	R:100E:L ratio
1992	20	-	-	-	-
1993	26	6	13	7	45:100:57
1994	35	8	17	10	47:100:59
1995	45	11	21	11	52:100:52
1996	65	15	33	16	46:100:48
1997	90	23	42	25	55:100:60
1998	102	16	49	37	32:100:76
1999	88	25	44	18	56:100:41
2000	95	21	46	29	47:100:69
2001	No Survey Conducted				
2002	36	19	13	4	146:100:31
2003	53	13	27	13	48:100:48
2004	64	19	37	11	51:100:30

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 this release, the population showed a steady increase and eventually 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.).

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. So, from 1999 to 2001, 27 ewes and 1 ram were removed from this population. In addition, there have been 20 known mortalities since 1996 – 17 rams and 3 ewes. Therefore, from 1996 to 2005, approximately 48 sheep have been removed from the population – 18 rams and 30 ewes.

With this high number of animals being removed, the subsequent low number of sheep observed by the permit hunter in 2001, and 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 and Whitestone areas 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 and another dead ewe was found in November 2004. From May 2003 to September 2005, 13 known sheep mortalities have occurred -- 4 from hunting, 1 from a vehicle collision, 3 from cougar, 2 natural, and 3 unknowns -- a total of 9 rams and 4 ewes.

The population in early 2003 was estimated to be around 60 animals, the 2004 population around 70-75 animals, and the 2005 (as of May) around 75-80. Lamb production appeared to be low with the 2004 aerial survey showing a ratio of 30 lambs to 100 ewes, however no trend is apparent with lamb ratios varying from 31 in 2002, 48 in 2003 and 30 in 2004. Mortality of the 15 released animals released in 2003 has been approximately 10% each year, with a total of 6 mortalities since release – 1 ram and 5 ewes. Cougar has been the source of 3 of those deaths.

Four mature rams have been removed in the past 2 years with both the regular permittees and auction winners being successful.

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 Valley, but follow up observations indicate they did not survive. In the future, we will attempt to distribute big horn 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, however, the presence of domestic sheep and goat herds within the unit represent an ongoing disease threat.

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, splitting of parcels all increase the future potential for sheep-human conflicts.

Management conclusions

The herd is now estimated to number around 75-80 animals. This population level is at or just above the management objective (70 sheep) for the Lincoln Cliffs herd as stated in the Bighorn Sheep Herd Plan (WDFW 2003).

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.

Permit controlled hunting for rams will be continued in the 2005-2006 season.

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BIGHORN SHEEP STATUS AND TREND REPORT: REGION 1
Vulcan Mountain

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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 were issued from 2000 through 2004. 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.

Bighorn sheep were counted and classified on October 21, November 17, and November 23, 2004. Table 1 provides the composite count for the fall of 2004 of 17 rams, 20 ewes, and 9 lambs.

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. Fall surveys in 2003 and 2004 documented at least 9 lambs recruited into the population for both years.

The population trend continues to improve through 2004 as the total fall composite count increased from 36 in 2003 to 46 in 2004 (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 1981 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 from 1999 through 2004.

Herd health and productivity

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

Table 1. Annual population composite counts of the Vulcan Mountain Bighorn Sheep Herd from 1980 through 2004.

			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
2004	9	20	5	7	5	17	46	45 : 100 : 85

* Annual "censuses" have been conducted regularly in the fall from 1990 on.

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).

Parasite levels in the Vulcan Mountain Herd were monitored in October of 2004 and again in March of 2005. Fecal samples were collected and submitted to Washington State University Veterinary Sciences Laboratory for analysis. In the October collection, 4 of 16 samples contained low to moderate levels of dorsal-spined larvae, and 1 sample contained low levels of *Protostrongylus* larvae. The 9 samples from March of 2005 contained no lungworm larvae (Foreyt, 2005). These results indicate relatively low parasite levels (Mansfield, 2004). The fact that the bighorns appear healthy and are producing lambs annually 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 application was to document range use, especially 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 (Doloughan, 2004).

In the past six years several projects to enhance habitat for the Vulcan Mountain Bighorn Sheep have been completed. These include broad range weed control, selective logging, 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. As an example, one of the private property forage range seeding projects accomplished in 2002 was followed up in 2004 with weed treatment.

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

The most recent large-scale project was the completion of a BLM timber sale within the core sheep range in 2004. This helicopter-logging project was designed to improve predator avoidance for bighorn sheep by elevating sight distances within the most heavily forested portions of their range, as well as increase forage production (Doloughan, 2004). The BLM provided a tour of the project in late November 2004 to WDFW and a journalist. It appeared sheep and deer were already taking advantage of the improved forage production that the increased sunlight had stimulated. Slash burning and grass seeding were scheduled for later in the fall or winter.

Management conclusions

The Vulcan Mountain Herd of bighorn sheep appears to have recovered in health and is now recovering in population. Lamb ratios for the last 2 years combined have averaged about 50 lambs per 100 ewes, a sign of a building population. With continued normal lamb recruitment, the Vulcan Mountain Herd should return to the population goal of 80 – 110 animals within a few years.

The 2004 fall census results indicated that the Vulcan Herd could sustain limited ram hunting again. The population parameters for establishing a permit were met (WDFW, 2003), as the population is stable or increasing; has more than 30 adult sheep; and has 8 or more ½ + curl rams of which 2 or more are greater than ¾ curl (Table 1). One permit for any ram was authorized for the 2005 fall season.

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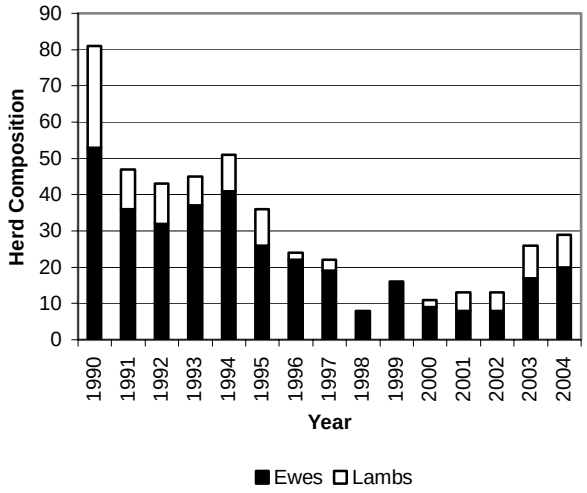

Figure 1. Vulcan Mtn. Bighorn sheep ewe and lamb composition, 1990-2004.

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 Stemilt 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 bighorns 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 suitable historic but unoccupied habitat within the District; and (5) provide public viewing opportunities.

There were an estimated 50-60 bighorns in the Swakane herd in June 2005. 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 2005, 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 (≥3/4 curl). For 2002, one permit was offered for the Swakane and the auction hunter also hunted the area. Both hunters took large ≥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 6 non-hunting bighorn mortalities occurred in 2004-2005, all caused by vehicle collisions on highway 97-A. For 2005, there will be one permit in Swakane, and two permits on the north shore of Lake Chelan. No hunting will occur in the 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). Sheep observations were down in 2004-2005 due to both extremely mild winters, and WDFW hazing efforts to discourage bighorns along 97-A. Radio transmitters would help locate groups of sheep and improve survey data. A minimum of 38 individual bighorns was observed during the reporting period, comprised of 15 ewes, 10 lambs and 13 rams; however, we believe there are at least 50-60 bighorns in this population.

On July 5, 2005, the Lake Chelan herd was surveyed by helicopter, using radio-telemetry (n = 8) to locate collared sheep. Telemetry proves invaluable for finding sheep hiding in timber or rocky habitat. Thirty-nine sheep were found on the north shore of Lake Chelan. Composition consisted of 1 rams (< 3/4 curl), 28 ewes, and 10 lambs (Table 3). One adult ram mortality (7 y.o., ¾ curl) was observed on this survey. In addition, a group of 17 rams (at least 5 > ¾ curl) were reported by an experienced volunteer July 3, 2005, for a minimum observed population of 55 (Table 3).

On November 6, 2004, 2 rams, 23 ewes and 9 lambs were observed at Chelan Butte, for a minimum of 34 sheep.

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 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 2004, compared to the observed average of 4.4 lambs for 1992-2001. Bighorn observations decreased in 2004, due to a combination of hazing efforts and very mild, open winter conditions, which reduced sightings. 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 13 Swakane bighorns have been killed by vehicles on Highway 97-A (7 male, 6 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. It is likely these mortalities have either slowed or eliminated herd growth. 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. This group is seeking funding to build a game proof fence west of Highway 97-A to reduce wildlife vehicle collisions.

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 were observed prior to 2004. 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 prior to 2005, indicated a 3 year average annual population growth rate of 38%. Total count trends indicate a three-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. Observed ewe:lamb numbers in 2005 were much lower, due to both timing of the survey, limited flight resources, and fewer radio collars. However, winter 2004-2005 was extremely mild, and it is believed that this herd was either stable, or increased. As a result, the 2004 population estimate of 98-129 is retained for 2005, as a conservative estimate. At the other extreme, applying the 38% population growth rate figure to the 2004 estimate indicates the population could be as high as 135-178.

In the Chelan herd, only one radioed ewe has died, hit by a train in February 2005. Assuming all other released adults survived, had identical recruitment to the observed ewes, and released lambs survived and were recruited as yearlings (classified as adults on the survey), the maximum fall 2004 population was 53. The actual fall 2004 population was therefore in the range of 34-53 (Table 4).

It had been believed less than 20 bighorns that use the Colockum and Stemilt watersheds within the Wenatchee District. These sheep are part of the Quilomene herd. In July 2005, a wildlife officer observed 12 ¾ curl or larger rams in a field near Alcoa. If these are resident rams, this observation suggests this subpopulation may be larger than previously thought.

Habitat condition and trend

Habitat conditions for Swakane, Lake Chelan and Chelan Butte 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 be excellent, 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

No reports of agricultural damage attributed to bighorns were received in 2004. In previous years, 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 likely continuing to grow, 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. Augmentation will be postponed until conflicts with domestic sheep are resolved.

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. In 2005, several landowners were contacted regarding the possibility of introducing bighorns. Response was negative, however it appears concerns centered more on lack of interest in working with WDFW and concerns about endangered species, rather than opposition to bighorns. The Foundation for North American Wild Sheep may be able to secure agreements for bighorn reintroduction, if landowner concerns can be addressed. 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 in 2003. 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 worked on a Memorandum of Understanding concerning bighorn management, but no progress occurred in 2004-2005. These efforts were 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 sometimes being highly accessible to the viewing public during the winter months. Viewing opportunities, in particular large adult rams, are highly valued by the viewing public. Harvest management should be conservative to maintain this viewing opportunity. Further investigations of strategies to reduce highway mortalities are warranted and ongoing.

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 will begin in 2005, with 2 permits 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.

The observation of 12 mature rams near Alcoa is higher than previously documented in this area. Consideration should be given to expanding the Quilomene hunt area boundary north to include this area.

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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. Observed population composition of the Swakane bighorn sheep herd, Chelan County, 1992-2004.

				Rams			Total	Population	Lambs:	Rams:
Year	Lambs	Ewes	Yrl	<3/4curl	≥3/4 curl	Total rams	sheep	estimate	100 ewes	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
2004	10	15	1	6	6	13	38	50-60	67	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, 1999-2005.

			Rams				Total	Lambs:	Rams:	Population
Year	Lambs	Ewes	Yrl	<3/4 curl*	≥3/4 curl	Total rams	sheep	100 ewes	100 ewes	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
2005	10	28	0	12	5	17	55	36	61	98-129

Table 4. Observed population composition and minimum estimated population of the Chelan Butte Bighorn sheep herd, Chelan County, 2004-2005.

			Rams			Total	Total	Lambs:	Rams:	Population
Year	Lambs	Ewes	Yrl	<3/4 curl	≥3/4 curl	rams	sheep	100 ewes	100 ewes	estimate
2004	10	23		3		3	36	43	13	36-47
2005	5	27	1	1		2	34	19	7	34-53

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. The number of permits and harvest are given in Table 1.

Surveys

Quilomene, Umtanum/ Selah Butte, and Tieton are typically surveyed via helicopter. 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). Since January 2001, 64 animals have been captured and trans-located to enhance or re-establish other herds in Washington. Ground counts documented 177 animals in 2004, but rams were likely missed.

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. In 2005, 289 sheep were seen on the survey, an increase of over 100 from any previous survey. A large portion of the increase was due to the establishment of a new group of sheep at the south end of the unit, which has grown to over 70 animals. Lamb production was also at a record level in 2005. It is possible some animals were double counted, but the Umtanum/Selah butte herd has grown rapidly in recent years and is generating complaints from the one private ranch in the area.

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, 2 rams legally harvested, 1 ewe predated (probable bear), and 4 road kills (3 ewes, 1 lamb). A total of at least 91 lambs have been produced in 8 years. In 2005, an aerial survey documented 112 sheep, but few

rams. Sheep were likely double counted in 2005, as most of the large lamb/ewe group was in one area. The actual population is probably close to 112, but with more rams and fewer ewes than surveys indicated.

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 Clemans and Tieton areas have regenerated new growth that should benefit sheep.

Augmentation/habitat Enhancement

In the past 6 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 8 years and should be continued.

Table 1. Summary of bighorn sheep harvest in Region 3.

Area	Year	Permits	Harvest	Comments
Cleman Mtn.	1996	1	1	
	1997	2	2	
	1998	4	6	Harvest includes raffle and auction hunters
	1999	3	2	One hunter became ill and could not hunt
	2000	5	6	Harvest includes auction hunter
	2001	6	8	Harvest includes raffle and auction hunters
	2002	3	3	
	2003	6	7	Harvest includes raffle hunter
	2004	7	8	Harvest includes auction hunter
Umtanum	1990	5	3	
	1991	3	3	
	1992	3	3	
	1993	3	3	
	1994	3	3	
	1995	3	3	
	1996	3	3	
Umtanum-	1997	3	3	
Selah Butte	1998	4	4	
	1999	4	4	
	2000	3	4	Mt. Hull hunter allowed to hunt area
	2001	8	7	
	2002	7	7	
	2003	7	6	
	2004	7	7	
Quilomene	1998	1	0	
	1999	3	6	Harvest includes auction, raffle, and 1 accidental
	2000	3	4	Harvest includes raffle hunter
	2001	6	5	
	2002	8	9	Harvest includes raffle hunter
	2003	7	6	
	2004	5	5	
Tieton	2004	2	2	

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	
2005	16	77	24	21	117	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	
2005	28	82	67		177	188	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	200	
2003	26	94	52	38	172	220	
*2004	33	87	28		148	240	
2005	61	159	69	54	289	275	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	
2005	20	88	4	3	112	110	75-150

Moose

MOOSE STATUS AND TREND REPORT: REGION 1
GMUs 101, 105, 108, 111, 113, 117, 121

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

Population objectives and guidelines

Statewide goals for managing moose include the following: (1) To preserve, protect, perpetuate, and manage moose and their habitats to ensure healthy, productive populations ; (2) To manage moose for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing and photography ; and (3) To manage statewide moose populations for a sustained yield by hunting.

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 2004 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. Once again in 2004 a drawing for three "antlerless only" permits specifically for persons with disabilities was offered in GMU # 117. General permit season dates remained October 1st through November 30th. All moose units were open for the use of any legal hunting method (archery, muzzleloader, or modern firearm) to provide eligibility to all hunters for all units and to maintain hunter choice. Except for the 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 45 bulls and 6 cows within the Colville District units in the 2004 season (Table 1). The hunter success rate was 91% and hunters averaged 5.7 days hunting per moose harvested. The 49 Degrees North B Hunt for persons with disabilities had 2 antlerless moose harvested out of the 3 permits issued for a 67% success rate. Hunters there averaged 9 days hunted per antlerless moose harvested.

Table 1. Colville District (GMUs # 101/105, 108/111, 113, 117, and 121/124 West) moose harvest and hunter effort, 1992 – 2004.

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
2004	56	91 %	45	6	51	291	5.7

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.

The 2004 winter helicopter survey was accomplished in the Selkirk Mountains and 49 Degrees North Game Management Units (Table 2). The sighting rate was 13.9 moose per flight hour. The bull and calf to cow ratio was 83 bulls and 45 calves per 100 cows respectively.

Moose hunters provide their observations with the mandatory report. Hunters reported observing 307 moose within the Colville District during the 2004 season which yielded a bull : cow : calf ratio of 118 bulls and 34 calves per 100 cows respectively (Table 3). This ratio was higher for bulls and lower for calves than our observed ratio from the post-season (early winter) helicopter flights (Table 4 and Figure 2).

Population status and trend analysis

Early winter composition survey flights have been accomplished each year for the last 11 years (Table 4 and Figure 2). The trend in the bull to cow moose ratio appears to be fairly stable and reasonably high in bulls.

A ratio of 70 or more bulls per 100 cows is typical. The eleven-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 a detrimental 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 2004, the mean antler spread of harvested bull moose was a little over 38 inches. The average age of bull moose taken in 2004 was 5.4 years. Mostly bulls over 5 years of age were harvested in 2004, which has also been the case in 6 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. The 2004-2005 winter was exceptionally 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 2005 increased by 2 from 2004, going from 56 to 58 tags allocated within the Colville District. Tags were increased only in the Huckleberry Range Special Hunt (GMU # 121 and 124 W.), however, from 4 permits in 2004 to 6 permits in 2005. 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.

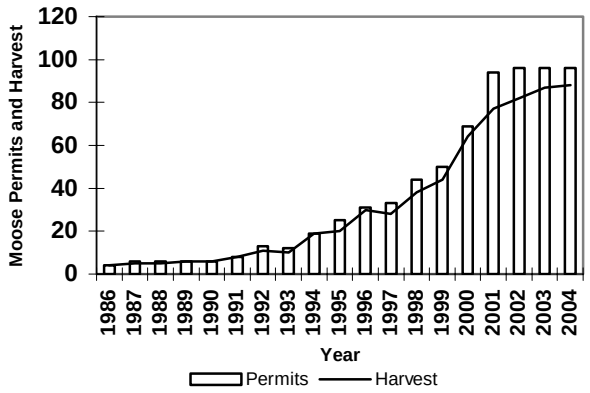

Figure 1. Statewide moose permit levels and harvest, 1986-2004.

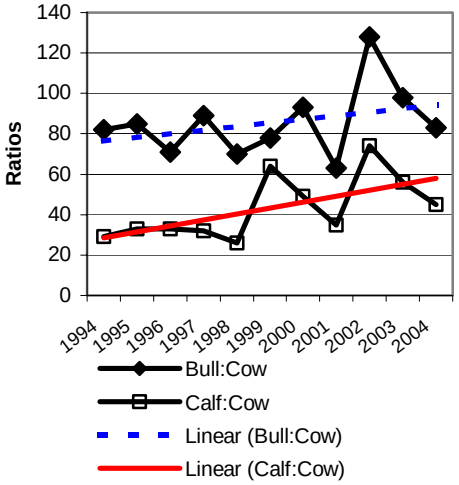

Figure 2. Composition and trends of moose herds as determined by early winter helicopter surveys 1994 - 2004. Areas surveyed vary annually.

Table 2. Composition counts of moose for helicopter-surveyed areas in the 2004 winter.

Area	GMU	Date	Bull	Cow	Calf	Total	Bull / Cow / Calf Ratio Bulls :100 Cows : Calves	Hours	Moose/hour
Selkirk Mountains	113	12/12/2004	18	23	10	51	78 : 100 : 43	5.5	9.3
49 Degrees North	117	12/20/2004	21	24	11	56	88 : 100 : 46	2.2	25.5
Overall :			*39*	*47*	*21*	*107*	*83 : 100 : 45*	*7.7*	*29.6*

Table 3. Moose hunter observations and days per kill in the Colville District for the 2004 season.

Area	Average Number of Days per Kill	Average Number of Moose Seen per Hunter	Bulls/Cows/Calves	Total Moose	Bull / Cow / Calf Ratio Bulls : 100 Cows : Calves
Kettle Range	No harvest	0	None observed	0	--
Three forks	9.8	5.2	13 / 18 / 0	31	72 : 100 : 0
Selkirk Mtns.	6.1	3.1	37 / 17 / 4	58	218 : 100 : 24
49 Degrees N	4.8	8.1	87 / 83 / 33	203	105 : 100 : 40
Huckleberry Mtns.	2.3	3.8	7 / 4 / 4	15	175 : 100 : 100
Overall :	*mean = 5.7*	*mean = 5.7*	*144 / 122 / 41*	*307*	*118 : 100 : 34*

Table 4. Summary of early winter survey effort by helicopter on moose within the Colville District from 1994 through 2004.

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
2004	113 , 117	7.7	107	13.9	83 : 100 : 45

Table 5. Tooth age and antler spread in inches for harvested bull moose in the Colville District from 1992 through 2004.

Year	Sample Size for Aging	Mean Age (years)	Sample Size for Antler Spread	Mean Spread (inches)	Yearling	2-5 years old	> 5 years old
1992	5	4.5	7	39	0%	80%	20%
1993	6	5.0	6	35	0%	67%	33%
1994	8	3.9	12	36	0%	75%	25%
1995	8	5.9	8	37	0%	50%	50%
1996	17	5.7	17	37	6%	29%	65%
1997	16	4.1	17	34	13%	56%	31%
1998	22	4.8	24	41	0%	55%	45%
1999	22	5.4	26	36	10%	45%	45%
2000	34	6.7	34	41	0%	37%	63%
2001	32	6.9	36	39	0%	31%	69%
2002	37	5.1	37	36	3%	61%	36%
2003	46	5.3	45	39	0%	46%	54%
2004	39	5.4	44	38	5%	41%	54%

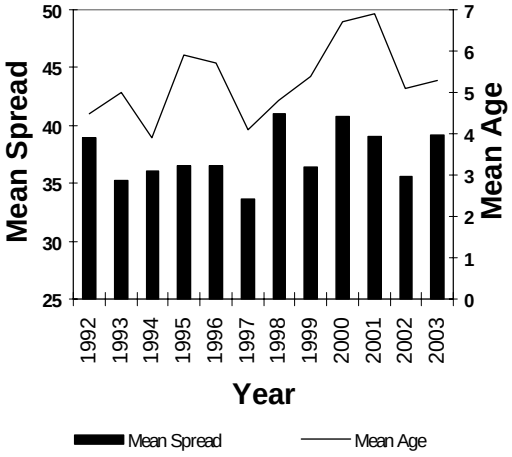

Figure 3. Average age (years) and antler spread (inches) of bull moose harvested within the Colville District, 1992 - 2003.

MOOSE STATUS AND TREND REPORT 2005: 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 (as of 2004 waived for antlerless-only hunts, raffle and auction hunts).

Permit season dates remain October 1 - November 30, 2004. 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 applications in 2004 increased to 12,990, up from 11,448 applicants 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 2004, with participation rates in each hunt at 100%. Thirty-five moose were killed (13 bulls, 22 cows) for an overall hunter success rate of 92%. The mean number of days hunted per hunter was 6.6 days up from 4.1 days in 2003 (Table 1). The success rate for the youth hunt in GMU 124, Mount Spokane, dropped to 87.5% from 100% in 2003 and 2002.

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's Wildlife Science Division, 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.). 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, 2003-04 and 2004-05 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 Washington-Idaho units were flown again in 2004-05. Two additional survey quadrats were established in the Hangman unit in 2002-03 and resurveyed in 2003-04 and 2004-05. 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, and 2004) 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. Winter surveys during 2004-05 resulted in observed high moose densities in the Mt. Spokane, Hangman and Idaho units, indicating the need for long-term trend data in managing moose. The mean antler size for bulls harvested in 2004 in the Mt. Spokane unit is 35 inches, while the mean antler size for the Hangman unit declined to 33 inches (Figure 1). By contrast, mean antler size in the Colville District was

38 inches in 2004. 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 in the Mt. Spokane unit were reduced to 30 in 2003 from a high of 40 to address this problem. However, permits at Hangman were increased from 5 to 8. 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. Management in this district is compounded by the fact that the moose regularly move from Washington to Idaho and back. Numbers vary throughout the season likely depending on hunting pressure, weather and snow conditions.

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).

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.

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.

Table 1. Moose harvest and hunter success for GMUs 124, 127 and 130.

Year	Permits	Success	Bulls	Cows	Total	Days/Kill
1993	3	100%	3	0	3	5.3
1994	4	100%	3	1	4	11
1995	5	100%	5	0	5	3.8
1996	8	100%	6	2	8	5.3
1997	11	91%	10	0	10	4.4
1998	15	87%	8	5	13	3.4
1999	17	100%	9	8	17	2.6
2000	27	96%	6	18	24	3.8
2001	45	82%	18	19	37	8.7
2002	45	96%	15	25	40	8.2
2003	38	97%	13	24	37	4.1
2004	38	92%	13	22	35	6.6

Table 2. Moose numbers and density by survey quadrat for years 1999, 2002, 2003 and 2004.

Survey	Number of Moose Observed				Density (moose/km^2)			
Quadrat #	1999	2002	2003	2004	1999	2002	2003	2004
9	-	0	0	-	-	0	0	-
10	-	5	0	6	-	0.14	0	0.13
11	1	-	-	-	0.02	-	-	-
12	7	6	9	-	0.13	0.11	0.17	-
13	7	7	8	29	0.08	0.08	0.09	1.05
14	20	17	23	17	0.73	0.62	0.84	0.18
15	6	10	3	-	0.13	0.22	0.07	-
16*	27	-	-	46	0.24	-	-	0.41
17*	7	-	-	-	0.17	-	-	-
18*	5	-	-	-	0.11	-	-	-
19*	8	-	-	52	0.08	-	-	0.57
100	-	25	7	-	-	0.76	0.21	-
101	-	21	10	-	-	0.55	0.26	-
102**	-	-	-	57	-	-	-	1.18

Table 3. Moose observations and herd composition during aerial surveys from 1990 to 2004.

Survey Area	Year	Bull	Cow	Calf	Total	Bulls:CowsCalf
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
Idaho-Unit*	2004	31	46	21	98	67:100:46
Mt. Spokane Unit	2004	14	22	16	52	64:100:73
Hangman Unit	2004	18	19	20	57	95:100:95

* Survey unit primarily in Idaho

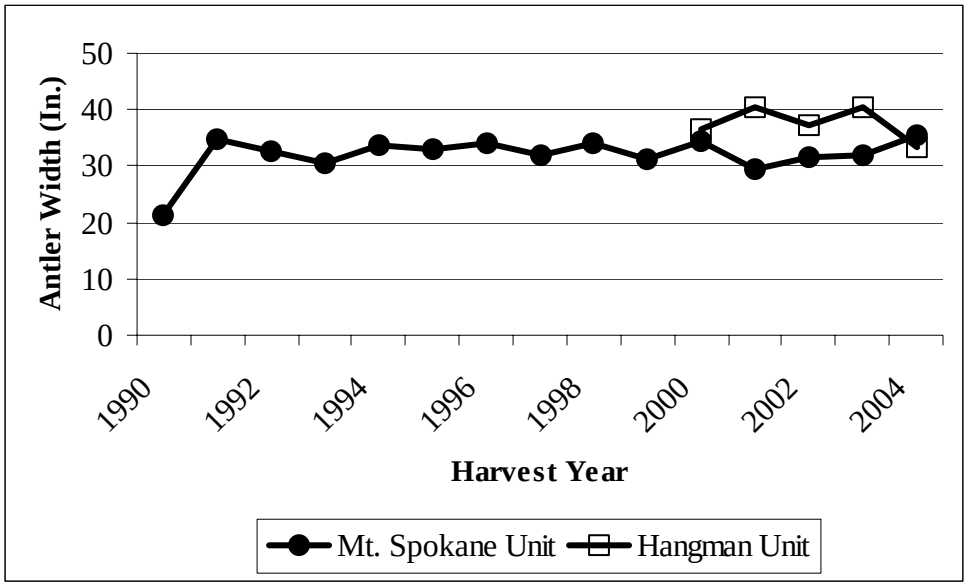

Figure1. Average antler width (in.) for bulls harvested in the Mt. Spokane (GMU 124) and Hangman (GMU 127 and 130) units.

Black Bear

BLACK BEAR STATUS AND TREND REPORT: REGION 6
Coastal Black Bear Management Unit (BBMU1)

WARREN MICHAELIS, Wildlife Biologist

Population Objectives/guidelines

In view of the implementation of Initiative 655 in November of 1996 as well as the increasing number of bear complaints in residential areas the primary objective at this time is the control of a population likely to increase.

Hunting Seasons And Harvest Trends

The estimated total black bear harvest for the coastal region in 2004 was 293 (Table 1). Estimated total harvest increased from the 2003 and 2002 seasons. About sixty eight percent of this total was males and thirty two percent females. Percent female harvest was similar in proportion with the reported 2003 percent female total harvest.

Hunter success increased as days/kill decreased from the 2003 bear harvest statistics (Table 1). The 2004 general black bear season extended from August 1 through November 10.

Nuisance and Damage Activity

Spring timber damage seasons in region 6 are on a "as needed" basis. Total take for the 2004 spring season was up from the 2003 spring season with 86 bears. This year 100 permits were issued to hunters for a special spring bear season in the capitol forest GMU 663. Season for permit holders was from April 15, 2005 to June 15, 2005. A total of total of 14 bears were taken. In addition for 2004, a second special damage hunt was held on the Quinault Indian Nation (QIN) reservation. A total of 51 permits were issued for state hunters and it is not known how many bears were harvested from QIN. The tribe is unwilling to share bear harvest information

Population Status And Trend Analysis

The age distribution of bears harvested in the last nine years is listed in Table 2. The median age for black bear harvested in 2004 was determined by cementum annuli from black bear tooth samples submitted by successful hunters. Sixty four teeth from male bears and 46 from females were aged. The median ages for males harvested in 2004 was 4.0. One male harvested was estimated to be 34.5 years. Male bears harvested from the Coastal BBMU have been frequently documented above 24.5 years of age (Table 2). The median ages of females harvested for 2004 was identical to the previous 2003 samples submitted.

Management Conclusions

Total estimated harvest of black bears for 2004 (293) increased from the 2002 and 2003 estimates. Since 2001 harvest estimates were calculated using the new mandatory harvest reporting system. Since 1996, total female harvest has comprised 48 percent of the harvest. This could be a result of the type of hunting method used rather than a function of increased population growth. A common method used by hunters in the coastal area is to find suitable bear habitat and wait until an animal is seen. This type of method would then tend to produce a higher proportion of females in the harvest compared to the methods used prior to Initiative 655. The use of dogs would tend to select for males rather than females since male bears cover greater distances and hence be more avaialable and more likely to be detected along roads (Kohler and Pierce 2003, Pers. Obs).

Future management-oriented research will include long term monitoring of adult female and cub survival. This radio telemetry monitoring will be conducted in GMU 663 Capitol Forest to more effectively monitor management actions and provide information on long-term population parameters.

Table 1. Region 6 bear harvest summary 1996-2004.

Year	Male	Female	Total	Days/Kill	Hunter Success
2004	200	93	293	119	8%
2003	135	71	206	176	5%
2002	150	77	227	198	5%
2001	178	97	275	184	6%
2000	127	32	159	327	2%
1999	126	98	224	401	3%
1998	131	90	221	178	5%
1997	102	56	158	92	9%
1996	222	44	266	103	10%

Table 2. Age distribution of male and female black bear harvested in the Coastal BBMU from 1996-2004 (*n* = number of tooth samples).

	Male age				Female age			
Year	*n*	Min.	Max	Median	*n*	Min.	Max	Median
2004	64	1.5	34.5	4.0	46	1.5	22.5	5.5
2003	76	0.5	17.5	3.5	49	2.5	22.5	5.5
2002	57	1.5	15.5	3.5	47	0.5	16.5	4.0
2001	58	0.5	25.5	3.5	30	1.5	13.5	5.5
2000	73	1.5	16.5	4.5	28	1.5	10.5	5.5
1999	65	0.5	16.5	4.5	57	1.5	19.5	5.5
1998	46	0.5	24.5	6.5	27	0.5	24.5	6.5
1997	39	1.5	21.5	4.5	19	2.5	20.5	8.5
1996	63	1.5	20.5	3.5	32	1.5	19.5	5.5

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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 2004 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. A relatively warm and wet spring likely favorably influenced the availability of plant foods for bears.

The number of bear hunters hunting in BMU 3 in 2004 was equal to that of 2003. Hunter success was the highest, at 15%, seen in the last 10 years. Although the 2003 and 2004 hunter numbers were basically equal, hunter success increased by 5% between 2003 and 2004, and hunter effort, measured in hunter days/kill decreased by 27 days.

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. Median ages and female percentage of total harvest are given in Table 1. Median age for males harvested in 2004 was 3.5 years, which is above the minimum age targeted for the statewide objective. Median age for females was 4.5, which is below the targeted age for females, but higher than the 2003 median age of 3.5. Percentage of females taken during the harvest was 40% for the second consecutive year.

Nuisance and damage activity

Thirty-three depredation permits were issued to industrial timberland owners concerned about tree damage in May and June, 2004, with 28 males and 5 females killed.

Bear sightings 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. We expect to see continued population growth and land conversion in BMU 3 for the next decade or more.

Management conclusions

Black Bear harvest in BMU 3 has continued to move closer to the state-wide target, with the harvest at 40% females of total harvest and median age of males taken above the target of 2.5 years old. The median age of females harvested increased by 1 year between 2003 and 2004, to 4.5 years of age (Table 1). The upward trend in female age is a positive sign, and is close to the target of 5 years for females. In general, the Black Bear management in BMU 3 appears to be positive, with the 2004 harvest approximating desirable statewide harvest objectives, hunter success increased, and hunter effort decreased during the 2004 hunt.

Table 1. Harvest data for BMU 3, North Cascades, 1995-2004.

						% hunter	median age		% female
Year	male	female	total harvest	days/kill	# hunters	success	male	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
2004	176	70	246	52.6	1,626	15.1	3.5	4.5	40

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 recreation, reduce timber damage, property damage, and black bear/human interactions 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 0.5, and a median male harvest age of 0.2.

Hunting Seasons And Harvest Trends

In 2004, hunter success for the general black bear season in the BBMU 4 was (0.05%). This was slightly higher that 2003 and considered a moderate level of success for bear hunting. The reported 2004 general season black bear harvest in the BBMU 4 was the highest reported harvest in the past ten years (Table 1). Bear hunter numbers remained similar to 2003 but were lower than the peak years of 1999 and 2000.

Depredation Season

In addition to general season hunting, black bear depredation permits continued to be issued to landowners during the spring of 2004 to mitigate timber damage. A total of 62 bears (45 males, 17 females) were taken during the 2004 season. This is similar to the 2003 harvest (n=65). 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

In 2004, the median ages of the female harvest was 4.5, which did not meet management goals for BBMU 4 (>5). This was the second year in a row that these target guidelines were not met. Statewide guidelines suggest a restriction in bear harvest under these conditions (Game Mgt. Plan 2002). The percentage of females in the 2004 harvest was 32% and meets the target level of less than 39% female harvest in the population

Surveys

No bear surveys were conducted in BBMU 4 in 2004-2005. 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 2004, enforcement officers responded to a total of 69 black bear complaints, up from 48 in 2003. The majority of these complaints were of sightings associated with people's homes. Most issues were resolved by working with landowners to reduce bear attractants (ie. garbage). No nuisance bears were removed by lethal means in 2004.

As urbanization continues to encroach on bear habitat in BBMU 4 the bear/human interactions have continued, especially in Clark and Lewis counties. 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 in 2004 was the highest reported in the last ten years (Table 1). Female harvest objectives as a percentage of the total harvest were achieved in 2004. Age class harvest parameters for female black bears in the South Cascade Bear Management Unit (BBMU 4) were not achieved in 2003 and 2004. Consideration should me made to determine the need to modify the current bear hunting season structure to meet female age harvest guidelines.

To better evaluate black bear harvest, WDFW has attempted to increase the number of tooth samples

returned from the bear harvest, particularly from bears taken during the spring depredation permit hunt. This information will improve 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, 1993-2004.

Year	Male	Female	Total	Success	Hunters	Days Hunted	Days/Kill
2004	162	80	242	0.05	4122	38,119	157
2003	111	81	192	0.04	4132	36,335	189
2002	134	61	195	0.04	4563	38,997	198
2001	156	77	233	0.05	4690	41,916	179
2000	127	44	171	0.02	7206	57,733	338
1999	71	15	86	0.01	7669	74,857	870
1998	95	67	162	0.03	5112	45,061	278
1997	36	30	66	0.02	2707	17,778	269
1996	127	70	197	0.08	2447	13,629	69
1995	70	26	96	0.04	2368	16,307	170
1994	97	44	141	0.05	2710	19,503	138
1993	97	44	141	0.06	2405	16,663	118

Table 2. Median age of black bear harvested in the South Cascades Black Bear Management Unit, 1993-2004.

Year	Male	Sample	Female	Sample	Sexes Combined	Sample
2004	4.0	42	4.5	24	4.5	66
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

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 harvest 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 4,700 in 2003 and 2004. In 2003, hunter success was 4.2 percent, eight percent higher than the previous 2 seasons.

The harvest of black bears in BBMU 6 ranged between 120 and 339 from 1989 to 2004. In 2004, 198 black bears were harvested, near the average from 1989-2004 (182). In 2004, the median age of males (4.5 years) and females (7 years) both increased from the previous year; however percent females in the harvest (37%) increased. Sex and age composition of the harvest was 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. These data suggest a stable to increasing population. Although median male age reached its lowest point in 2001, 2.5 years, median age of harvested males in 2004 increased to 4.5. Female median age has remained high (6+) for the past 5 years.

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 2004, 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.

Table 2. Black bear harvest information and median age of black bears for Black Bear Management Unit 6, 1989-2004.

Year	No. males	No. females	Total	No. hunters	% success	Hunter days	Median age		% females in harvest
							Males	Females	
1989	112	65	175	2,392	7.4	9,550	4.0	4.5	37
1990	No harvest data available								
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
2004	125	73	198	4,664	4.2	34,460	4.5	7	37
Avg.	124	59	182	4736	5	31672	4	6	31

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%.

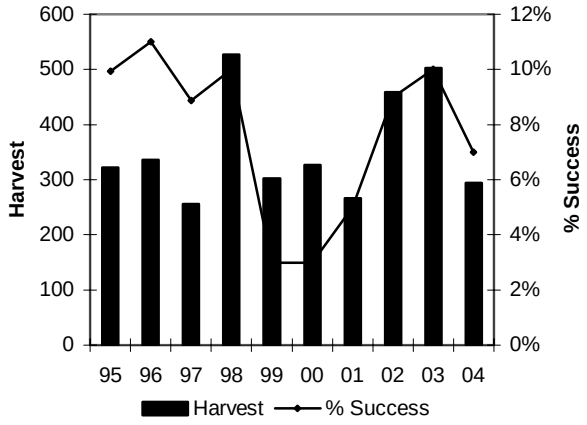

Figure 1. Total harvest and % hunter success, BBMU 7, 1995-2004.

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 7, the day after Labor Day. Hunter numbers declined 11 percent from 2003 but the harvest dropped 42 percent. The average hunter effort per bear harvested rose from 66 to 96 days. (Table 1, Figure 1).

Population status and trend analysis

In BBMU 7, the median age of harvested female black bears in 2004 remained at 5 (Table 1, Figure 2); so

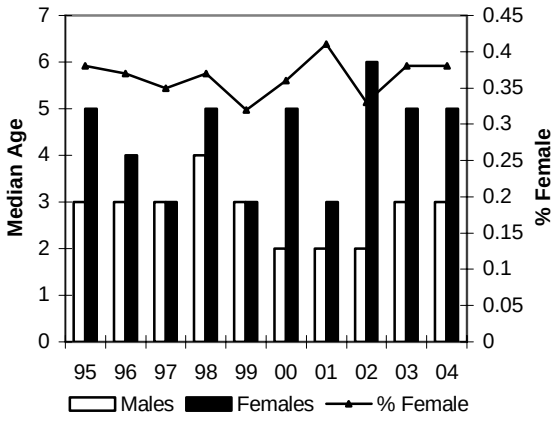

Figure 2. Median ages of harvested bears and % female in the harvest, BBMU 7, 1995-2004.

this unit met the minimum harvest guidelines on females (≥5) three out of the last three years. The median male age remained at 3 years, which is within the acceptable range of 2-4 years. The percentage of female black bears in the 2004 harvest remained at 38%; this falls within the acceptable 36%-39% range.

Nuisance and damage activity

Fish and Wildlife Enforcement Officers recorded 88 black bear complaints (includes sightings, nuisance, depredation) in the Northeast BBMU in 2004. This is down from the 144 tallied in 2003, and 175 in 2002. A total of 9 bears were removed from the incidents responded to by officers. The highest number of complaints came from GMU 101, with 18. 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 fails, 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. In 2004 the natural berry crop improved and is likely the primary reason complaints and sightings declined. 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, huckleberry production improved in 2004 and has been exceptionally good for the summer of 2005. 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. Eliminating, or improved management of food attractants around residences greatly reduces the conflicts humans have with black bears.

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 dropped considerably in 2004, likely due primarily to the 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.

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.

Table 1. Black bear harvest, hunter effort, and median age, Northeastern Black Bear Management Unit, 1995-2004.

								Median Age		Hunter Rept
Year	Male	Female	Total	# of hunters	Success	Hunter Days	Days per kill	Males	Females	% Females
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
2004	181	113	294	4,405	7%	28,414	97	3	5	38

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 Black Bear Management Unit 8 (BBMU-8). The general season ran for 69 days in 2004 (Sept. 7 - Nov. 15). A permit controlled spring bear season runs from April 15 to May 31, with 105 permits distributed between 7 game management units

The permit controlled, spring hunting season was added in 1999 in order to improve the distribution and composition of the harvest. Since this season was initiated, 594 permits have been issued with 381 hunters participating in the hunt. Hunters averaged 24% success, harvesting 91 bears; 64 males, and 27 females. The 2004 permit controlled, spring season produced a hunter success rate of 19%, and a harvest of 14 bears; 9 males, 5 females (Table 1 and 2).

Hunters harvested at total of 92 bears during the 2004 spring and fall hunting seasons; 58 males, 34 females. Hunter success during the fall general season was 6%, with a harvest of 78 bears; 49 males, 29 females. The 2004 general season bear harvest is consistent with the 1992-03 average of 78 bears/year.

The percentage of male bears in the general season harvest averaged 62% between 1992 and 2003. In 2004, males averaged 63%, which is consistent with the long-term average.

The age of bears harvested in 2004 ranged from 1.5 years to 20.5. years. Males ranged in age from 1.5 to 14.5 with a median age of 5.5 (N = 14). Females ranged in age from 1.5 to 20.5 years with a median of 8.5 years (N = 9).

Age data from 1999-2004 appears to indicate a difference in the vulnerability of age classes of bears harvested in the spring vs. the fall hunting season (Fig. 1). Younger bears appear to be more vulnerable in the fall, and older bears in the spring. Between 1999-2004, 43% of the males and 48% of the females harvested in the fall were older than 4.5 years old. In the spring, 75% of the males and 76% of the females were older than 4.5years old. Also, in the spring, 33% of the males and 36% of the females were older than 10.5 years, compared to the fall when only 12% of males and 19% of females were older than 10.5 years.

The difference in vulnerability between age classes in the spring and fall hunting seasons could be due to a couple of factors; 1. older bears are much more visible in the spring, and hunters more selective, and 2. young bears are more visible in the fall and hunters are less selective.

Nuisance and damage

The number of bear complaints received has remained fairly stable over the last few years.

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).

A major wildfire consumed 51,000 acres of habitat in the Tucannon drainage in August of 2005. This may re-distribute some bears from the Tucannon to adjacent areas not impacted by the fire.

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 but receive very little hunting pressure. These areas supplement bear populations in adjacent units through emigration.

Combining the general bear season with a permit controlled spring bear season enhances our ability to provide optimum recreational opportunity and a well-balanced harvest by game management unit.

Table 1. Black Bear General Season Harvest Summary 1992-2004, Blue Mtns., Washington.

	Bear Harvest			# of hunters	% Success	Hunter Days	Days per kill	Median Age	
Year	Male	Female	Total					Male	Female
1992	30	16	46	494	9%	2,740	69	1.5	2.5
1993	25	32	57	491	12%	1,988	35	6.5	2.5
1994	71	38	109	903	6%	5,450	50	2.5	5.5
1995	88	46	134	1,024	13%	7,363	55	3.5	5.5
1996	43	18	61	1,325	5%	8,543	140	3.0	4.5
1997	14	14	28	1,486	2%	11,567	413	10.5	5.5
1998	40	42	82	1,566	5%	1,567	130	3.0	5.5
1999	83	13	96	3,057	3%	25,212	263	NA	NA
2000	16	17	33	2,782	1%	16,224	492	5.0	3.5
2001	31	25	56	1,323	4%	7,855	140	3.0	2.5
2002	86	49	135	1,478	9%	9,026	67	5.0	5.5
2003	57	41	98	1,312	7.5%	8,582	88	5.5	4.5
2004	49	29	78	1,292	6%	7,989	102	5.5	8.5

Table 2. Spring Bear Hunt Statistics. 1999-2004

			Bear Harvest				Spring Season	General Season
Year	Permits	Hunters	Males	Females	Total	Hunter Success	% Male in Hv.	% Males in Hv.
1999	70	51	5	2	7	14%	71%	86%
2000	100	82	14	3	17	21%	82%	48%
2001	108	47	5	3	8	17%	63%	55%
2002	106	72	18	12	30	42%	60%	64%
2003	105	57	13	2	15	26%	87%	58%
2004	105	72	9	5	14	19%	64%	63%
Total	594	381	64	27	91	24%	70%	65%

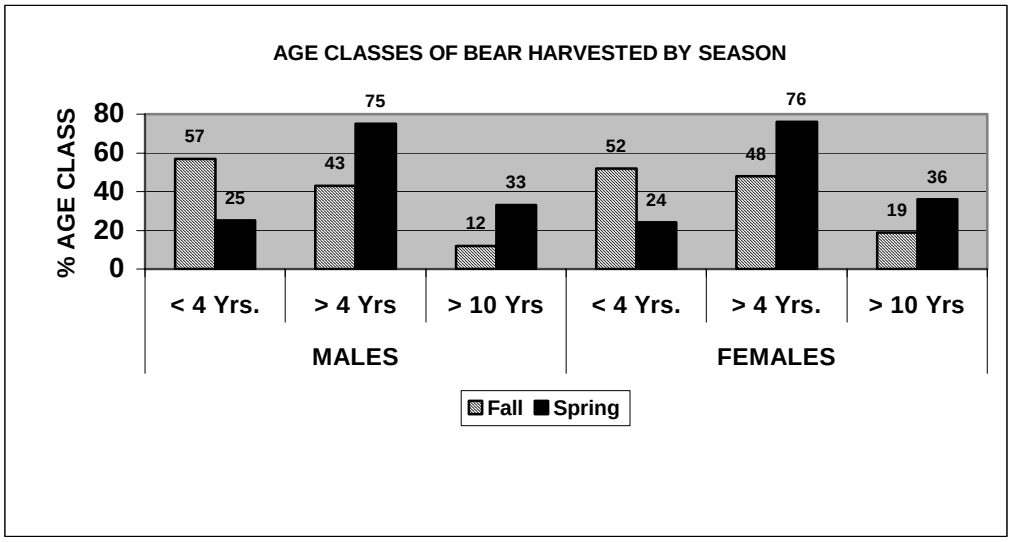

Figure 1. Age Classes of Bear Harvest Spring vs. Fall Hunting Season, Blue Mtns. Wash.

Cougar

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 2004 cougar season extended from August 1, 2004 through March 15, 2005. There were no permit or pursuit-only seasons. The use of hounds is not permitted in this management unit.

A total of 14 cougars were reported taken during the 2004-2005 cougar season in the Coastal Management Unit. One of these was a depredation take. Thirty-three percent of the harvest was female. Teeth from 12 harvested cougars (8 males, 4 females) were submitted for aging. The 4 females ranged in age from 1.5 to4.5 years (median 2.5 years). The 8 males ranged in age from 0.5 to 6.5 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 - 2004 are listed in Table 1.

Table 1. Cougar hunting harvest and percent females in harvest for 1996-2004.

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
2004	General Season	13	33

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 viable and at least stable. 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.

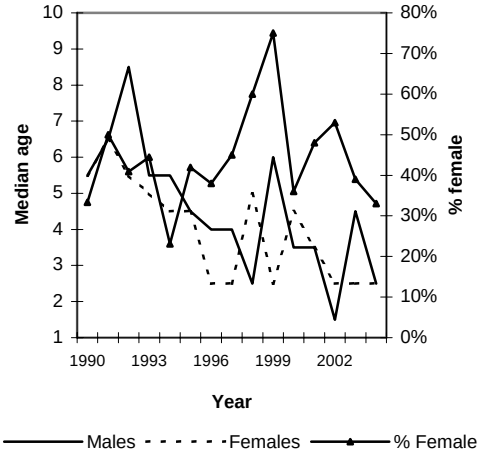

Figure 1. Median ages and percent females of cougar harvest, 1990-2004.

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.

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 2004 to 15 March 2005. 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 of 28 cougars in 2004, was an increase in comparison to the recent past and is still higher than historical records. The majority of cougars are harvested in Lewis and Skamania Counties in Region 5. 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 thought to be 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, 85 cougar complaints were documented in Region 5 and 64 were judged to actually involve lions. One public safety removal took place on a sub adult lion that wandered into the Vancouver area. This animal was euthanaized during an attempt to capture. WDFW officers are spending an increasing amount of time responding to cougar sightings and complaints

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.

Table 1. Cougar harvest in the South Cascades Cougar Management Unit 4 (South Cascades), 1994-2004.

Year	Male	Female	Unk	Total
2004	12	12	4	28
2003	9	7	0	16
2002	7	3	2	12
2001	11	7	2	20
2000	7	7	1	15
1999	4	10	2	16
1998	9	8		17
1997	5	8		13
1996	1	5		6
1995	9	7		16
1994	6	2		8

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, and includes Game Management Units (GMUs) 203, 209, 215, 218, 224, 231, 233, 239, 242-247, 249-251, 328-330, 334-336, and 340. The Columbia Basin CMU (9) includes most of the drier lowlands of the Columbia Basin, and includes GMUs 136, 139, 142, 248, 254, 260, 262, 266, 269, 272, 278, 284, 290, 371, 372 and 381. 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

During the last 44 years, cougar management in Washington has 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. As a result, cougar tags were made available as a general license available for purchase by any hunter.

In 2005, the Washington Legislature passed a law authorizing a pilot cougar hound hunting season in 5 counties (Chelan, Okanogan, Stevens, Ferry and Pend Oreille) in northeastern Washington. Implementing this new law resulted in substantial changes in cougar seasons in these 5 counties, and included the northern portion of CMU 5. As a result, the boot hunting season (without the use of dogs) was curtailed November 30 in these 5 counties, and a permit-only hunt with the use of dogs occurred from December 1 – March 31, using a kill quota system. There were 12 permits issued in the Chelan Hunt Zone, comprising all of Chelan County, with a total quota of 10 and a female quota of 4. In the Okanogan Hunt Zone there were 34 permits, with a total quota of 28 and a female quota of 11. The Okanogan Hunt Zone is comprised of those portions of GMUs 203, 209, 215, 218, 224, 231, 233, 239 and 242 within Okanogan County. Kill quotas started September 1, 2004, and include all cougars killed during seasons with and without the aid of dogs, as well as depredation permits, landowner kill permits, and WDFW kills. Hunters were required to call a telephone hotline prior to hunting, to determine whether the quota had been filled. Once a zone quota was filled, either by attaining the total quota or the female quota, the season remained open through March 31 for pursuit-only.

In the remainder of CMU 5, and in CMU 9, the season remained open for general hunting without the use of dogs from August 1 to March 15.

Cougar harvest in Unit 5 1999-2004 was considerably higher than in the previous eight years (42-64 per year 1999-2004, compared with 12-34 per year 1991-1998; 14 year average is 35). There is no apparent trend in Unit 9 cougar harvest, although the past 4 years are 4 of the 5 lowest harvest years during the 14 year period; harvest has ranged from 1 (2002) to 25 (1994, 1995), averaging 11 annually. The 2004 cougar harvest of 52 in Unit 5 is 49% above the average annual harvest during 1991-2004 (35), and is typical of the past 6 years harvest (1999-2004 average = 51, range = 42-64); this total includes 23 general hunter harvests, 20 hound hunter harvests, 9 depredation takes, and 0 public safety removals. General hunter harvest decreased 12% from 2003, while depredation take decreased 25% and public safety removals decreased from 8 to 0. All but one of the depredation removals occurred within the Okanogan County portion of the CMU. In 2004, 6 cougar were killed in Unit 9. During 1991-2004, harvest in the Columbia Basin has averaged 11, and ranged from 1 to 25 annually. Since 1991, cougar harvest in units 5 and 9 combined has averaged 46 animals annually.

Total harvest over the past 14 years has been slightly skewed toward females in CMU 5 (57%), and

slightly skewed toward males in CMU 9 (55%). The 2004 harvest was slightly skewed toward females, in marked contrast to 2003, when 78% of the harvest was females. Since 1991, median age of cougar killed by unit and sex has varied from 2.5 to 6.5 years old. In 2004, the median age of tooth-aged cougar harvested was 3.5 in CMU 5 (n=44), compared to 2.5 in 2003; and 2.5 in CMU 9 (n=4), compared to 1.5 in 2003.

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. A DNA mark-recapture study is underway, which should produce a population estimate for a portion of the population.

Habitat condition and trend

Loss of mule deer due to wild fire and severe winters may have 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 will be even more challenging into the foreseeable future, as more people move into the wildland interface, particularly mule deer winter ranges.

Implementation of the pilot hound hunt in portions of CMU 5 may explain much of the change in harvest from the previous year, particularly in Okanogan County. It appears hound hunting may have reduced the need for non-hunting removals, as evidenced by reductions in depredation and public safety removal kills. Winter 2004-2005 was characterized by very low snowfall, however, and this likely also factors into the reduction in non-hunting removals. Sex and age structure of the harvest also showed improvement over 2003, with a greater proportion of males harvested, and increased median age of harvested cougars. Most of the improvement in sex composition of the harvest is attributable to the hound harvest; in CMU 5, hound hunters harvested 75% males, while 71% of known sex general hunter harvest was female, similar to 2003 when general hunter harvest was 76% female. Inferences about the influence of the pilot hound hunt on harvest demographics are preliminary and based on only one year of data; the next two years will provide greater insights. However, this trend is consistent in data from CMU 7, North Cascades, where hound hunter harvest was 51% male, compared to 36% male for general hunter harvest. After one year, it appears there may be positive demographic benefits attributable to this new hunt structure.

Table 1. Cougar harvest for Cougar Management Unit 5 (East Cascades North) and Unit 9 (Columbia Basin), 1991-2004.

	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
2004	24	25	3	52	5	0	1	6	58
Average	15	20	2	35	6	5	0	11	46

[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

Thirteen cougar were taken during the 2004-05 season (Table 1). The reduced harvest compared to last year was probably because of lack of snow. 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 20004-05, 4 cougar were harvested in Klickitat County and complaints are increasing.

Nuisance and damage activity

Nuisance and damage activity in CMU 6 was low. One cougar was 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. Nuisance and damage complaints are low compared to other areas of the state, but are increasing. 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	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
2004	General Season	13	54

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 Northeastern 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. Substitute Senate Bill 6118 was passed by the Washington State Legislature and became effective in October 2004. This legislation directed the Washington Department of Fish and Wildlife(WDFW), in cooperation and collaboration with the county legislative authorities of Ferry, Stevens, Pend Oreille, Okanogan, and Chelan counties, to establish a three-year pilot program of cougar pursuit and kill seasons with the aid of dogs within these counties.

Hunting seasons and harvest trends

The 2004-2005 hunting season in the Northeastern CMU provided cougar harvest opportunity for general boot (without the aid of dogs) hunters from August 1 through November 30. Kill and pursuit hunts with the aid of dogs ran from December 1 through March 31. Cougar harvest levels (quotas) were established by WDFW to address cougar management goals and objectives. For the Ferry-Okanogan Hunt Zone the kill was not to exceed 26 total cougar or 10 females, whichever was reached first. For the Stevens – Pend Oreille Hunt Zone the quota was 38 total cougar or 15 females.

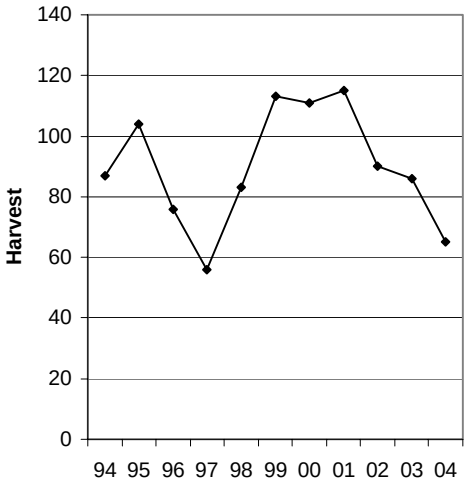

Figure 1. Cougar taken by hunters, depredation, and other means, CMU 7, 1994-2004.

The 2004-2005 cougar harvest in CMU 7 totaled 65 cougar, down 24% from the 2003 kill and down 37% from the 5-year (1999-2003) average (Figure 1). Boot hunters took 27 cougar, hound hunters took 35 cougar, and there were 3 kills authorized by WDFW due to depredation. The cougar harvest was distributed surprisingly well across the CMU, however the Ferry – Okanogan Hunt Zone (GMU's 101 and 204) accounted for 20 (31%) of the kill. GMU 133 is not in the Pilot Hound hunt area but boot hunters took 7 cougar there, an unusually high harvest for that area.

Human safety and wildlife damage

Wildlife Officers received 104 public contacts regarding complaints or encounters with cougar in the Northeastern CMU during the 2004 calendar year. Most of these were sightings and /or nuisance complaints from a reliable witness; others were depredation on livestock or attacks on pets. This is similar to the 94 in 2003 and down considerably from 188 in 2002. These incidents were distributed across the entire Northeast CMU in a similar manner to the final cougar kill. Areas with high human populations such as GMU's 108 north of Colville, and 124 near Spokane had similar incidents as more remote areas such as GMU's 101 and 204 in the Ferry – East Okanogan areas.

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 seem to have stabilized over the last two years. It may be significant that the distribution of human-cougar encounters is not showing the spikes in numbers for individual GMU's but rather, has become somewhat equally distributed across the CMU.

The kill declined in 2004. The quota for the Stevens-Pend Oreille Hunt Zone was not reached by the end of the hound season. Certainly snow-tracking conditions in northeastern Washington were exceptionally poor during the 2004-2005 winter. Acknowledging the poor hunting conditions, the lower harvest still suggests cougar population decline across the CMU. The harvest by general boot hunters declined from 41 in 2003 to 27 in 2004, the depredation kills declined from 7 to 3, and the hound hunts under the Public Safety Cougar Removal

program in 2003 accounted for 38 cougar killed while the open hound hunt in 2004 accounted for 35 cougar.

The percentage of females in the harvest exceeded males again in 2004 at 58%. This remains a relatively high percentage of female harvest compared to the years prior to 1997 when nearly all kills were with the aid of dogs (Table 1). The median age of harvested male and female cougars in the Northeastern CMU was 2.5 for each sex in 2004 (Figure 2). These median ages are similar to other current cougar median ages across the state but are much lower, especially for males, than recorded for cougars taken in the Northeastern CMU prior to 1997.

Habitat condition and trend

Deer populations have increased over the last several years. Foothills and mountain white-tailed deer populations are at moderate levels while low elevation and agricultural areas support higher populations. Elk populations continue to increase and are at all-time highs at this time. 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. While mule deer numbers are not as high as 10 or more years ago they have increased considerably in recent years, which has likely improved conditions for cougar.

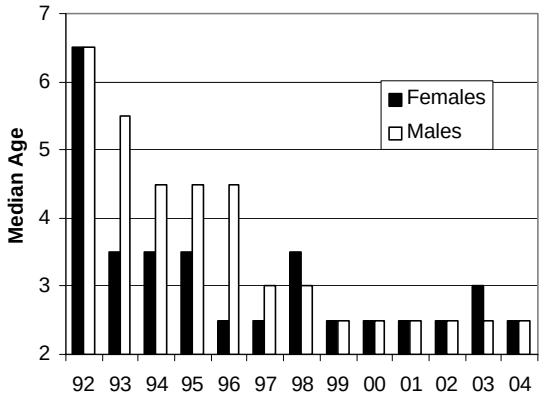

Figure 2. Median age of harvested cougar (sample sizes range from 15 - 54), CMU 7, 1992-2004.

Management conclusions

The cougar harvest in CMU 7 declined in 2004 to 65 cats taken. The harvest was down 24% from the 2003 kill and down 37% from the 5-year (1999-2003) average of 103. The harvest by general season boot hunters has steadily declined from a high in 1999 of 97 cougar to a low in 2004 of 27 cougars. Boot hunting opportunity has been relatively consistent from year to year. In 2004 it was cut off in most GMU's after November 30; however, traditionally few boot hunters have taken cats after the deer and elk seasons closed. Given the steady decline in boot hunter kills from 1999 to 2004 it would appear that the management objective to reduce cougar populations in CMU 7 has been successful.

For most of the GMU's in the Northeastern Cougar Management Unit , the cougar harvest quota system will be in place as part of the on-going pilot hound hunt. This effective means of harvesting cougar (tracking dogs) will be available as a management tool to minimize threats to public safety and property. At the same time the quota on the female and total kill helps to ensure cougar population viability into the future.

Table 1. Cougar harvest, depredation, public safety removal, and other mortality, CMU 7, 1994-2004 (Other Take includes Public Safety Removal Harvest from 2000 to 2003).

	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%
2004	33	2	35	27	1	28	60	3	65	58%

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. Cougar Management Unit (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.

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 2004 hunting season produced a harvest of 14 cougars for the Blue Mountains (Figure 1.), compared to 18 in 2003, a decrease of 22%.

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 (1997-2004) the harvest has averaged 62% females. However, over the last 3 years, the percentage of females in the harvest has declined significantly, averaging 42%.

The median age of males harvested in 2004 was 5.0 years (n=4). The median age of females harvested was 3.5 years (n=5).

Population status and trend analysis

The cougar population in CMU-8 remains at a high level compared to population levels in the 1970's and 1980's. Cougar are well distributed throughout the Blue Mountains and have moved into the farmland areas and Snake River breaks where they have not been observed for 40+ 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.

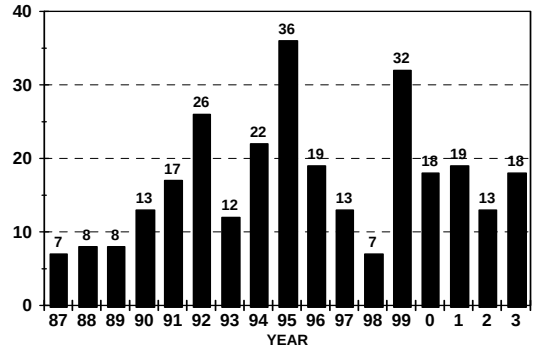

Figure 1. Cougar harvest, Blue Mtns, 1983-2003.

Table 1. Cougar Harvest Trend 1992-2004, 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	18	44%
2004	General/Damage	6	5	3	14	45%

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 based on the WDFW call-count survey. PFC is currently working to develop a revised population objective based on the new mineral site survey. Population objectives for mourning doves are being developed as part of the national mourning dove harvest strategy.

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 and 2004, 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

This report describes the results of band-tailed pigeon mineral site surveys completed in the summer of 2004 and mourning dove surveys completed in the late spring of 2005. The WDFW band-tailed pigeon call-count survey was initiated in 1975, and was patterned after the mourning dove survey. In 2001, USGS-BRD (California Science Center) received a grant from USFWS to design a population index survey for use throughout the range of Pacific Coast population of band-tailed pigeons. As part of an earlier grant, USGS-BRD evaluated several population survey techniques, and found that an optimally timed mineral site survey offered statistical advantages over other surveys, including the WDFW call-count survey. A final report on the mineral site survey was completed in 2004, and coastal states adopted the new mineral site survey as the official index for this population. Based on these actions, the WDFW call-count survey was discontinued after the 2003 survey, but are presented in this report for comparison to the mineral site survey.

Methods

Band-tailed pigeon call-count survey. The band-tailed pigeon call-count surveys were similar to mourning dove call-count routes. A total of 50 routes, 5.7 miles in length comprised the survey, conducted in western Washington below 1,000 ft. elevation. Surveys were completed during a 16-day period beginning the Saturday closest to June 21, as designed by Jeffrey (1989). Data were sent to USGS in Laurel, MD (Bill Kendall) for analysis using route regression programs developed for the mourning dove survey (Sauer *et al.*, 2003).

Band-tailed pigeon mineral site survey. USGS conducted mineral site surveys at 8 locations in 2001 and 2002 (Overton and Casazza 2004). These included two in Region 4 (Pigeon Point and Sumas Springs), one in Region 5 (Cedar Creek), and five in Region 6 (Lilliwaup, McAllister Creek, Mud Bay, Potlatch, and Red Salmon Creek). In 2003, WDFW surveyed these same sites. In 2004, WDFW expanded surveys to 15 sites, as specified under protocols developed for the Pacific Flyway (Overton and Casazza 2004). The new sites included two in Region 4 (Lake Cavenaugh Rd.-Pefley and Warm Beach), four in Region 5 (Altoona, Newaukum River, St. Martin's Hot Springs, and Upper Kalama) and one in Region 6 (Willapa Estuary). Cooperators from WDFW and USFWS completed surveys during the July 10-20, 2004 survey period.

Mourning dove call-count survey. The mourning dove survey was completed between May 20-31, 2004 following methods in Dolton and Smith (2005). 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 after Dillman (1978).

Mourning dove harvest. Mourning dove harvest was estimated as part of the statewide hunter survey conducted by WDFW (WDFW 2005).

Results

Band-tailed pigeon call-count surveys. Past call-count survey results are presented in Table 1 and Figure 1.

Band-tailed pigeon mineral site surveys. Mineral site survey results are presented in Table 2 and Figure 1.

Mourning dove call-count survey. Mourning dove survey results are presented in Dolton and Smith (2005).

Mourning dove harvest. As measured by WDFW surveys, harvest in 2004 was estimated at 68,795 doves, down 6% from 2003 (Figure 2). Hunter numbers were estimated at 5,392, down 12% from 2003. Number of days hunted was 14,784, down 10% from 2003.

Band-tailed pigeon harvest. Harvest and hunter activity for the 2002-2004 seasons are summarized in Figure 3 and Table 3.

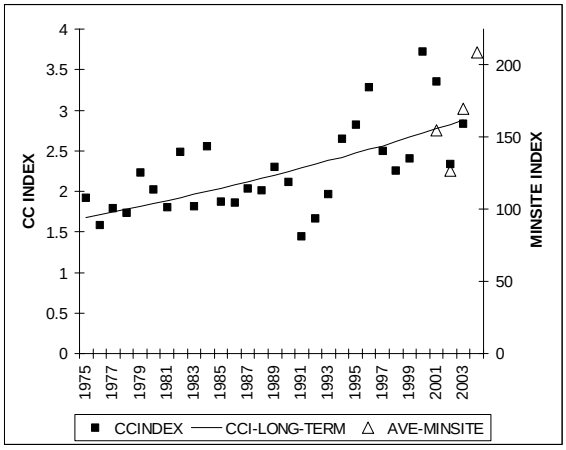

Figure 1. Band-tail pigeon survey trends

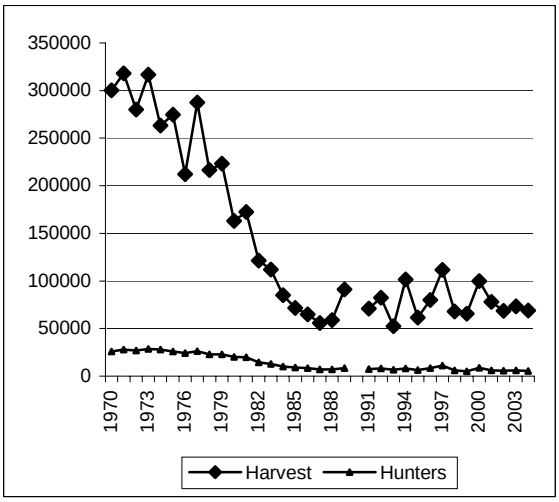

Figure 2. Dove harvest and hunter trends.

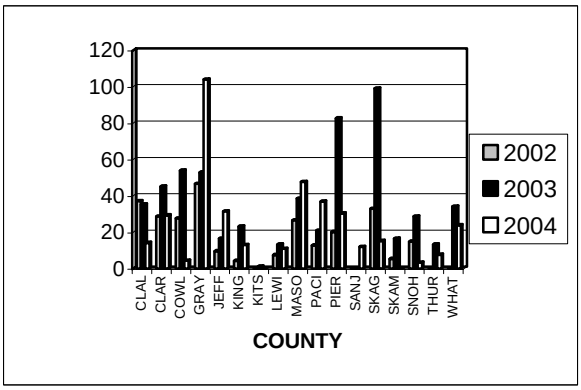

Figure 3. Band-tailed pigeon harvest by county.

Population status and trend analysis

Figure 1 and Table 1 show that based on the call-count survey, the band-tailed pigeon population generally increased since 1975. The route regression method is 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.

The mineral site survey in 2001-2003 exhibited the same general trend as the call-count survey (Figure 2). This rough correlation can be used in the future to develop population objectives consistent with the past Pacific Flyway management plan. The 2004 mineral site survey results point to continued increases in numbers of band-tails present during the breeding season.

Based on USGS analyses, the 2001-2004 trend for Washington showed a non-significant increase (at the 8 sites counted for multiple years) of 10%/year (C. Overton, USGS, pers. comm.). The overall trend for Pacific Coast band-tailed pigeons also indicated an increase of nearly 10%/year during 2001-2004 (C. Overton, USGS, pers. comm.).

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Table 1. Band-tail call-count survey results - route regression method.

Start Year	End Year	Change	Lower 90% CI	Upper 90% CI	Routes Used	Sig. 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.

Table 2. WDFW Band-tail pigeon mineral site survey results.

Year	Altoona	Cedar Cr.	L. Cavenaugh	Lilliwaup	McAllister	Mud Bay	Oyster Cr.	Newaukum	Potlatch	Red Salmon	St. Martins	Sumas
2001		328		60	82	164	362		135	52		67
2002		215		77	118	154			147	103		71
2003		157		108	174	222	455		90	121		31
2004	64	215	108	199	124	134	474	634	297	179	220	46

Table 3: WA band-tailed pigeon harvest report summary

	2002	2003	2004
NUMBER OF PERMITS ISSUED	522	657	766
TOTAL DAYS (SUCCESSFUL)	357	337	209
TOTAL HARVEST	273	574	383
HARVEST BY COUNTY			
CLAL	37	35	14
CLAR	29	45	29
COWL	28	54	4
GRAY	47	53	104
JEFF	10	16	31
KING	4	23	13
KITS	0	1	0
LEWI	7	13	11
MASO	26	38	48
PACI	13	21	37
PIER	20	82	30
SANJ	0	0	12
SKAG	33	99	15
SKAM	5	16	0
SNOH	15	29	3
THUR	0	13	8
WHAT	0	34	24

Waterfowl

WATERFOWL STATUS AND TREND REPORT Breeding Populations and Production

RON FRIESZ, Waterfowl Specialist

Introduction

This report summarizes data collected during 2005 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 seven strata in eastern Washington: West Okanogan Potholes, Omak-Douglas Potholes, Far East Potholes, Northeast, and Palouse Streams, Columbia Basin Irrigated, and Yakima Valley 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 were determined historically from the proportion of areas within the strata that were 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 stratum.

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 2005 index of breeding duck populations in eastern Washington was 111,503 (Table 2, Fig. 2), down 3% from 2004 and down 29% from the long-term average. This represents the sixth straight year of declining breeding populations, with an average of decrease of 9.3% per year (Table 2, Fig. 2). Mallard numbers were 40,794, up 3% from 2004, but 24% below the long-term average (Fig. 3, Table 2).

Declines in the total duck breeding population index occurred in all strata except in the Irrigated stratum, where the index was 6% higher than 2004 (Fig. 4, Table 3). Due to continued drought conditions and the resultant poor habitat quantity and quality, the largest declines occurred in the Palouse and Potholes strata, where numbers were down 44% and 11%, respectively, from 2004. Compared to the long-term average, the breeding population index was down 82% for the Palouse and 45% for the Potholes stratum. Breeding populations for all areas combined were down 9% from 2004 and 21% from the long-term average.

Most of the long-term variability in our breeding duck index has come from surveys in the Potholes stratum (Fig. 4, Table 3). This area has inconsistent precipitation patterns and many semi-permanent and ephemeral wetlands. This year, 31% of the breeding ducks in eastern Washington were found in the Potholes strata, down from 34% in 2004. Five years ago (2001), the Potholes stratum supported 45% of the duck population of all strata combined.

As stated above, the number of ducks in the Irrigated stratum was up 6% from the 2004 count. This represents the fourth straight year of increase in this stratum, possibly an indication of displacement from the Potholes stratum. However, total ducks in the Irrigated stratum remains 15% below the long-term average (Fig. 4, Fig. 5, Table 3). 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 irrigation blocks. Urban sprawl and associated human disturbance also likely contributed to the decline, particularly in the Yakima and Tri-Cities areas. Declines in wetlands associated with the wasteway systems (Fig. 5) of 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.

Cinnamon and blue-winged teal have not been separated in the long-term database because of historic differences among observers in recording data. However, in 2005 it was estimated 87% of the cinnamon/blue-wing group were cinnamon teal. Historically, the proportion of cinnamon teal was much lower. During 1981-1990, cinnamon teal averaged 37% of this group. From 1991-2000, cinnamon teal averaged 68%, and in the past five the years (2001-2005) the average has increased to 79% cinnamon teal (Fig 6). Aside from 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 down 15% from 2004 and 57% 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 (Fig. 3, Fig. 6).

The 2005 gadwall numbers were up 3% from 2004, and remained 24% above the long-term average. (Fig. 3, Table 2). The gadwall population growth has occurred over the past three decades. Between the 1970's and the 1990's the average number of gadwall increased by 3.5 times, with the most noticeable increases during the early 1980's. There may be some correlation between increased numbers and hunters avoiding the harvest of gadwalls due to misidentification. Gadwalls are similar in appearance to mallard hens and pintails, which have had restrictive bag limits since in the mid-1980's.

Redhead numbers in 2005 decreased 40% from 2004 and were 68% below the long-term average. This is likely the combined result of the continued drought conditions in the pothole areas and loss of suitable open water habitat in the wasteway complexes associated with the irrigation projects.

Results: Western Washington

The western Washington duck surveys estimated the breeding population index for mallards at 8,378, or 9% below the 2004 index and 12% below the nine-year average. The wood duck breeding index was 199 or 74% below the 2004 index and 92% below the long-term average (Table 4, Fig. 7). Wood ducks are difficult to survey from the air, and this decline may be due to visibility problems rather than a true population decline.

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. 8, Table 5). The 1997 index of 15,665 ponds was the highest ever recorded. In 2005, the pond index was 2,526, which is 40% below 2004 and 60% below the long-term average. This was the lowest estimated pond numbers since 1992, when 2,160 ponds were estimated (Fig. 8, Table 5). The loss of the pothole habitat occurred across all pothole stratum except for the Omak Lake plateau, where the pothole count remained the same as the 2004 count. The largest losses occurred in Lincoln and Douglas Counties, where pond numbers were down 57% and 46%, 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 2005 duck production survey for the

Potholes, Palouse, and Northeast strata showed a 24% decrease in total number of broods observed compared to 2004 (Table 6, Fig. 9) and a 49% decrease from the long-term average. Brood production varied across the strata, with greatest losses of production in the Channeled Scabland (Potholes) (-28%) and the Palouse (-50%) strata, where continued severe drought conditions greatly reduced the quantity and quality of the brood habitat. The brood index for the Columbia Basin was 21% above the 2004 index and remained 2% 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 longer intervals. Geese are also recorded on the breeding duck surveys. 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 2005 index for the goose nest surveys showed significant variation across the survey area as detailed below, but overall the nest index was 4% above 2004 and 2% below the long-term average (Table 9, Fig. 10). This index increased between 1982 and 1987, and has remained relatively stable since (Figs. 9 and 10, Table 9).

The nest surveys in the Upper Columbia showed a 14% decline in nesting effort compared to 2004, and also showed a 19% decline from the long-term average (Table 9, Fig. 11). The reduction of numbers occurred primarily on Hanford Reach, Priest Rapids Pool and Rufous Woods Lake. The loss of nests is partly attributed to predation by raccoons and common ravens.

The total number of nests found on the Lower Columbia decreased by 8% from 2004, but remained 7% above the long term average (Table 9, Fig. 11). Incomplete surveys between 2000-2005 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, 391 nests were recorded in 2005, a 2% decrease from 2004, but 7% above the long-term average. The nest count on the John Day Pool was down 37 % from 2004 and down 46% from the long-term average. This lost of nests may be partly caused by to invasive woody vegetation displacing nesting habitat.

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 were 102% higher than in 2004, and remained 5% above the long-term the long-term average (Table 9, Fig. 11). The large increase resulted from an intensive nesting effort at Potholes Reservoir, where nesting conditions change dramatically from year to year depending on water level management and human disturbance.

The weighted number of geese observed during the breeding duck survey was included in this report since 1995 (Table 9, Fig. 12). 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 2005 index decreased by 32% from 2004 and remained 28% above the long-term average.

For western Washington, the population index for Canada geese was 1,394, a decrease of 44% from 2004, and 52% below the 9-year average of the survey (Table 4, Fig. 13).

Potential Improvements to Waterfowl Breeding and Production Surveys

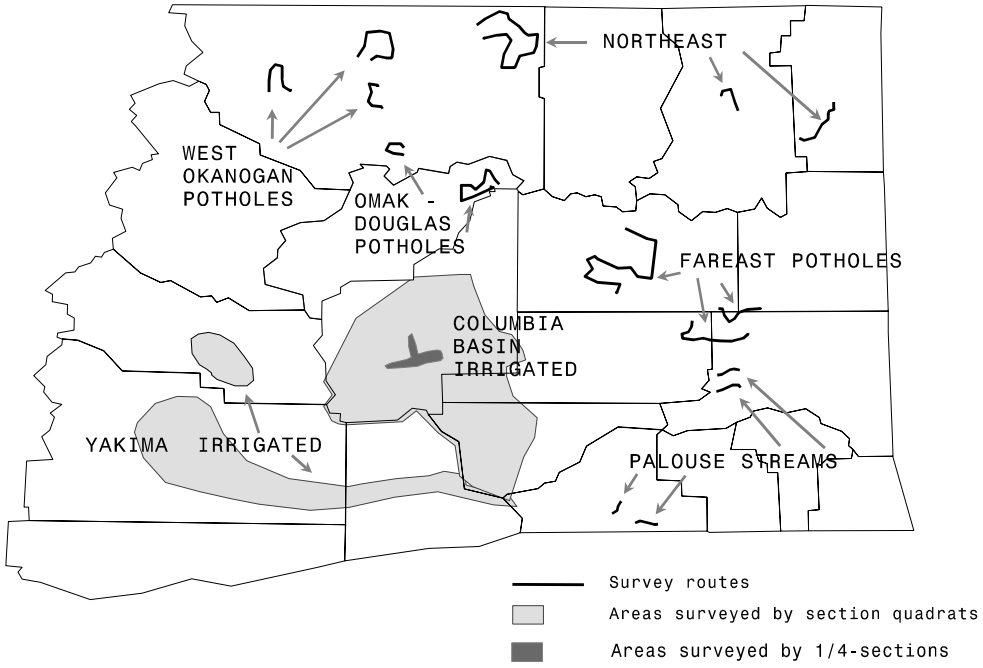
Breeding Duck Survey

- Expand this report to better cover western Washington
- Design and initiate helicopter transect surveys for Eastern Washington breeding duck populations compatible with adjacent states and provinces.
- 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.



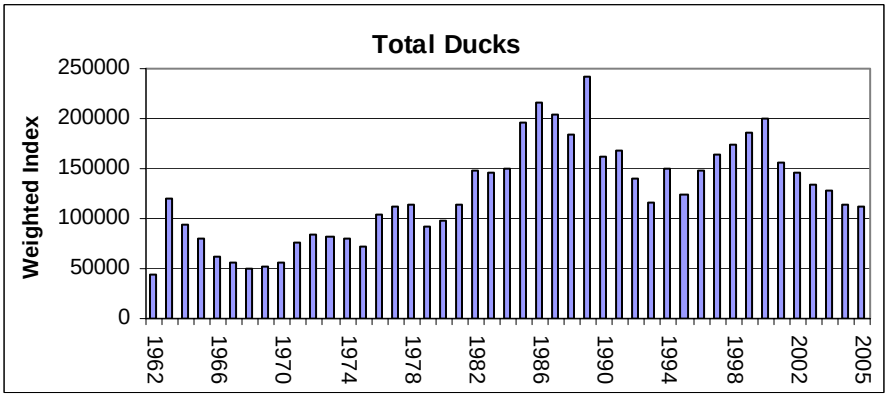


Figure 2. Breeding duck population index for Eastern Washington (1961-2005)

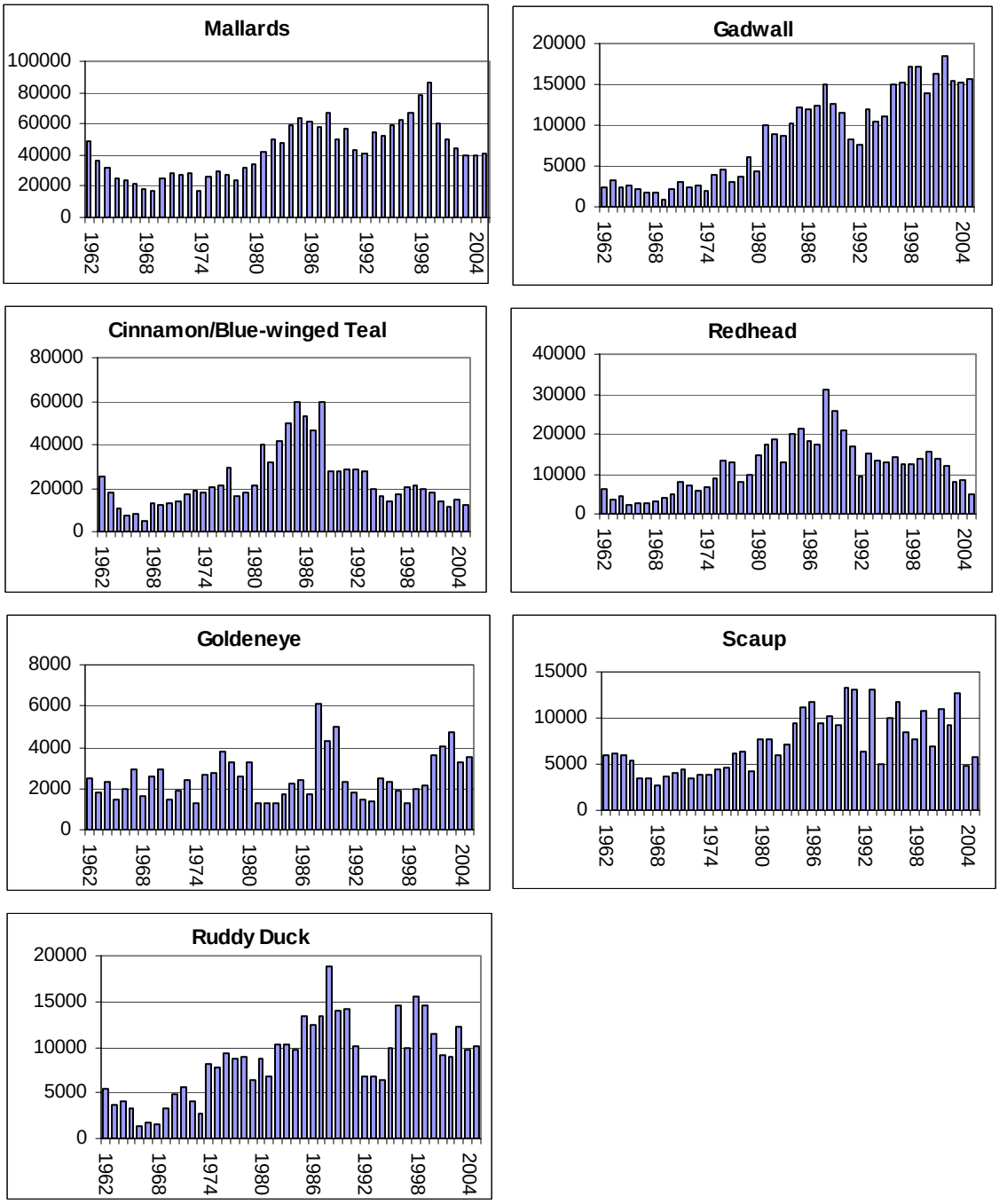


Figure 3. Indices of common breeding ducks in eastern Washington, (1962-2005)

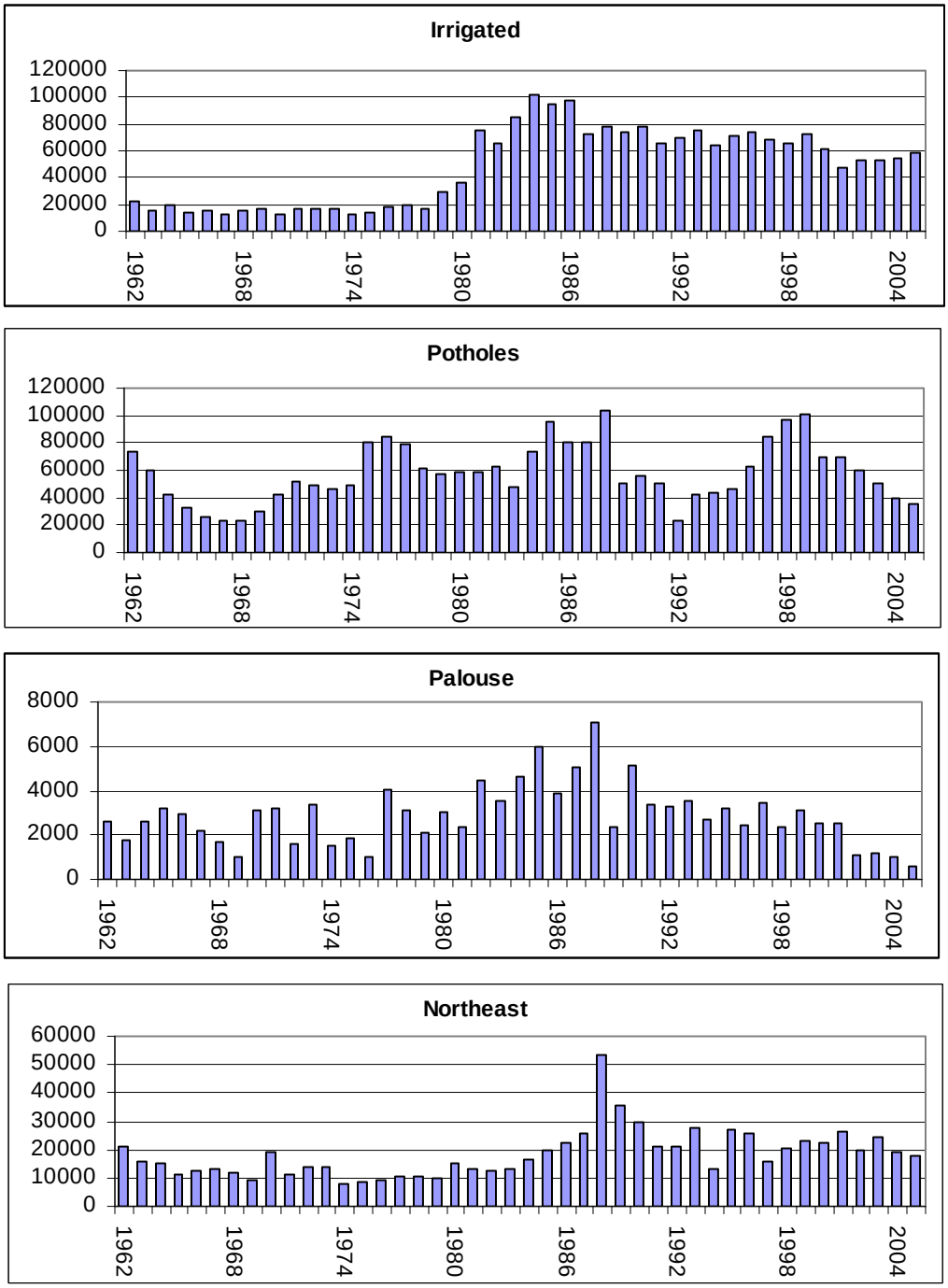


Figure 4. Weighted duck breeding population indexes by eastern Washington strata (1962-2005).

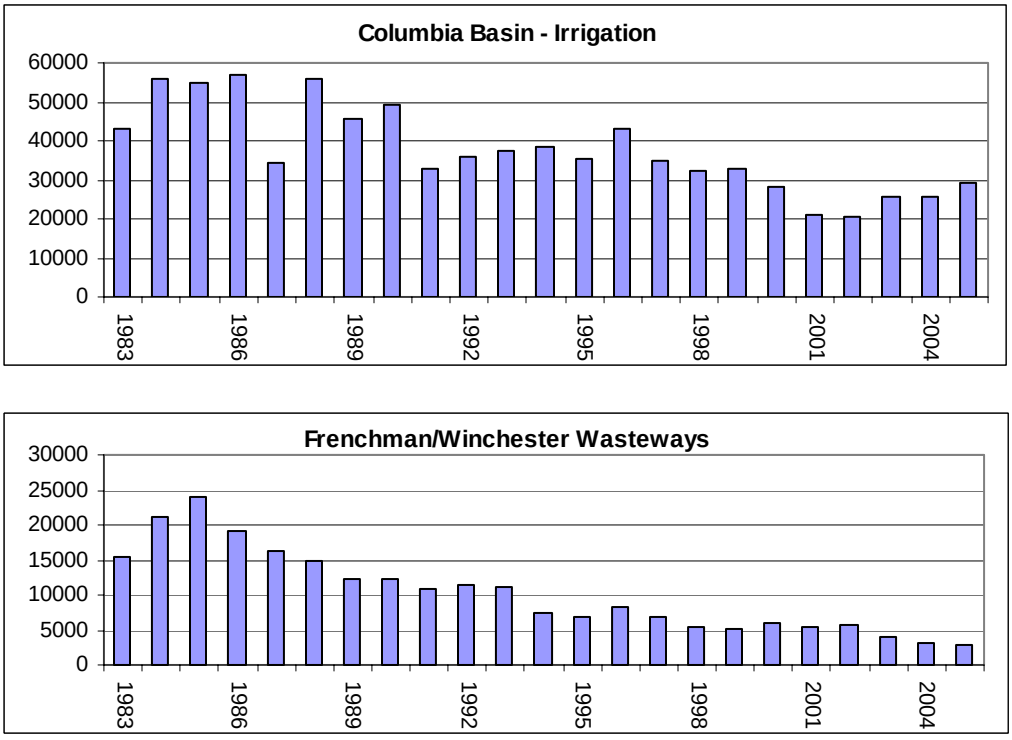


Figure 5. Weighted duck breeding populations in the Columbia Basin (1983-2005)

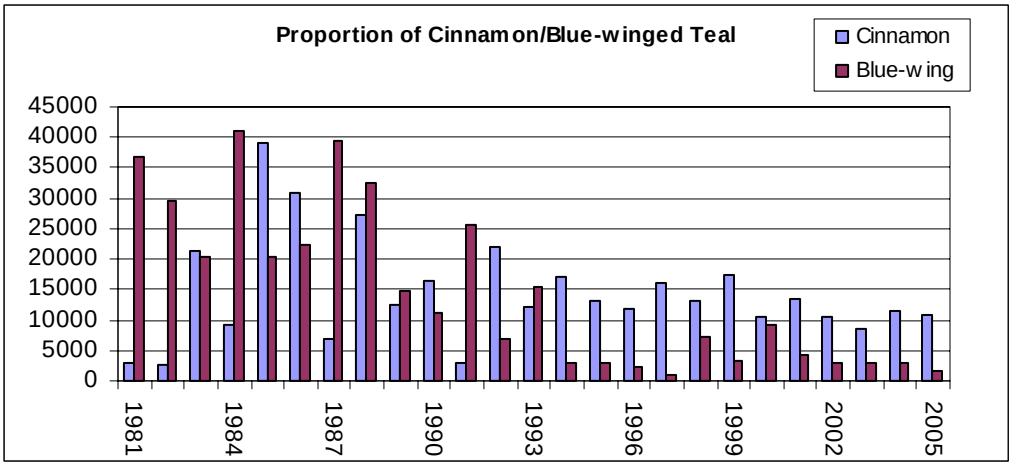


Figure 6. Proportion of Blue-winged and Cinnamon Teal in population (1981-2005).

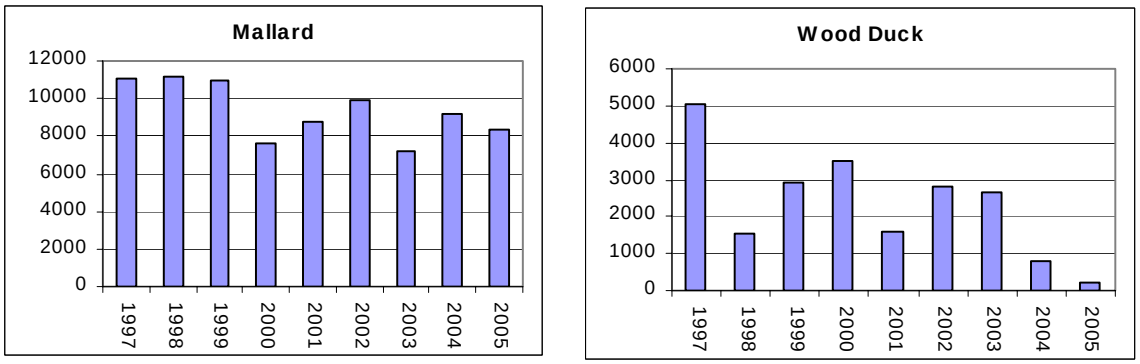


Figure 7. Western Washington total population indices for breeding ducks (1997-2005)

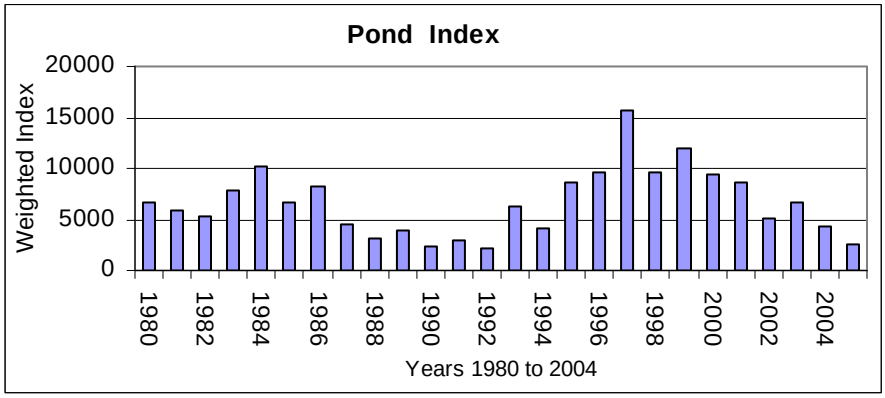


Figure 8. Index to pond numbers in the potholes strata (1980-2005).

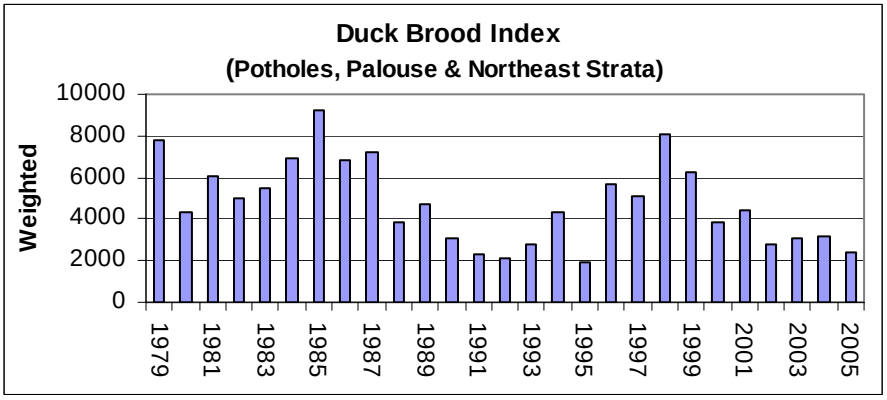


Figure 9. Weighted Duck Brood Index (1997-2005).

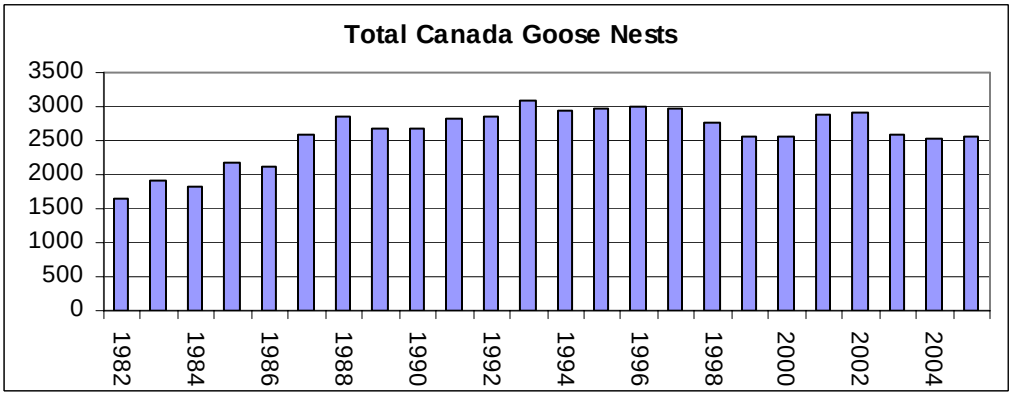


Figure 10. Total goose nests found on Columbia and Snake Rivers and in Columbia Basin (1982-2005).

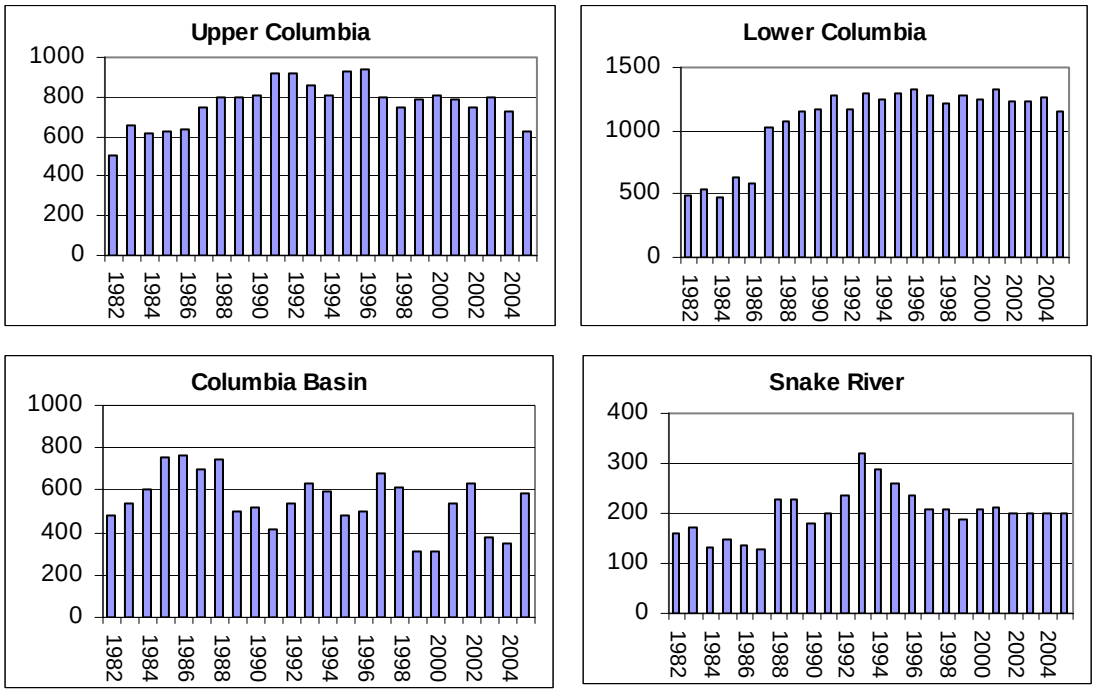


Figure 11. Canada goose nest surveys by strata (numbers of nests).

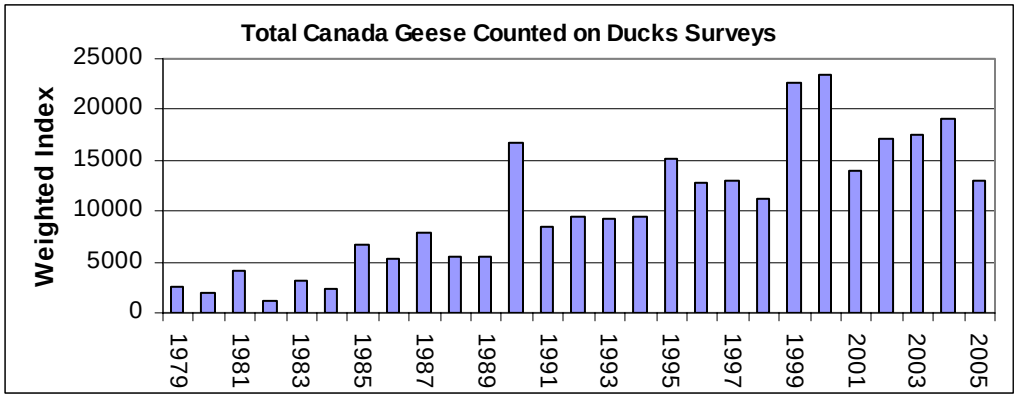


Figure 12. Canada geese counted on eastern Washington duck surveys (1979-2005).

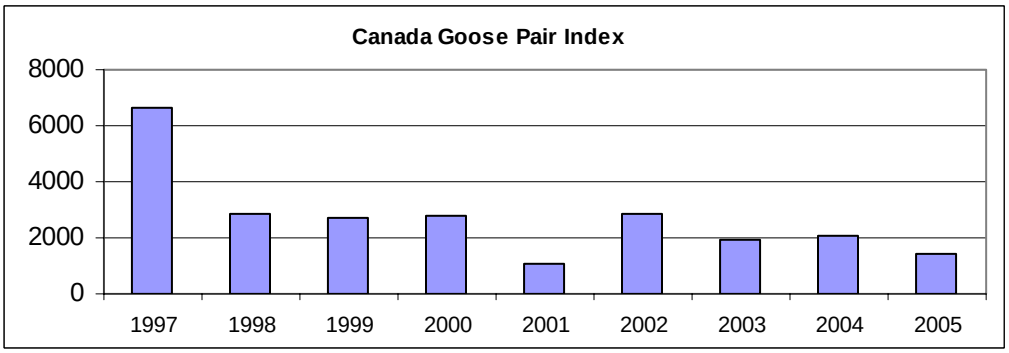


Figure 13. Canada goose pairs counted on western Washington duck surveys (1997-2005).

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, 1998-2005

Species	1998	1999	2000	2001	2002	2003	2004	2005	1979-2004 Average	% Change From 2004	% Change From Average
mallard	78962	86243	60434	50464	44676	39843	39958	40794	53941	+3	-24
gadwall	17077	17130	13908	16261	18527	15353	15185	15665	12193	+3	+28
wigeon	7039	5721	4523	3593	6501	5028	5442	3439	6056	-37	-43
green-winged teal	3983	3665	3320	3037	2673	1749	1477	2406	3070	+63	-22
bwt+cinn teal	20228	20916	19848	17931	13717	11274	14619	12404	28736	-15	-57
northern shoveler	12580	14926	9100	8000	5968	7794	6292	4477	6885	-29	-35
northern pintail	2110	2145	970	1018	395	608	1096	644	1884	-41	-66
wood duck	1836	2496	1841	2223	1863	616	1553	1375	1667	-11	-19
redhead	12399	13568	15584	13915	11831	8117	8365	4978	15621	-40	-68
canvasback	619	1032	603	1073	1507	919	618	610	783	-1	-22
ring-necked duck	2490	3835	5100	3931	1405	3063	850	2525	2791	197	-10
goldeneye	1308	1993	2126	3643	4036	4713	3255	3567	2615	9	+36
bufflehead	805	1094	410	826	1606	3034	1280	2425	1284	90	-11
ruddy duck	15474	14566	11419	9156	9023	12175	9624	10150	10944	5	-7
merganser	668	182	161	356	327	757	463	304	402	-34	-24
TOTAL	**185251**	**200210**	**156328**	**146401**	**133343**	**127764**	**114883**	**111503**	**158047**	**-3**	**-29**
coot	49629	43832	25945	40172	18171	19328	19085	12346	32356	-35	-62
Canada goose	11199	22598	23449	13890	17179	17596	19137	13022	10208	-32	28

Table 3. Weighted breeding duck population indices by area for eastern Washington 1979-2005.

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
2005	58339	35014	585	17564	111503
1979-04 AVG	68607	64032	3284	22123	158047
% change					
from 2004	+6	-11	-44	-9	-3
from AVG	-15	-45	-82	-21	-29

[1] 2001 filed surveys were not completed; 2001 table values were determined by extending forward the 2000 values assuming no net gain in ponds.

Table 4. Breeding Waterfowl Population Indices for Western Washington (1998-2005).

Species	1998	1999	2000	2001	2002	2003	2004	2005	97-03 Ave	% Change from 2003	% Change from Average
Mallard	11127	10979	7608	8766	9874	7232	9163	8378	9470	-9	-12
Wood Duck	1535	2922	3490	1571	2828	2631	779	199	2599	-74	-92
Canada Goose	2889	2741	2762	1042	2844	1903	2104	1394	2865	-44	-52

Table 5. Weighted pond index from transects within the Pothole Areas of Washington, 1979-2005.

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
2005	**336**	**492**	**177**	**904**	**617**	**2526**
1979-2004 Average	976	624	335	3685	1088	6447
% change						
From 2004	-46	-24	0	-57	-8	-40
From AVG	-66	-21	-47	-75	-43	-60

Table 6. Weighted duck brood indices by species for the Potholes, Palouse, and Northeast areas of Washington, 1998-2005.

Species	1998	1999	2000	2001	2002	2003	2004	2005	79-04 Average	% change from 2004	% change from Average
mallard	2978	3226	1864	1762	1123	1328	1634	1557	1813	-5	-14
gadwall	842	332	281	740	383	230	230	26	427	-89	-94
wigeon	93	153	102	153	102	179	204	255	300	+25	-15
green-winged teal	641	306	255	204	77	102	26	26	142	0	-82
blue-winged teal	466	357	281	281	230	179	153	26	650	-83	-96
cinnamon teal	699	153	51	281	51	26	51	51	104	0	-51
northern shoveler	406	255	230	357	179	204	51	0	189	-100	-100
northern pintail	342	77	230	128	153	102	51	0	137	-100	-100
wood duck	70	0	51	51	0	26	77	26	40	-67	-36
redhead	684	536	230	128	179	255	51	0	473	-100	-100
canvasback	26	51	26	51	77	128	26	26	32	0	-21
Scaup	127	102	26	0	0	102	0	0	55	0	-100
ring-necked duck	31	77	0	0	0	26	128	0	54	-100	-100
goldeneye	282	332	77	230	26	26	357	179	142	-50	+26
bufflehead	0	0	0	0	179	26	0	26	8	0	+225
ruddy duck	411	255	102	51	0	179	102	204	241	+100	-15
merganser	14	26	26	0	0	26	26	0	42	-100	-100
TOTAL BROODS	**8112**	**6239**	**3830**	**4417**	**2757**	**3089**	**3166**	**2400**	**4848**	**-24**	**-49**

Table 7. Weighted duck brood indices by area for eastern Washington, 1979-2005.

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	1813	791	102	3166	147
2005	**332**	**1098**	**919**	**51**	**2400**	**178**
1979-04 Avg.	2776	989	880	210	4855	181
% change from	--	--	--	--	--	--
2004	-28	-38	+16	-50	-24	+21
Average	-88	+11	+4	-76	-49	-2

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	00-05
UPPER COLUMBIA				5%/yr	5%/yr	-3%/yr	-2.6%/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	+1.2%
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	+7.3
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, (1974-2005) and weighted number of geese observed during duck population surveys (1979-2005).

	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
2005	**626**	**199**	**1157**	**584**	**2566**	**13022**
1984-04 AVE	773	203	1083	557	2616	10208
% Change from	--	--	--	--	--	--
2004	-14	0	-8	+5	4	-32
AVG	-19	-2	+7	+102	-2	+28

WATERFOWL STATUS AND TREND REPORT
Winter Waterfowl Populations and Harvest

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Introduction

This report summarizes the 2004-05 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 Survey, 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 a 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 some 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 Survey Results

WDFW and U.S. Fish and Wildlife Service (USFWS) personnel completed the 2004-05 midwinter waterfowl survey in January 2005. Washington's data for total waterfowl show increases of 18% above last year and 20% above the 10-year average (1995-2004) (Table 1). The Pacific Flyway midwinter index for total waterfowl was 7.5 million waterfowl, a 41.4% increase from 2004, 23.1% above the 10-year average (1994-2004), and 12.0% above the long-term average (1955-2003).

The 2004-05 midwinter indices for total ducks in the 11 Pacific Flyway states was 5,762,328 (Fig.2), a 33.5% increase from the 2003-04 count of 4,316,512 and 18.1% above the 10-year average. In Washington, the total duck population was 956,979, an increase of 18.5% above last year's population of 780,273 (Fig. 3). The Washington total duck count represents 16.6% of the flyway population, or 1.1% above the state's 10-year average of 15.5% of the flyway population (Fig. 4).

The mallard total for the flyway was 1,357,471, a 63.9% increase from 2004 and 7.4% above the 10-year average (1994-2004), but remained 17.0% below the long-term average (1955-2004). The total number of mallards counted in Washington was 470,186, an increase of 9% from last year, and 7% above the 10-year average (Table 1). Washington holds a high percentage of the Pacific Flyway mallard population with a 10-year average of 34.7% (Fig. 5).

Canada geese are often 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 during the 1999-00 survey, when 498,026 geese were recorded. In 2005, the flyway count of 415,996 was 82.0% above last year's count, but remained slightly below (1.7%) the 10-year average. The number of Canada geese wintering in Washington has been variable over the past 20 years. In 2005, the total was 43,908, an increase of 12% from 2004, but remained and 38% 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.

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 December 2004 were 47,111 in Skagit County and 21,037 in the Fraser Delta, for a total of 66,141, a 2% increase from 2004 and 31% above the 10-year average. (Table 1. Fig. 7). During 1997-2003, the Skagit valley snow goose populations averaged 21.5% juveniles per year, compared to 12.8% in 2004 and 15.3% in 2005.

The number of brant counted in Washington during the 2005 midwinter survey was 14,286, a 2% reduction from 2004, but 13% 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, 2005, mainly in Padilla and Samish bays, was 11,415 (Table 2).

The Skagit county wintering brant population in December and January is predominately gray-bellied (WHA) brant. On January 4, 2005, 97.3% of 732 brant counted at Swinomish Spit (Skagit Co.) were gray birds.

The northern Puget Sound (Skagit, Whatcom, and Snohomish counties) mid-winter survey of trumpeter swans for 2005 totaled 5,217 birds (see Table 2), or 54.3% above the 2004 count. The 2005 count was the highest total count ever recorded. The previous high was in 2002 when 4,343 trumpeter swans were recorded. Juveniles accounted for 17.5% of the 2005 population (Table 2), compared to the 14.9% average for the last nine years.

The northern Puget Sound tundra swan mid-winter population from 1996-97 to 2003-04 averaged about 1,850 birds per year. The 2005 count was significantly higher, at 2,547. Juveniles represented 14.2% of the population (Table 2).

Lead shot poisoning in wintering trumpeter swans continued to occur in 2004-05, with 241 swan mortalities in north Whatcom County. Swans ingest lead shot as they forage for food and grit in north Whatcom County or the lower British Columbia mainland. WDFW assisted the efforts of University of Washington in gathering information for future identification of problem areas.

Periodic Aerial Survey Results

Aerial waterfowl surveys in northern Puget Sound were accomplished by WDFW,

and surveys in the Columbia Basin were conducted cooperatively between USFWS and WDFW (Table 2). Poor weather and limited aircraft availability prevented two surveys from being completed in the south Columbia Basin during 2004. The highest count in the North Columbia Basin during 2004-05 occurred during December, with 284,021 total waterfowl counted. The January count in the south Columbia Basin was 104,525 total waterfowl, continuing a declining trend in that area. The highest count in northeastern Puget Sound occurred during the December survey, with 619,690 total dabbling ducks (Table 2). This count was 12.0% greater than the December 2003 flight and 56.3% greater than the December 2002 survey, representing significant increases in dabblers wintering in the north Puget Sound in recent years.

Hunting Season Regulations

The 2004-05 waterfowl harvest occurred under season regulations shown in Table 3. Large North American duck populations over the last 8 years have allowed for longer seasons and larger bag limits (Table 4). Under the federal framework, the Pacific Flyway was allowed the maximum number of days as prescribed under the Migratory Bird Treaty Act - 107 days. Our general season length was 105 days statewide, with two additional days for the statewide youth hunt on Sept.18-19. The season for northern pintails and canvasback was restricted to 62 days, including the youth hunt (see Tables 3 & 4). The daily bag limit was 7 ducks, to include not more than 2 hen mallards, 1 pintail, 4 scaup, 1 canvasback, 2 redheads, 1 harlequin (per season), 4 scoters, and 4 long-tailed ducks (Table 3).

The season lengths 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, with 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 2004-05 (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 county. 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, for them to record the species of the birds they bagged. These data were used to estimate the species composition of 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 for brant hunters since 1990, and for 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 authorization 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 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.

To more closely monitor the harvest of sea ducks, written authorization was required for all persons hunting sea ducks (harlequin, scoter and long-tailed duck) in western Washington starting with the 2004-05 season. Hunters were required to report harvest by species and county with mandatory harvest report cards by February 15, 2005. Hunters failing to comply with reporting requirements were ineligible to participate in the 2005-06 season.

Harvest Survey Results

The 2004-05 Washington duck harvest of 369,457 was 2.0% lower than the 2003-2004 harvest of 376,987 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 242,516 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 7.5% over the past 4 years.

Mallards made up 53.4% of the harvest, followed by American wigeon and American green-winged teal, at 11.9% and 10.2%, respectively (Table 5).

The total Canada goose harvest for 2004-05 was 25,479, a 23.9% reduction from the 2003-04 harvest of 33,497. This represents the lowest harvest of Canada geese on record starting with the 1963-64 season. During recent years, local production of large Canada geese increased in Washington and has contributed to the increased harvest during the period from 1987 to 2001 (Fig. 12). However, the harvest of large Canada geese has dropped significantly the past four years at an average of 16% per year (2001-2004). The 2004-05 harvest of 14,326 was 42% below the 2003-04 total of 24,326 (Fig. 12). There are no obvious explanations for this sharp decline in harvest, but it 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 of western Washington. 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. This year's harvest of 11,153 (Fig. 11) is up 26% from 2003-04, but represents the second lowest harvest on record. The reasons for the decline in small goose harvest are also uncertain. Banding information is minimal and aerial surveys are logistically difficult.

Waterfowl harvest is summarized by WDFW administrative regions (Table 7 and Fig. 11). Except for the 2003-04 season, when Regions 2, 3, and 4 shared equal percentages (23.0%) of the harvest, Region 2 has traditional accounted for the highest percentage of the state's harvest. This was again the case for the 2004-05 season, when Region 2 had 29.9% of the harvest, followed by Region 3 (23.6%), Region 4 (20.3%), Region 1 (11.5%), Region 6 (9.2%) and Region 5 (5.5%).

The 2004-05 pre-season count of brant in Padilla/Samish/Fidalgo Bays was above the closure threshold of 6,000, allowing the January hunting season to remain open in Skagit County. This resulted in a total state harvest of 389 brant, similar to the 2003-04 harvest of 342 (Fig. 13, Table 8). Between 1993 and 2003, the brant harvest ranged from a high of 1,534 in 1996 to a low of 60 brant in 2002 (Table 8), for a 10-year average harvest of 620 (1993-04).

The snow goose harvest in Washington is highly variable (Table 9, Fig. 14). It had been on a negative trend during the mid 1980's and early 1990's. However, the harvest of snow geese has increased and stabilized over the past twelve years (1993-2004) with an average harvest of 1,628 (Fig. 14). The harvest in 2004 was 2,160, down 9% from the 2003 harvest of 2,374. The snow goose harvest in Washington remains low, at 3.2% of the population. The harvest of snow geese in northern Puget Sound is weather dependent and related to the number of juveniles in the population. Cold and windy weather forces geese from estuaries to forage inland where they are more vulnerable to hunters. These factors may be of greater importance than annual abundance, because the erratic annual harvest (Fig. 14) does not follow the number of geese counted in Washington during the midwinter count (Fig.7).

The 2004-05 sea duck harvest, determined by the initial year of mandatory harvest report cards, indicated a projected total harvest of 2,275 (Table 6). The harvest was dominated by surf scoters (60.3%), followed by white-winged scoters (18.4%), long-tailed ducks (9.7%), black scoters (6.5%), and harlequin ducks (5.5%). From a total of 906 authorizations, it was estimated that 335 hunters were successful and hunted a total of 900 days. The harvest was reported from 11 counties with Island County reporting 41.5% of the harvest followed by Clallam (17.0%) and Skagit (11.4%) counties.

Hunter Numbers

The Washington hunter survey is used to estimate the number of waterfowl hunters in the state. During the 2004-05 season, an estimated 23,078 hunters participated, representing the lowest estimate of Washington waterfowl hunters on record (Fig. 15). This is the fourth consecutive year that waterfowl hunter numbers have declined, and the state has lost an average of 10.0% per year since 2000-01. This decline follows a slight increase of hunters through the 1990's. Prior to that time there was a steady decline in hunters through the 1980's (Fig. 15).

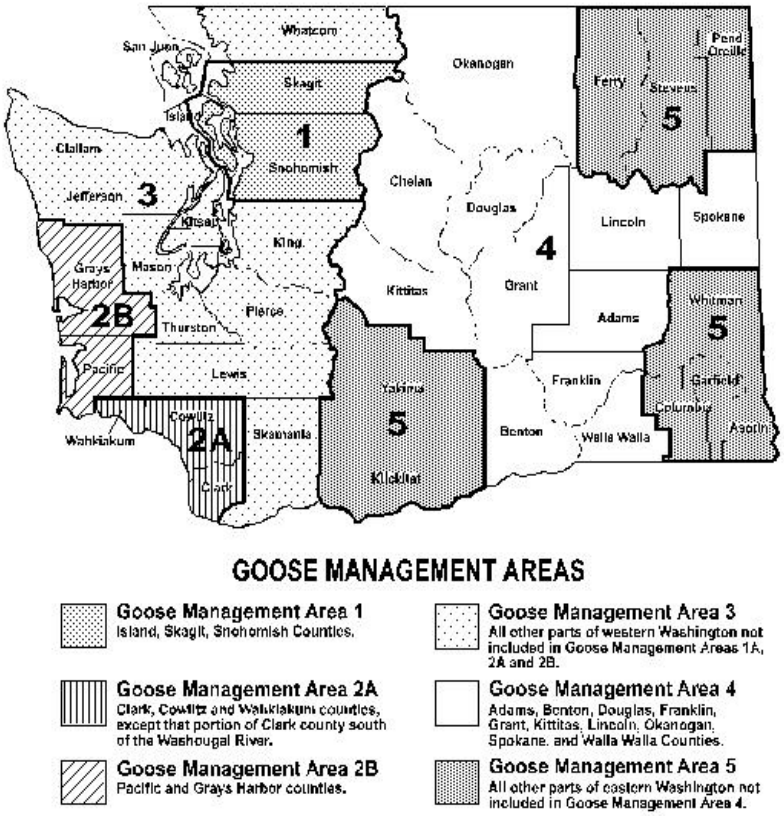
The estimated average number of ducks harvested per hunter in 2004-05 was 16.0, which was 3% higher that the 15.5 average during 2003-04 (Fig. 16). Hunter success, based on ducks harvested per hunter per year, has been stable if not on an upward trend for the past 20 years (Fig. 16). Therefore, it appears the downward trend in duck harvest (Fig. 10) is largely a result of hunter numbers (Fig. 15), and not decreased annual hunter success (Fig. 16). The high success rate may indicate that we have retained the most avid and successful waterfowl hunters.

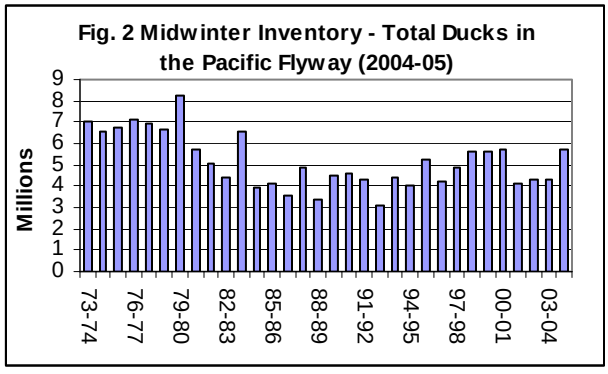
Members of the hunting public often believe the decline in hunter numbers is a result of the restrictive regulations that began in the mid-1980's (Table 4). This may have contributed to the reduced hunter participation (Fig. 15), but the downward trend in hunter numbers began in the early 1980's when there was a 7 duck daily bag limit, no special restrictions on mallards and pintails, and season lengths were 93 days west and 100 days east (Table 4). The downward decline in hunter numbers is

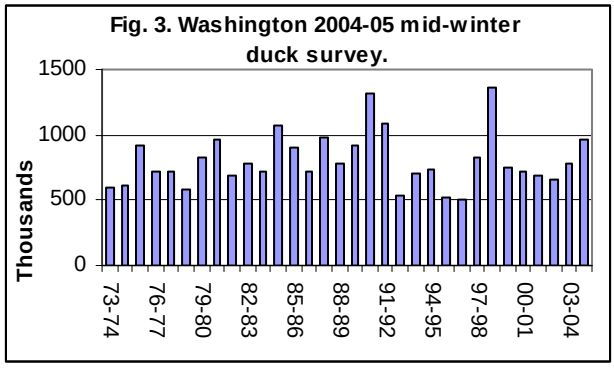
likely a result of changes in social views on hunting, lack of recruitment of new hunters, and lack of public hunting access.

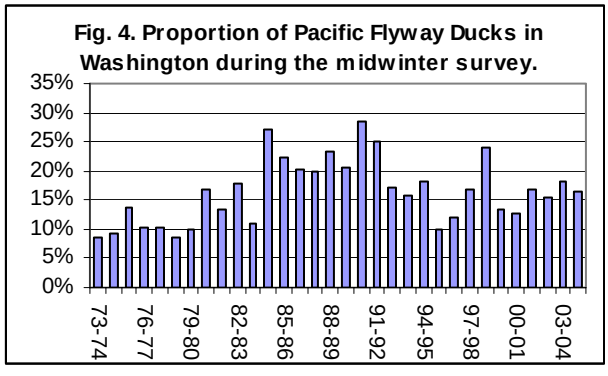
The quality of waterfowl hunting opportunities in Washington has been good. Decreased hunter numbers has resulted in lower hunter densities in the field and success has increased. In addition, the state is still holding a relatively large percentage of the Flyway's ducks. Canada goose regulations have been liberalized and until the past four seasons, the harvest had been increasing. The recent sharp decline in Canada goose harvest may be related more to hunter effort than to reduced goose hunting opportunities in the state. 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). We are also working to provide more public access to private lands, pending legislative funding.

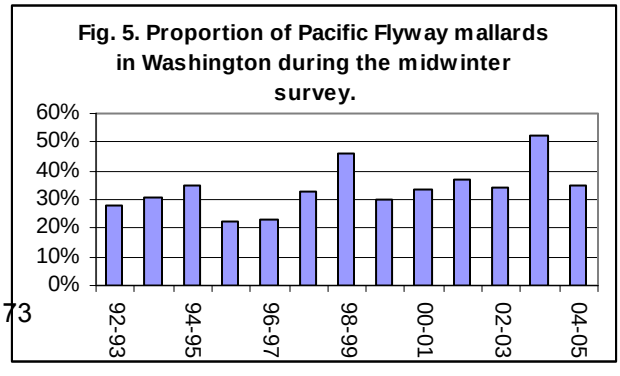
Fig. 1. Washington Goose Management Areas.











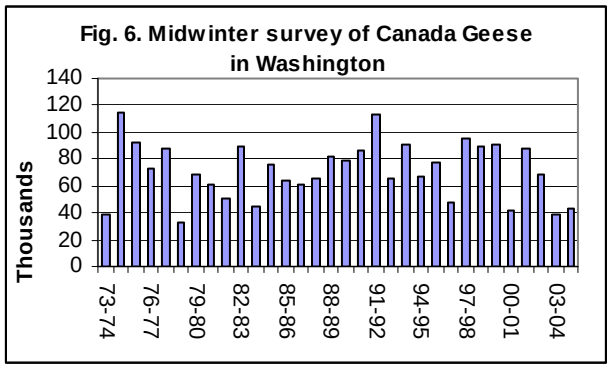


Fig. 6. Midwinter survey of Canada Geese in Washington
Thousands
140
120
100
80
60
40
20
0
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04

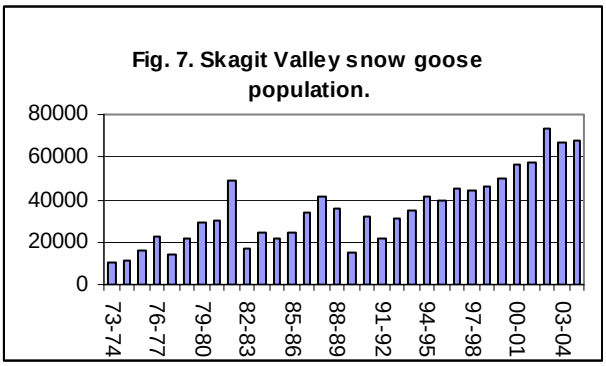


Fig. 7. Skagit Valley snow goose population.
80000
60000
40000
20000
0
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04

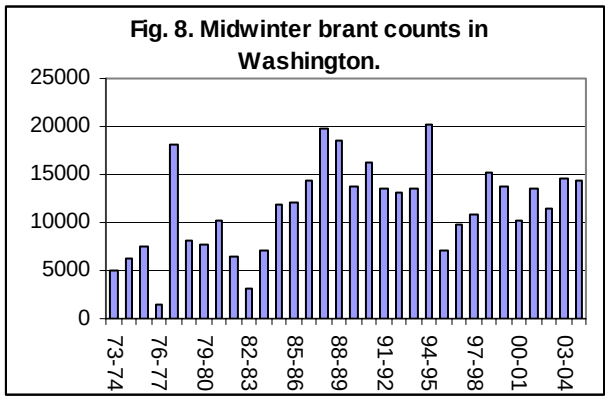


Fig. 8. Midwinter brant counts in Washington.
25000
20000
15000
10000
5000
0
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04

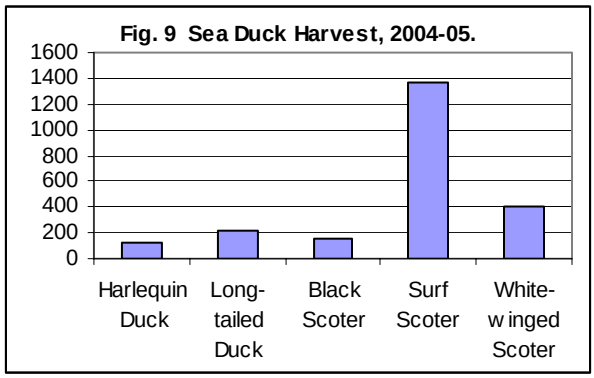


Fig. 9 Sea Duck Harvest, 2004-05.
1600
1400
1200
1000
800
600
400
200
0
Harlequin Duck
Long-tailed Duck
Black Scoter
Surf Scoter
White-winged Scoter

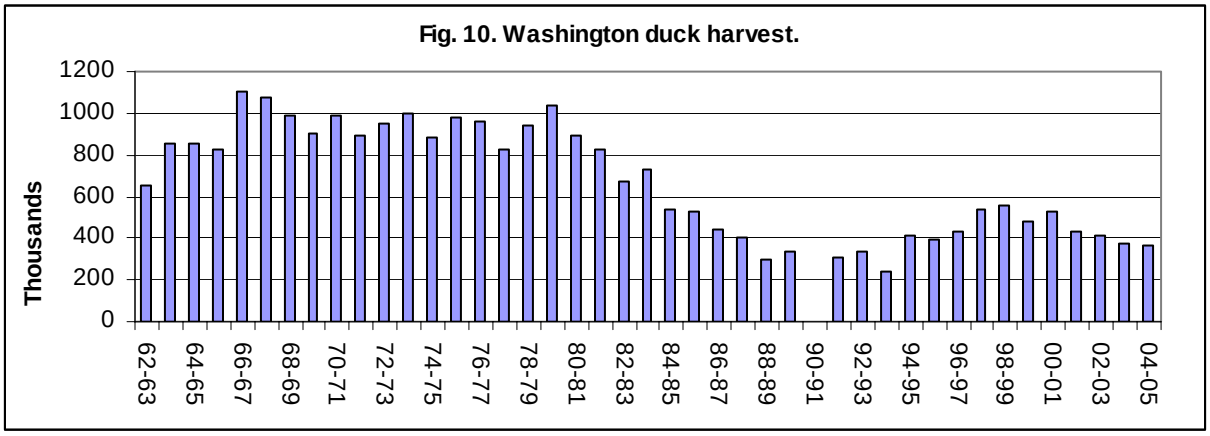


Fig. 10. Washington duck harvest.
Thousands
1200
1000
800
600
400
200
0
62-63
64-65
66-67
68-69
70-71
72-73
74-75
76-77
78-79
80-81
82-83
84-85
86-87
88-89
90-91
92-93
94-95
96-97
98-99
00-01
02-03
04-05

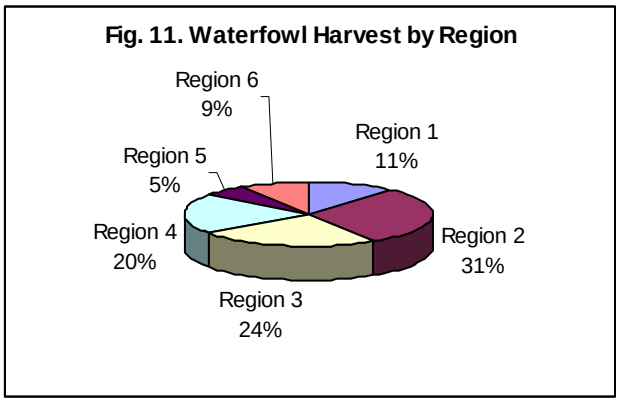
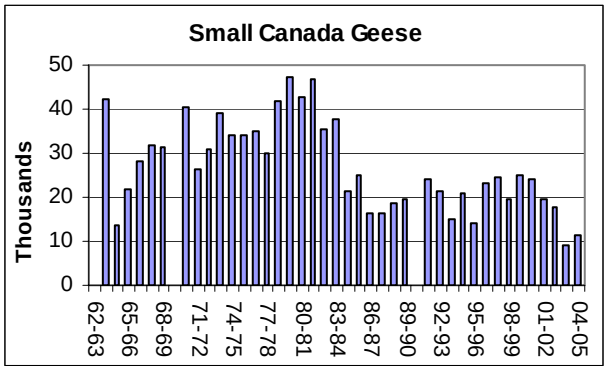


Fig. 11. Waterfowl Harvest by Region
Region 6 9%
Region 1 11%
Region 5 5%
Region 4 20%
Region 2 31%
Region 3 24%

Fig. 12. Washington Canada Goose Harvest



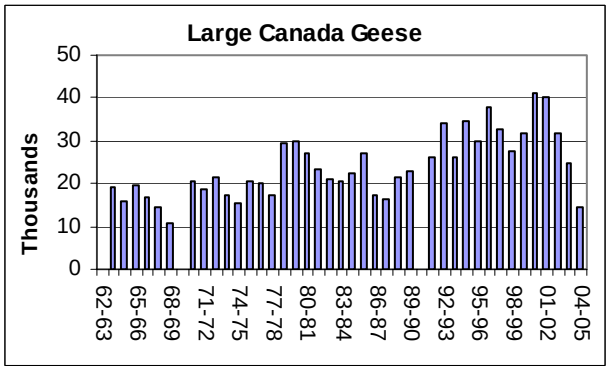


Fig. 13. Washington Brant harvest.

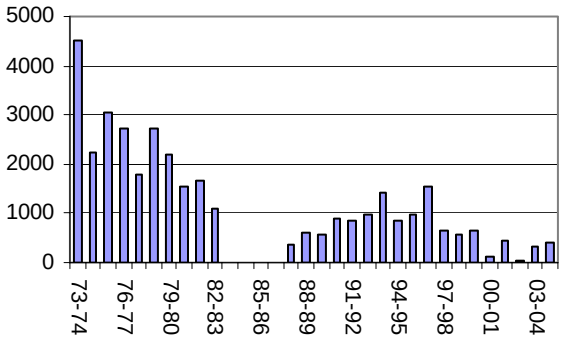


Fig. 14. Skagit Snow goose harvest.

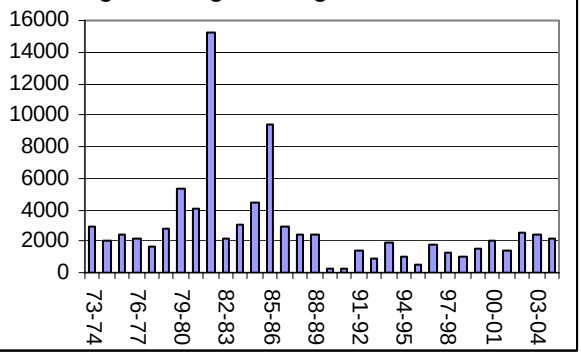


Fig. 15. Washington waterfowl hunters.

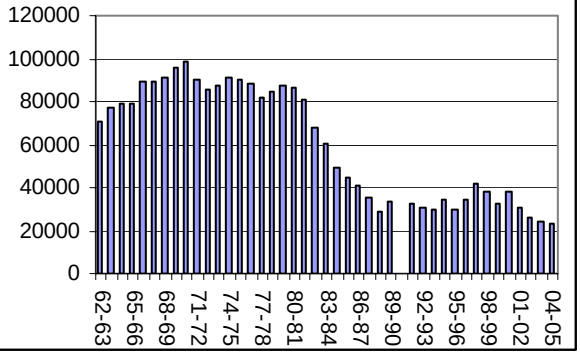


Fig. 16. Duck hunter success rates.

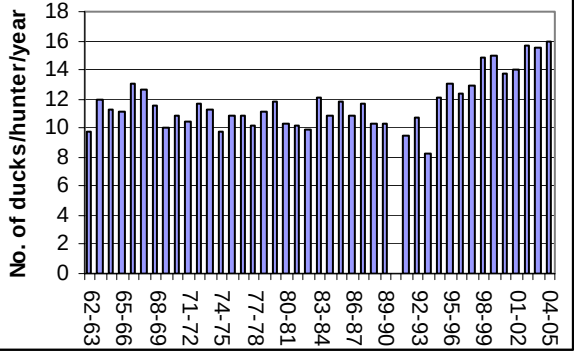


Table 1. Washington Department of Fish and Wildlife Annual Waterfowl inventory- January 2005.

SPECIES	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	05 vs. 04	94-04 ave.	05 vs. ave.
Mallard	419005	310724	240838	547134	979679	442811	356830	348841	325459	432570	470186	9%	440389	7%
Gadwall	2565	3165	6304	7482	5243	8043	10571	10595	11391	9252	10904	18%	7461	46%
Wigeon	116748	73771	68478	117536	172049	112926	133465	124301	113838	151981	195798	29%	118509	65%
Green-winged Teal	18247	10993	7121	6729	12486	11089	6098	13695	8083	14565	33358	129%	10911	206%
B.W. & Cinn. Teal	425	0	0	0	2	0	0	484	57	11	4	-64%	98	-96%
Shoveler	1305	2310	1313	3100	2890	3036	1358	1852	5801	3445	2553	-26%	2641	-3%
Pintail	56808	48227	39156	43763	81653	70040	75597	72106	57465	49567	117296	137%	59438	97%
Wood Duck	454	162	30	72	329	84	206	356	59	132	472	258%	188	151%
Redhead	6779	1517	6782	2495	2335	1505	27918	11353	6867	2621	4795	83%	7017	-32%
Canvasback	2941	4673	6115	6261	4841	2898	6020	3272	2131	3350	2929	-13%	4250	-31%
Scaup	40644	32261	36545	28684	28274	26933	28833	31970	41832	40744	34884	-14%	33672	4%
Ringneck	5456	4314	3782	3327	3240	7488	6386	7306	6457	4583	8358	82%	5234	60%
Goldeneye	22360	19663	16951	12894	10851	13157	17177	15711	20098	14035	15941	14%	16290	-2%
Bufflehead	26724	19441	20818	14780	17185	18017	20647	20266	26426	20009	23293	16%	20431	14%
Ruddy Duck	3372	4248	3417	2712	2476	3819	3075	3457	4966	2936	1937	-34%	3448	-44%
Eider	0	0	0	0	0	4	0	0	0	0	0	0%	0	-100%
Scoter	35437	26059	26939	21386	21507	20326	15932	16597	14125	15876	16753	6%	21418	-22%
Oldsquaw	1550	636	1046	575	645	450	559	423	573	478	654	37%	694	-6%
Harlequin	884	1077	909	791	696	843	603	653	797	963	793	-18%	822	-3%
Merganser	10971	9830	7039	5750	6653	7762	9535	10564	12325	10495	10202	-3%	9092	12%
Unidentified Ducks	8338	8064	4304	7364	3527	2577	1539	1606	3552	2660	5969	121%	4353	35%
Snow Goose*	36681	32340	44441	42666	38185	48843	47743	55480	73363	66801	47111	-29%	48654	-3%
White-fronted Goose	2	25	20	1	0	3	34	21	2	5	27	440%	11	-139%
Canada Goose	67383	76884	47901	95444	88698	91229	41351	88092	67941	39301	43908	12%	70422	-38%
Brant	20308	7082	9753	10881	15252	13859	10197	13478	11455	14544	14286	-2%	12681	13%
Tundra Swan**	1332	4118	3211	3424	2802	4342	4597	2521	6393	1447	2778	92%	3419	-19%
Trumpeter Swan**	75	3017	2817	2352	3215	3896	4047	4562	4263	3996	5508	38%	3224	71%
Unknown Swan**	251	85	103	371	11	402	49	254	168	2432	2381	-2%	413	477%
Coot	52746	59652	64956	58199	104706	62387	74250	80631	91284	91387	105522	15%	74020	43%
TOTAL	959791	764338	671089	1046173	1609430	978769	904617	940447	917171	1000786	1178500	18%	979201	20%
*B.C. Snow Geese	5179	7206	806	1418	7759	879	8679	1770	0	0	21037	-100%	3369	524%
Skagit/B.C. Total	41860	39546	45247	44084	45944	49722	56418	57250	73363	66801	68148	2%	52024	31%

** Comprehensive western Washington swan surveys in 1989, 1991, 1996, 2001.

Table 2. 2004-05 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. 20	Nov. 18-19	Dec. 13-14	Jan.
Mallards	16,771	60,877	130,640	68,640
Total Ducks	106,528	175,862	237,503	114,855
Total Geese	20,673	22,787	46,357	8,391
Total Swans	86	414	237,503	193
TOTAL WATERFOWL	191,267	264,913	284,021	154,815

South Columbia Basin	Oct.	Nov. 12	Dec. 15	Jan. 3
Mallards	21,120	No Survey	No Survey	73,089
Total Ducks	35,885			93,737
Total Geese	18,991			883
Total Swans	110			76
TOTAL WATERFOWL	60,538			104,525

Northeastern Puget Sound	Oct. 21	Nov. 4	Dec. 13	Jan. 5
Mallards	40,065	95,010	235,765	283,911
Northern pintail	55,820	104,482	174,010	83,408
American wigeon	52,950	69,791	166,568	118,235
Green-winged teal	22,960	14,892	43,557	25,091
Brant				
TOTAL DABBLERS	171,795	284,175	619,690	510,545

Snow Goose Aerial Photo Counts	Date	Skagit/Snohomish	Fraser	Total	% Young
	12-22-04	47,104	21,037	68,141	15.3%
	01-27-05	63,729	1,588	65,317	

Brant Aerial Surveys	Date	Skagit Co.	Whatcom Co.	Total
	12-16-04	5,080	1,150	6,230
	1-10-05	9,990	1,425	11,415

Age-ratios obtained from field observations - Northern Puget Sound

	Date	Sample size	Juveniles
Brant	Jan. 4, 2005	732	11.6%
Snow Geese (pre-season)	no data		
" " (post-season)	no data		
Trumpeter Swan	Jan. 25-28, 2005	5,217	17.5%
Tundra Swan	Jan. 25-28, 2005	2,547	14.2%

Table 3. Waterfowl hunting season regulation summary 2004-05.

	Area	SEASON DATES (inclusive)	Daily Bag Limit	Possession Limit
DUCKS *Sea ducks require written authorization (g)*	Statewide	Sept. 18-19, 2004(Youth hunting only)(a)	7 (b)	14 (c)
		Oct. 16-20 and Oct. 23, 2004 – Jan. 30, 2005, *except pintail and canvasback closed Oct. 23-Dec. 6, 2004.*	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. 11-15, 2004	5 Canada Geese	10 Canada Geese
	Goose Mgt. Area 2A	Sept. 11-15, 2004	3 Canada Geese	6 Canada Geese
	Goose Mgt. Area 2B	Sept. 1-15, 2004	5 Canada Geese	10 Canada Geese
	Goose Mgt Areas 4 & 5	Sept. 11-12, 2004	3 Canada Geese	6 Canada Geese
	Statewide, except in Goose Mgt. Areas 2A & 2B	Sept. 18-19 (Youth hunting only)	4 Canada Geese	8 Canada Geese
	Goose Mgt. Area 1	Oct. 16-29 & Nov. 6, 2004 - Jan. 30, 2005, except snow, Ross, or blue geese may only be taken Oct. 16, 2004-Jan. 9, 2005.	4 (d)	8 (e)
	Goose Mgt. Area 2A	8. a.m. – 4 p.m. Sat. only, Nov. 27, Dec. 4, 11, 14, 18, 21, 26, 28; Jan. 1, 4, 8, 15, 18, 22, 2005, Ridgefield NWR - Sat., Tues., and Thurs. only, Nov., 27 2004-Jan. 22, 2005	4 (f)	8 (f)
	Goose Mgt. Area 2B	8 a.m. – 4 p.m. Oct. 16, 23, 30 Nov. 6, 13, 20, 27, Dec. 4, 11, 18, 26, 2004; Jan. 2, 8, 15, 2005	4 (f)	8 (f)
	Goose Mgt. Area 3	Oct. 16-29 & Nov. 6, 2004-Jan. 30, 2004	4 (d)	8 (e)
	Goose Mgt. Area 4	Oct. 16-18 and Sat., Sun., Wed., only, Oct. 23, 2004-Jan. 23, 2005; Nov. 11, 25, 26, Dec. 27, 28, 30, 31, 2004; & everyday Jan. 24-30, 2005	4 (d)	8 (e)
	Goose Mgt. Area 5	Oct. 16-18, & Oct. 23, 2004- Jan. 30, 2005	4 (d)	8 (e)
Brant	Skagit & Pacific Co.s	Nov. 20, 21, 25, 26, 2004; Jan . 22, 23, 26, 29, 30, 2005 (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).
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.
c) **Daily bag limit**: 4 geese – to include not more than 3 snow, Ross' or blue geese.
d) **Possession limit**: 8 geese – not to include more than 6 snow, Ross' or blue geese.
e) 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).
f) 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.
g) All persons hunting sea ducks (harlequin, scoter, long-tailed duck) in Western Washington are required to obtain written authorization and harvest report card from WDFW

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
04-05	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)
[10] pintail season limited to 62 days (Sept. 18-19; Oct. 16-20; Dec. 7-Jan. 30)

Table 5. Waterfowl harvest by species in Washington (2004-05)[1]

Species	No. Harvested	% of total
Mallard	197,573	53.4%
Northern pintail	8,308	2.2%
American wigeon	44,067	11.9%
Green-winged teal	37,910	10.2%
Other ducks	72,011	22.3%
Total ducks	369,457	100%
Large Canada	14,362	49.3%
Small Canada	11,153	38.3%
White-fronted	570	1.9%
Snow	590	2.0%
Brant	--	--
Total geese	29,113	100%
Total waterfowl	398,570	

[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. Sea duck harvest, 2004-05[1].

Species	No. Harvested
Harlequin duck	125
Long-tailed duck	221
Black scoter	148
Surf scoter	1371
White-winged scoter	410
ALL SCOTERS	1929
TOTAL	2275

[1] These figures are based on analysis of mandatory report returns, corrected for non-response bias.

Table 7. Waterfowl harvest by region (2003-04)

Regions	Ducks and Geese Harvested	% of State Total
Region 1	45,774	11.5%
Region 2	119,106	29.9%
Region 3	94,215	23.6%
Region 4	80,948	20.3%
Region 5	21,805	5.5%
Region 6	36,719	9.2%
Total	398,570	100%

Table 8. Brant harvest report summary*.

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Permit Issued	1069	1207	1445	1331	1348	1336	1295	1436	1387	1187	1612
Hunters	287	343	254	197	243	218	39	187	27	152	126
Days (successful)	484	552	549	326	350	386	59	277	277	200	209
Season Days	6	11	11	5	5	9	5	10	10	10	10
Harvest											
Skagit	825	918	1493	597	570	581	0	403	18	257	344
Whatcom	0	0	0	0	0	0	0	0	0	0	0
Pacific	23	44	41	59	18	86	108	37	42	77	45
Total	848	962	1534	656	588	667	108	440	60	334	389

Table 9. Snow goose harvest report summary*.

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Permits Issued	2588	2313	2363	2795	3086	3061	3076	3144	3196	3013	3333
Hunters	433	221	427	424	341	445	460	407	442	530	474
Days (Successful)	664	373	996	812	585	777	1039	953	1217	1155	1075
Harvest											
Island	60	57	39	38	29	71	18	4	18	20	37
Skagit	496	99	381	545	678	815	1058	753	1,419	1465	1267
Snohomish	522	331	1400	749	262	598	919	696	1,084	889	893
Total	1078	487	1820	1332	969	1487	1995	1453	2522	2374	2160

*These figures are based on analysis of mandatory report returns, corrected for non-response bias.

Pheasant

PHEASANT STATUS AND TREND REPORT 2005: 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 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. In 2004 the eastern Washington general pheasant season ran from October 23 to December 31. In addition, a two-day youth only hunting season was run on September 18 and 19. The bag limit was 3 cocks per day, with a 15-cock possession limit. 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 an increase in harvest in 2003, the regional harvest decreased 28% in 2004 to 35,413. Roughly the same harvest as 2002.

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, 11,329 in 2003, and down to 9809 in 2004 (Figure 2). Hunter participation is probably influenced by several factors, including weather and pheasant abundance.

Hunter success in Region One varies from year to year. During the periods 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 2001-2004 the hunter success rate was 3.8 birds/hunter (Figure 3).

Surveys

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) and, production counts in late July and August However, all surveys in Region One were discontinued in 1996 due to time constraints, lack of personnel, and questionable value of the data.

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. However, harvest during 2004 fell back to 2002 levels, indicating that the combination of factors responsible for an increase in 2003 did not occur in 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.

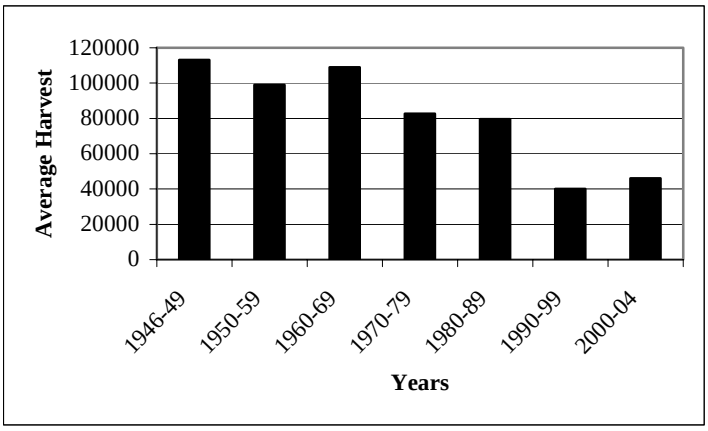


Figure 1. Region 1 pheasant harvest trend

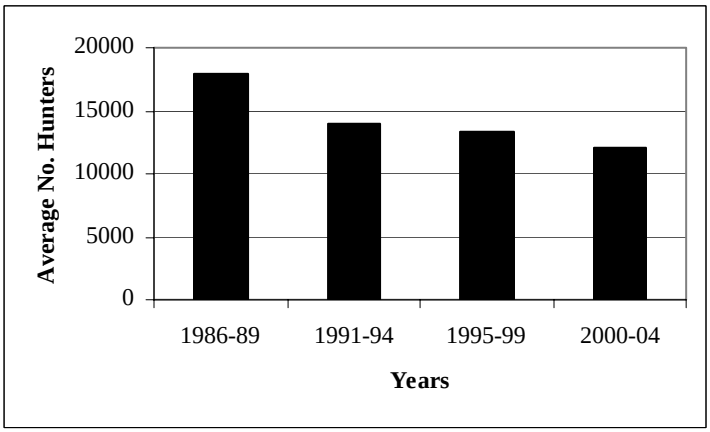


Figure 2. Region 1 pheasant hunter participation trend

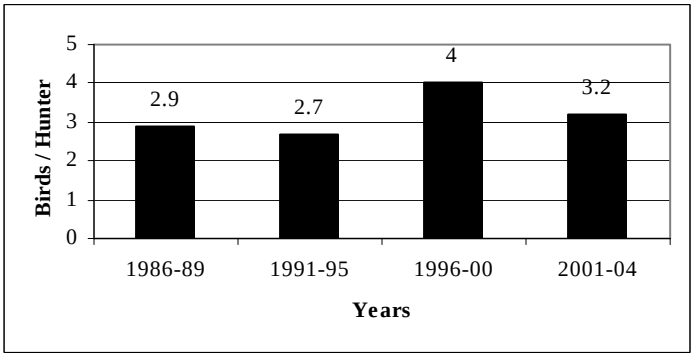


Figure 3. Region 1 pheasant hunter sucess reported as birds harvested per hunter.

PHEASANT STATUS AND TREND REPORT: REGION 3
Yakima and Lower Mid-Columbia River Basins

MIKE LIVINGSTON, District Wildlife Biologist

Population objectives and guidelines

Pheasant management objectives are outlined in the Game Management Plan (WDFW 2003). The overall objective is 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 18-year period 1986-2004 (Figure 1). Participation was slightly down (3%) from 2003, and was 40% down from the 10-year average. Effort of 36,582 recreation days was 1% above last year's level. Harvest increased 3% from 2003, but remained 42% below the 10-year average.

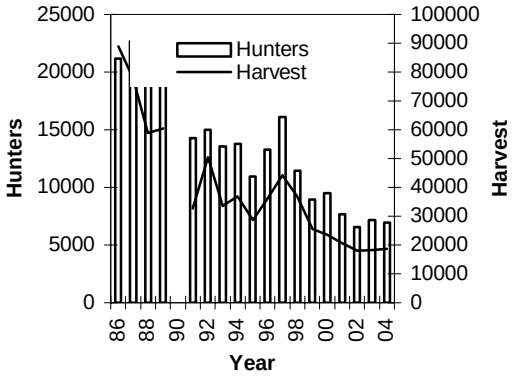


Figure 1. Pheasant hunters and harvest, 1986-2004.

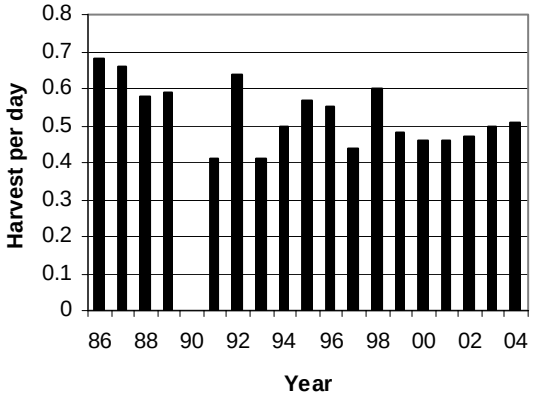


Figure 2. Pheasant harvest per day, 1986-2004.

Hunter success, measured as birds harvested per hunter per day, ranged between a high of 0.68 in 1986 to a low of 0.41 in 1991 and 1993 (Figure 2). Hunter success increased by 2% between 2003 and 2004, and remained 1% below the 10-year average.

Surveys

Brood 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.

Population status and trend analysis

The long-term trend has been characterized by a marked decline in total pheasants harvested and in total hunter participation (Figure 1). Assuming total harvest is an accurate index to population status, the long-term population trend is significantly downward. In contrast, the number of birds harvested per hunter remained relatively constant during the period 1986 – 2004 (Figure 2). A declining number of hunters pursuing pheasants have been, relatively speaking, consistently successful. The Pheasant Enhancement Program likely contributes to hunter success. Since 1997**,** pen-raised roosters have been released and subsequently reported in the harvest. Therefore, inferences about the wild pheasant population status are likely biased high, and should be made with caution.

Habitat condition and trend

Pheasant habitat quality and quantity has declined for decades and continues to do so. Changes in farming practices, particularly in irrigated agriculture, has been a primary cause of habitat quality degradation. "Clean" farming practices have removed cover from bordering fields, riparian areas, and irrigation canals. Forbs, weed seeds, and insects are critical to pheasant chick survival, but herbicides and pesticides are heavily used to keep crops free of weeds and insects. The frequency and timing of alfalfa harvest can be a significant source of chick mortality. Modern irrigation technology permits harvest to occur during the peak nesting and brood rearing periods. Modern machinery (swathers) used to harvest alfalfa moves fast and can be deadly for pheasant chicks.

Changes in crops primarily from annual grains and pasture to high-value perennial crops such as orchard, vineyard, and hops have decreased habitat quantity. These 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 2004 with the releasing of approximately 6,250 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 1 reached an all time high between 1979-81, but crashed in 1982. The long-term objective will be to increase chukar populations within Region 1 to historic levels that occurred in the late 1970's. 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 1. Most of the harvest occurred within the Snake River basin portion of Whitman, Garfield, and Asotin counties. The average harvest in Region 1 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 first 5 years of the 21st century has shown a continued decline in chukar harvest, with an average of 6,337 from 2000 through 2004.

The Region 1 harvest remained low in 2002, 2003, and 2004 at 3,871, 6,673, and 4,243, respectively (Table1).

Hunter participation peaked in the late 1970's and early 1980's, but has declined significantly since then. Today, only 1000-2000 hunters pursue chukars in Region One (1,265 in 2004).

Surveys

Chukar populations were surveyed by helicopter between 1987 and 1997, but aerial surveys were terminated due to budget constraints. At present, no surveys are conducted to monitor chukar populations. Field personnel note the abundance of broods during regular field operations.

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. Some of the best chukar habitat has been inundated with yellow star-thistle over the last 15 years. Thousands of acres of habitat along the breaks of the Snake River south of Clarkston are covered with yellow star-thistle. This loss of habitat will likely hinder population recovery. Also, during the 1980's and 1990's, weather during the nesting season has been less than satisfactory. Nesting conditions in 2003 and 2004 have been above average in SE Washington.

The annual chukar population is dependent on the current years production. Production in 2004 and 2005 appeared to be excellent, but 2004 harvest numbers do not reflect a higher population.

Habitat condition and trend

Noxious weeds, especially yellow star-thistle, are expanding 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 over-grazed and infested with cheatgrass (*Bromus tectorum*), they are not fond of areas inundated with yellow star-thistle.

Cheatgrass is a staple in the chukar diet in spring and fall, and the availability of cheatgrass can have a significant impact on the chukar population. 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 historical 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 1 are still below

the peak levels of the 1970's and early 1980's. Habitat deterioration and the lack of good land management practices will result in the loss of more habitat. Nesting conditions improved in 2004 and 2005, which should provide a significant boost in the chukar population in some areas. However, chukar populations will not return to historical levels until the spread of noxious weeds is reversed, and several years of optimal nesting conditions allow for high productivity and survival.

Table 1. Region One Chukar Harvest Summary 1993-2004.

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Asotin	4,742	2,790	6,781	5,111	5,006	3,547	4,788	3,687	1,440	3,246	3,315
Columbia	439	374	695	561	273	111	155	179	147	163	42
Ferry	0	0	0	0	0	0	0	0	0	0	0
Garfield	1,387	187	864	2,057	2,648	1,337	724	769	673	676	155
Walla	670	0	112	155	0	0	55	429	384	410	61
Whitman	994	1,082	1,531	1,075	2,319	1,875	2,953	2,644	1,058	2,024	650
Lincoln	0	229	807	77	135	148	174	76	137	108	0
Spokane	0	145	17	405	154	55	146	111	32	46	100
Stevens	0	0	0	0	0	0	0	10	0	0	0
Pend Ore	0	0	0	0	0	0	0	0	0	na	0
Total	10,226	6,802	12,803	11,438	12,533	9,072	10,995	7,905	3,871	6,673	4,243

CHUKAR STATUS AND TREND REPORT: REGION 3
Yakima and Lower Mid-Columbia River 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 Chukar hunting season during 1990-1997 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 2003 levels; meanwhile, harvest decreased by 4% (Fig. 1) and success decreased by 2% (Fig. 2). Hunter numbers were 15% below the 10-year average. Harvest per day was 11% above the 10-year average.

Population status and trend analysis

Population surveys have not been conducted for 7 years. A post-season survey of hunters is used to estimate harvest and hunter effort. Harvest and opportunistic information indicate the chukar population has been below the 10-year average the past 6 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, spring conditions were similar to 2003, yielding the second highest harvest 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

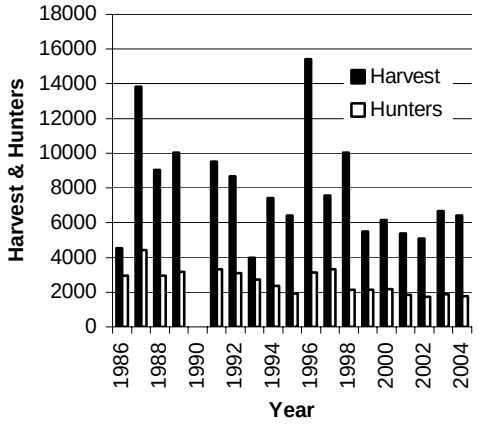


Figure 1. Number harvested and hunters during the period 1986-2004 in Region 3.

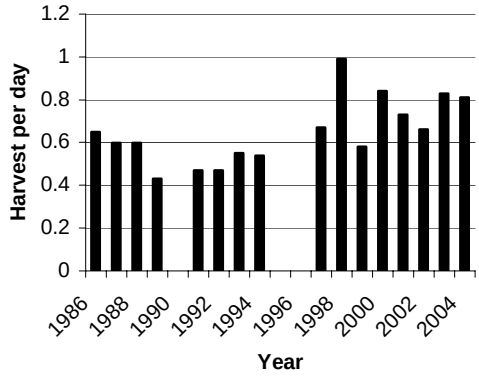


Figure 2. Hunter success measured as number harvested per hunter day during the period 1986-2004 in Region 3.

short-term negative impact. In 2004 the prolonged drought continued, however, there was some modest precipitation and cool weather in May and June. Precipitation during this key period likely improved forb and insect productivity, which may have contributed to a decent harvest this past fall. Similarly, annual productivity of forbs and insects was given a boost by May and June precipitation in 2005. In addition, the 2004/2005 winter was extremely mild in temperature and snowfall. Time will tell if total harvest will improve in response to these apparent favorable conditions for chukar.

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

Paul Wik, Wildlife Biologist

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.

A supplemental release of 73 Mountain Quail (*Oreortyx pictus*) from Oregon occurred on the Asotin Wildlife Area in March, 2005. The release is part of a three-year program to enhance existing Mountain Quail populations in southeast Washington.

Hunting seasons and harvest trends

The 2004-2005 hunting season for California quail and Northern bobwhite (*Colinus virginianus*) in Eastern Washington extended from October 2, 2004 to January 17, 2005. In addition, a youth-hunting-only season occurred for two days, on September 18-19, 2004. As in past years, the bag limit for quail was 10/day, with 30 in possession. Mountain quail 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 2000 season is 37,158.

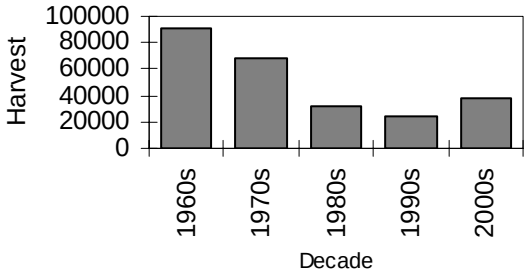


Figure 1. Mean annual quail harvest by decade, Region 1.

Despite the long-term decline in harvest since the 1960's, the quail harvest in Region 1 may have stabilized at a lower level, based on relatively consistent harvest levels over the last 25 years (Figure 2). Harvest during 2004 declined to 30,947 from 49,320 in 2003. This is a 14% decrease over the 1999 to 2003 average of 36,421 birds and a 37% decrease over the 2003 quail harvest of 49,320.

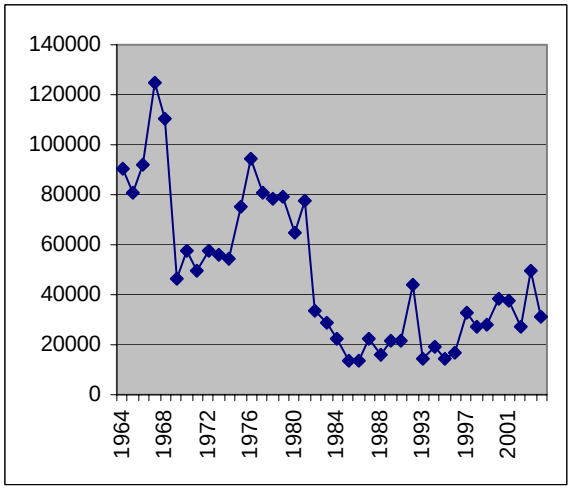


Figure 2. Quail harvest in Region 1 (1964-2004)

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 and 2004 were well above the past few years, perhaps due to favorable weather conditions during the nesting season.

A three-year project to enhance the Mtn. Quail population in southeast Washington was implemented in March, 2005. Mtn. Quail were trapped in southwest Oregon for release in Idaho and Washington. Washington released 73 Mtn. Quail on the Asotin Wildlife Area. Monitoring of the released birds is accomplished by fitting 50 of the birds with radios. Radioed birds produced 8 nests, with an average clutch size of 9.25 eggs per nest. Nesting success was good with 7 nests successfully hatching 72 young. After 28 days, 46 young

still remained. As of 12 August[1], 31 (62%) of the radioed birds have died. Graduate students and technicians from the University of Idaho are monitoring the Mountain Quail.

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.

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, but many landowner cooperators withdrew from the program in 2004 due to changes in administration of the program. This will likely decrease the amount of land available to hunting compared to past years.

[1] Martins, Ashley. 12, August, 2005. Progress Report

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. In 2004, the season was Oct. 2-Jan. 17There has been a slight difference (up to 8 days) in the closing date of the season annually. In 2004, there was also a youth hunting season Sept. 18-19.

Region 2 is one of the state's most popular quail hunting regions. In 2004, 37% of quail hunters statewide hunted in Region 2. There were 7535 quail hunters in Region 2 in 2004 (Table 1). This was 15% more than that of 2003 and was 43% higher than the 1994-2003 average of 5,283 .

Table 1. Number of quail hunters in Region 2, Washington, 1994-2004.

Year	Adams	Douglas	Chelan	Grant	Okanogan	Total
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
2004	598	1696	1347	2680	1214	7535
Ave.	627	1125	1216	1842	1062	5283

During the 2004 season, 45% of the statewide quail harvest occurred in Region 2. 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 2004 harvest of 72,633 was 4% below that of 2003 and 86% above the 1993-2003 average of 38,971 birds. The 2004 harvest was the largest since 1993 in Adams, Douglas, Chelan, and Grant, Co.'s. Chelan Co. has yielded the largest harvest during most years and Adams County the smallest. Chelan Co. has also shown the largest annual variation in harvest.

Table 2. Quail harvested in Region 2, Washington, 1993-2004.

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
2004	3907	20,365	19,630	16,019	12,722	72,633
Ave.	2,169	8,476	10,228	7,227	10,390	38971

Surveys

Population/production surveys for quail have not been conducted since 1999.

Population status and trend analysis

The number of quail harvested in Region 2 has increased dramatically (approx. 400%) in the past 11 years. Although other factors may have contributed to this increase, the quail population size has likely increased significantly. Major annual declines in population size usually follow severe winters with persistent snow cover especially when combined with poor production during the previous and/or subsequent summer.

Habitat condition and trend

The winter of 2003-04 was moderate in most parts of 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 have been relatively large. In addition, incidental observations indicated good production in 2004.

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 quantity 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) and Wildlife Area personnel often trap and transplant quail within Region 2. In most past years, Quail were usually captured in urban and suburban areas of Okanogan County and released at WDFW-managed sites throughout the region. In 2004, approximately 100 quail were trapped in Chelan Co. and relocated to Grant Co. Additional translocations were made in Douglas and Grant 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 and Lower Mid-Columbia River 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. At the same time, WDFW seeks to maximize recreational opportunities consistent with population management objectives.

Hunting seasons and harvest trends

In 2004, harvest declined by 8% whereas effort (total hunter days) increased by 2% (Fig. 1). These same metrics were 33% and 7% above the 10-year average, respectively. Hunter success, measured as birds per hunter-day, decreased 10% from 2003, but was 23% 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 2004 was an above average year for quail production in Region 3. In fact, total harvest was the third highest recorded during the 18-year monitoring period (Fig. 1).

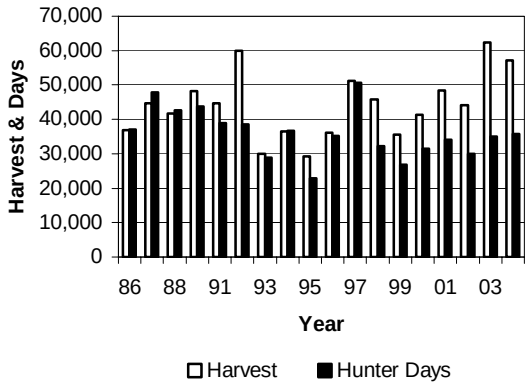


Figure 1. Quail harvest and hunter days for the period 1986-2004 in Region 3.

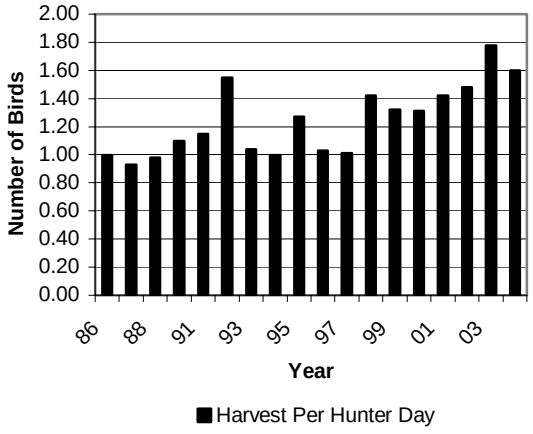


Figure 2. Quail hunter success during the period 1986-2004 in Region 3.

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. In 2004, 40 quail were moved from Fulbright Park to the Cottonwoods pheasant release site.

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.