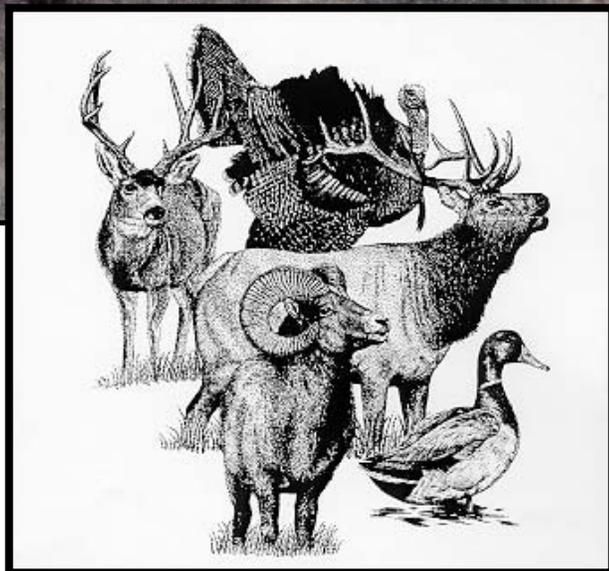


STATE OF WASHINGTON

2003 Game Status and Trend Report



Washington
Department of
**FISH and
WILDLIFE**

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2003 GAME STATUS AND TREND REPORT

July 1, 2002 – June 30, 2003

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Deer

DEER STATUS AND TREND REPORT: REGION 1 PMU 11 – GMU 101 PMU 13 - GMUs 105, 109, 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 most substantially in Ferry County, but their 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 when possible. The buck escapement goal is to maintain at least 15 bucks per 100 does in the post-hunt population. However, post-hunt surveys have not provided reliable information to date, so pre-hunt ratios are currently being used. Pre-hunt buck ratios should exceed 30 (range 27-33) bucks per 100 does. Antlerless hunting opportunity will be managed to maintain white-tailed deer populations within landowner tolerance and provide hunting opportunity.

The management goal for mule deer is to provide conservative hunting opportunity, maintain at least 15 bucks per 100 does in the post-hunt population, and increase productivity and population levels. No mule deer antlerless opportunity has been offered in northeastern Washington in the past several years.

Hunting seasons and harvest trends

Figure 1 depicts the trend in total estimated deer harvested by hunters within Game Management Units

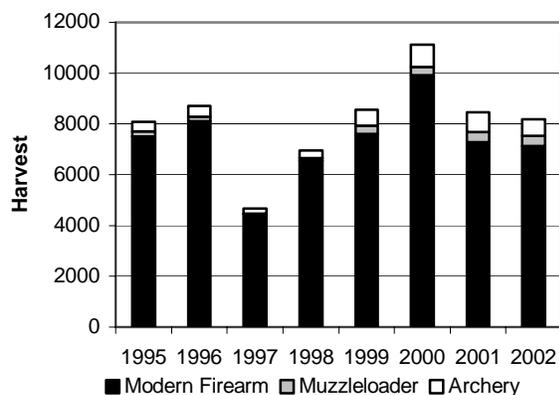


Figure 1. Trend in total deer harvest, GMUs 101-124, 1995-2002.

(GMUs) 101 - 124 from 1995 through 2002. Hunter numbers through the Deer Park Check Station on opening weekend of modern firearm season remained relatively stable since 2000 (Table 1).

Table 1. Opening Sunday Deer Park Check Station, all deer checked 1995-2002 *.

Year	Hunters	Bucks	Antlerless	Total	% Success	
					Bucks	Total
1995	625	39	14	53	6%	9%
1996	650	63	21	83	10%	13%
1997	503	42	10	52	8%	10%
1998	551	61	25	86	11%	16%
1999	506	53	53	104	10%	21%
2000	401	34	23	57	8%	14%
2001	392	29	35	94	7%	24%
2002	417	47	40	79	11%	20%

* some harvest taken outside the district

Mule deer bucks legal for harvest have been limited to a three-point minimum for all weapons since 1997. The most significant mule deer harvest in the Colville District occurs in GMU 101, which is primarily northern Ferry County. Mandatory harvest reporting has been in place since 2001. Table 2 shows mule deer harvest for GMU 101 under the new reporting system.

Table 2. Mule deer harvest trend by user group, GMU 101.

Year	Archery	MZL	Modern Firearm	Total	% Bucks with 4pt.+
2001	6	0	184	190	45%
2002	13	0	227	240	53%

There was only a slight increase in the antlered whitetail harvest from 2001 (5605) to 2002 (5669). Youth, Senior, and Disabled (Y/S/D) hunts were offered for whitetails of either sex in GMUs 101-124 during the early general hunt. The estimated harvest of antlerless whitetails by Y/S/D declined in 2002 by 27%, possibly due to the increased opportunity for youth and disabled hunters in the Okanogan units. Archers and muzzleloaders were allowed to hunt any whitetail during their hunts too. Modern firearm

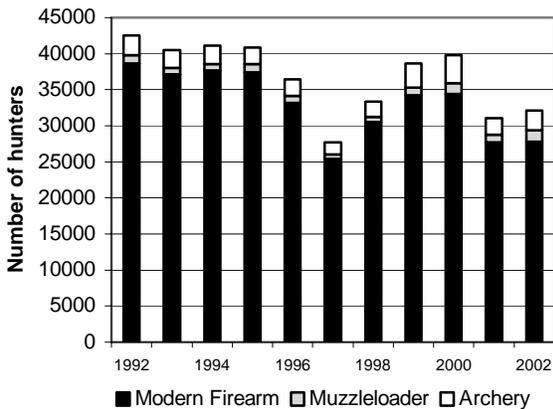


Figure 2. Trend in the number of deer hunters, GMUs 101-124, 1992-2002.

antlerless permits were increased 35% in 2002 but the actual number of permits issued was only 29% greater than 2001. The harvest of antlerless whitetails only increased 7% over 2001 (Table 3). Hunter pressure for all weapons combined over the entire deer season was only slightly above 2001 (Figure 2).

Special permits for antlerless, white-tailed deer were undersubscribed. There were 3,450 antlerless white-tailed deer permits approved, and 2,810 ultimately issued for GMUs 101-124 in 2002. Mandatory reports were filed by 90% of the permittees. Of those, 547 (22%) did not hunt. Of those that hunted, 46% were successful in 2002 vs. 50% in 2001. Permit holders took 918 deer, but 222 (24%) of the deer they took were antlered bucks harvested under general season tags. This is similar to the 23% bucks they took in 2001. The antlerless white-tailed deer permits legal in the general season continue to be a relatively inefficient means of achieving desired doe harvests. As a consequence, “any white-tailed deer” opportunities have been created for archers, muzzleloaders, modern firearm youth, senior, and

disabled hunters. These hunts accounted for 69% of the antlerless harvest in northeastern Washington in 2002 (Table 3). The popular Y/S/D “any whitetail” accounted for 44% of the antlerless harvest in GMUs 101-124.

Surveys

Age, antler and sex ratio data is collected from harvested deer for monitoring deer populations and developing season recommendations. The percentage of mature white-tailed bucks is monitored by determining the percentage of adult bucks (yearlings excluded) 5 years or greater (Figure 3); and the percentage of 5 point and larger bucks in the total buck harvest (Figure 4). Bucks are examined at check stations and data are collected through mandatory hunter reports. The check stations yielded 16%, and the mandatory hunter reports yielded 14%, 5 point or greater bucks in the harvest, which continues the improving trend since the low in 1999 (Table 5 and Figure 4). Age data is also collected at check stations and field checks to determine the percentage of yearlings, mean age of adult bucks, and fully mature (5+) bucks. All checks combined yielded 36% (n=118) yearling white-tailed bucks and 25% (n=40) yearling white-tailed does. The mean age of the adults only (yearlings excluded) was 3.0 years (n=62) for bucks and 5.5 (n=30) for does; down slightly for bucks and no change for does.

Table 3. Harvest estimates for antlered and antlerless white-tailed deer, PMUs 11 and 13, 2002.

PMU	GMU	Antlerless				Total	Antlered	Antlerless per 100 Antlered
		Archery	Permit	Y/S/D	Muzzleloader			
11	101	71	43	182	0	225	512	44
	105	17	68	36	0	121	298	41
13	109	8	97	86	64	255	675	38
	113	5	6	45	49	104	345	30
	117	37	77	126	62	302	854	35
	121	55	262	257	1	575	1504	38
	124	102	143	162	49	456	1481	31
Total:		295	696	894	225	2038	5669	36

Y/S/D = Youth/Senior/Disabled Hunters

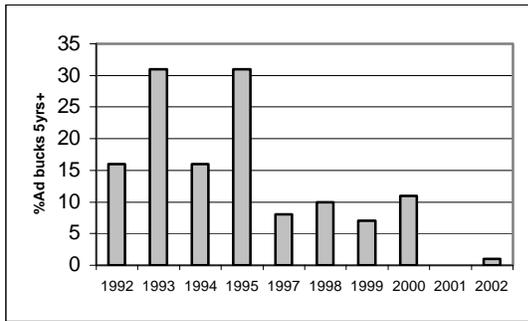


Figure 3. Percent of adult whitetail bucks 5 years and older from check station checks, 1992-2002.

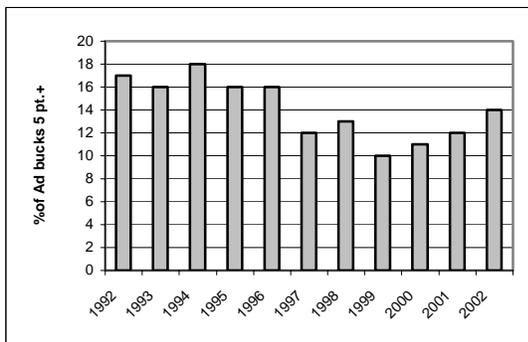


Figure 4. Percent of whitetail bucks 5 point or better from hunter reports, 1992-2002.

Post-winter “green-up” surveys for deer provide fawn per adult ratios and give an index to realized recruitment for the year. Post-winter mule deer ratios for spring 2003 were 37 fawns per 100 adults ($n=247$). Post-winter whitetails surveyed over wide areas from GMUs 101-121 yielded a fawn:adult ratio of 41:100 ($n = 527$). These are relatively poor ratios showing little change from spring of 2002.

Whitetail buck:doe ratios for summer 2003 are 31 bucks per 100 does in PMU 13 (Table 4) vs. 47 in Ferry County where there is no late rifle season. The fawn ratio is low again at 51:100 in PMU 13, our major whitetail area. The percentage of yearling whitetail bucks remained low in the surveys at 59 % in 2002.

WDFW and USFS classified 801 mule deer, primarily in western Ferry County, during late summer, 2003. The buck ratio was basically unchanged at 34:100 does but the fawn ratio improved to 66:100 vs. 52 a year ago.

Population status and trend analysis

The percentage of yearling bucks in the harvest was exceptionally low in 2002. The early season checks yielded 44% yearlings and the late season checks only 11% yearlings. For our total field checks only 36% of our bucks were yearlings. The trend

toward fewer mature (5 point or >) whitetails in the harvest implies a lower percentage of the buck population is prime aged than in the past. In 2002 with 62 adult bucks aged; we had only one buck older than 4.5. Historically at least 15% of the adult bucks checked were 5 or older (Figure 3). Based on mandatory hunter reports, our percentage of five point or better bucks has improved. But given the lower than normal yearling component some of the improvement in that percentage for 2002 is likely just due to fewer young deer (Figure 4).

We have not experienced significant whitetail losses from epizootic hemorrhagic disease (EHD) since 1999 and winter severity has been below average since 1996 (Figure 5). However, fawn ratios have not been impressive so the antlerless whitetail harvests have been maintained at relatively stable levels in the last 3 years. For 2002 the antlerless whitetail harvest declined by 27% while the buck harvest increased slightly so the ratio dropped to 36 antlerless per 100 antlered for the Colville District (Table 3).

The summer mule deer fawn ratios continue to improve (43:100 does in 2000, 46:100 in 2001 and 52 in 2002; 66:100 in 2003). Mule deer populations should expand with 66 fawns:100 does. The antler restrictions on mule began in 1997 when the population was very low. That first year 55% of the bucks taken were 4 point or better. The percentage of 4 point or better dropped to the mid-forties for a few years, but showed improvement at 53% in 2002.

The late summer whitetail fawn ratios are relatively poor again for the 2003 summer (51:100 in GMUs 101-121) so while we’ve experienced average winters the summer and fall precipitation has been exceptionally low and may be a significant influence on the recruitment rate. The whitetail pre-season buck ratio improved from 22:100 in 2002 to 31 in our major whitetail units (Table 3, PMU 13).

Table 4. White-tailed deer pre-season composition survey sample sizes with buck:100 doe and fawn:100 doe ratios by PMU.

PMU	Year	August		September		B:D Ratio	F:D Ratio
		Bucks	Does	Does	Fawns		
11	1999	69	151	156	76	46	49
13	1999	181	580	509	247	31	49
11	2000	57	150	57	42	38	74
13	2000	239	794	487	316	30	65
11	2001	50	191	226	85	35	50
13	2001	269	916	458	262	29	57
11	2002	49	141	201	127	35	63
13	2002	170	1163	502	277	22	55
11	2003	36	77	135	93	47	69
13	2003	252	812	612	315	31	51

Table 5. Whitetail buck age trends from field checks and hunter reports, GMUs 105-124.

Year	Early Check Station		Late Check Stations		All Field Checks		Hunter Reports %5pt+
	Sample	%Yrlg	Sample	%Yrlg	%Yrlg	%5pt+	
1991	62	61%	106	29%	41%	24%	15
1992	88	68%	34	37%	52%	16%	17
1993	21	52%	44	27%	31%	28%	16
1994	50	46%	61	23%	35%	20%	18
1995	29	83%	0	---	---	---	16
1996	53	64%	0	---	---	---	16
1997	40	65%	63	30%	39%	22%	12
1998	51	72%	92	47%	58%	9%	13
1999	57	68%	77	42%	53%	16%	10
2000	30	50%	88	40%	42%	17%	11
2001	20	60%	63	44%	45%	13%	12
2002	39	44%	37	11%	36%	16%	14

Disease and Predators

We continued to experience exceptionally dry fall weather in 2003 as in 2002 and 2001. While no reports of deer lost to Epizootic Hemorrhagic Disease emerged in 2002 it does appear we may have lost a few whitetails in isolated areas of the southern most portions of Stevens and possibly Pend Oreille counties. WDFW continues to test harvested deer statewide for Chronic Wasting Disease; and many deer have been included in the sample from throughout northeast Washington.

Cougar populations appeared to be exceptionally high during the mid to late 1990's but hunter harvests and special harvest permits to reduce populations for human safety concerns appear to have reduced numbers in recent years.

Habitat condition and trend

The impacts of drought are not as obvious as a severe winter but we speculate the dry summers and low water table may be a significant factor contributing to the poor deer population recovery from the 1996 winter losses. The effects of the drought are readily noted in the loss of trees in the forest and over-grazed pastures and rangeland. Deer, especially nursing does, must be impacted by the same conditions.

The human population continues to build in northeast Washington with associated losses of winter ranges and other critical habitat to development. White-tailed deer typically co-exist well with a high degree of human development. Ultimately, however, the amount of land converted to buildings, roads, or impacted by dogs, snowmobiles, and ATVs reduces the deer carrying capacity. There have been tremendous changes in much of the whitetail habitat in the forested hills and mountains due to forest practices. These combined with the human impacts to the winter ranges

that the deer depend on may be contributing to the general impression that the mountain deer populations have declined.

Mule deer populations are showing some signs of stabilizing or recovering. Land managers, especially the USFS, have begun an aggressive program to restore the historic park-land forest environment that mule deer likely prefer, relative to decades of fire protection and cutting large diameter trees that has led to dense, young stands of fir and pine. Maintaining adequate winter and spring concentration acreage may be difficult as humans move farther up the slopes.

Wildlife damage

Whitetails foraging in alfalfa, and collisions with vehicles are the primary economic losses reported. Antlerless permits and either-sex hunting opportunity by youth, senior, or disabled are part of the management strategy to stabilize populations, and control excessive deer damage. 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).

Management conclusions

Mule deer populations show some signs of improving.

The whitetail population appears stagnated with poor recruitment. Winter severity has been below average and we have not had a deer "killing" winter since 1996-97. The poor late-summer whitetail fawn ratios still suggest there may be habitat limitations though and a prolonged drought that is obviously impacting other ecological systems may be stressing

deer populations too.

The lower than average percentage of 5-point or better, and 5 year or greater bucks in the harvest continues to concern us. The goal is to provide high recreational hunting opportunity but we want to be assured that the deer population also has a reasonable number of bucks representing all age classes from yearling to at least prime.

Antlerless permits for white-tailed deer increased in 2002. However, the antlerless harvest by Y/S/D declined; this resulted in the ratio of does taken per 100 bucks to drop from 50 to 36. There are multiple management goals in maintaining doe harvests: (1.) improve habitat for remaining deer, (2.) address crop/vehicle damage, (3.) provide increased hunter success and (4.) reduce some of the harvest pressure on bucks. Sample sizes are low but it appears we may have slightly impacted the doe population with the harvest in 2001. The 2002 age data indicates a slight increase in the yearling doe percentage from 20% in 2001 to 25% in 2002 ($n=40$). Sample ages on does still show a good representation from 1.5 to 12.5 years.

Populations that are heavily impacted by harvest would be expected to have few older aged animals; of the 30 adult does aged in 2002 36% were 5 years or older (vs. 41% in 2001). On bucks where the harvest rate is much greater we had only 1 adult whitetail buck come in at 5 years or greater ($n=118$).

Given the relatively low whitetail fawn ratios for fall 2003 we will likely not be looking at much improvement in the population for 2004.

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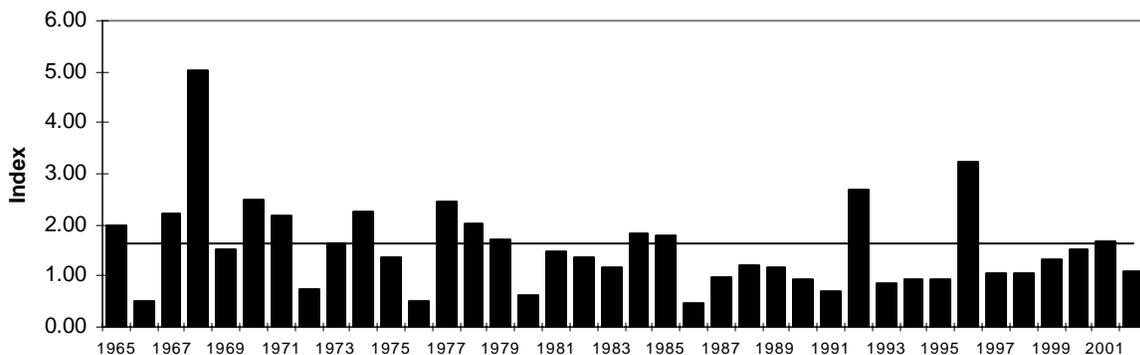


Figure 5. Chewelah winter severity index, based on mean temperature and total snowfall, 1965-2002.

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

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Population objectives and guidelines

Deer management goals for District 2 are to maintain both white-tailed deer (*Odocoileus virginianus*) and mule deer (*O. hemionus*) numbers at levels compatible with landowners and urban expansion; and provide as much recreational use of the resource for hunting and aesthetic appreciation as possible. Further objectives are to meet the state guidelines for buck escapement (at least 15 bucks per 100 does post-season) and to maintain healthy buck:doe:fawn ratios while minimizing agricultural damage from deer.

Hunting seasons and harvest trends

The Game Management Units (GMUs) numbered 127 through 142 make up the Population Management Units (PMUs) 14 and 15. These PMUs provide quality recreation in a relatively open habitat. Larger bucks have been taken in recent years as a result of the 3-point minimum regulation.

Both species of deer are responding very well to current management strategies. WDFW offers a short nine-day modern firearm season with a three point minimum regulation for both deer species, plus a nine-day late whitetail buck hunt, which is also restricted to 3-point minimum. Archery mule deer seasons were 3-point minimum September 1-30 in GMU 127, and in GMUs 130-142 the season was three-point minimum September 1-15, and 3-point minimum or antlerless from September 16-30. For whitetail, the season was extended to September 1-30, for three point minimum or antler less. Late archery was limited to GMU 127, and hunters could take mule deer, whitetail 3-point minimum or antlerless deer. Muzzleloader hunts are offered in GMUs 133 and 142 in the early season (Oct. 5 – 9), and GMUs 130 and 139 in the late season (Nov. 21-Dec. 8).

Harvest of whitetail bucks has increased since the implementation of the late buck hunt in November. Harvest figures (Table 1.) indicate a trend of increased hunter take during the previous 6 years with a slight reduction in deer harvested in 2001 and a slight increase in 2002. The buck harvest in 2002 was slightly higher than an average of the previous 3 years

for both whitetail and mule deer. Total harvest was up

Table 1. Antlered and antlerless harvest.

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

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

	Year	Game Management Unit					
		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
Days/ Harvest.	1996	29	15	11	16	16	12
	1997	22	20	21	15	15	9
	1998	31	30	19	23	20	14
	1999	36	35	25	33	21	13
	2000	17	25	15	21	11	8
	2001	18	16	16	12	11	8
	2002	18	17	16	11	12	10

10.2% in PMU 14, and the same 13% in PMU 15. Hunter success was slightly greater in 2002 than previous years (Tables 2 and 3).

Table 3. Percent hunter success by GMU.

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

Current habitat conditions will support increased population growth until a severe winter or a significant drought. The possibility of an outbreak of EHD in whitetail is a real threat in those GMUs with a high whitetail component when drought conditions reduce standing water levels. Youth/senior/disabled hunts are used to manage antlerless white-tailed deer and mule deer and alleviate agricultural damage.

Surveys

Deer populations in the Central District have been surveyed by ground and aerial methods. The post-hunt ratios more accurately reflect composition and performance of these herds, than the pre-hunt survey figures. However, whitetail bucks are often difficult to survey because of nocturnal behavior and the hunting pressure of the late whitetail buck season. As a result, the whitetail post-season buck:doe ratio figure is probably a conservative measure of composition.

Whitetail ratios in 2002 averaged 24 bucks: 100 does: 50 fawns pre-season, minimal post-season data

Table 4. Deer surveys results, Central District.

Species	Year	Pre-season			Post Season		
		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
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	*	*	*

* Survey efforts focused on mule deer population.

were collected. Mule deer ratios in 2002 averaged 33 bucks: 100 does: 64 fawns pre-season, and 20 bucks: 100 does: 67 fawns post-season (Tables 4 and 5).

Pre- and post-hunt survey data is not available for 2000 and 2001. Post-hunt aerial surveys were conducted during 2002. Pre-season surveys were implemented during August and September 2002.

Table 5. Deer composition ratios for 1999 and 2002.

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

* Survey efforts focused on mule deer population.

Population status and trend analysis

Although whitetail post-season buck ratios are probably underestimated by surveys, ratios for both whitetail and mule deer exceed guidelines (15 bucks per 100 does) for post-season herd composition (Tables 4 and 5). Doe:fawn ratios are reduced from 1999 values in most units and indicate a need for continued monitoring. These GMUs are largely private lands, and although WDFW has little control of management practices on private lands, the recent mild winters and general fertile nature of these soils have helped produce healthy populations of both deer species in past years.

We are managing mule deer very conservatively in the Central District, yet resulting a buck:doe ratio of 20 bucks post-season represents a decline from 1999. Dry summer conditions during the past several years may be a contributing factor.

Management conclusions

Deer populations in the Central District are productive and increasingly abundant in recent years. 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 may be necessary to increase the harvest of antlerless component of both deer species in the Central District to control herd levels in the Central District.

It seems that with 3-point regulations, WDFW can continue to emphasize white-tailed deer harvest in the Central District. Due to the vulnerability of bucks to harvest in the open habitat of GMUs 127-142 close

monitoring sex and ages classes is imperative. Recreational opportunities to harvest older age class bucks may be enhanced by switching to a permit only opportunity during the late season. Those units near urban centers continue to receive high hunting pressure and will need to be closely watched to avoid over harvest.

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

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

The GMU 142 mule deer population along the Snake River breaks of Whitman County continues to be a concern. With agriculture being the dominant land use in the area, we anticipate the continued use of antlerless special permits to help resolve depredation problems when they occur.

DEER STATUS AND TREND REPORT: REGION 1
PMU 16 - GMUs 145, 149, 154, 178, 181
PMU 17 - GMUs 162, 163, 166, 169, 172, 175, 186

PAT FOWLER, District Wildlife Biologist
 PAUL WIK, Wildlife Biologist Population objectives and guidelines

Mule deer (*Odocoileus hemionus*) populations are at management objective along the breaks of the Snake River and in the foothills of the Blue Mountains. Mule deer populations in the mountains are still depressed, but are improving. Five years of mild winters contributed to low over winter deer mortality, although fall drought is having an impact on fawn production in arid areas. White-tailed deer populations have increased in the foothills areas, and are recovering along the breaks of the Snake River where the EHD outbreaks reduced the population in 1998.

Hunting seasons and harvest trends

The general buck season was re-structured in 1990 by combining the nine-day season with a three-point regulation for mule deer. The regulation was expanded to include white-tailed deer in 1991. 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). Buck survival and post-season buck ratios for both mule deer and white-tailed deer have improved significantly since 1990.

Mandatory hunter reporting replaced the Hunter Questionnaire for determining the deer harvest in 2001. From 1994-00 the District buck harvest averaged 2,290 bucks/year, and compares favorably with the 1985-89 (pre three-point) average of 2,340 bucks/year. The 2002 buck harvest was 13% above the 1994-2001 average (2304) at 2599 bucks (Table1).

Three user groups have general seasons in the Blue Mtns., archery, muzzleloader, and modern rifle.

Over the last three years, modern firearm hunter numbers have averaged 9,375 for the general season, with an average harvest of 2,251 bucks. Modern firearm hunters harvested 2,382 bucks and 981 antlerless deer in 2002. General season hunters had a success rate of 28%.

Muzzleloader hunter numbers are increasing annually since the general season was established in 2000. The first year, only 118 hunters participated in the new season, but by 2002 that number

increased to 372 hunters. The buck harvest increased from 24 in 2000 to 113 in 2002. Muzzleloader hunters also harvested 26 antlerless deer in 2002. Muzzleloaders have the highest success rate of

all three user groups, at 37%. A success rate this high will definitely result in more interest and increasing numbers of ML hunters.

Archery hunter numbers range between 800 and 1300, and average 1030. Archers harvest an average of 111 bucks per year in the Blue Mtns. In 2002, 900 archers harvested 94 bucks and 143 antlerless deer, for a success rate of 26%, which is almost equal to general season modern firearm hunters (28%).

Species composition of the harvest changes little from year to year, with the 2002 buck harvest consisting of 61% mule deer and 39% white-tailed deer, which is comparable to the long term trend (60%md, 40% wtd). However, three factors contribute to a higher percentage of white-tailed bucks in the harvest than they occur in the deer population. One, approximately twice as many yearling white-tail bucks are legal under the three-point regulation, compared to yearling mule deer bucks. Two, the permit controlled, late white-tail hunts add approximately 8-10% to the white-tailed buck harvest (Table 2.). Three, a change in the late white-tail regulation in 2001 and 2002, allowed hunters to harvest "any white-tail" and increased the percentage of sub-legal (yearling) bucks

Table 1. Deer harvest summary, 1990-2002, 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

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

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

Year	No. Permits	Bucks	Does	Total	Hunter Succ.	Whitetail Buck	
						%Harvest \geq 5 pt.*	OI
1990	50	16	4	20	54%	12%	
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%	

Note: % \geq 5 point calculated from harvest under three point regulation.

in the harvest.

The antlerless deer harvest fluctuates according to permit levels, and hunter success rates. From 1994-2001, the antlerless harvest averaged 888 per year. Antlerless permits were increased for the 2002 season from 2685 to 2835, which resulted in a harvest of 917 antlerless deer. The permit controlled harvest, and general season antlerless harvests totaled 1150 antlerless deer, which is 30% above the 1994-2001 average (888). Antlerless deer were harvested at a rate of 44 antlerless per 100 bucks. The overall success rate for antlerless permits was 59%, with general permits (mule deer/wt deer) averaging 62%, and "whitetail only" permit success averaging 49%. Approximately 25% of the antlerless permit holders did not hunt.

Surveys

Deer surveys are conducted to determine pre-hunt and post-hunt herd composition. Both aerial and ground surveys are used for herd composition counts.

Pre-hunt surveys were conducted from the ground and air, and resulted in 1151 mule deer classified. Productivity was good with 58 fawns/100 does (Table 4).

Post-hunt surveys were conducted from the ground and air, with 1509 mule deer classified (Table 3). December fawn ratios had declined to 35 fawns/100 does.

Population Status And Trend Analysis

Several factors have contributed to improved deer populations in southeast Washington. Five mild winters contributed to good fawn production and survival, and over 400,000 acres of CRP lands have improved habitat conditions.

Table 3. Post-hunt mule deer surveys 1989-02, Blue Mtns., Washington.

Year	Bucks				Total	Per 100 Does F:100:B
	Ad.	Yearl.	Doe	Fawn		
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

Mule deer populations along the Snake River and in the foothills of the Blue Mountains are at management objective. Mule deer populations south of Clarkston in GMU 181 and in the mountains are improving.

The white-tailed deer population in GMU 145-Mayview and GMU149-Priscott appear to have recovered from the EHD die-off that occurred in 1998. Conditions in 2003 were perfect for a serious EHD outbreak, and Idaho did experience a severe outbreak of EHD on the South Fork of the Clearwater River.

Increased hunting opportunity and lower fawn survival along the breaks of the Snake River is putting significant pressure on the mule deer buck population. Lower fawn production/survival in 2002 will result in fewer antlered bucks recruited into the population in 2003, which will exacerbate this problem for the 2003 hunting season. Post-hunt mule deer buck ratios in 2002 declined to 14 bucks per 100 does, which falls below the minimum listed in the Game Management Plan. The average post-hunt ratio for mule deer in 2000 and 2001 was 25 bucks/100 does. The 10-year average (1992-2001) post-hunt buck ratio for mule deer ranged between 14 – 29 bucks/100 does, and averaged 20.7 bucks/100 does.

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

Habitat Condition And Trend

Summer-Fall drought has occurred during the past 2 years (2001 and 2002), and is having a negative impact on the mule deer population. The green-up produced by fall rains is very important to deer in southeast Washington. Forage tends to dry out early in

the summer, but the fall green-up allows deer to accumulate fat reserves for winter. The lack of fall rains can have a serious impact on fawn production and survival the following year.

The Conservation Reserve Program (CRP) dramatically improved habitat conditions for deer in the major agricultural areas, providing approximately 400,000 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 may be why the mule deer population in this area has not increased, compared to other areas along the lower Snake River.

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

Landowners enrolled in the CRP program will be required to re-plant approximately 50% of their existing CRP acres with new wildlife mixtures, including sagebrush. If grazing is allowed in CRP lands, hopefully it will be done in a way that improves stand condition and doesn't degrade CRP for wildlife.

Wildlife Damage

Damage complaints attributed to deer have been minimal in southeast Washington, compared to deer densities. Vineyard development is increasing at an alarming rate in GMUs 149 and 154, and could result in serious deer damage problems in the future.

Management Conclusions

Mule deer populations along the breaks of the Snake River, and in the foothills of the Blue Mountains are at management objective. High elevation mule deer populations in the mountains are improving.

Fall drought in 2001 and 2002 resulted in lower fawn production and survival for mule deer in the arid

areas of southeast Washington, which will impact the buck harvest over the next two years.

The three-point regulation has accomplished the goal of increasing post-season buck survival for both mule deer and white-tailed deer. However, expansion of hunting opportunity for various user groups over the last few years is contributing to lower mule deer buck survival. The 2002 post-season mule deer buck/doe ratio declined below the minimum goal of 15 bucks/100 does as listed in the Game Management Plan. If this trend continues, adjustments in hunting seasons will be necessary to improve buck survival.

The quality of bucks harvested under the three-point program has improved, compared to the era when hunters could harvest "any buck". Since 1992, 43-55% of the mule deer bucks harvested possessed four or more antler points. The white-tailed buck harvest ranges from 18-24% five point or better. Public support of the three-point regulation is excellent, due to the quality of the bucks harvested, and good hunter success rates.

The three-point buck regulation should be maintained in the Blue Mountains for now. However, other states that tried a "three point" regulation usually failed, due to expanding hunting opportunity, or maintaining long hunting seasons. Hunting opportunity has been expanded in southeast Washington over the last three years as a result of hunting season guidelines, which will necessitate a reexamination of the three point program and harvest regulations.

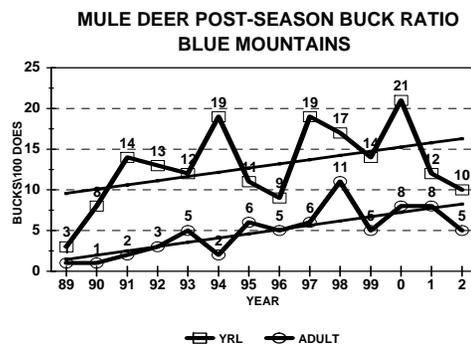


Figure 1. Post hunt mule deer buck ratio.

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. 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 2002 hunting regulations retained the nine-day modern firearm season and the three-point minimum for mule deer implemented in 1997 for all user groups. Antlerless opportunity continued for archery hunters during the early season, and youth and disabled hunters enjoyed an any-deer, modern firearm season. Hunter numbers in the Okanogan District edged up in 2002, and 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, however, dry conditions made stalking difficult. The mild weather during the general season meant that deer were still well distributed at this time. Significant seasonal migration had not yet begun and hunters had to search widely to locate animals.

Hunter success fell slightly in 2002 (Figure 2), but harvest increased proportionally with hunter numbers

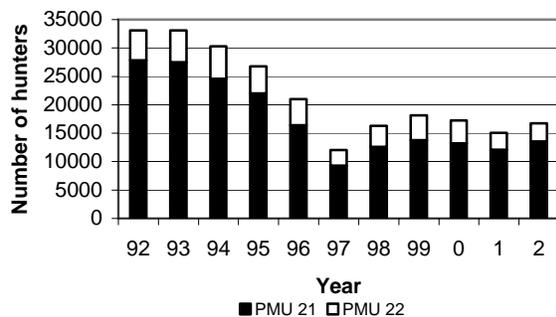


Figure 1. Trend in number of hunters, PMUs 21-22, 1992-2002.

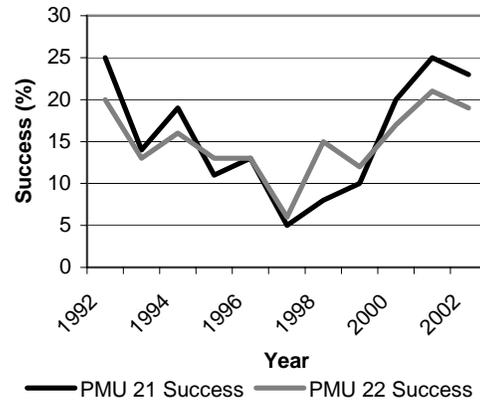


Figure 2. Success in PMUs 21 & 22, 1992-2002.

(Figure 3). Antlerless harvest increased to 869 animals, exceeding the target of 500-700 animals. The largest portion of this harvest is attributable to youth/disabled seasons, which were restructured by the Commission in April to a limited, special permit opportunity for fall of 2003.

WDFW check station personnel surveyed 1265 hunters and examined 99 deer in 2002 (Table 1). Staff collected chronic wasting disease and DNA samples from carcasses when possible.

Tribal input

Year 2002 data from the Colville Confederated

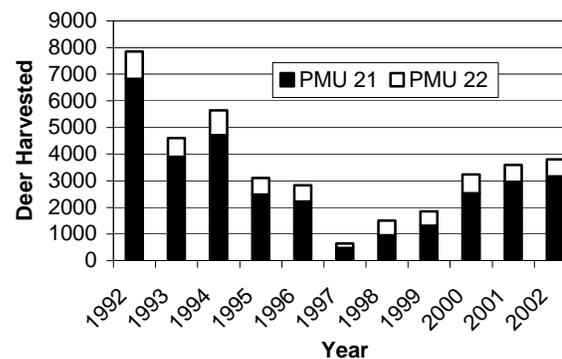


Figure 3. Deer Harvest for PMUs 21 & 22, 1992-2002.

Tribes (CCT) had not been received at the time of this report. In 2001, Tribal harvest continued to decline, representing only 11% of the total PMU 22 harvest (Figure 4). Reasons for this decline are unknown. Tribal officials share WDFW's interest in the status and trend of mule deer herds in Eastern Washington, particularly immediately north of the reservation. The CCT continue to be active partners in an ongoing mule deer research project in North Central Washington, contributing staff time and financial resources.

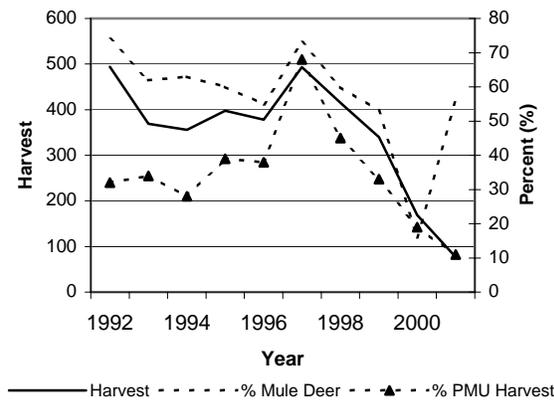


Figure 4. CCT harvest statistics.

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 early November / late 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.

Table 2. Post-season population composition counts from 2002, by area. F:100:B is fawns and bucks per 100 does.

Area	Unit(s)	Buck Antler Class			Does	Fawns	Total	F:100:B
		≥3 pt	< 3 pt	Subtotal				
Methow	218-231, 239,242	176	258	434	1497	1179	3110	79:100:29
Okanogan	209, 215, 233, 239	38	61	99	562	428	1089	76:100:18
Total		214	319	533	2059	1607	4199	78:100:26

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 sample size shortcomings and limited resources.

Table 1. Chewuch Check Station Results.

Year	Deer Age Class			% Yearl. Hunters Success		
	Adult	Yearl.	Total	Yearl.	Hunters	Success
1991	70	81	151	54	--	--
1992	92	105	197	54	2,256	0.09
1993	48	99	147	68	2,410	0.06
1994	--	--	160	--	1,994	0.08
1995	--	--	36	--	1,388	0.03
1996	24	51	75	68	1,247	0.06
1997	3	2	5	40	729	0.01
1998	30	3	33	9	980	0.03
1999	48	5	53	9	1,414	0.04
2000	69	3	72	4	1,250	0.06
2001	106	27	133	20	1,314	0.10
2002	71	28	99	28	1,265	0.08

Biologists classified a total of 4,199 mule deer during helicopter surveys in PMU 21 in early December 2002 (Table 2). The counts yielded overall buck:doe and fawn:doe ratios of 26:100 and 78:100 respectively. Ratios show a decline in productivity, likely attributable to recent drought conditions (Table 3).

During hiking surveys in late March and early April 2003, biologists classified 2,022 mule deer in PMU 21 (Table 4) and observed a fawn:adult ratio of 33:100. This further decline in over-winter recruitment is also probably a result of drought conditions that reduced forage quality and quantity (Table 5). Falling recruitment will be addressed with changes in doe harvest strategies in 2003.

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. No recent reliable population estimates have been calculated. Our intention is to generate estimates using population reconstruction models, and efforts are underway to obtain reliable pre-season fawn:doe ratios. Check station data on buck mortality and age structure are unobtainable 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 shifts in winter weather patterns.

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

Year	Buck Antler Class			Does	Fawns	Total	F:100:B
	>3 pt +	< 3 pt pt	Total				
1991	--	--	--	--	--	905	63:100:13
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

A recent overall gradual decline in mule deer numbers seems evident. For roughly the last 15 years, harvest data indicated that even during periods of mild winter weather, the population is not rebounding to the historic highs of the 1950s and 60s. These historic highs are probably not realistic goals for mule deer populations under current conditions.

Table 4. Spring population composition counts from 2003, by area for PMU 21. F:100:B is fawns and bucks per 100 does.

Area	Unit(s)	Adult	Fawn	Total	F:100
Methow	218-231, 239, 242	1109	373	1482	34:100
Oka	209, 215, 233	407	133	540	33:100
Total		1516	506	2022	33:100

Loss of winter range, due to increased human population and associated development is likely a major contributor to reduced herd size. This has been true district-wide, but is most pronounced in PMU 21. These development trends are continuing, and in fact are accelerating, especially the Methow Valley, where the largest concentration of wintering mule deer occurs. This is being mitigated somewhat by WDFW's aggressive land acquisition efforts in the Methow, that have targeted mule deer winter range and migration corridors.

High harvest of does may also contribute to population decline. Past harvest strategies have been based on the assumption that hunting mortality is compensatory. Current research in other states, suggests that hunting mortality may be more additive for mule deer. Ongoing research in Washington will address the effects of hunting mortality. In the interim, more conservative hunting regulations have been adopted, and guidelines for antlerless harvest have been

developed using an additive mortality model. It is hoped the combination of habitat acquisition and conservative harvest will slow, and perhaps even halt, the decline over the long-term.

In recent years, qualitative observations from land managers, biologists, and long time residents, as well as harvest figures, suggest that by 1997 the population may have fallen to half or less of what it was in the mid 1980s and early 1990s. Severe winter weather in 1992-93 and 1996-97 contributed most to this short-term decline.

Fortunately, the last six 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 data in the spring of 2003 again indicated less recruitment than expected. The herd is still growing, but the rate of growth is slowing

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

Year	Adults	Fawns	Total	F:100:A
1993	707	137	844	20:100
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

significantly, likely a function of drought.

Unlike mule deer, whitetail deer have increased in the district over the long-term. Development patterns and agricultural practices, may have promoted the expansion of whitetail. Whitetail are widespread in the

eastern part of the district, and now inhabit most of the major drainages and valley bottoms in the western half of the county, including many places where they were never seen historically. Relatively flat harvest figures suggest the whitetail population may be stabilizing. White-tailed deer have also sustained significant winter losses in recent years, but in general, have been more resilient than mule deer.

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

Habitat condition and trend

Deer enjoyed easy access to available natural forage during last year's mild winter; however continuing drought conditions are expected to negatively impact production and recruitment to some extent.

Winter range continues to be lost on an annual basis throughout the Okanogan District. In PMU 21, conversion of land to agriculture and urban encroachment are responsible for most losses in the Okanogan Valley. Winter range and migration corridors in the Methow Valley are being lost to subdivision, and residential construction associated with a booming recreation industry. These development pressures are likely to continue and even accelerate, particularly in the Methow Valley.

WDFW continues to pursue the opportunity and resources to purchase land and/or easements in the most critical habitat at risk in the Methow. Over \$25 million has been spent by WDFW to acquire 13,000 acres of important winter range and migration corridors since 1992, and additional purchases are expected in the following year.

Seasonal ranges are poorly defined in PMU 22. Changes to the landscape are occurring more slowly here than they are in the adjacent unit to the west. Even so, significant amounts of habitat are being lost on an annual basis to human development. This is probably most evident for mule deer winter range being converted to agriculture and residences at lower elevations. Many deer utilize mid-elevation mature forest as winter range in the eastern portion of this unit. Much of the forest is under harvest management. Ongoing research will help define seasonal ranges in PMU 22, and these results will help guide more focused deer habitat management.

Summer forage quantity and quality are important for fawn production and recruitment. Recent drought

conditions; however, have been severe, and summer range condition has deteriorated. The effects of this deterioration have been exacerbated by competition with livestock. Much of Okanogan County is intensively grazed. In some areas, livestock not only compete with mule deer for early season grasses and forbs, but also consume deer winter forage during the late summer and fall. Impacts are most acute during dry years, like the three seasons just experienced. Availability of irrigated pasture can mitigate somewhat for these effects, but a declining farm economy could potentially reduce irrigated acreage. This could in turn reduce available deer forage at lower elevations, and negatively affect deer production.

In addition, heavy livestock grazing accelerates the spread of noxious weeds that aggressively displace many deer food species. Throughout the district, noxious weed invasion continues to be a major concern. County, state, and federal agencies and private landowners are all developing more aggressive integrated weed management programs.

PMU 21 has an abundance of noxious weeds, particularly on dry land range at lower elevations, an area where forage is already limited during the critical winter-spring season. In much of PMU 22, weeds are not as big a problem; however, most of the unit is intensively grazed, creating the potential for noxious weed invasion. In general, the mid to upper elevation range in this area is wetter during the growing season than in PMU 21, making the landscape more resilient to grazing pressure and weed colonization.

Land managers are concerned that much of the bitterbrush on winter range in PMU 21 and portions of PMU 22 is very old and not very productive, due to long-term fire suppression. Some low-intensity, prescribed burns have been conducted in an attempt to revitalize some of these areas. Early results are encouraging; however, the long-term effectiveness of these measures will not be known for several years.

Large areas of the Sinlahekin Wildlife Area are becoming less productive winter range due to increasing tree cover, again due largely to fire suppression. Recently, efforts to reintroduce fire to the landscape have been initiated, which should stimulate regeneration of ceanothus and other winter browse species.

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

Management conclusions

Mule deer populations had bottomed out after a series of severe winters, but have now rebounded nicely, fueled by high productivity and recruitment, and aided by conservative hunting seasons. Even so, a gradual long-term population decline will likely continue, if reductions in habitat quantity and quality are not curbed. In the short-term, drought will likely slow production and recruitment, as reflected in recent declines in fawn:doe ratios. Buck:doe ratios have improved in response to stricter hunting regulations, and will likely remain higher in accordance with management guidelines. The Department will continue

investigating a best management practice for post-hunt age ratios goals for bucks.

Whitetail deer numbers have also dipped during harsh winters in recent years, but are likely also rebounding strongly. 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 difficulties in achieving adequate harvest on private lands, where whitetail 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 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 current 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 increase deer populations as habitat recovers from fire, and maintain the post-season minimum objective of 15 bucks:100 does. Composition surveys and hunter harvest will be 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 2002 deer hunting seasons were slightly more liberal than 2001, but still very conservative compared to those prior to 1997. All general seasons are restricted to the harvest of 3-point minimum bucks, with the exception of youth and disabled any deer permit seasons in three Douglas County Game Management Units (GMU). Deer season began with September early archery. The modern firearm 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 five days in early-October. The early modern firearm season was open for nine days in mid-October. Late archery hunting was open in 3 GMUs in late November and early December. There were no general late muzzleloader or modern firearms seasons.

Limited-entry, special permit hunting was offered for modern-firearm and muzzleloader hunters. One hundred-thirty November any buck permits were offered in six Chelan County GMUs. One hundred antlerless permits were issued in GMU 251. Six hundred antlerless permits were offered in Douglas County, however three permit hunts were undersubscribed; 589 permits were issued in the drawing. One hundred youth any deer permits were

offered in GMU 251, however only 77 were taken in the permit drawing.

The deer population in Chelan is migratory and is widely dispersed during the modern firearm season in mid-October. Because they are difficult to locate at this time, only a small portion of the bucks are harvested. Fifty-four percent of the bucks observed in Chelan County during post-hunt surveys in 2001 were mature (age 2+) bucks, suggesting low harvest rates.

As the deer population increases, there has been a corresponding increase in damage to agricultural areas. There were 600 antlerless deer permits available in Douglas County in 2002, compared 425 in 2001 and 200 in 2000. A hunt for youth and disabled hunters offered in a portion of Douglas in 2001 was continued in 2002, to increase opportunities, reduce damage and promote youth hunting.

Buck harvest for the Wenatchee District in 1997 was the lowest on record (Fig. 1). 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.

The Douglas PMU buck harvest decreased dramatically from 1996 to 1997, but has increased since that time (Fig. 1). The Douglas buck harvest increased 21% from 2001 to 2002 (765 to 922). Youth and disabled general season modern firearms hunters harvested 164 antlerless deer in GMUs 248, 260 and 269, and permit hunters harvested 262 antlerless deer throughout the PMU, for a total antlerless harvest of 426. Total harvest for the Douglas PMU in 2002 was 1,348 deer, an increase of 21% from 2001.

The Chelan PMU buck harvest has an increasing trend. From 1997 to 2002, the Chelan buck kill more than doubled (247 to 657). Chelan's buck harvest in 2002 increased 34% from 2001, but is still only 30% of the 1992 harvest of 2,206 bucks. The 1992 buck harvest level probably is not achievable with the 3-point restriction, even when populations recover to the 1992 level.

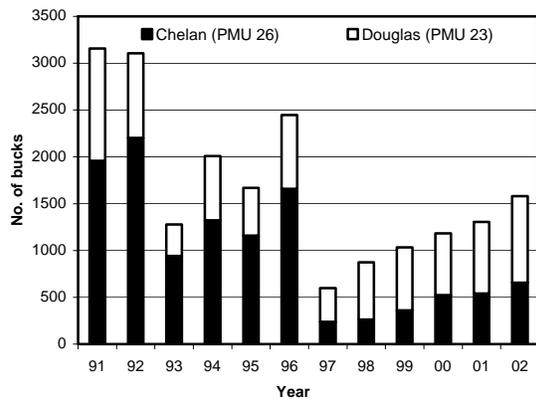


Figure 1. Wenatchee district buck harvest.

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 is the highest in at least 10 years. Antlerless deer harvest in Chelan is still extremely restricted; 45 antlerless deer were harvested in 2002.

The number of general season deer hunters in the Wenatchee District declined dramatically from 21,082 in 1992, to 6,438 in 2001. Hunter numbers increased 18% in 2002 from 2001, totaling 7,593. Deer hunter numbers over this period in Douglas have been relatively stable, ranging from a high of 4,813 in 1992, to a low of 2,560 in 1997. General season hunters numbered 3,648 in Douglas in 2002, a 16% increase from 2001. The majority of the land in Douglas is private, and most landowners allow similar hunter numbers annually. In Chelan numbers declined 80% from 1992 to 2001, from 16,269 in 1992 to 3,281 in 2001. Chelan general season hunter numbers increased 20% in 2002 from 2001, with 3,945 hunters. The long-term decline is likely attributable to a number of factors, including: deer population declines, restrictive early seasons, rugged topography and an aging hunter population. Numbers are now likely increasing in conjunction with a recovering deer herd, however the other factors will likely continue to be a factor in coming years.

Vehicles kill a large number of deer each year in the Wenatchee District, based on data collected by the Department of Transportation. From 1997 to 1999, over twice as many deer were killed on state highways,

on average, in Chelan County (\bar{x} = 157, range 91-281) compared to Douglas County (\bar{x} = 71, range 49-95).

More deer are killed in Chelan County because the mountainous terrain forces deer to lower elevations in the winter to avoid deep snow. The number of deer killed was greatest in 1997, when the severe winter conditions forced deer onto roadways in both counties.

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 antlers are dropped. These surveys are used to monitor post-hunt buck and fawn ratios relative to does. Helicopter surveys were conducted December 13 and 17, 2002. Ground surveys are conducted during the month of March, after most winter weather but before dispersal, to monitor adult:fawn ratios as an index to survival.

In the Douglas PMU, observed postseason ratios were 28 bucks and 81 fawns per 100 does ($n=363$). In the Chelan PMU, observed postseason ratios were 27 bucks and 71 fawns per 100 does. Adult (age 2+) bucks comprised 54% of Douglas bucks and 65% of Chelan bucks, while yearling (age 1+) bucks comprised 46% and 35% of observed bucks in Douglas and Chelan respectively. Pooled spring fawn:adult ratios of 58:100 ($n=796$) indicate very high fawn survival during the 2002-2003 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 is considered recovered. In addition, there have been significant habitat enhancements associated with the Conservation Reserve Program that have been beneficial for deer.

The Chelan PMU was severely impacted by the 1994 Tye 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 now appears to be increasing based on the increase in the number of bucks harvested, increasing postseason buck:doe ratios, and increasing adult buck proportion. During winter deer are beginning to use shrub communities that have begun to recover from the 1994 fire. Continued mild winter conditions and conservative antlerless harvest

should allow this population to rebuild within the constraints of habitat recovery.

Buck post-season composition data suggest hunting pressure is truncating the buck age structure in the Douglas PMU. Although hunting pressure is reduced due to the predominance of private lands, low numbers of 3+ aged bucks post-season suggest hunters are able to kill most 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.

Population models using POP-II (Fossil Creek Software, v. 1.2.11) 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 has increased 50% between postseason 1997 and postseason 2002. The Douglas model aligns less precisely, indicating further modeling and/or data needs, and is interpreted cautiously; however, the simulation indicates a greater rate of population increase post-1997 than in the Chelan PMU, which is in agreement with field perceptions of these trends.

Habitat condition and trend

Wildfires have negatively impacted deer winter range in Chelan County for several years since 1994, but in the future deer may benefit from fire due to increased quantity and quality of forage. 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 severely 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.

Management conclusions

There are concerns with the current 3-point regulation in conjunction with the early, short modern firearms season in the Chelan PMU. We can probably meet buck escapement goals under the current season

structure in Chelan without the 3-point regulation, because most of the bucks do not move down to lower elevations where they are vulnerable to harvest until after the 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. If the 3-point regulation is retained into the future, additional opportunities will be explored to increase buck harvest. If this population continues to increase, 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.

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, some concerns about the long-term ramifications of poor recruitment of older age bucks, as it appears most bucks are still being harvested by 3 years of age.

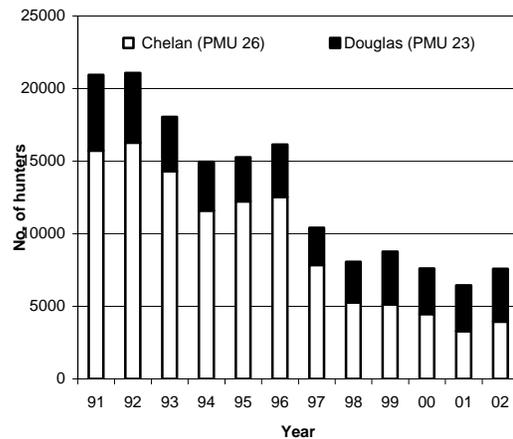


Figure 2. Wenatchee district deer hunters.

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 was established 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 2002 (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, GMU 272 had a late archery season (Nov. 22-Dec. 8) for 3-point buck minimum or antlerless mule deer or any white-tailed deer. GMU 290 had an any deer, permit archery season with 104 permits (Sept. 14-Oct. 6).

All units except 290 had a nine-day general modern firearm buck season in 2002 (Oct. 12-20). In GMU 290, 15 permits were issued for a 15-day modern firearm any deer hunt (Nov. 1-15).

In 2002, 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 three general seasons in GMU 284 and a permit season for four hunters in GMU 290 (Oct. 21-27). The general seasons in GMU 284 were Oct. 5-9 (whitetail, any buck and mule deer, 3-point buck minimum), Nov. 20- Dec. 8 (whitetail, 3-point buck minimum or antlerless), and Nov. 22- Dec. 8 (mule deer, 3-point buck minimum or antlerless).

Antlerless permits were issued for two GMUs in 2002. GMU 272 had 200 antlerless permits for an Oct. 12-20 season. GMU 290 had 50 permits for a Nov. 25-Dec. 1 season.

Special seasons and regulations were in effect in PLWMA 201 (contained in GMU 272). The deer hunting season was Sept. 15-Dec. 31. Hunting was by permit only.

In the 2002 season, 3,154 deer hunters hunted in the four Columbia Basin GMUs (Table 1). This represented 9% of Region 2 hunters. Hunting pressure, as measured by number of hunters in the four GMUs combined, decreased by less than 1% in 2002 compared to 2001.

Hunting conditions during the 2002 seasons were good in all units. Weather was cool but dry during the general modern firearm season.

Overall hunter success (all weapons) in the four GMUs combined was 31% and was slightly higher than that of 2001 and considerably higher than the 10-year mean of 1992-2001 (Table 1). Highest hunter success (49 %) was in GMU 290.

Buck harvest in the four units combined was 721 in 2002 and increased 5% from that of 2001 (686 bucks) and was 27% greater than the 1992-2001 mean of 569 bucks (Table 1). Forty-seven percent of the buck harvest in the four units was from GMU 284, 46 % from GMU 272, 4 % from GMU 278, and 3 % from GMU 290.

In GMU 290, 13 of the 15 modern firearm any deer permittees hunted and harvested 11 bucks. The four muzzleloader hunters harvested no deer. Thirty-one of the 104 archery permittees hunted in the GMU and reported harvesting 7 bucks and 1 antlerless deer. Twenty-three of 50 antlerless permittees hunted to harvest 16 deer.

Antlerless harvest in the four units has fluctuated annually, primarily as a result of the number of permits

issued. GMU 272 had antlerless permits in all years from 1992-97 and in 1999-2002 (the number varied from 50 to 300 annually). GMU 278 has had no antlerless permits in the past 11 years. GMU 284 had no antlerless permits in 1994-1997 but had 150 permits in 1992 and 1993 and 100 permits each year in 1999 and 2000. The unit had no antlerless permits in 2001 and 2002. None of the four GMUs had antlerless permits in 1998. The mean 10- year (1993-2002) harvest of antlerless deer in the four units combined was 176 (range, 42 to 256).

Harvest of deer by archers in the four GMUs is small, accounting for a small part of the total harvest in the past 10 years. In 2002, 4 % of the deer harvest in the four GMUs was made by archers. Muzzleloader hunters accounted for 18 % of the deer harvest in the four GMUs.

The four Columbia Basin GMUs produced 15 % of the buck harvest in Region 2 in 2001. Hunter success in the four Columbia Basin GMUs was 31 % compared to 22 % in the remainder of Region 2.

Surveys

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

Post-hunt herd composition surveys have been done annually (except no survey in 1994) in GMU 272 including areas outside PLWMA 201. Surveys have been made from a helicopter, airplane, or from the ground during November and December. In PLWMA 201 (an intensively managed cooperative of approximately 44,000 acres), pre-and post-hunt "total" counts were made annually from 1992 through 1999. Counts were made from a helicopter in late August or early September (pre-season) and late November or early December (post-hunt). In 2000, only the post-hunt count was made. In 2001 and 2002, no counts were made.

Post-hunt herd composition surveys were made in GMU 290 from a helicopter in December 1995 through 1997. In 1995, intensive counts from the ground supplemented data obtained from the helicopter and allowed an estimate of herd size to be made. In 1997, the helicopter survey (approx. 2 hours of survey time) failed to produce an adequate sample size to estimate the composition of the herd. From 1998 through 2002, the post-hunt survey for herd composition was made from the ground by volunteers and WDFW personnel. In 2002, the post-hunt survey was made by 31 volunteers and 3 WDFW personnel. Two post-hunt

herd composition surveys of GMU 284 were made in 2002 from an airplane.

The 2002 post-hunt herd composition surveys in GMU 284 were made on Nov. 25 and Dec. 26. A total of 292 mule deer were classified. The buck:doe:fawn ratio was 26:100:62 and 60% of the bucks were adults.

In Nov. 2002, 925 mule deer were classified in that part of GMU 272 outside PLWMA 201 (Table 2). Post-hunt ratios were 17 bucks and 71 fawns/100 does. Approximately 40 % of the bucks were judged to be adults. The buck:doe ratio decreased slightly from that of 2001 but the percent of adult bucks and the fawn:doe ratio was greater. Surveys in 1993 and 1995 produced sample sizes too low to provide confidence in observed buck:doe and fawn:doe ratios and percent bucks. The survey in 1992 provided a sample size of 212 deer and a reliable estimate of seven bucks and 60 fawns per 100 does.

During the November 23, 2002 post-hunt herd composition survey, 504 deer were classified in GMU 290 with 36 bucks and 40 fawns per 100 does (Table 4). The 1995 estimate of herd size within the 250 square mile GMU 290, based on a helicopter survey and intensive ground count, was 264 (170 deer seen during the survey) deer with a composition of 54 bucks, 95 does, and 115 fawns. Based on incidental observations in the past 20 years, herd size has increased substantially and distribution within the area has expanded.

Population status and trend analysis

Little data other than estimates of harvest are available for use to evaluate long term trends of deer herd size in the Columbia Basin GMUs. Based on annual buck harvest since 1980, it appears that deer numbers in GMU 272 increased substantially through 2000, but decreased slightly in 2001 and 2002. The 1980 harvest was 112 bucks compared to the 2000 harvest of 416 bucks. In 2002, 335 bucks were harvested. In GMU 284, a trend similar to that of GMU 272 shows an increase in herd size. The 1980 harvest was 76 bucks compared to 322 in 1997, 297 in 1998, 206 in 1999, 356 in 2000, 362 in 2001 and 335 in 2002. Buck harvest since 1980 in GMU 278 has been erratic and rather small but indicates herd size has increased recently above that of the early 1980's. The 1980 harvest was 10 bucks compared to 29 bucks in 2002.

Post-hunt buck ratio in GMU 272 in 2002 was 17 bucks per 100 does and was above the objective of 15:100. The post-season buck ratio in GMU 284 was 26 bucks per 100 does in 2002. Post-hunt buck ratio in GMU 290 in 2002 was 36 bucks per 100 does and was above the management goal of 30 bucks per 100 does.

Habitat condition and trend

The winter of 2002-03 was moderate with little snow cover in all GMUs and provided no major disadvantage for deer.

Winter food for most deer in GMUs 272 and 284 is green winter wheat and fall/winter growth of forbs. During the winter of 2002-03, these short-stature foods were available to deer most of the winter because of reduced snow cover. In some parts of GMU 284, dry conditions reduced the availability of green winter wheat. Wintering herds were spread widely throughout GMUs. Winter mortality was likely less than that of harsh winters.

Three major changes in habitat have occurred in the Columbia Basin in recent years that appear to have affected deer significantly. Several thousand acres of primarily dryland wheat ground 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, but in some areas has removed a vital winter food resource (i.e., winter wheat).

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

Wildlife damage

Deer related damage claims/complaints in the Columbia Basin GMUs involve primarily orchards, alfalfa haystacks, alfalfa fields, various row crops, and ornamental trees and shrubs.

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

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

Management conclusions

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

Population data for deer herds in the Columbia Basin GMUs are minimal at present. Post-hunt herd composition estimates are often made from sample sizes too small to be reliable.

Table 1. Mule deer harvest in GMUs 272^a, 278, 284, and 290 from 1992 - 2002.

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

^a Does not include PLWMA 201

Table 2. Post-hunt mule deer herd composition in GMU 272 from 1992-2002.

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

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

Year	Bucks	Does	Fawns	Unid.	Total deer	Adult Bucks (%)	Per 100 Does	
							Bucks	Fawns
1988	45	185	141	23	394	--	24	76
1990	90	390	362		842	--	23	93
1991	134	342	264	209	949	--	39	77
1992	145	550	446		1141	48	26	81
1993	159	565	474		1198	59	28	84
1994	166	480	453		1099	52	35	94
1995	185	517	534		1236	49	36	103
1996	255	593	580		1428	50	43	98
1997	182	520	411		1177	57	35	79
1998	229	613	514	7	1363	54	37	84
1999	217	615	522	17	1371	46	35	85
2000	219	594	492		1305	48	37	83

Table 4. Post-hunt mule deer surveys in GMU 290, 1995- 2002.

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

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

JEFFERY A. BERNATOWICZ, District Wildlife Biologist

Population objectives and guidelines

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

Hunting seasons and harvest trends

Game Management Units (GMUs) 329, 342, 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, north portion 360, 364, and 368. Only GMUs 336, 352 and 360 are open for muzzleloader.

Deer hunter numbers in Region 3 in 2002 were at an all time low, down 39% from the 10 year average and over 20,000 since the early 1990's (Table 1). The winter of 1996-97 reduced deer numbers. The 3-point restriction and subsequent low success rate further deflated hunter interest. The deer populations seem to be rebounding, but hunters have not returned to the region.

Harvest has increased since 1997, but remains well below average (Table 2). Total harvest was 50% below the 1991-96 (pre-3 point minimum) average in 2002. Hunter success has been above average the last 2 years.

Surveys

In December of 2002, PMUs 32, 33, 35, and 36 were surveyed via helicopter. Portions of PMUs 32 and 33 were also surveyed from the ground. The purpose of the December surveys was to estimate fawn and buck ratios. The survey results should be viewed with caution. The survey area may not be representative of the population, especially the buck portion that is somewhat segregated from does and fawns during December. Positively identifying all the fawns and small spike bucks in a large group of deer from the helicopter is difficult. The reported buck and possibly fawn ratios are probably minimal estimates.

All four PMUs were also surveyed for population using a stratified random sample in April. The April

2003 surveys were the first time an attempt was made to estimate population. The stratification of units was preliminary and may need refining.

Population status and trend analysis

Recent surveys estimate the deer population at approximately 6300 deer in PMU 32, and 8700 south of I-90 (excluding GMU 372). The estimates are for known concentrations of deer and do not include scattered, low-density groups. Harvest data seems to be consistent with the estimates.

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

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

Year	Modern Muzzle-			Total	Success rate (%)
	Firearm	loader	Archery		
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
1993-02avg	15,671	481	4,129	20,291	8.3

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 was instituted in 1997. In PMUs 32 and 33, buck ratios and number of mature bucks have been kept near goals by using late-season permits. The majority of deer migrate out of the permit-only units (GMUs 329 and 342), are subjected to general season mortality, and are then hunted during the rut after they've migrated back to winter range during permit seasons. PMUs 35 and 36, which do not have late season permits, have far exceeded the goal of 15 bucks per 100 does. GMU 371 (PMU 34 Survey data) is a non-migratory herd that is managed for quality hunting.

Habitat condition and trend

There is little data on the historic or current condition of the deer range. Woody browse was probably negatively impacted by fires during the 1980s. Cheat grass has probably increased the frequency of fire and greatly 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 determine if an increasing deer population is meeting management objectives without a better index to the population. The current hunting

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

Year	PMU	Total Sample	Fawns: 100 does	Bucks: 100 does
1996	32	704	49	2
1997	32	326	46	10
1998	32	325	78	16
1999	32	255	58	21
2001	32	559	47	14
2002	32	372	48	13
1996	33	863	58	2
1997	33	427	37	8
1998	33	645	75	11
1999	33	609	44	17
2001	33	481	37	15
2002	33	1017	44	17
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

season structure has helped increase buck ratios and in some cases have met or exceeded population objectives, but it may have decreased harvest and probably the number of deer hunters participating. In fall 2003, antlerless opportunity will be provided throughout the Region. In addition, GMU 342 will be changed from a special permit opportunity to a general season opportunity. These changes should increase hunter numbers, particularly archers and muzzleloaders.

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

Year	PMU 32		PMU 33		PMU 34		PMU 35		PMU 36		Region Buck	Total 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
Mean	458	48	487	42	154	13	139	22	125	12	1,344	136

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

MIIKE DAVISON, District Wildlife Biologist

Population Objectives/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 the available habitat base, provide recreational opportunity, and minimize damage complaints. The population objective is to maintain a post-hunt buck:doe ratio of 15 bucks: 100 does when possible.

Hunting Seasons And Harvest Trends

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

Harvest and recreational opportunity profiles for GMUs 407-450.

The statewide total for deer hunters during the 2002 general season was 137,921. This is comparable to the 140,340 hunters documented for the 2000 season in Washington State. The number of deer hunters in Region Four declined from a total of 15,962 hunters in 1999 to 7,292 hunters in 2002 (a 54.3 percent

decrease). Low deer population densities and limited access to lowland and mid-elevation deer range is generally credited as the causes of lowered hunter participation in north Region four.

Region four deer harvest for the 2002 season was 1,654 animals. This represents a moderate decrease as compared to the previous years harvest of 1,755 deer in Region four.

Black-tailed deer harvest in GMUs 407 – 450 during the 2002 season totaled 1,266 animals. Antlerless harvest for the 2002 season totaled 215 animals (17 percent) with antlered harvest totaling 1,051 animals (83 percent). Harvest distribution in Region four by hunting method is as follows for the 2002 season:

Table 1. 2002 deer harvest in Region 4.

Harvest	Modern Firearm	Archery	MZL	Total
Antlerless	63 (41.4%)	211 (71.8%)	20 (6.8%)	294
Antlered	1115 (82%)	178 (13.1%)	67 (4.9%)	1360
Total	1178	389	87	1654

The proportion of deer harvested in 2002 within GMUs 407-450(1,266 animals) as compared to the statewide harvest for the 2002 season (38,770animals) indicates that these northern Region four GMUs represent 3.3% of the statewide total harvest. This number is consistent with the 3.4% of the statewide total harvest that came from GMUs 407-450 in 2001. However, when compared to harvest trends in the remaining southern GMUs in Region four, it is apparent that a significant shift in regional harvest distribution is indicated with 76.5 % of the 2002 harvest total for Region four coming from GMUs 407-450. This compared to the 43.9% of total regional harvest attributed to northern Region GMUs in 1999 represents a 33% shift in harvest distribution in northern units. Decreases in hunter access in southern Region four GMUs appear to explain the shift in harvest distribution.

Surveys

Herd composition surveys are not conducted in GMU's 405-450 due to low deer population densities and equally low hunter distribution and numbers. There are currently no meat cutting businesses that accept wild game in Whatcom, Skagit, and San Juan Counties.

Hair loss syndrome continues to be prevalent throughout the mainland GMUs in north Region four but is still absent in the island habitats of GMUs 407 and 410. A driven survey on Orcas Island conducted in February 2001 indicated that none of the 237 deer observed were infected.

Chronic Wasting Disease (CWD) sampling efforts in 2001 were limited due to the absence of meat lockers and limited access to road kills. Based upon small sample numbers, CWD remains undocumented in GMU 405-450.

Two black-tailed deer were immobilized for the purpose of biological sampling on Orcas Island (GMU 410) in March 2001. Laboratory analysis of blood and fecal samples collected indicated no disease problems in these animals. Testing for *Paralaphystrongylus* larvae were negative. Ecto-parasites levels were low.

Population Status And Trend Analysis

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

Wildlife Damage

Deer related damage to private property has remained a chronic problem throughout all of the mainland portions of north Region four. No damage payments were made for deer related property damage in north Region four during 2001. However, chronic deer depredation problems on the Jones Creek Farm in Skagit County did result in the issuance of 5 kill permits to the landowner.

San Juan County (GMU 410) continues to experience high deer damage problems associated with agricultural lands and residential properties. Deer/Vehicle collisions remained high during 2001 and are anticipated to increase as the human population in San Juan County continues to increase. Widespread

posting of land and a county ordinance restricting hunting access to private property limit WDFW options for managing the deer populations in these areas of Region four.

Habitat Condition and Trend

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

Increased use of herbicides on private timberlands 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. Confirm the absence of Chronic Wasting Disease in Whatcom, Skagit, and San Juan county deer populations. Collect tissue samples for laboratory analysis from a minimum of 20 deer per district.
4. Continue monitoring local deer populations for presence /absence, distribution and severity of hair loss syndrome.
5. Increase biological sampling for diseases and parasites in the San Juan Island portion of GMU 410.

DEER STATUS AND TREND REPORT: REGION 4

PMU 44 – GMU 454

PMU 48 – GMU 466, 485

LEE KANTAR, District Wildlife Biologist

Population objectives and guidelines

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

Precise population estimates for GMUs 454, 466 and 485 are unavailable. Mandatory hunter reports starting in 2001 will be used to monitor deer population trends and hunting regulations.

Deer in GMU 454 have shown little fluctuation based on harvest estimates despite human population growth and development (Figure 1). Deer may be declining in GMU 466 because of a reduction in habitat quality and potentially, extended deer hunting seasons (Figure 2). GMU 485 retains a special permit hunt with limited access. Deer that winter in the low elevations of GMU 485 may range into GMU 466 during other times of the year and be legally harvested (Raedeke 1995). Population guidelines for GMUs 466 and 485 should be considered together.

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

Hunting seasons and harvest trends

Hunting seasons are similar for the GMU 454 and 466 deer herds. All 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. All have an archery season from September 1-30, and extended, any-deer late archery season in November through 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. In general, male and female harvest in GMU 454 has been stable, with yearly fluctuations since 1991. However, data

indicates a general and surprising increase in harvest from 1997-2000 remaining consistent from 1999-2002. In 1999 and 2000 buck harvest increased by about 82% compared to 1998 (Figure 1) and has also remained steady. Buck harvest in GMU 466 has declined about 50% from levels observed between 1991 and 1993 (Figure 2 and 3) but over the last four years has moved back and forth indicating extrinsic factors in harvest rather than population changes. Antlerless harvest has been generally stable in 454 since 1997. GMU 466 antlerless harvest has shown some variation with yearly fluctuations most likely affected by dry early fall weather and late 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.

Surveys

There are currently no surveys conducted in GMU 454, 466 or 485 because of limited funds.

Population trend and analysis

Based on limited, primarily anecdotal information, deer in GMU 454 have exhibited little change, while declines in deer numbers in GMU 466 appear more stable in the beginning of the new decade.

It is possible that the deer hair loss syndrome initially observed in western Washington herds since about 1996 could also be negatively influencing these populations. It is unknown how deer seasons established by Native American Tribes are influencing populations in GMU 466. Declines in habitat quality are also a concern.

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. Openings created by timber management that may have provided quality deer forage between 1991 and 1995 have likely declined consistent with progressing forest seral stages to a closed canopy. As the number and total acres of these openings declines, so does available forage, which may influence deer populations and harvest.

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.

Developing an accurate assessment of the population size and composition is the most important concern in GMU 466 and 485. This information is vital to management, habitat protection and enhancement efforts to maintain and potentially expand herd size, recreational hunting and wildlife viewing opportunities.

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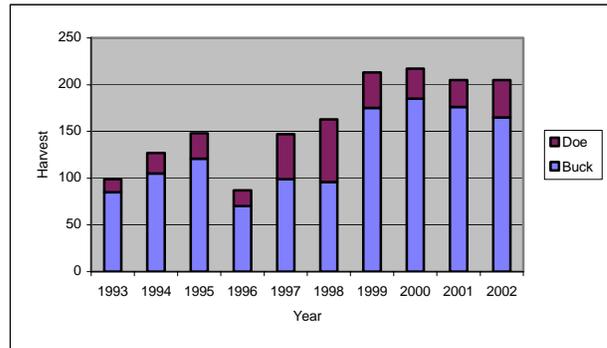


Figure 1. Deer harvest in GMU 454, 1993-2002.

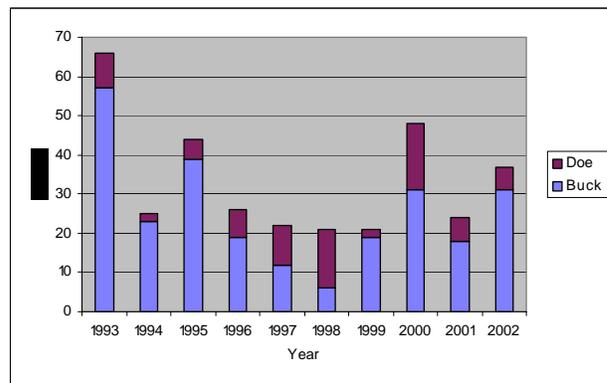


Figure 2. Deer harvest in GMU 466, 1993-2002.

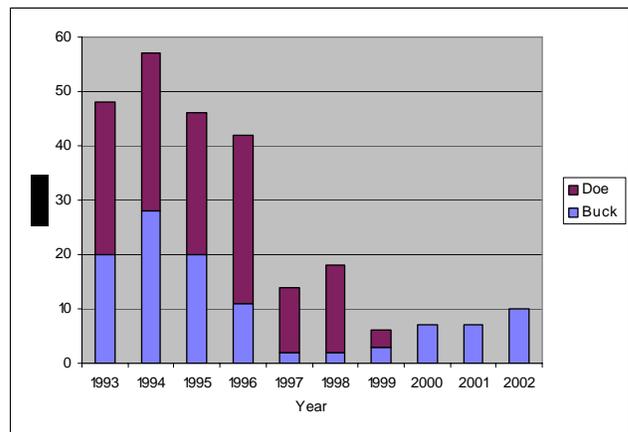


Figure 3. Deer harvest in GMU 485, 1993-2002.

DEER STATUS AND TREND REPORT: REGION 4 PMU 47 – GMU 460

LEE KANTAR, District Wildlife Biologist

Population objectives and guidelines

Little is known about the population dynamics of black-tailed deer (*Odocoileus hemionus columbianus*) in the western Washington Cascade Mountains. This is primarily due to the secretive life history of blacktails and the dense habitat they occupy. Herd composition counts are one of the more common methods used to obtain direct measures of deer herd composition to assess herd population status.

Population objectives for the deer in this Game Management Unit (GMU) are to maximize harvest opportunity and maintain the post-hunt buck composition ratio at a minimum 15:100 does. Recent 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 GMU 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, harvest trends, and surveys

This deer unit 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 ten years, 1993-2002, an average of 3201 deer have been harvested. (Figure 1). 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 2002 with buck take declining by more than 50% over the last 5 years (Figure 1).

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

Table 1. Preseason Deer Composition Survey Results from Helicopter

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			

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).

In 2001 only a post-season survey was flown. 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 hunters was implemented to provide essential harvest information to game managers.

During a 3-year buck mortality study to determine mortality sources, annual 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

Table 2. Postseason Deer Composition Survey Results from Helicopter

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)

dynamics of the GMU's deer herd and its apparent decline.

Hunting seasons and guidelines, regulations and hunter pressure

Hunting seasons have remained basically unchanged over the last 10 years; season changes are generally reflected in simple calendar date adjustments. 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 to overall hunter numbers in 1998 compared to 1997 (Figure 2), it did reduce overall harvest as expected. However, the overall trend in hunter numbers for the years 1993-2002 shows a general and continued decline (Figure 2). The 5-year average for 1993-1997 period was 3,463 hunters compared to 1,712 for the period 1998-02. This reflects a notable decline of about 50% percent. Access fees have increased over time and may contribute to lower number of hunters.

Population status and trends

Beginning in 1996, black-tailed deer field surveys documented a hair loss syndrome affecting deer during the late winter and early spring surveys. It appears this has negatively influenced deer survival, particularly of fawns, and ultimately impacted recruitment. Over a three-year period Bender and Hall (2001) reported rates of hair loss syndrome in fawns as 55, 74, and 46 % from 1999-2001. Effects of hair loss syndrome are still not completely understood with further research needed in Washington, Oregon, and Northern California to understand the relative contribution of this malady to black-tailed deer demographics.

Habitat condition and trend

The majority of GMU 460 is managed for timber

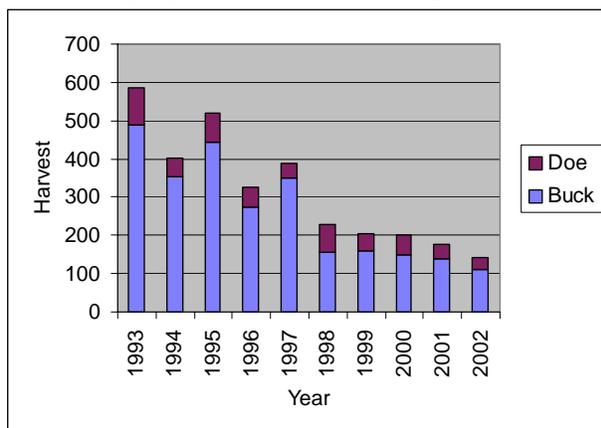


Figure 1. Annual deer harvest, GMU 460, 1993-2002.

*1997 was last year of late buck hunt.

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.

Management conclusions

Management actions for black-tailed deer in GMU 460 will be to continue the late buck season closure and measure response by monitoring post-hunt buck:doe ratios. If ratios exceed the recommended levels of 15:100 bucks consider a limited entry late buck hunt in 2003. With declines continuing in productivity, a buck only hunt across all weapon choices should also be considered until further analysis can more clearly understand population levels and herd dynamics.

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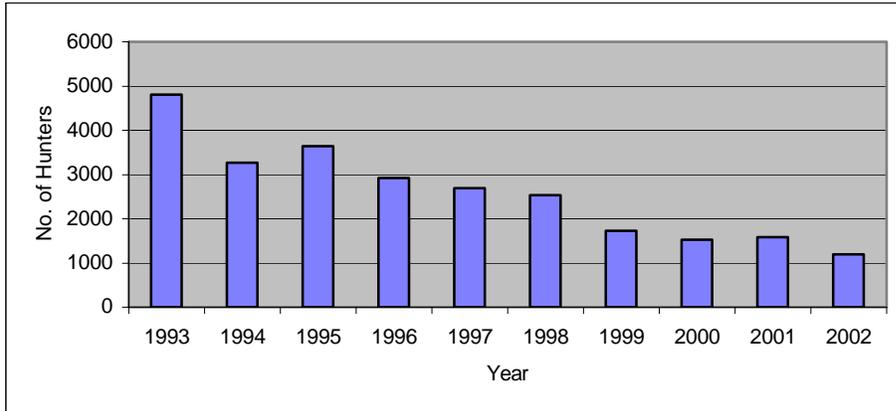


Figure 2. Number of deer hunters, GMU 460, 1993-2002.
*1997 was last year of late buck hunt.

DEER STATUS AND TREND REPORT: REGION 4 PMU 46 – GMU 448

RUTH L. MILNER, District Wildlife Biologist

Population objectives and guidelines

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

Hunting seasons and harvest trends

The 2002 hunting season in GMU 448 was unchanged from previous years, with the general archery season open for any deer from Sept. 1-30, the general muzzleloader season open for any buck from Oct 5-9, and the general modern firearm season open for any buck from Oct 12-31. Late buck seasons were closed for all weapons.

Gates remain closed at access points to many of the private industrial and State owned timberlands. Additionally, suitable hunting areas continue to shrink in the western third of the GMU due to the pressures of human development.

Fewer hunters (775) chose to hunt GMU 448 in 2002 compared to previous years, continuing a trend first seen in 2001 when hunter numbers declined by over 50%, compared to the previous 6 year average. In 2001, 950 hunters reported hunting in GMU 448. For the period 1995-2000, the mean number of hunters was 2,152 (SD=485). However, 16% of hunters hunting GMU 448 in 2001 were successful, which was over twice the success rate of the previous 6 years (average 7% (SD = 2%)). The increased success rate first seen in 2001 was basically unchanged in 2002, with 15% of hunters reporting success.

The number of deer harvested in GMU 448 during the 2002 season (115 animals, Figure 1) declined from previous years. However, the harvest equaled that of 2001, when adjusted for the number of hunters choosing to hunt this GMU. Thus, the trend in number of animals harvested each year from GMU 448 remains stable.

The Swinomish, Sauk-Suiattle, Tulalip and Stillaguamish Indian Tribes hunt in Game Management Unit 448. The tribes that contributed to the tribal harvest report compiled by The Northwest Indian Fisheries Commission reported 2 bucks and 4 does taken by tribal hunters in 2001.

Tribal input

Year 2002 data from the Colville Confederated Tribes (CCT) had not been received at the time of this report. In 2001, Tribal harvest continued to decline, representing only 11% of the total PMU 22 harvest (Figure 4). Reasons for this decline are unknown. Even so, Tribal officials share WDFW interest in the status and trend of mule deer herds in Eastern Washington, particularly immediately north of the reservation. The CCT continue to be active partners in an ongoing mule deer research project in North Central Washington, contributing staff time and financial resources.

Surveys

Surveys were not conducted in GMU 448 in 2002.

Population status and trend analysis

Field observations indicate the hair loss syndrome affecting black-tailed deer in western Washington continues to afflict deer inhabiting GMU 448. Systematic study of the disease has not been conducted in GMU 448, and the impact of the disease on fawn production is not known for this area. Fawns with hair loss may be more susceptible to disease, which could contribute to poor fawn survival in Snohomish County.

Habitat condition and trend

Much of the forested deer habitat available on USDA Forest Service lands are designated as late successional reserve (LSR). This designation has eliminated widespread clear-cutting and much of the Federally managed timber is in a 10 to 30 year age class. These conditions provide minimal forage for deer due to the presence of large tracts of dense young trees with minimal browse available to deer. The nutritional quality of the forage available is not known. Clear-cutting continued at a modest level on private and State owned timberlands in GMU 448. However, timber companies apply herbicidal sprays in many clear cuts to control brush and undesirable plant regeneration, which limits forage available to deer in many parts of the GMU.

Although a downturn in Snohomish County's economy has slowed human population growth in the county, conversion of open space and timberland to houses and supporting infrastructure continued in 2002, as in past years. Much of the heavily developed lands in the western third of the county have eliminated suitable habitat for deer. In many suburban/rural interface areas, where habitat may, in fact be beneficial

to deer, hunting is not allowed due to safety and other social concerns.

Access to hunting areas remains challenging due to the increasing numbers of locked gates on State and private lands, and the number of US Forest Service roads that are being decommissioned.

Management conclusions

Fewer numbers of hunters chose to hunt GMU 448 in 2002 compared to previous years, and the

number of animals harvested decreased as a result. However, hunter success was equal to success in the previous year, and remains higher than hunter success reported for a decade prior to 2001. For those hunters willing to hike or bicycle into areas where access is gated and for those who look for less crowded Game Management Units, GMU 448 continues to offer opportunity.

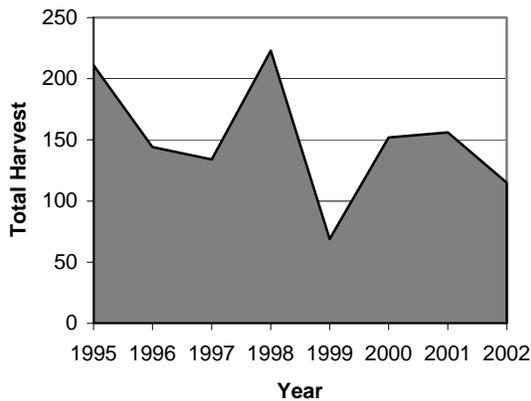


Figure 1. Trend in total deer harvest GMU 448, 1995-2002.

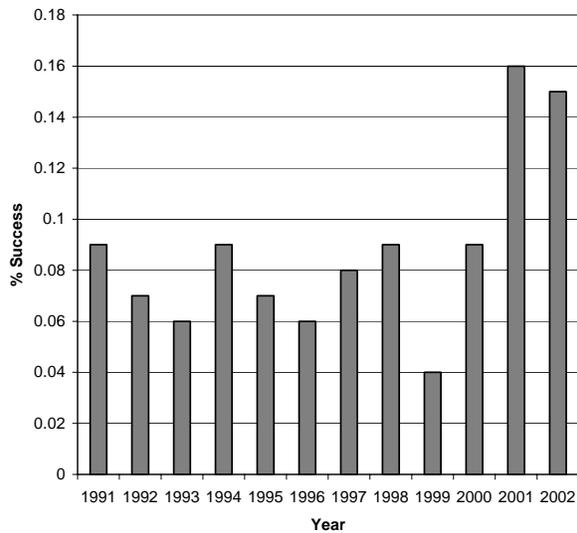


Figure 2. Percent successful deer hunters in GMU 448, 1991-2002.

SPECIES STATUS AND TREND REPORT: REGION 5

PMU 51 - GMUs 578, 588

PMU 52 – GMUs 564, 568, 574

PMU 53 – GMUs 524, 554, 556, 558

PMU 54 – GMU 516, 560, 572

PMU 55 – GMU 510, 513

PMU 56 – GMU 505, 520, 550

PMU 57 – GMUs 501, 504, 506, 530

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Population objectives and guidelines

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

Hunting seasons and harvest trends

Information on black-tailed deer harvest and hunter effort during the 2002 hunting season was obtained from WDFW's mandatory reporting system. Estimates of total harvest, hunter pressure, and hunter success are based on these reports. All hunters were required to submit hunting activity reports. The mandatory reporting system is thought to provide accurate estimations of hunter activity.

Black-tailed deer are hunted under WDFW's resource allocation strategy. Hunters must select a weapon type (modern firearm, muzzleloader, or archery) with which to hunt. Each weapon type has distinct seasons of varying lengths designed to provide equal opportunity. Season length and timing are determined by 3-year hunting packages, the most recent of which covered 2000-02. During the 2002 hunting season, modern firearm hunters made up 77% of the hunters, archery accounted for 14%, while those choosing to hunt with a muzzleloader made up 9%.

Several harvest strategies are employed in Region 5. During the general modern firearm season, the majority of Game Management Units (GMUs) are managed under an any-buck strategy, where any buck with visible antlers is legal for harvest. Selected GMU's (558, 574, 578, and 588) are managed under a 2-pt. or greater harvest regime.

Finally, GMU 382 is managed as a mule deer unit, with a 3-pt. minimum. Muzzleloader harvest is primarily

restricted to any buck, except for those seasons which occur in the branched antler GMU's above. Similarly, archery hunters are subject to the same branch-antlered buck restrictions as modern firearm and muzzleloader hunters. Harvest of antlerless deer during archery season is legal in the majority of GMU's. However, those archery hunters electing to hunt in GMU's 506, 530, 550 and 568 are restricted to bucks only. Apart from the archery harvest, antlerless permits are allocated based on the damage history and the total estimated population of deer in selected GMU's.

In 2002, an estimated 29,231 hunters spent a total of 201,360 days deer hunting in Region 5 (Table 1). Estimated hunter participation in 2002 was just 68% of the 11-year mean of 42,866 hunters. The total deer harvest was 64% of the mean harvest from 1992-2002. Total deer harvest in 2002 was 5,219 with a hunter success rate of 17.9% (Table 1). The percentage of hunters that harvested a deer in 2002 was very similar to the 11-year mean of 17.3%. Hunter success rates were not evenly distributed throughout the Region (Figure 1). Similarly, deer harvest was not uniformly distributed throughout the Region (Figure 2). Those PMUs located in the Cascade Mountains contributed relatively less to

Table 1. Hunter Numbers and Harvest Statistics for Region 5, 1992-2002.

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

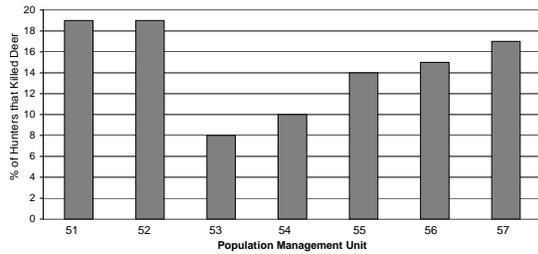


Figure 1. Deer hunter success rates by PMU, Region 5, 2002.

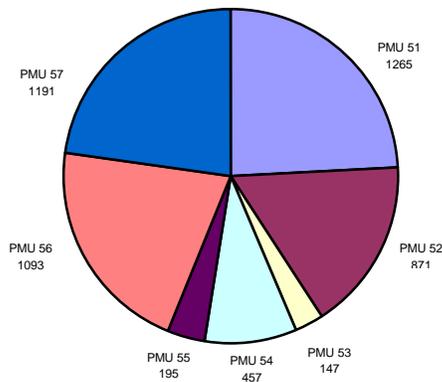


Figure 2: Region 5, 2002 Deer Harvest by PMU

the overall deer harvest than their lower elevation counterparts. In turn, those hunters electing to hunt in Cascade Mountain GMUs enjoyed a lower level of success relative to other areas of Region 5.

In addition to the deer hunting effort and harvest discussed above, 899 hunters participated in special hunts open only to permit holders in 2002. These hunters enjoyed a combined success rate of 40%. In aggregate, Region 5 special deer permit holders harvested 127 bucks and 236 does.

Surveys

Region 5 black-tailed deer demographics are collected from three types of annual surveys. These surveys include; (1) annual biological sampling stations, (2) annual summer productivity surveys, and (3) annual spring counts of the Klickitat deer herd. Data from the sampling stations and productivity surveys are used as inputs into the Sex-Age-Kill (SAK) population reconstruction model.

Sampling stations designed to collect deer biological data were established in 1993. Eight voluntary deer sampling stations were staffed by a combination of

Regional Staff and volunteers during the opening weekend of the general firearm deer season, 12-13 October 2002. Biological sampling stations were located in Cougar, Toutle, Chehalis, Vader, Randle, on Headquarters Road near Kelso, on Elochoman Valley Road near Cathlamet and on Mill Creek Road near Longview. Stations were strategically placed near major routes of travel from popular hunting areas to maximize the number of deer checked. The spatial arrangement of sampling stations is intended to allow for coverage of the entire west side of the Region.

Deer brought to sampling stations were examined by WDFW personnel and/or qualified volunteers. Age, sex, number of antler points, and GMU of harvest were taken from each checked deer. Age was determined by tooth irruption and deer were grouped into one of three discrete categories (fawn, yearling, adult) at the discretion of the examiner. Additionally, brain-stem samples were collected from each deer and submitted to WDFW’s veterinary staff for chronic wasting disease testing.

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

A total of 53 male deer were checked at the biological sampling stations during October 2002. The annual yearling buck percentage (AYBP) from any-buck GMU’s was 0.43. The 2002 annual buck mortality rate represents a return to the rates observed from 1993-97, when the AYBP averaged 0.42. Annual buck mortality rates in the range of 40%-50% are indicative of a lightly exploited population. The increase in estimated buck mortality rates from 1998-2001 may have been indicative of increases in non-hunting related mortality. See Figure 3 for a graphic display of the AYBP and number of deer sampled from 1993-2002.

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

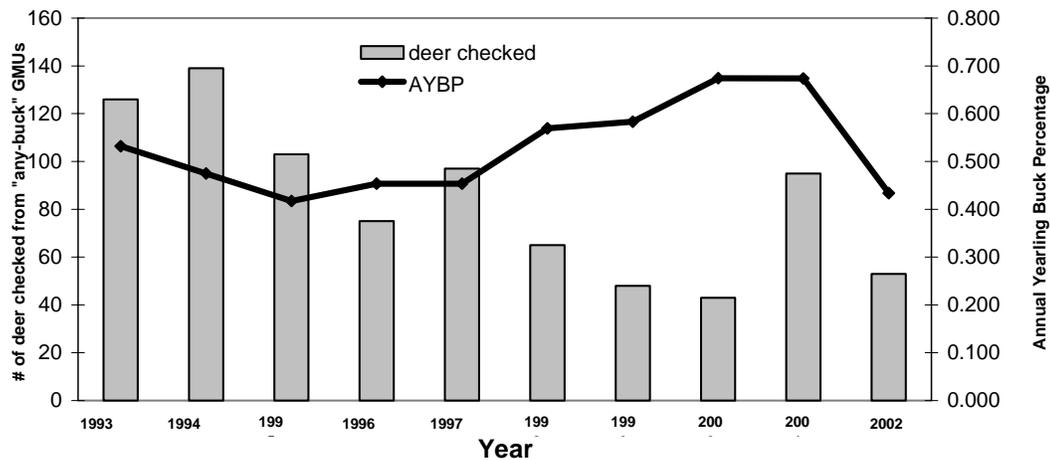


Figure 3. Region 5 annual yearling buck percentage, 1993-2002.

Summer deer productivity surveys were first established in 1995. In 2002, deer observations were conducted throughout the Region from August 15th to September 30th. Personnel from the Wildlife Management, Habitat Management, Fisheries Management, and Enforcement Programs of the WDFW recorded observation data for all deer encountered during field activities or recreational outings. In addition to these incidental deer observations, one deer productivity aerial survey was conducted. Finally, multiple night deer surveys (spotlighting) were conducted by a combination of Wildlife Management Staff and volunteers. Deer group sizes and composition were determined. All deer were classified as bucks, does, fawns, or unknowns. However, only those groups of deer in which all individuals were classified were included in statistical analysis to help eliminate observer bias.

During the 2002 productivity surveys, a total of 456 deer were classified. The mean value of .44 fawns/doe is the lowest recorded since 1995 and is well below historical productivity data (~.75) for the Region (Figure 4). We do, however, sample after the peak of neo-natal mortality, so these values are closer representatives of ultimate recruitment than fecundity.

For spring counts, four permanent survey routes centered on the Klickitat Wildlife Area, near Goldendale, WA, were censused on 17-18 March 2003. Transects were driven on the evening of the 17th and morning of the 18th. Deer group sizes and composition were determined. All deer were classified as fawn, adult, or unknown. The fawn:adult ratio was determined. A total of 647 deer were classified during the March 2003 Klickitat deer survey (Table 2). The resulting fawn:adult

ratio of 0.52 is indicative of good over-winter survival. The long-term mean (1980-2003) ratio for this area is 0.45.

Long-term correlations (1992-2002) between the spring fawn:adult ratio and the overall buck harvest in GMU 588 the following fall are significant ($r = 0.65$). These analyses indicate that spring surveys are a good predictor of hunting success in GMU 588. The biological significance of this relationship is straightforward. First, since fawns are generally more vulnerable to resource shortages and other environmental stress, low fawn:adult ratios indicate tougher over-wintering conditions and likely lower overall survival of deer. High winter mortality across all age classes will result in lower fall harvests. Secondly, biological sampling station data indicate that many yearling bucks develop two points on at least one antler and are therefore legal for harvest at age 1.5. Depressed fawn:adult ratios in the spring mean fewer yearling bucks will be available in the fall; hence, a lower total buck harvest.

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

Population status and trend

Hunter reports for the 2002 hunting season in Region 5 indicate that the deer harvest was the lowest since 1992. However, the deer hunter success rate was equal to the 11-year mean. While deer hunter success rates over the past eleven years have remained very constant in the Region ($R^2=.03$), total deer harvest has slowly declined

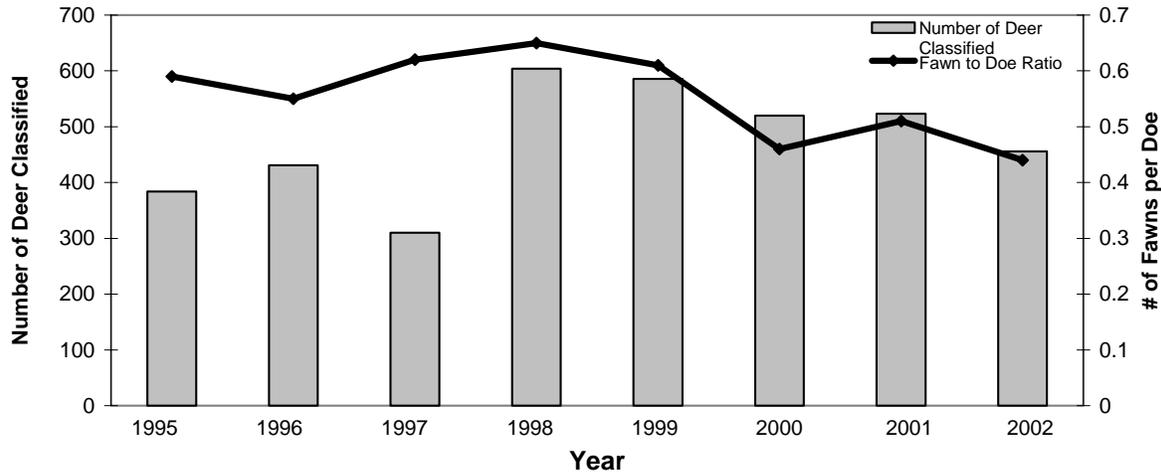


Figure 4. Region 5 deer productivity survey results, 1995-2002.

($R^2=.52$). Hunter days per deer kill have increased slightly as well ($R^2=.14$). In Region 5 there is a moderate relationship between the number of deer hunters and the total deer harvest ($r=.40$). Additionally, days per kill and total deer harvest are moderately inversely related ($r=-.48$).

Assuming the age structure of Region 5 deer is stable, biological data indicate that we are seeing a decline in deer populations. The AYBP has increased slightly since 1993 ($R^2=.19$). These data suggest a slow increase in overall buck mortality during a time period when harvest-related mortalities have not increased. Additionally, recruitment rates seem to be declining in Region 5. 2002 summer productivity surveys resulted in a ratio of .44 fawns per 100 does, down from 60 or greater fawns per 100 does in the late 1990's and far lower than the historical figure of 75 fawns per 100 does. The population of black-tailed deer in the Eastern portion of Region 5 continues to be robust. Six years of higher than

average over-winter survival of fawns have followed the severe winter of 1996-97. Total deer harvest in GMU 588 has increased during this time period as well, from 617 in 1997 to 824 in 2002.

Habitat condition and trend

At this time there are no known climatic factors directly affecting deer populations in Region 5. In localized areas, extreme winters can result in large winter-kills, the winter of 1996 being an example. Weather, however, is not thought to be a limiting factor for deer in the western portion of Region 5. Indirectly, however, weather factors may be exerting some pressure on deer in the Region. Severe winter conditions may result in lower yearling recruitment.

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

Additional negative impacts to deer habitat are the result of forest management activities. While forest canopy removal (natural or otherwise) generally increases forage production, certain aspects of forestry are detrimental to black-tailed deer. For example, timber harvest (especially on private lands) tends to effect large areas of habitat at one time, leaving many square miles in

Table 2. Historic fawn:adult ratios for the Klickitat spring deer survey, 1992-2003.

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

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

In the Cascades (PMUs 54 and 55 as well as GMUs

of habitat condition. Large amounts of forested habitat were clearcut in the 1980s prior to (or in anticipation of) the listing of the northern spotted owl. Those forest stands harvested in the 1980s are now largely at an age (13-23 years), where forage production is minimal. In the Cascades, largely held in Federal ownership, subsequent timber harvest has been tremendously reduced. Additionally, the level of timber harvest anticipated under the Northwest Forest Plan has not been realized. Outside of the above-listed areas, reduced deer populations may not be simply attributed to reduced timber harvest. Ownership outside of the Cascade Mountains is largely private or Washington State Department of Natural Resources (DNR) managed. Timber harvest in these areas has remained relatively constant.

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

Management conclusions

In several areas of Region 5, deer populations seem to be declining (Figure 5). The habitat conditions discussed in the previous section have likely contributed significantly to this trend. One potential additional cause of the decline in deer numbers is hair loss syndrome. Reports of the problem began in PMU’s 56 and 57 during 1996. Since that time, numerous reports of affected deer have been received from throughout the Region. Hair loss syndrome was observed in Klickitat County for the first time in 2000. Approximately 3% of the deer

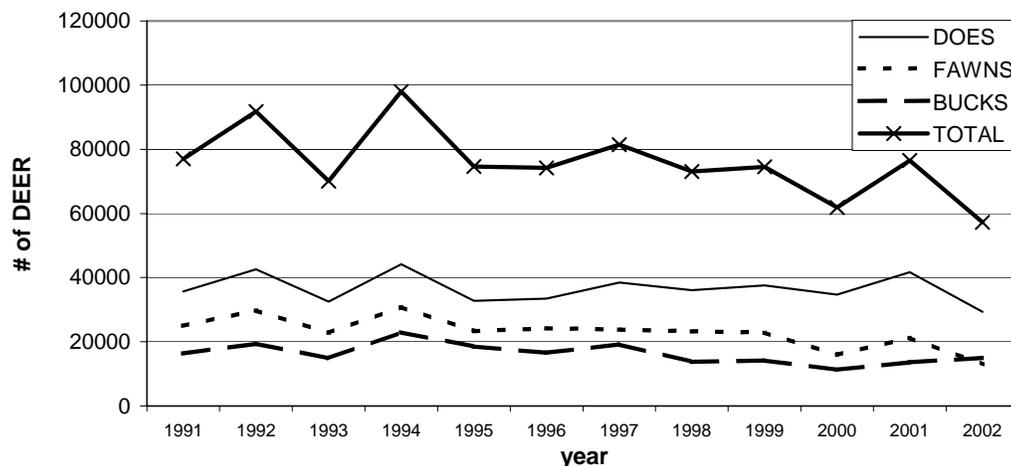


Figure 5. Region 5 estimated total deer population.

558 and 574) the downward trend we are seeing in the deer population is a long-term trend and likely the result

observed during the March 2003 Klickitat deer survey had noticeable signs of the syndrome. The declines in

harvest, increases in buck mortality rates and reduced productivity in the western portions of Region 5 all roughly coincide with the onset of the hair loss syndrome.

Anecdotal reports indicate that deer are now absent from areas where they were present in high numbers during the mid 1990s. In summary, the cumulative effects of increased development, certain forest management activities, reduced federal timber harvests and the hair loss syndrome, have reduced the Region's deer population.

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

GREG SCHIRATO, District Wildlife Biologist

Population objectives and guidelines

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

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

Hunting seasons and harvest trends

Based on the analysis of the Game Harvest Questionnaire, number of hunters decreased in 2001 and 2002. Hunter success remained high (0.23) with a large increase in hunter-days. Estimates of total annual mortality rates (i.e. from all sources) vary depending on the data source. However, recent findings from the completed buck mortality study have shown that the percent yearlings in the harvest as measured by tooth eruption at check stations accurately estimates annual mortality rates. For GMUs without check stations, the analysis of harvest report card data looking at antler size (spike vs. branch antlered)

adjusted for older spikes and yearling 2 points determined a regional buck mortality rate from 0.27 to 0.41 for various Population Management Units (PMUs). Work in 1998 showed that there is a small underestimation of buck mortality rate from report cards due to bias in under reporting harvest of spikes. Estimates of harvest from the mandatory reporting system that started 2001 will be incorporated into these estimates, substituting for report cards. An analysis of 303 antlered deer at the Vail check station showed that 41 % were yearlings. A sampling of adult (yearling and older) antlerless harvest in GMU 667 resulted in an estimate of an average annual mortality rate of 35% (n = 63). In general, the hunting regulations continue to be conservative with doe harvest targeted at 20 % of buck harvest.

Four GMUs, 651 (Satsop), 663 (Capitol Peak), 667 (Skookumchuck), and 648 (Wynochee) have had a special limited special November deer hunting season. This season overlapped with elk rifle season, but gave an opportunity to hunt deer through the rut. These hunts are extremely popular. They provide a new opportunity for deer enthusiasts. These hunts provide a higher quality buck hunt. But, these hunts have some of the highest success rates for the permits approaching 80%. Because of the nature of the hunt and the individuals seeking this opportunity success for these buck only permits often exceeds or doubles the success of the antlerless permit hunters.

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

Surveys

A pre-hunt helicopter survey was conducted in GMU 667 (Skookumchuck), GMU 672 (Fall River) and GMU 660 (Minot peak). In GMU 667, a total of 50 deer were classified. The ratios of fawns and bucks per 100 does were 76 and 24 respectively. The pre-hunt survey in GMU 672 classified 49 deer the ratio of

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

Year	Hunters	Hunter days	Success	Days per kill
1993	30,474	170,865	0.17	32
1994	31,632	193,324	0.22	27
1995	31,449	192,221	0.19	31
1996	27,733	192,717	0.20	30
1997	29,402	130,400	0.17	26
1998	35,333	145,523	0.12	34
1999	36,762	229,611	0.13	47
2000	38,259	172,331	0.14	33
2001	22,367	135,997	0.25	24
2002	23,666	159,414	0.23	30

fawns and bucks to does was 23 and 100 per 100 does. The pre-hunt survey in GMU 660 observed 29 deer. The ratios of fawns and bucks were 100 and 20: 100 does.

Deer check stations were run at Vail on 4 weekends in 2002 with the help of the Eyes in the Woods volunteers.

Population status and trend analysis

A Sex-Age-Kill Ratio (SAK) model was used to generate deer population estimates by PMU. Population parameters were estimated from Vail check station data, antler harvest reports, well as the aerial pre-season surveys. (Table 3). The recovery rate was reduced to .75 to more closely reflect the data from the mortality study. The model is most sensitive to the female survival estimate. Therefore, the higher doe mortality of .35 reduced generated deer populations. Confidence intervals or standard deviations were calculated using parametric bootstrapping with variances derived from the harvest questionnaire.

Management conclusions

There are some general declines in deer numbers in some GMUs while others are expanding. This follows the patterns that would be expected from timber rotations, where large magnitude changes in population occur with stand age. Long-term declines are expected and are occurring on USFS lands where there is little timber harvest and a push for older stand age classes. In addition, declines are occurring where canopy closure is occurring over large expanses of even aged timber management, (GMU 627). While increases are occurring where these even age stands are being harvested again (GMU 667, 663). The current year had higher harvests and success rates. The early November buck hunt provides a popular special opportunity. Due to the success of this hunt it has the ability to quickly shift the overall mortality rate in the buck portion of the population. If resistant is not met with the elk season overlap this opportunity could be expanded to other units. It is recommended that the permits not exceed 2-3 % of the total buck harvest to prevent substantial shifts in buck mortality and recruitment of bucks to the older age classes desired in these hunts.

Table 3. SAK population estimate by PMU.

PMU population	Estimate+/- SD
67	4,791 +/-794
66	2,597 +/-514
65	2,660 +/-524
64	10,377 +/-1911
63	12,969 +/-1883
62	10,771 +/-1761
61	9,474 +/-2004

Elk

ELK STATUS AND TREND REPORT: REGION 1

Selkirk Herd

PMU 11, GMUs 101, 105, 108, 111, 113, 117, 121, 124

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

Population objectives and guidelines

Elk (*Cervus elaphus*) are managed in two zones within the Colville District. Within Game Management Units (GMUs) 111, 113, and 117, more elk along with a wider distribution is the goal. Here the elk harvest objective is to maintain the annual overall bull mortality rate at less than 50% and a post-hunting season bull to cow ratio of at least 15:100 (WDFW 2002). Antlerless hunting opportunity within these GMUs is by permit only, except that bow hunters may hunt any elk. Elk population growth is discouraged within the other elk management zone, which includes GMUs 101, 105, 108, 121, and 124. Consequently “any elk” seasons are generally offered within these GMUs.

Hunting seasons and harvest trends

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

All GMU’s were open to “any elk” during the archery early and late hunts in 2002. Muzzleloaders had a general early October bull hunt in GMU 109, over-lapping a whitetail hunt, and could apply for antlerless permits along with the modern firearm hunters. The modern firearm general bull elk hunt was consistent with the rest of eastern Washington. Antlerless permits were issued for GMU 109 (Threeforks), GMU 117 (49 Degrees North), and GMU 124 (Mount Spokane). The high number of permits in the Mount Spokane Unit (GMU 124 east of Highway 395) was to address increasing agricultural damage problems with elk there. Hunters could take any elk in GMU 101 (Sherman), GMU 105 (Kelly Hill), that part of GMU 109 west of Aladdin-Northport Road, GMU 121 (Huckleberry), and west of Highway 395 in GMU 124 (Mount Spokane). There was little change in hunter numbers (Figure 1) compared to 2001. Modern firearm hunters declined slightly while archery and muzzleloader participation increased.

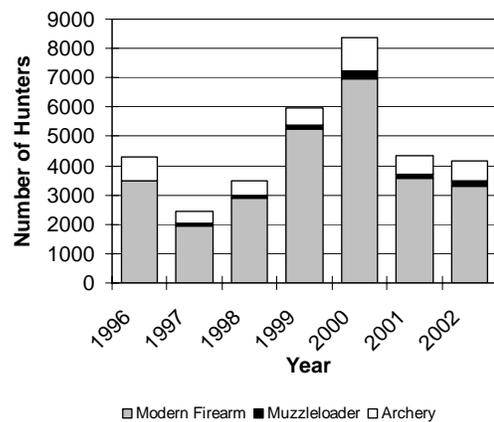


Figure 1. Trend in elk hunters by hunt method, GMU's 101-124.

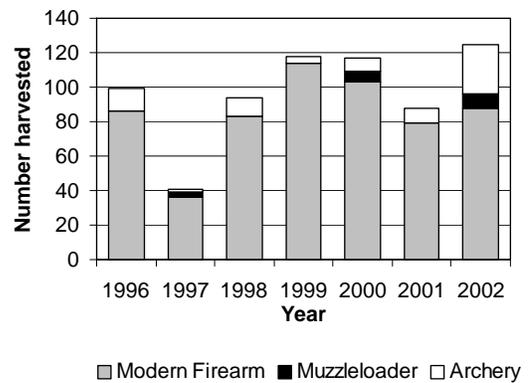


Figure 2. Trend in elk harvested by hunt method, GMU's 101-124.

The estimated bull harvest for 2002 was up 34%, and cows were up 65% from 2001 (Table 1). Archery hunters had an especially good year, taking 29 elk in 2002 compared to 9 in 2001 (Figure 2). The increased archery success was spread over all units but was most significant in GMU 117 at 10 elk and 124 at 8 elk.

Table 1. Three year bull and antlerless elk harvest within the Colville District, GMU's 101-124.

Year	Antlered Bull Harvest	Antlerless Harvest	Total Harvest
2002	87	38	125
2001	65	23	88
2000	102	9	111

A survey of all permit holders (Rieck, 2003) revealed that harvest by “any elk” permit holders continues to be exceptionally low. (Table 2). Of the 120 total permits issued, only 70% of the hunters reported even hunting. The harvest included only 1 bull and 9 cows taken from the following Game Management Units: GMU 109 (1 elk), GMU 117 (3 elk), GMU 113 (3 elk), and GMU 124 (3 elk). Permits for any elk appear to be providing substantial recreational opportunity for hunters in these units, but the harvest is almost negligible.

Table 2. Special permit allocation and hunter take, GMU's 101-124, 2000 to 2002.

Year	Number of Permits	Antlered Bull Harvest	Antlerless Harvest	Percent Hunter Success
2002	120	1	9	8 %
2001	80	2	12	18 %
2000	70	3	5	11 %

Hunters did well in the “any elk” units (including GMUs 101, 105, 109 west of Aladdin Road, 121, and 124 west of Highway 395) in 2002. Even though antlerless elk were legal game, the increased take was on bulls. Unit 109 saw an increase in harvest for general firearm hunters from 10 elk in 2001 to 18 in 2002. Only 3 of those 18 elk taken in 2002 were cows. The either-sex hunts within these GMU's appear to be having little effect on the expansion of elk populations within these units.

Surveys

Harvest rates have generally been relatively low for the northern Selkirk Herd compared with other regions of Washington State. Consequently, devoting substantial time to surveying bull to cow ratios has not

been a high priority. For management decisions we currently rely on trends in bull mortality rates based upon age estimates from antler point data obtained by hunter reports and field checks (Table 3). Hunter reporting rates have improved with the mandatory reporting system begun in 2001.

Table 3. Antler point data from hunter harvested elk, GMU's 101-124.

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

In the early winter we conduct moose composition flights over some elk range and classify elk wherever encountered. While the sample is low, these are the only post-hunting season data we currently have. During our December 2002 moose survey flights we observed only 16 elk for a ratio of 50 bulls:100 cows and 50 calves:100 cows. To improve the sample we can look at the last three years of flight surveys with a combined sample of 69 elk over several GMU's for a bull:cow:calf ratio of 23:100:37. This bull:cow ratio is above the minimum goal of 15 and the calf ratio is near the average calf ratio for other state herds (WDFW 1996). In 2002 an observation rate of only 2.2 elk vs. 19.0 moose were observed per helicopter flight hour. Elk are exceptionally difficult and expensive to survey in the Selkirk Mountains of northeastern Washington.

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

The calf:cow ratio is the most reliable information gathered on post-winter/early spring surveys; however, even this ratio is questionable as calves are difficult to classify by April when they have nearly grown to “yearling” size. The 2003 survey efforts yielded a ratio of 57 calves per 100 cows, which is considerably higher than the last several years (Table 4). In addition multiple observers documented the high calf ratio in 2003 over a broad area.

Table 4. Early spring elk composition surveys, GMU's 101-121.

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

Population status and trend analysis

General observations and anecdotal information indicate that elk populations may be increasing primarily by expansion of their range. The high recent calf ratios and hunter harvest in 2002 support these observations. We do not consider the bull:cow ratios observed during post-winter surveys as being accurate because generally mature bulls do not show themselves in the farm fields in daylight hours as do antlerless elk and young bulls. Nevertheless the ratios observed can be considered as minimums and in the last 3 years those bull:cow ratios have been at or near the 15 bulls:100 cows that management guidelines call for in the post-hunt population (Table 4).

Habitat condition and trend

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

Drought conditions have prevailed for several years within northeastern Washington. The prolonged drought has had significant impacts on forest health and grazing range for cattle. Consequently elk forage quality and quantity may have been negatively impacted as well.

Wildlife damage

We continue to experience only a few formal elk damage complaints in northeastern Washington each year. Instances of elk frequenting agricultural areas as they continue to expand into western Stevens and northwestern Spokane Counties are passing the novelty

stage and are beginning to generate more concern. Within GMU 124 relatively large groups of elk have been regularly observed near the suburbs of northeast Spokane and conflicts with agriculture are a problem. For 2003 all of GMU 124 will be included in the "any elk" hunting opportunity for all hunting methods to address this increasing threat.

Habitat enhancement

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

Management conclusions

Mandatory reporting by all elk hunters began in 2001. Harvest data are currently the most important information we collect for management of elk in northeastern Washington.

The bull harvest improved in 2002 with good ratios of mature animals in the harvest. With the bull:cow:calf ratios looking good it appears elk are currently doing well in the Colville District and harvest rates are appropriate.

Literature cited

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ELK STATUS AND TREND REPORT: REGION 1

PMU 11 – GMUs 127, 130, 133, 136, 139

PMU 13 – GMU 142

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

Population objectives and guidelines

The population goal for this elk (*Cervus elaphus*) herd is to manage the elk population for a sustained yield; a variety of recreational, educational and aesthetic purposes including hunting, wildlife viewing and photography; and to preserve, protect, manage and enhance elk and their habitats. 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 2002 general elk hunting seasons for Game Management Units (GMUs) 127-142 were:

- Modern Firearm - Oct. 26-Nov. 3, Any elk
- Archery - Sept. 1-14, Any elk
- Late Archery (GMU 127) - Nov.20-Dec. 8, Any elk
- Muzzleloader - Oct. 5-11, Any elk
- Late Muzzleloader - Nov. 20-Dec. 8, Any elk
- AHE only - Dec. 9-31, Any elk

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

The current hunting season structure, which allows the harvest of any elk combined with a late season opportunity, appears to have increased the harvest of elk in 1999 and 2000 (Table 1). However, the last 2 years of total elk harvest dropped significantly to 117 and 112 animals from an all time record harvest of 244 elk taken in 2000. One consideration, when looking at these numbers is the switch in 2001 to mandatory reporting which may have significantly influenced our reported harvest numbers.

Muzzleloader hunters again had the highest success rate (9%) with a reported harvest of 22 bull elk and 28 antlerless elk. The modern firearm hunters had a

relatively short season, but managed a success rate of

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

Year	Antlered	Antlerless	Total	Hunters	Hunter days
1991	76	82	158	1330	4795
1992	24	40	64	461	2542
1993	6	19	25	582	2944
1994	40	67	107	1016	3960
1995	32	28	60	1107	3758
1996	29	106	135	1305	5210
1997	25	45	70	735	3563
1998	2	19	21	254	661
1999	101	103	204	2473	17210
2000	75	169	244	2966	10634
2001	61	56	117	2674	11380
2002	59	53	112	1555	7150

6.5%, taking 33 bulls and 21 antlerless. Archery success was lowest at 4% (but twice the success of 2000) taking 4 bulls and 4 antlerless.

In 2001, hunter numbers peaked, more than doubling the number of hunters in 1991. In 2002, the number of hunters dropped by over 4000, perhaps due to shortage of public lands along with the increased leasing of private lands.

Surveys

Ground and aerial surveys are used to gather population and herd composition estimates. In 1998 a mark-resight study was conducted in GMUs 127 and 130 resulting in a minimum estimate of 179 elk. Post-hunt composition counts were conducted in GMU 130 in the Turnbull Wildlife Refuge and also in GMU 124, indicating average bull:100cow:calf ratios of 21:100:32 and 19:100:43, respectively (Table 2).

Table 2. Elk Composition Counts in GMUs 124 and 130.

Date	GMU	n	Cow	Calves	Bulls	per 100 Cows	
						Calves	Bulls
Jan-03	124	38	22	12	4	55	18
Jan-03	124	27	17	8	2	47	12
Jan-03	124	18	10	4	4	40	40
Jan-03	124	35	19	9	7	47	37
Mar-03	124	31	20	6	0	30	0
Mar-03	124	37	20	6	5	30	25
Mar-03	124	36	24	12	0	50	0
Mar-03	124	38	23	11	4	48	17
Oct-99	130	72	45	16	11	36	24
Nov-99	130	29	18	3	8	17	44
Aug-00	130	42	23	14	5	61	22
Oct-00	130	95	57	19	19	33	33
Jan-01	130	97	71	24	2	34	3
Jul-01	130	0	0	0	0	0	0
Sep-01	130	56	34	14	7	41	21

Population status and trend analysis

Harvest data from 1991 indicate an inconsistent harvest, possibly indicating a similarly fluctuating population, with a large number of animals being harvested one year and a subsequent drop in harvest the next year. This continued through 1998. In 1999, the harvest was more than 5 times the number of the previous year. This high harvest continued for one more year, and then dropped more than 50% in 2001. In 2002, this same harvest rate was sustained. One issue to consider again is the mandatory reporting that started in 2001. Because of the limited public land in these GMUs along with the increased leasing of land, hunting pressures may be more evenly spread out over the area and consistent over time and as a result elk populations may be more stable when compared to the past due. Next year will be the third year of mandatory reporting and we will keep a close watch to see if numbers continue on the current trend.

Habitat condition and trend

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

Elk Damage

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

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

Management conclusions

The higher level of harvest occurring in this area, especially in 1999 and 2000, was due primarily to the change in the harvest strategies developed in the 1999 hunting seasons and regulations. The obvious drop in harvest this past year may be due to the large harvest taken the previous 2 years; or it could just be a result of the new mandatory reporting scheme. At this point, because of the new reporting scheme and the lack of surveys conducted in the last 2-3 years it is impossible to know. These changes and uncertainties underscore the fact that it is imperative that consistent annual surveys be conducted to monitor elk productivity, distribution and population numbers in order to effectively manage the elk populations in these GMUs.

ELK STATUS AND TREND REPORT: REGION 1

PMU 13 – GMUs 145, 149, 154, 162, 163, 166, 169, 172, 175, 178, 181, 186

PMU 14 – GMU 157

PAT FOWLER, District Wildlife Biologist
PAUL WIK, Wildlife Biologist

Population objectives and guidelines

Elk (*Cervus elaphus*) populations in the Blue Mountains remain below management objective. Between 1985 and 1992, the elk population declined by approximately 1500-2000 animals. Sub-populations in GMU 169 Wenaha, GMU 175 Lick Creek, and the eastern portion of GMU 166 Tucannon, and GMU 172 Mt. View are still below population management objectives by approximately 1,000-1200 elk. The goal will be to increase elk populations in units 166, 169, and 175. The elk population in GMU-172 appears to be reaching the tolerance level for some landowners in the area. Surveys in March, 2003 produced a sightability estimate of 4,750 elk for the Blue Mountains.

Hunting seasons and harvest trends

The Blue Mountains has been under a spike-only management program since 1989. This program was designed to improve breeding efficiency, by increasing the number and age of adult bulls in the post-hunt population, and has been very successful at achieving that goal. The program has resulted in a dramatic improvement in post-season bull ratios in most units. The elk population contained very few bulls older than 3 years of age prior to the spike-only program (< 2%), and post-season bulls ratios ranged from 2-5 bulls/100 cows. Bull ratios have improved, ranging from 10-30 bulls in units where the harvest of adult bulls is controlled. In GMU-175, where tribal hunting occurs, the post-season bull ratio has declined to 4 bulls/100 cows.

Hunters harvested an average of 752 bulls per year between 1984 and 1988. Between 1995 and 2001, the bull harvest averaged 230 bull/year. The reduction in the bull harvest is due to a marked decline in elk populations in GMU's 166, 169, 172, and 175, and poor calf survival, which results in fewer yearling bulls available for harvest.

The 2002 bull harvest was almost identical to 2001, at 224 bulls (Table 1).

Adult bulls are harvested under permit control. Only 28 permits were issued in 2002 for rifle, muzzleloader, and archery hunters. Permit holders harvested 15 bulls, for an overall success rate of 68%; rifle-91%, ML-50%, archery-43%. Bull permit holders

Table 1. Blue Mountains Elk Harvest (PMUs 13 &14) 1992-02.

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

Table 2. Permit Controlled Bull Elk Harvest - All Weapons, 1992-02, Blue Mtns. WA. (excludes GMU-157 Watershed).

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

can still look forward to a very high quality hunt (Table 2). Six point or larger bulls comprised 87% of the 2002 permit harvest.

Special permit hunters (Auction, Raffle, Incentive tags) are focusing on the Blue Mountains, which will result in less opportunity for other permit holders. Since the adult bull harvest is based on an allocation of bulls, the impact of Special Tags will need to be assessed against the overall harvest. In 2002, three of the four tags (Auction, Raffle, Incentive) hunted in the Blue Mountains and harvest 3 bulls.

During 2002, poachers continued to kill bulls in GMU-162 Dayton, and 13 bulls were lost to poachers

in GMU-154 Blue Creek. As a result, no permits will be issued in GMU's 154, 162, and 166 for the 2003 hunting season. Poaching losses in these units have exceeded 50 bulls over the last two years. The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) honored a request from the WDFW to close GMU-162 to tribal hunting of adult bulls.

Forty permits were issued for GMU-157 Watershed in 2002. Hunting conditions improved compared to the previous year, although very cold weather may have hindered hunters. Hunters harvested 6 bulls and 1 cow, for a success rate of 23%. Six point or larger bulls comprised 67% of the bull harvest.

Agricultural damage complaints have resulted in a large increase in antlerless permits in GMU's 154 and 162. Permits in this area have increased steadily over the last three years, from 160 in 2000, to 310 in 2001, and 695 in 2002. As a result, the cow harvest increased from 24 cows in 2000, to 110 in 2001, to 145 in 2002.

Surveys

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

Post-season surveys are conducted to determine population trend and herd composition in late winter. The annual post-season survey was conducted during mid March 2003. The survey followed the protocol for the Idaho Elk Sighting Model, using the Hiller 12-E helicopter. A total of 31 of 38 survey zones were covered in nine GMU's.

Population status and trend analysis

Winter surveys in March, 2003 produced a count of 3,332 elk, compared to 3,795 elk in 2002. Elk were concentrated at lower elevation, due to heavier than normal snow conditions. The sightingability model produced a population estimate of 4,750 elk. The difference in the number of elk counted between 2002 and 2003, was a result of low counts in GMU-169 Wenaha. Elk numbers in the Wenaha were very low during our survey. Camps with 4 -5 shed antler hunters were observed during the flight. Disturbance from shed antler hunters appeared to have moved elk out of the Wenaha River and Crooked Creek drainages. The count in GMU-172 Mt. View, adjacent to the Wenaha, increased by 250 elk. The Oregon Dept. Fish and Wildlife conducted a fixed wing survey approximately 3 weeks after our survey, and elk numbers returned to normal (423), after shed antler hunting activity had subsided.

Elk population status varies between sub-herds.

Most sub-herds are stable, but increased levels of antlerless permits to address damage problems is resulting in a reduction in the elk population in GMU's 154 Blue Creek and 162 Dayton. Population trends over the last three years in GMU-162 have gone from a high of 1028 in 2001 to 751 in 2003. Surveys in GMU-154-157 Blue Creek/Watershed over the last three years declined from 1008 to 669. Antlerless permit levels will need to be re-evaluated after the 2003 hunting season, and 2004 surveys. The Wenaha herd appears to be stabilizing at a very low level. Sub-herds in GMU 166 east, 172, and 175 are slightly below management objective.

Summer calf ratios have improved to historical levels (Fig. 1). Late winter calf ratios improved, ranging from low of 19 ca./100 cows in GMU-157 to 34 ca./100 cows GMU-166, and averaging 29 calves/100 cows. Winter calf ratios from 1995 to 2002 ranged from 15-24 calves/100 cows. Calf to cow ratios declined 43% between the summer of 2002 and March 2003 (51 ca. to 29 ca.), compared to 62% the previous year. Hopefully, winter calf ratios will continue to improve.

The number of yearling bulls counted post-hunt varies from year to year, and is influenced by several factors: calf production and survival the previous year, and yearling bull mortality. The number of yearling bulls counted in spike-only units between 1993-02 ranged from 71 to 108, and averaged 105. The March 2003 survey produced a count of 98 yearling bulls, a decline of 36% from 2001.

The post-season bull ratio in spike-only units averaged 13 bulls:100 cows between 1991-2001. The 2002 post-season survey produced a ratio of 12

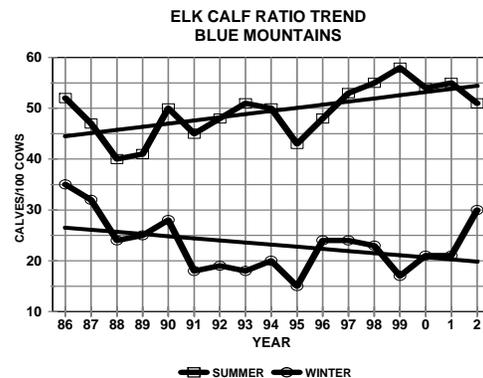


Figure 1. Summer and Winter Calf Ratio Trend, Blue Mountains 1986 - 2002.

bulls/100 cows. Between 1990 and 1997, the post-season bull ration averaged 14 bulls/100 cows. Post-hunt bull ratios in 2002 ranged from a low of 4 bulls:100 cows in GMU-175, to a high of 31 bulls:100 cows in GMU-157 Watershed.

Shed antler hunting activity has increased to a level that it creates significant disturbance to elk on the winter range. It is not unusual to see 3-5 camps of shed antler hunters on a winter range, or to encounter aircraft buzzing the ridges looking for bulls. Elk use patterns in several units have changed over the last few years due to human disturbance caused by shed antler hunting activity. Bull groups are broken and scattered into the upper elevation timber and snow, while cow/calf groups are pushed out onto agricultural lands. As indicated above, shed antler hunting activity may have caused elk to abandon the Wenaha winter range this spring, moving over 250 elk onto Grouse Flats in GMU-172, where damage problems are a constant problem. The Department will need to take a serious look at regulating human activity on public land elk winter ranges, before conditions get any worse.

Habitat condition and trend

Habitat conditions on National Forest land are improving due to the implementation of a prescribed burning program. Decreasing road densities on the Pomeroy District would greatly improve habitat effectiveness for elk in GMU’s 166 east, and GMU-175.

The Pomeroy District is planning more ORV trails in GMU-175. The WDFW has responded by requesting more road closures as mitigation for the increase in ORV trails.

The road closure program on the Walla Walla

Ranger District is completed.

The WDFW in conjunction with conservation organizations and the BPA, purchased the Schlee ranch in GMU-175 Lick Creek. This added approximately 5,300 acres of critical winter range to the Asotin Creek Wildlife Area. Programs will be developed over the next 5 years to improve security and forage conditions for wintering elk.

Augmentation and habitat enhancement

Habitat preservation and enhancement projects continue on the Wooten and Asotin Wildlife Areas, mostly in the form of weed control of yellow-star thistle and knapweed. One forage enhancement project was initiated in 2000 on Able’s Ridge (Wooten Wildlife Area). The project was seeded in the spring of 2001, but drought hindered growth the first year. Areas of the project were re-seeded in 2002, and resulted in excellent forage production. Another forage enhancement project was started on Cook Ridge (Asotin WA) in the spring of 2003, and the results have been excellent. More projects are planned for the future.

Elk damage

Elk damage continues to be a problem in GMUs 154 and 162. A meeting with landowners, public officials, and sportsmen was held in Dayton on May 21, 2002 to discuss elk damage, elk populations, and solutions. Antlerless permits were increased on private land in both units to curb the damage problem. Damage complaints in 2003 declined in GMU-162.

Landowners in GMU-181 complained of elk damage in late summer. Two meetings were held with landowners in GMU-181 Coulee. Two groups of elk numbering 100-150 are summering in the CRP fields and feeding in crops. Landowners want the herd reduced. Permits will be recommended for 2004 to address this damage issue.

Management conclusions

The spike-only management program was implemented in the Blue Mtns. in 1989 to improve adult bull survival, and the age class structure of the bull population. The number of adult bulls in the population increased rapidly, reaching 16 bulls/100 cows by 1991. The increase in adult bull numbers resulted in a significant improvement in breeding ecology and efficiency. The intensity of rutting activity increased dramatically, harem sizes were much smaller and a high percentage of conception occurred during the first estrous (57% before/93% after). More adult bulls in the population allowed the WDFW to offer high quality, permit controlled hunting opportunity (Table 2). The intense rutting activity and presence of

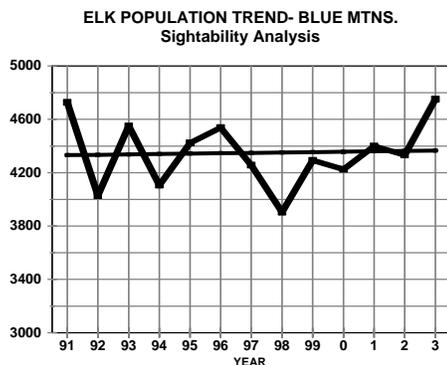


Figure 2. Trend in total elk population size.

large, adult bulls also resulted in a tremendous increase in elk watching activity during the month of September.

Summer calf ratios remain high at 50+ calves/100 cows, but winter calf ratios usually decline to 20-25 calves/100 cows. Low calf survival has had a negative impact on several sub-herds.

Elk populations on the westside of the Blue Mountains have been reduced, due to agricultural damage problems. Elk populations on the eastside of the Blues, and in GMU-169 Wenaha are still below management objective by approximately 1,000 elk.

Several factors are limiting the ability of the Blue Mountains elk herd to reach population management objectives. Calf survival, although improved in 2002, remains below objective. Habitat values that have declined due to roads, logging, noxious weeds, and fire suppression must be reversed in order to increase habitat effectiveness for elk on public land. Third, agricultural damage complaints have increased over the last four years resulting in a reduction of the elk populations in GMU's 154 and 162. Better ways to deal with damage should be developed, or population management objectives may need to be lowered. And fourth, efforts to develop an agreed upon cooperative harvest and habitat management strategy with the Nez Perce tribe for herds within their treaty hunting area will be continued. The Blue Mountains elk population will not increase or meet population management objectives in the near future, unless each of these factors is managed to reduce the negative impact on this elk herd.

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

Hunting seasons and harvest trends

Historically, the Colockum Game Management Units (GMUs) 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. Population Management Unit (PMU) 34, which is within the Yakima elk herd designated boundary has been managed as a damage area with a wide array of liberal seasons allowing the harvest of both antlerless elk and any bull.

Early archery seasons ran September 1-14. Early 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. Late muzzleloader is 5 days in mid-November. Late archery starts the day before Thanksgiving and continues into early December. There are also various damage control seasons for muzzleloader that start as early as August 15th and end as late as December 15th.

In 2002, the reported number of elk hunters in Region 3 increased slightly and was near the 10-year average (Table 1). The number of modern firearm and archery hunters decreased while muzzleloaders increased in the region. Mandatory hunting activity reporting was instituted in 2001. Hunter numbers and harvest information for 2001 and 2002 reflect this change in data collection.

Overall hunter success was unchanged from 2001 and near the 10-year average (Table 1). Modern firearm success decreased while muzzleloader and archery

hunters success rates increased.

Bull and antlerless harvest in the Colockum increased in 2002 and was above the 10-year average (Table 1). Bull and cow harvest decreased from the previous year for the Yakima herd, but was still above the 10-year average (Table 1).

Surveys

Post-hunt aerial surveys were conducted in February 2002. Survey units were stratified and randomly selected. Approximately 70% of the Colockum and Yakima units were surveyed. Feedlots for the Yakima herd were ground surveyed. PMU 34 is not included in the flights or data summaries.

Observed calf recruitment in both the Yakima herd and the Colockum herd decreased (Table 2). However, historical harvest data suggests that when large decreases are observed on post-season surveys, calf recruitment actually increases. 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 are typically occupy small portions of the winter range and are in a clumped distribution, making year-to-year comparisons difficult. The number of bulls and bull:cow ratios should be viewed as a gross scale estimate over a number of years. Surveys are being re-designed as more is learned about the distribution of bulls. Future surveys will hopefully more accurately estimate the bull population.

Population status and trend analysis

In February 2003, the Colockum and Yakima herds were estimated at 3,920±445 and 9,834±983 (Tables 2 and 3), respectively. Estimated populations have consistently decreased the last 3 years. The Yakima herd is now within the objective range and the Colockum herd is slightly below. It is unknown if the populations have actually decreased given mild winters, variance of the estimates, and tweaking of surveys.

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

Year	Colockum harvest		Yakima harvest		Regional hunter numbers				Regional hunter success			
	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
Mean ^a	441	430	982	1,161	22,037	5,109	5,318	32,397	9.1	9.8	9.0	9.3

^a 10 Year Mean ending 2002

If bull harvest is used as an index of population, the Colockum herd has decreased the last 15 years while the Yakima herd is above the historic average but decreasing.

Harvest comparisons must be viewed with caution as regulations have changed dramatically the last 15 years. Recruitment of calves will also have a major influence on bull harvest, which is weighted heavily toward yearlings.

However, to maintain the high bull harvest seen in the Colockum from 1986-92, there were either more adult cows, a higher number of young per cow, or a combination of the 2 factors.

The Yakima herd survey matches the harvest data fairly closely and the observed decrease in overall population. A high antlerless harvest the last 4 years 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 the Arid Lands Ecology Reserve (ALE), which increased harvest. A low harvest in 2001 and 2002 will probably result in an increasing population.

Habitat condition and trend

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

Colockum winter range forage quality is likely decreasing. 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 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 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 adjacent, 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 herd designated boundary have been fenced. However, in some areas the fence is deteriorating and needs to be rebuilt.

Most of the chronic damage areas used by the Colockum herd are not fenced. Damage is being managed by early and late general muzzleloader hunts and modern firearm and muzzleloader special permit hunts. The boundaries of the muzzleloader hunt are

drawn depending on where damage is occurring. The program has been fairly successful. Additional problem elk are being managed through hot spot and landowner preference hunts. The goal is to eliminate/displace the elk that have developed a preference for agricultural crops.

Cattle ranchers in the Yakima area are concerned about the potential for competition between elk and cattle. In 2001, a state bill was passed allowing ranchers to claim wildlife damage on rangeland grazed by elk. Claims have been filed, but measuring the impact of elk on rangeland is difficult and controversial.

The PMU 34 herd has the potential to cause the most significant annual agricultural damage. In 2001, damage payments to wheat farmers exceeded \$200,000. The total

Table 2. Colockum elk winter composition 1990-2003.

Year	Antlerless		Bulls		Total Elk	Ratios (per 100 cows)	
	Cow	Calves	Spike	Branched		Calves	Bulls
1990	918	336		21	1,275	37	2
1991	559	213		23	795	38	4
1992	NO	DATA					
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

^a 1999-2003 data based on visibility model

^b 90% Population Estimate ± 90% Confidence Interval

Table 3. Yakima elk winter composition 1990-2003.

Year	Antlerless		Bulls		Total Elk	Ratios (per 100 cows)	
	Cow	Calves	Spike	Branched		Calves	Bulls
1990	929	371		28	1,328	40	
1991	432	195		28	655	45	7
1992	NO	DATA					
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	29	15

^a 1999-2003 data based on visibility model

^b Population estimate ± 90% C.I.

for damage payments for the entire region from 1991-2000 was \$37,777. The proximity of PMU 34 elk to valuable tree crops further increases the risk. Controlling the herd size is problematic as the core use area is on ALE, where hunting is prohibited.

Management conclusions

Based on the information available, both the Colockum and Yakima herds appear to be near management goals. The bull ratio in the Colockum fell slightly below the goal of 12:100 cows. Surveys indicate calf recruitment has declined in both herds as bull ratios have increased. Cow nutrition is likely driving calf recruitment and not bull ratios.

The overall summer range may be improving on the Colockum range, but animals seem to concentrate in small areas for an extended period in late summer and fall. Winter range quality has probably deteriorated. Ideally, the condition of the animals would be measured on various ranges and seasons in hopes of identifying nutritional bottlenecks. If funding is not available for radio collaring, then efforts should be made to measure condition of animals harvested by hunters.

The Yakima herd appears healthy. Hunter opportunity and elk harvest has been high the past 4 years as the herd has been reduced. The herd can probably not remain stable at the current level of harvest, unless recruitment increases. There is a perception by some of the constituency that the Yakima elk herd is too large and should be reduced to prevent range damage. Information needs to be collected on elk movement, range condition and forage utilization to better respond to those concerns.

The PMU 34 herd is above the goal of 300-400 elk, and is expected to continue to grow. Damage payments in 2000-01 emphasize the need to reduce the PMU 34 elk population. Hunting is not expected to control herd growth under the current harvest strategies available to WDFW. Direct management access to elk on the Arid Land Ecological Reserve (ALE) is required to effectively manage the number of elk in this sub-herd.

ELK STATUS AND TREND REPORT: REGION 4

PMU 44 – GMU 454

PMU 47 – GMU 460

LEE KANTAR, District Wildlife Biologist

Population objectives and guidelines

Precise population estimates for elk (*Cervus elaphus*) in Game Management Units (GMUs) 454 and 460 are unavailable. Estimates for elk numbers in these areas are based on limited surveys and knowledge of herd and sub-herd sizes. Past numbers have been reported for elk in GMU 454 at approximately 200-250 head and 175-225 elk in GMU 460 (WDFW 2001). Elk occurring in GMU 454 are generally restricted to the eastern portions, adjacent to core elk herds and away from the suburban growth and sprawl. However, habituated, small satellite herds do occur in suburban and rural areas. Elk are appreciated by many citizens that perceive them as a “quality of life” indicator. Other citizens do not support the presence of elk because of damage to ornamental plants and gardens.

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

Hunting seasons and harvest trends

Management strategies vary for these two elk herds. GMU 454 has liberal seasons, including extended antlerless seasons designed to maintain the population at a level that keeps damage complaints at an acceptable level. In GMU 460, there has been limited antlerless harvest and a 3-point or better restriction on bull harvest designed to allow the population to grow at a slow rate and expand their range. Antlerless harvest was eliminated since the 2000 season to enhance herd growth. This GMU has good elk habitat, primarily on managed forestlands and the potential to support about 450-550 elk without damage concerns. Harvest for years 1993-2002 in GMU 460 and 454 is presented in Figures 1 and 2, respectively.

Surveys

There are currently no surveys conducted in GMU

454 or 460 because of limited funds.

Population status and trend analysis

Based on limited, primarily anecdotal information, the elk population in GMU 454 is stable or declining slightly. The elk population in GMU 460 is increasing slowly.

Habitat condition and trend

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

Wildlife damage and nuisance problems

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

Management conclusions

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

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

Several small sub-herds occur within and immediately adjacent to the urban boundaries of the cities of North Bend and Snoqualmie. Strong community interest suggests these elk represent a “quality of life” indicator consistent with a rural lifestyle and characterized by open space consisting of greenbelts, local parks, and conservation areas. Efforts

should be initiated to identify the scope of habitats used by these elk sub-herds and incorporate new data into city planning efforts to direct development, protect open space, establish parks, and other conservation efforts. Encounters of elk and humans along the urban interface present an opportunity for building and expanding public interest in wildlife conservation.

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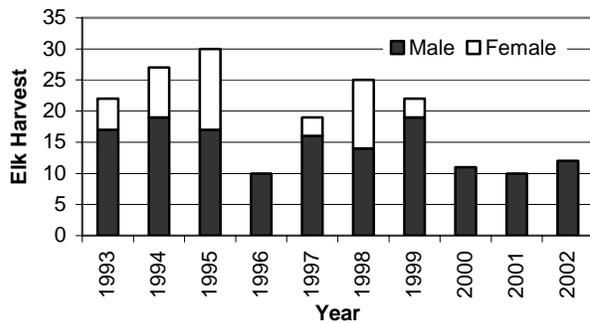


Figure 1. Trend in elk harvest, GMU 460, 1993-2002.

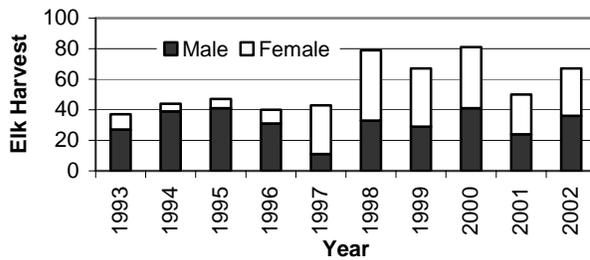


Figure 2. Trend in elk harvest, GMU 454, 1993-2002.

ELK STATUS AND TREND REPORT: REGION 4

PMU 45 – GMUs 418, 437

PMU 46 – GMU 450

MIKE DAVISON, District Wildlife Biologist

Population objectives and guidelines

- 1) Manage the North Cascade elk herd using the best available science.
- 2) Increase elk population numbers in the North Cascade elk herd to or above the late 1980's estimated level of 1700 animals.
- 3) Promote expanding the North cascade elk herd into potential ranges south of the Skagit River in the Sauk unit.
- 4) Re-establish tribal/state authorized hunting seasons.
- 5) Manage hunted elk units for spring bull ratios consistent with the statewide 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) Increase public awareness of elk and promote recreational uses of elk, including viewing and photographic opportunities.
- 10) Maintain elk habitat capability on U.S. Forest Service, Department of Natural Resources, and private lands.

Hunting season and harvest trends

Conservation closures were established in both GMUs 418 and 437 in 1997 as outlined in the management strategies of the North Cascade Elk Herd Plan (Wash. Dept. of Fish and Wildlife 2002). Tribal hunting has continued in areas outside the primary range of the Nooksack elk herd (damage areas in both the Skagit and Nooksack river drainages, and other portions of GMUs 407 & 437). Reported tribal harvest during 2002 was 1 cow in GMU 437. Non-tribal harvest during the 2002 season was 3 animals (2 bulls, 1 cow in GMU 437).

Surveys

Aerial herd composition surveys in GMU 418 were conducted on Sept. 4, 5, 9, and 11, 2002. A total of 166 elk were classified. The ratio of bulls:cows:calves was 43 bulls:100 cows:60 calves.

The number of branch antlered bulls (3pt. +) was very high at 66 percent of the total observed.

Radio telemetry monitoring and biological sampling has been conducted on the North Cascade elk herd from 1998 – 2002. Blood samples as well as fecal samples were collected as part of a body condition and parasite analysis. Total fat levels were determined utilizing ultrasonography and a body condition scoring system. Pregnancy rates were also evaluated via ultrasonography. Preliminary data analysis indicates that total body fat levels of Nooksack elk averaged 5.6 %, which was significantly greater than 2 other western Washington and 1 western Oregon population ranging from 3.8 - 4.8% body fat (L. Bender and J. Cook, personal communication). Parasite levels were very low as compared to other western populations. Pregnancy rates were also very high with 15 of 17 cows (88%) verified as pregnant (L. Bender, personal communication). Recaptures of radio-collared elk are scheduled to continue through November 2003. Final analysis of body condition, parasite loads, and pregnancy rate data will be completed in 2003.

Preliminary analysis of movement data (radio telemetry) indicates that radio-collared cows are staying in the forested habitats considered primary range for the North Cascade elk herd, avoiding the lowland agricultural habitats considered damage areas. Six discrete sub-herds and associated home ranges have been identified to date.

Population status and trends

The North Cascade Elk Herd Plan (Wash. Dept. Fish and Wildlife 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 250 and 300 animals. Elk numbers and distribution within the central range do not appear to have changed from previous low levels. Using theoretical population models, 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).

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 the Year-2000, Landsat flight data. Problems limiting the current effectiveness of the Nooksack elk range continue to include, high road densities on both summer and winter range areas, cumulative disturbance impacts from multiple recreational and management uses on the land, and increased development of trails (hiking, horse, and ORV). Housing development and conversion of forestlands to agricultural and/or industrial use is accelerating and poses the greatest threat to elk habitat in the future.

Wildlife damage

The number of elk occupying agricultural damage areas has remained stable at an estimated level of between 75 –100 animals in 2002. 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 and the U.S. Forest Service has significantly reduced the overall problem associated with elk use of private lands. Future, key land purchases could secure farms currently recognized as the most impacted by elk in the valley.

Augmentation and habitat enhancement

Considerable work has begun to accomplish augmentation of the herd in the North Cascade Elk Range. An augmentation Plan has been completed and distributed to all appropriate landowners, sports groups, and tribal representatives. The NEPA review process has been initiated by the U.S.F.S. as required for potential elk releases on federal lands. Internal (WDFW) planning for augmentation has begun with a potential target date for release of October 2003.

Management conclusions

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

- Continue efforts to establish a statistically valid population estimate.
- Shift the survey time period for aerial herd composition surveys to late July and early August, in an effort to increase elk classification sample size.
- Continue road closure agreement with DNR and Crown Pacific, Inc. in primary winter range areas.
- Evaluate the potential for a mark/re-sight population estimation project.
- Maintain and/or upgrade existing habitat enhancement projects.

- Establish new habitat (forage enhancement and road closure) projects in key summer range areas.
- Maintain elk population numbers in agricultural damage areas at or below current estimated levels (75-100 animals).
- Continue to evaluate the potential for a transplant project in GMU 418 (Nooksack) and 437 (Sauk).
- Continue to collect genetic samples from the North Cascade elk herd.
- Continue work on a Nutritional Ecology Study designed to evaluate elk nutritional levels on a seasonal basis.
- Complete a Habitat Landscape Evaluation for GMU 437 (Sauk).
- Continue recaptures and monitoring of radio-collared elk to evaluate migration patterns, habitat use, mortality rates, and habitat description of elk range in GMU 418 (Nooksack).

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

LEE KANTAR, District Wildlife Biologist

Population objectives and guidelines

The Green River elk (*Cervus elaphus*) herd is a relatively small and compact population that has exhibited a decline since the early 1990's. Elk historically occurred in the Green River, but numbers were limited. In the early 1960s with increased timber harvest, elk populations expanded. There are no historical population estimates, but late winter, early spring numbers likely peaked at about 800-900 elk between 1988 and 1991. The current elk population estimate of 200 animals (95% C.I. ± 34) may signify an increase over recent years. (Vales unpubl. data 2003).

In 1984, the Green River Game Management Unit (GMU 485) became a unique management unit where access is strictly limited by the City of Tacoma to protect water quality and eliminate unauthorized access. The Stampede Unit (GMU 466) is also in the Green River drainage with multiple ownership 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 elk season since 1997. The adjacent GMU 466 retains public access and hunting opportunities for bull elk with a 3-point minimum.

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

Hunting seasons and harvest trends

When it was open for elk hunting, hunters entered and exited GMU 485 at one of two specified gates providing the opportunity to check every harvested elk. 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. Subsequently, permit allocation changed to include the Tribe as follows: 1992 and 1993 - 15 elk (6 spike, 9 antlerless); 1994 - 31 elk (6 spike, 19 antlerless, 6 branch-antlered bulls); 1995 and 1996 - 43 elk (6 spike, 35 antlerless, 2 branch-antlered bulls). Permit numbers totaled 93 for both hunts combined. No permits were issued from 1997-2002.

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

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 by providing 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 Public Utilities.

GMU 466 continues to be included in the general season with 1998 being the last year an antlerless elk could be taken. Elk not only intermix with GMU 485 elk, but 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 GMU's should be assessed to determine associated impacts to this sub-herd

Total elk harvest in GMU 466 dropped substantially from a high of 30 (8 bull, 22 cow) to 5 (3 pt. minimum bulls) in 2002 with an average of 5.3 elk killed (range 3-8/season) between 1999 and 2002 (Figure 1). From 1997 the total hunter success rate has dropped from 11% in 1998 to 3% in 2002.

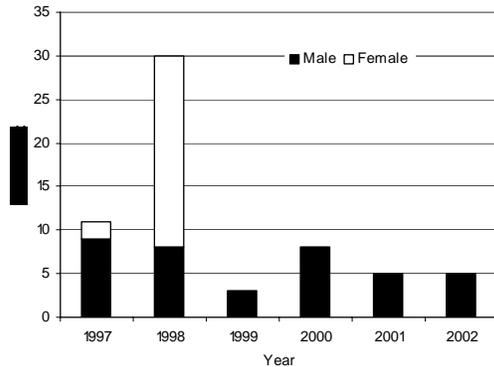


Figure 1. Trend in elk harvest, GMU 466, 1997-2002.

Surveys

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

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

The pre-hunt, branch-antlered bull ratios have generally increased since 1984 and stabilized at about

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.

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 1998-2002 no pre-hunt flights were conducted because of population declines.

Post-hunt (March) composition counts from 1985-2002 have shown a general decline in calf recruitment with a potential upswing noted the last few years (Table 2). Branch-antlered bull composition has varied annually since 1991 and low spike recruitment has continued to be an issue over time preventing bull:cow ratios from stabilizing at herd objectives of > 12:100. This data should be viewed with caution because post-season branch-antlered bull counts may under represent bulls.

Population status and trend analysis

In 1994, 156 elk were marked with paintballs fired from CO2 rifle using a Bell 206B helicopter. Three right flights were flown with 1,206 total elk observed and 202 marked elk seen. An average of 56% of the total marked elk were seen for the three flights combined (range 55.7-79.5 %). The population estimate was 612 elk (± 68, 95% CI) including 460 cows, 50 calves, 85 branch-antlered bulls, and 16 spikes. This type of mark-recapture estimate has been successful in Washington for estimating elk populations.

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 2002. 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

Table 2. GMU 485 Post-hunt elk herd composition 1984-2002 (all ratios per 100 cows).

Year	Spike	Br. Bull	Total Bull	Calves
1984	5.5	3	9	21
1985	6	4	10	30
1986	4	9	13	23
1987	5	5	10	15
1988	8	11	19	22
1989	6	12	18	21
1990	7.5	19.5	27	15
1991	7.4	23	30	14
1992	9.3	11	20	21
1993	3.4	18.5	22	12
1994	3.7	16	20	13
1995	4.3	9.2	13.5	10
1996	2.3	6	8.4	11.5
1997 ^a	3.4	23.5	27	7
1998	1.8	12.7	14.5	6.4
1999 ^a	6	13.1	19.2	8.1
2000 ^a	.08	16.4	17.0	19
2001 ^a	16.1		16.1	32.3
2002 ^a	8.1	4	30.3 ^b	15.2

^a Flight and data provided by D. Vales, Muckleshoot Indian Tribe Biologist.

^b Ratios include bulls not classified.

(n=28) found highly significant statistical selection for elk < 1 year old. 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). Please see GMU 485 Mark-Recapture Population Estimate- Final Report 1997 for results and discussion. 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 on 2002 gave an estimate of 152 elk (D.Vales unpublished data).

Calf mortality study

The WDFW initiated a calf mortality study in May of 1997 and in June 1998 to determine the sources of elk calf mortality. In 1999 the Muckleshoot Tribe continued with this in cooperation with WDFW. This cooperative study included the Muckleshoot Indian Tribe, City of Tacoma, Public Utilities, Weyerhaeuser and Plum Creek Timber Companies, and the Army Corp of Engineers. Results have suggested that predation, predominantly mountain lion, is the primary source of death to radio equipped calves. However, based on preliminary data, the nutritional status of radio equipped adult cows, many associated with these

calves is poor which may be also affecting calf survival and their vulnerability to predation. In addition it has been noted that the nutritional condition of other Westside Cascade elk herds tends to be poor, further research to distill differences in calf survival and both proximate and ultimate causes is necessary to understand these relationships (WDFW 2002, D.Vales, pers. comm. 2003).

Habitat condition and trend

The area 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 1955 to 1995. This was determined from a forage based model called HABSIM (Raedeke and Lehmkuhl 1984, Raedeke 1995) that tracks forest seral stages and quantifies the change in the amount determined as forage and change in elk numbers for each seral stage over time.

Wildlife damage to private property and nuisance problems

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

Habitat enhancement activities

Past and present work has included cooperative projects with the U.S. Army Corp of Engineers, Tacoma Public Utilities, 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 Rocky Mountain Elk Foundation (RMEF), City of Tacoma-Public Utilities, 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 2003. At this point 544 acres have been treated mechanically and/or chemically to improve forage conditions on the range.

Management conclusions

Low calf recruitment rates are a concern for this elk herd. Continued low recruitment and the antlerless

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

This past permit hunt was one of Washington's most popular because of the opportunity to harvest and view quality bulls coupled with the high success rates. Elk permits were not issued for the 1997 to 2002 hunting seasons because of the continued population decline. No permits will be issued in 2003.

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

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Population Objectives and Guidelines

The Washington Department of Fish and Wildlife (WDFW) long-term population goal for elk (*Cervus elaphus*) in all Game Management Units (GMUs) of Region 5 is to maintain current population and harvest levels (WDFW 1996). Specific Region 5 objectives include, (1) manage general hunting GMUs to achieve post season bull elk escapement objectives of 12 bulls per 100 cows, (2) manage limited entry GMUs for 15-25 bulls per 100 cows, and, (3) discourage the proliferation of elk in several units with liberal regulations to reduce damage. In general, herd productivity is managed to equal or exceed the previous 5-year mean. (WDFW 1996).

Hunting Seasons And Harvest Trends

Historically, data on elk harvest, hunter success, and hunter effort were obtained annually through the WDFW hunter questionnaire and mandatory hunter report cards issued with each elk permit. Beginning in 2001, all hunters were required to report their hunting activity via the phone or internet. This new mandatory harvest report will hopefully provide WDFW with more accurate harvest data in the future.

Elk are hunted under WDFW resource allocation strategy. Hunters must choose a weapon type (modern firearm, muzzleloader, or archery), each of which has distinct seasons of varying length designed to minimize the chance of over-exploitation and to provide equal opportunity. Season length and timing are determined by 3-year hunting packages, the latest of which covered 2000-02.

As previously mentioned, in 2002 elk were managed under three principal harvest strategies in Region 5. During the modern firearm season these were; any-elk (where any elk is legal) GMUs (564, 568, 574, 578, 382, and 588), 3-pt minimum (any bull with 3 or more points is legal) GMUs (504, 505, 506, 510, 513, 516, 520, 530, 550, 558, 560, and 572); 3-pt or antlerless GMUs (501), and permit only (limited entry, hunting by permit draw only) GMUs (524 and 556). Concern over the level of antlerless harvest in GMU's 506, 520, and 530 led to a reduction in modern firearm antlerless permits and a restriction of late archery season cow harvest. Antlerless harvest was curtailed for all user groups entirely in GMU's 510, 513, and 516. In all other

units, apart from the any-elk GMUs and GMU 501, antlerless harvest was allowed during archery seasons and by permit during general firearms and muzzleloader seasons.

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

Hunting conditions were warmer and drier than average during the 2002 elk season. Typical warm, dry weather during September and early October made early archery and muzzleloading hunting challenging. Fire danger during the early archery season resulted in the closure of all private timberlands during the first week of September. Typical fall and early winter precipitation and cooler temperatures failed to dominate the region during the general firearm and late seasons.

A total of 28,239 elk hunters spent 160,176 days afield in 2002. Region 5 harvest was 2,479 elk. Overall hunter success during the general season was 9%. The estimated 2002 elk harvest of 2,479 was 14% lower than the 2000 harvest of 2865. Modeling, estimated harvest, and harvest/effort all indicate a general decline in elk populations in Region 5

Increased cow mortality in the Packwood area has also been a concern. The South Rainier elk herd has been declining for several years, although the number of resident elk in the Cowlitz River valley has been increasing over the same time period. Due to the decline in the South Rainier herd, no antlerless elk hunting was allowed in the three GMU's that encompass the Cascade sub-herd area. Earlier work had suggested that the timing of tribal harvest in this area took both migratory and resident elk. Surveys in Mount Rainier National Park in 1999, however, indicated an increase in the Mount Rainier South elk herd. These survey results suggest that resident elk herds may be receiving the majority of the harvest pressure, rather than the Park herd population modeling indicates that the population slightly increased in the 1999 to 2000 timeframe and then slightly decreased in the 2000-2002 period. Harvest restriction should remain in place.

Surveys

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

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

Counts were conducted from a helicopter. All elk encountered were recorded. All sample units (SUs) were sampled only once and SUs were widely spaced (>5 miles between SUs). Since sampling was accomplished within a short time period, the possibility of double count bias was minimized. In 2002, fall surveys were conducted on 2-6, 18, 25, and 26 September and 1 and 4 October. Observed elk were classified as calf, cow, or bull. Bull elk were further classified by number of antler points to determine the percentage of prime (heavily beamed, five or more antler points per side) bulls present in the herds. Data were used to generate calf:cow and bull:cow ratios, expressed as the number of bulls/calves per 100 cows. Ninety percent confidence intervals were constructed about the ratios following Czaplewski et al. (1983).

A total of 1,590 elk was classified during the 2002 surveys (Table 1). Despite our desire to improve both coverage and sample size, survey coverage in 2002 was similar to that of 2000 and 2001. Due to hot weather, Lewis River (GMU 560), Siouxon (GMU 572), Yale (GMU 554), and Marble (GMU 558) were sparsely covered. Overall, weather conditions during the surveys that were conducted were variable, with some good days and others with bright sun and temperatures in excess of 65° F. Wind was not much of a factor during most flights.

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

basis.

Permit Units

After two years of higher harvest and overall mortality, demographics in both Margaret and Toutle were closer to what they had been prior to 1997. Bull mortality rates in both units were 25 - 30%, which is right where they were prior to the onset of tribal harvest in 1997 (Table 3). The return to lower observed mortality rates was a result of decreased harvest. Bull ratios in both units were also good. A longer-term decline in productivity has apparently ended in Toutle. Whether the 2001 and 2002 productivity estimates are a short-term event or the start of an increasing trend remains to be seen.

The age distribution of bulls in both these units showed a slight decrease in the 2002 surveys (Table 3). The mature bull component of the population in Margaret has decreased from 27 % for 2001 to 23% in 2002. In Toutle, mature bulls have gone from 17% to 12% over the same time period. Prior to the 2 years of tribal harvest, over-harvest of bulls, particularly in the Margaret, likely occurred. Thus, permit allocation was reduced from 50 bull tags to 29. It is hoped that this harvest rate is sustainable and will likely still result in an older standing bull population. Given the fairly constant rag horn bull percentages in these two units, and with better control over harvest now, the mature bull component should increase over the next couple of years.

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

Open Entry Units

Productivity was mostly up throughout the Region (Tables 2, 4, and 5). Bull ratios were also high, a reflection of the previous year's productivity and a mild winter. Spikes, however, made up the majority of bulls. The presence of mature bulls improved over 2001 throughout the open-entry units. Mature bulls comprised 13% of the sampled bull population, which is above the average of 8% in these units prior to 3-pt minimum regulations. Rag horn percentages are ~30-35% in these units.

Surveys continue to indicate that the 3-pt minimum is not resulting in achievement of bull mortality rate objectives. In the Coweman, data indicate mortality rates of 47%. Models predicted ~60-65% in 1998, so 3 years of 3-pt regulations in this unit has resulted in past overall bull mortality rates in the low to mid 60's. This is a lower rate than the historic 70% when these units were any bull,

TABLE 1. RAW HELICOPTER SURVEY DATA, SEPT 2002

PMU	GMU	SPIKE	RAG	MATURE	BULL	COW	CALF	TOTAL	B:CO	CA:CO
P52	568	1	4	2	7	9	4	20	78±21	44±19
P53	554	2	4	0	6	10	8	24	60±18	80±19
	558	1	7	1	9	35	12	55	26±10	34±11
	TOTAL	3	11	1	15	45	20	79	33±9	44±10
P54	560	0	4	4	8	38	12	57	21±9	32±11
	572	2	6	2	10	30	8	48	33±12	27±11
	TOTAL	2	10	6	18	68	20	105	26±8	29±8
P56	520	35	17	9	61	104	48	213	59±6	46±6
	550	28	27	4	59	92	51	202	64±6	55±6
	TOTAL	63	44	13	120	196	99	415	61±4	50±4
P57	506	14	10	1	25	62	28	115	40±8	45±8
	530	30	11	8	49	92	55	196	53±6	60±6
	TOTAL	44	21	9	74	154	83	311	48±5	54±5
NO PMU	524	22	42	19	83	132	77	292	63±5	58±9
NO PMU	556	24	60	11	95	199	74	368	48±4	37±3
	524+556	46	102	30	178	331	151	660	27±2	23±2

Table 2. Demographic parameters combined for PMU, Sept. 2002.

PMU	Bulls:100 Cows	Calves:100 Cows	SAMPLE SIZE
P52	78±21	44±19	20
P53	33±9	44±10	79
P54	26±8	29±8	105
P56	61±4	50±4	415
P57	48±5	54±5	311

TABLE 3. HISTORIC SURVEY DATA FROM GMU'S 524 AND 556, 1995 - 2002

GMU	YEAR	SPIKE	RAG	MATURE	BULL	COW	CALF	TOTAL
524	2002	22	42	19	83	132	77	292
	2001	37	38	15	90	153	95	338
	2000	39	55	13	107	189	85	381
	1999	13	39	11	63	145	44	252
	1998	38	37	20	95	193	70	358
	1997	35	39	26	100	210	100	410
	1996	34	29	27	90	167	75	332
	1995	25	28	20	73	128	70	271
	556	2002	24	60	11	95	199	74
2001		10	21	12	43	144	65	252
2000		17	27	4	48	140	73	261
1999		5	20	3	28	84	29	141
1998		29	20	7	56	158	52	266
1997		18	17	11	46	131	64	241
1996		25	27	16	68	109	53	230
1995		18	13	9	40	92	47	179

but still well above our goal of #50% annual mortality. That mortality rate showed a decline in 2002. Branched bull survival rates continue to be low in these units. If productivity continues to be high (>40:100), we will likely reach post-season escapement goals, but will have bull populations highly skewed towards animals <2.5 years old.

Observed bull mortality rates were even higher in PMU 57 than in PMU 56 (Table 1). Harvest estimates for 2002 in both Ryderwood and Willapa Hills were very high. The paucity of older bulls in the surveys suggested that, indeed, bull harvest was heavy. Since the initiation of the early muzzleloader bull hunt in Ryderwood, we have seen an increase in observed bull mortality rates from 50% to 67%. This is not too surprising, since we had a similar season in Willapa Hills during 1995 and had bull mortality rates ~63%. With increasing bull mortality rates and continued reports of spike bull kill we are not going to meet escapement goals in this PMU. Continued high productivity, however, will help, although the PMU will continue to have few older bulls.

The 2002 survey results from PMU 56 and 57 underscore the importance of comprehensive annual surveys. Lack of survey information in many of the Cascade elk units (GMU's 510, 513, 516, 560, and 572), due to limited funding makes evaluation of the 3-pt minimum regulation incomplete (see Table 6.). Differences exist in habitat, climate, and access between the Cascades and the lowland areas. We need to determine whether the 3-pt minimum will achieve our bull mortality and escapement objectives in the Cascades, where elk have greater cover and access is tougher. Presently, survey data and modeling suggests that the 3-pt minimum, at least in the lowland areas does not appear to result in significantly lowered bull mortality rates. There was little difference in demographic parameters among the lowland units. If we take out Ryderwood and the higher mortality rates presumably associated with the early muzzleloader season; Winston, Coweman, and Willapa Hills all exhibited similar demographics-bull mortality rates between 47% and 57%.

Population Status and Trend

Population modeling, in conjunction with other indices, indicate a general decline in elk populations in some areas of Region 5. Increasing hunter pressure, loss of both quality and quantity of habitat, declining productivity in some areas, and stochastic events are likely the cause.

Habitat Condition And Trend

In most years, climate tends to have a negligible effect on Regional elk populations west of the Cascade Crest. Localized effects, however, can be drastic. Although snowfall at higher elevations may be heavy,

subsequent freezing conditions seldom occur. Elk summering at higher elevations tend to be migratory in response to snow; whereas elk at lower elevations exhibit year-round fidelity to those areas. The primary effect of climate on elk west of the Cascade crest is the influence it exerts on hunting pressure. The severe winter kill of 1998-99 in the Toutle river valley was largely due, to the poor quality of wintering ground and high elk numbers, than a catastrophic winter event. There were approximately 30 elk mortalities documented on the St Helens Wildlife Area during the winter of 2002/2003 although climatic data indicated a average winter. Some conjecture that elk are entering the winter in poor condition and that a moderate winter will cause losses is being evaluated.

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

Region 5 faces significant loss of elk habitat through a number of different avenues: (1) establishment of extensive Late Successional Reserve (LSR) areas will result in loss of both summering and wintering habitat on US Forest Service (USFS) lands, (2) increased residential development along the three hydroelectric reservoirs (Merwin, Swift, and Yale Reservoirs), whose creation had already resulted in loss of significant amounts of historic winter range, will result in additional loss of winter range along the Lewis River watershed, and (3) general increases in development and human encroachment throughout the Region, which is resulting in a lower tolerance by landowners to the presence of elk.

Loss of elk habitat due to LSR establishment is expected to approach 41% in certain areas (R. Scharpf, GPNF, unpub. data). Efforts to minimize this impact, including manipulation of Managed Late Successional Areas (MLSA's) to provide elk forage, are currently being evaluated by the USFS and WDFW. These losses of habitat directly affect the South Rainier herd and parts of the St Helens herd.

Mitigation for the loss of winter range along the Lewis River watershed has been addressed in the Merwin Wildlife Management Plan. The Plan is a cooperative management agreement for Merwin Reservoir between Pacificorp (Portland OR), the utility company managing Merwin, Swift, and Yale Reservoirs, and the WDFW. Similar negotiations are currently underway for lands surrounding Yale Reservoir and Swift Reservoir. Degradation of wintering habitat is occurring along the

TABLE 4. Historic pooled demographic parameters for GMU'S 524 and 556, 1995-2002.

YEAR	Bulls:100 Cows	Calves:100 Cows	BULL MORTALITY	SAMPLE SIZE
2002	27±2	23±2	26%	660
2001	40±7	48±8	61%	390
2000	46±9	49±10	62%	291
1999	30±10	51±15	38%	143
1998	37±8	33±7	68%	267
1997	26±5	42±7	74%	296
1996	26±9	42±12	70%	151
1995	24±6	54±11	82%	293

Table 5. Historic demographic parameters for GMU 530, 1995-2002.

YEAR	Bulls:100 Cows	Calves:100 Cows	BULL MORTALITY	SAMPLE SIZE
2002	53+6	60+6	62%	196
2001	42+18	46+21	64%	261
2000	63+11	54+15	71%	145
1999	36+12	56+17	67%	128
1998	26+10	47+16	50%	107
1997	31+11	39+13	64%	122
1996	21+8	39+12	56%	135
1995	39+12	47+14	50%	134

Table 6. Pooled survey data by geographic area, 2002

LOCALE	SPIKE	RAG	MATURE	BULL	COW	CALF	TOTAL
CASCADES (PMU54)	2	10	6	18	68	20	105
LOWLANDS (PMU56+57)	107	65	22	194	350	182	726

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

Augmentation/habitat Enhancement

Steps continue to be taken to enhance forage quality on the Toutle mudflow through plantings and fertilization. With the cooperation of the Rocky Mountain Elk Foundation, Mt St. Helens Preservation Society and other volunteers, two hundred and thirty-six acres were seeded in 2002. Additionally, forty acres of existing forage were fertilized and forty-five acres of scotch broom were eradicated. Stabilization of the mudflow itself through tree planting is also being attempted.

The initiation of a translocation project began during this reporting time period. Transferring elk from the Mount Saint Helen's Wildlife Area to the Nooksack herd may temporarily alleviate some pressure on the Toutle River valley wintering grounds.

A cooperative habitat enhancement project to benefit the South Rainier herd continues to be developed.

With the cooperation of the Rocky Mountain Elk Foundation and Rayonier Timberlands, an initial step was undertaken with the fertilization of ninety acres of winter range just outside of the town of Packwood. Analysis of the forage quality of the treated area is being conducted by Washington State University Wildlife Habitat lab.

Management Conclusions

Elk populations in the Region seem to be in a general decline. Steps to address these declines were initiated during formulation of the 2000-02 hunt package.

Allocation of antlerless permits has been reduced in several of the areas of concern. Following the regulation changes, a 45% decrease in antlerless harvest occurred in those areas. Conservative cow harvest will continue in these areas until populations are back at management goal levels. Increases in the amount of elk damage occurring within localized areas of the Region and political pressure complicate the reduction of antlerless opportunity.

Bull escapement continues to be of concern in the Region. Analysis indicates that objectives are not being met in many of the open-entry units. After 3 years of implementation, reduction in the general firearm season

TABLE 7. SOUTHWEST WASHINGTON (REGION 5) ELK HARVEST FOR THE 2002 GENERAL HUNTING SEASON

WEAPON TYPE	BULL HARVEST	COW HARVEST	TOTAL HARVEST	# HUNTERS	HUNTER SUCCESS	HUNTER DAYS	DAYS/KILL
MODERN FIREARM	1358	104	1462	17,563	0.08	88,158	60.3
ARCHERY	289	354	643	5703	0.11	40,879	63.6
MUZZLELOADER	259	115	374	4973	0.08	31,139	83.3
TOTAL	1906	573	2479	28,239	0.09	160,176	64.6

TABLE 8. SOUTHWEST WASHINGTON (REGION 5) ELK HARVEST FOR THE 2002 GENERAL HUNTING SEASON BY POPULATION MANAGEMENT UNIT (PMU) AND GAME MANAGEMENT UNIT (GMU)

PMU	GMU	BULL HARVEST	COW HARVEST	TOTAL HARVEST	# HUNTERS	HUNTER SUCCESS	HUNTER DAYS	DAYS/KILL
P51	578	64	66	130	1884	0.07	10,336	79.5
	588	15	17	32	620	0.05	2911	91
	TOTAL	79	83	162	2454	0.07	13,247	81.8
P52	564	34	32	66	609	0.11	3078	46.6
	568	21	19	40	606	0.07	2819	70.5
	574	54	37	91	1217	0.07	6251	68.7
	TOTAL	109	88	197	2348	0.08	12,148	61.7
P53	554	15	2	17	224	0.08	1189	69.9
	558	140	34	174	1804	0.1	9667	55.6
	TOTAL	155	36	191	2020	0.09	10,856	56.8
P54	516	93	0	93	1379	0.07	6851	73.7
	560	212	50	262	3196	0.08	18,534	70.7
	572	120	38	158	2054	0.08	10,930	69.2
	TOTAL	425	88	513	6366	0.08	36,315	70.8
P55	510	7	0	7	167	0.04	715	102.1
	513	41	0	41	695	0.06	3264	79.6
	TOTAL	48	0	48	851	0.06	3,979	82.9
P56	505	48	58	106	1485	0.07	8581	81
	520	205	56	261	2874	0.09	16,483	63.2
	550	282	20	302	3152	0.1	18,097	59.9
	TOTAL	535	134	669	7192	0.09	43,161	64.5
P57	501	30	33	63	1441	0.04	7033	111.6
	504	44	7	51	514	0.1	3363	65.9
	506	256	59	315	2461	0.13	13,665	43.4
	530	225	45	270	2921	0.09	16,409	60.8
	TOTAL	555	144	699	7008	0.1	40,470	58

from 12 to 9 days has not yet resulted in achievement of post-season objectives. The current 3-year package continues the 9-day season. We will continue to monitor the efficacy of this strategy.

Prior to 2000, the level of population survey in Region 5 was inadequate to determine the effects of both winter severity on calf survival and various harvest regimes on our elk. The utility of spring surveys to determine over-winter calf survival was illustrated in the early 1999 survey (Table 8). Although not suitable for adult sex ratios due to biased samples, spring surveys do provide good indications of calf survival and ultimate recruitment to the population.

The current intensity and coverage of Region 5 fall surveys needs to be continued. Recent survey coverage has been just adequate to provide representative sampling of the entire Region. Population modeling is dependent on good data input. Due to the variability in our elk units, representative survey data must be collected annually. Current pre-season survey intensity needs to remain high, in order to increase sample sizes, reduce confidence intervals, and provide the best model inputs.

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

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Population objectives and guidelines

The year 2002 hunting season was the third of the 2000-2002 three-year season package. Specifically, goals are to increase elk (*Cervus elaphus*) populations in suitable habitat while addressing elk damage complaints. On the Olympic Peninsula long-term management strategies will need to be cooperatively developed and implemented with Olympic Peninsula Treaty Tribes.

Hunting seasons and harvest trends

For the year 2002 hunting season the three-point minimum requirement for antlered elk was retained region-wide. A total of 662 either sex or antlerless-only permits were issued to all user groups including Advanced Hunter Education graduates and Persons of Disability. Only 63 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 up 38 percent above that of the previous year. This increase in elk harvest was partially due to increased antlerless permits in chronic damage areas although antlered harvest also increased. The estimate of the number of elk hunters in Region 6 declined slightly (1 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 2002 – 2003 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 17 through September 24, 2002 pre-season helicopter elk composition counts were conducted in a number of

Game Management Units (GMUs).

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

During the first week of April 2003, post-season helicopter elk composition counts were conducted (see Table 3). Post-season surveys have value in estimating over-winter calf survival and hence recruitment into the yearling class. Post-season surveys are not, however, good indicators of adult bull (older than yearling) escapement since adult males do not mix freely with other elk at this time of year. This pertains particularly to the forested areas of coastal Washington. One method of estimating annual bull mortality from all sources is to look at the proportion of yearling males among antlered elk seen during pre-season (fall) surveys. Because of bull elk behavior during the rut it is felt that this results in a conservative estimator of overall annual bull elk mortality rates from all sources. In Region 6 this estimator varies yearly but tends to fall between 50-60 percent total annual mortality rate for antlered elk.

Region-wide the harvest of antlered elk increased to 774 bulls in 2002. This represents an increase of 22 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 declined somewhat (14 percent) in this PMU after doubling the previous season.

Population status and trend analysis

Harvest figures of legal bulls taken during the 2002 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 Olympic Peninsula Tribes). The state has continued the moratorium on antlerless harvest on the Olympic Peninsula for the 2002 season except in damage areas. The cooperative elk management group continues to support the antlerless harvest recommendations

presented in table 5.

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

The 2002 – 2003 time period marked the fourth year of monitoring elk mortality in GMU 615 (Clearwater). The purpose of this effort is to assess mortality rates from various sources in elk of both sexes at least 1 year old. The results of four years worth of mortality data are summarized in Table 4 and represent average annual mortality rates of branch-antlered (legal) bulls and cows over a 4-year period. The initial sample sizes from which these mortality estimates were derived were 47 antlered and 51 cow elk.

Habitat condition and trend

Habitat conditions on managed forestlands 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 2002 elk season. These include a 3-point antler minimum 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 2002 general elk seasons by PMU.

PMU	Antlered harvest	% change from 1999
61	399	+29
62	68	+19
63	86	+18
64	5	+66
65	90	-14
66	74	+85
67	52	+11

Table 5. Maximum cow harvest levels recommended to tribal policy planners in 2002.

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

Table 2. Results of pre-season elk surveys by GMU (Fall 2002)

GMU	n	Antlerless		Antlered		Ratios per 100 cows		
		Cows	Calves	Spikes	Branch	Calves	Spikes	Branch
615	122	70	28	10	14	40	14	20
648	69	43	16	3	7	37	7	16
654	257	161	62	27	7	39	17	4
673	157	96	41	6	14	43	6	15
681	68	38	17	5	8	45	13	21

Table 3. Results of post-season elk surveys by GMU (Spring 2003)

GMU	n	<u>Antlerless</u>		<u>Antlered</u>		<u>Ratios per 100 cows</u>		
		Cows	Calves	Spikes	Branch	Calves	Spikes	Branch
648	252	164	65	20	3	40	12	2
673	291	181	68	32	10	38	18	6

Table 4. The number and associated average annual mortality rates of branch-antlered bulls and adult cows in the Clearwater unit by mortality source (July 1, 1999 – June 30, 2003).

Sex	Hunting mortality		Tribal mortality		Unknown mortality		Natural mortality		Poaching mortality		Total mortality	
	n	rate	n	rate	n	rate	n	rate	n	Rate	n	rate
Bulls	12	0.24	10	0.20	0	0.00	1	0.03	0	0.00	23	0.47
Cows	0	0.00	3	0.02	1	0.01	8	0.06	2	0.02	14	0.11

Mountain Goat

MOUNTAIN GOAT STATUS AND TREND REPORT Statewide

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

Population objectives and guidelines

The population monitoring objective for mountain goats is to monitor population demographics of mountain goats at a level where a 20% decline in population size can be detected within 3-years or less. The corresponding harvest objective is to provide recreational hunting opportunities in individual mountain goat herds where harvest success averages >50% over a 3-year period, while at the same time goat population size remains stable or increasing. Specific guidelines for managing harvest within sustainable limits are discussed WDFW's Game Management Plan (2002). Key guidelines are to maintain a herd productivity goal of 25 kids: 100 adults, only allow harvest in goat population meeting or exceeding 50 total animals, and limit harvest opportunity to 4% of the total observed population.

Hunting seasons and harvest trends

Mountain goat hunting opportunity in Washington is limited by permit. Permit availability (and therefore hunter opportunity) has decreased dramatically over the last 10 years (Figure 1). Twenty-six permits were available in 11 goat management units in 2000 and a total of 4,384 applicants entered the drawing. The 2001 mountain goat season provided 47 days of mountain goat hunting (September 15 to October 31).

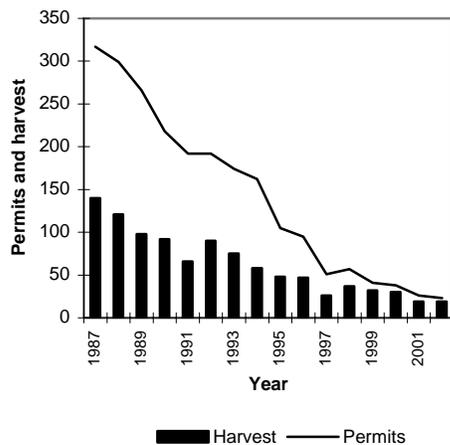


Figure 1. Mountain goat recreational hunting opportunity in Washington.

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

Of the 23 permits available in 2002, 22 individuals actually reported that they hunted goats. A total of 19 goats were killed for a hunter success rate of 86.4%.

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

Surveys

For many years, funding limitations greatly reduced the Departments ability to conduct thorough and consistent surveys. However, during the last four years, funding from cooperative grant sources allowed volunteers and Department staff to survey all goat units during 2002 that were open to hunting. All surveys were conducted using a helicopter and generally occurred between July and September. Because the funding level wasn't enough to survey all goat units, (regardless if they're hunted or not) priority was given to hunted units. As such, no consistent survey effort has been accomplished during the last 5 years for most of the goat units closed to hunting. Those survey efforts in units closed to hunting have typically been funded and conducted via collaboration with land management agencies and tribes.

Population status and trend analysis

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

Habitat condition and trend

Fire suppression policies and natural forest succession continues to degrade critical mountain goat

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

Management conclusions

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

MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 1

Linton Mountain

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

Population Objectives/Guidelines

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

Hunting Seasons And Harvest Trends

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

Surveys

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

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

Population Status And Trend Analysis

So far as we know, mountain goats did not occupy Linton Mountain since Euro-American settlement until 7 animals were released there by the Washington Department of Game in 1965. The original herd came from Nason Ridge in Chelan County and consisted of 2 billies, 4 nannies, and 1 female kid. 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 new goats, 2 billies and 1 nanny, were subsequently found at Linton Mountain.

Until October of 2000, only one mountain goat kid had been identified since 1994. Prior to 1994, kids were observed every year in which adequate population surveys were carried out (Table 1). Adult goats surveyed from 1994 to the present may have included yearlings. The two age classes are often lumped due to difficulty distinguishing them at long viewing distances. The mountain goat population at Linton Mountain is perilously low and unproductive. Reasons may include poor habitat conditions, the severe winters of 1992-93 and 1996-97, and predation.

Habitat Condition And Trend

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

Augmentation

There is currently no source of goats available for an augmentation. As the pool of breeding animals is dying out since the population peak around 1989. A new introduction is likely necessary to keep the herd viable.

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

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

^a Year that 7 Mountain Goats were translocated from Chelan County to Linton Mountain.

^b No survey data available.

^c Years that herd was hunted by special permit.

^d Year that 3 marked Mountain Goats were identified at Linton Mountain that came from failed release of 11 animals at Hooknose Mountain in 1981.

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 ground-based surveys to document how many animals are present. Since surveys are labor intensive, qualified survey volunteers who possess necessary optical equipment will be enlisted whenever possible.

Reference Cited

Guenther, S.E. 1972. Linton Mountain Goat Study. Unpublished report for the Washington Department of Game. Olympia, Washington, USA.

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 the 2002 season but no goat was harvested. One permit was authorized for 2003.

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 1999-2002 were milder.

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 1990 (Table 3). Kid:adult ratios are below productivity goals, averaging 18:100 since 1990. The kid:adult ratio in 2002 was 24:100. There were 21 kids observed in 2001-02, compared to the average of 18 kids observed per year between 1990-2001.

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

In fall 2000, the North Wenatchee River area was surveyed intensively by helicopter and from the

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	^a				

^a Season not complete.

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.

ground. During the survey 35 goats (25 adults, 10 kids) were counted. During summer 2001, the Rex Creek fire on the north shore of Lake Chelan burned over 40,000 acres, including approximately 50% of the goat winter range. This fire profoundly changed nearly all goat winter range on the north shore, and may impact this population; whether positively or negatively remains to be seen.

Habitat Condition And Trend

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

Management Conclusions

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

Table 3. Mountain goat population composition for Lake Chelan, Chelan County, 1990-2002.

Year	No. kids	No. adults	Unk.	Total Count	Kids:100 adults
1990	18	98		116	18
1991	27	155		182	17
1992	16	88		104	18
1993	13	92		105	14
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
Average	18	92		110	19

MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 2

Methow and Mount Chopaka

SCOTT FITKIN, District Wildlife Biologist

Population Objectives/guidelines

Currently, the Methow unit is being managed for conservative, sustainable yield, with the goal of increasing herd size and distribution where possible. Incidental observations suggest goats may be beginning to recolonize historical range along the “goat wall” west of Mazama. Animals in this portion of the unit are often viewed at a salt lick along the Hart’s Pass Road, providing a favorite watchable wildlife opportunity. Unfortunately, productivity has been down in recent years, likely the result of drought conditions. This may limit harvest opportunities.

The Mt Chopaka goat herd is limited in size, and is likely in decline. This herd provides excellent viewing opportunities for the general public and is currently managed as a watchable wildlife resource. Harvest in this unit was suspended in 1999. Sustainable harvest would be reinstated if habitat conditions and herd size improve.

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

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

Hunting Seasons And Harvest Trends

Hunters enjoyed fair conditions; the high country remained accessible throughout the season in 2002, but the landscape was very dry and the weather quite mild. Two permits were issued for the Methow Unit (Table 1), and no permits were issued for the Mt. Chopaka Unit (Table 2). For 2003, WDFW again issued only two permits in the Methow Unit and none in the Chopaka Unit, in accordance with herd management guidelines.

Permit holders harvested only one of two goats during the 2002 season. On average hunters saw 26 goats apiece, including several kids.

Surveys

Biologists conducted an aerial survey of the Methow unit in late June, 2003. WDFW has adopted a policy of not offering permits in any Units not adequately surveyed. The surveys located 53 goats. This represents a significant decline from 2002 and is attributable to only two goats being observed in the

Table 2. Summary of harvest information for mountain goats in the Mt. Chopaka Unit.

Year	Permits	Hunters	Harvest	Success	Goats Seen/Hunter
1991	2	2	2	100%	--
1992	2	2	2	100%	6
1993	2	2	1	50%	9
1994	1	1	1	100%	15
1995	1	1	0	0%	0
1996	1	1	1	100%	2
1997	1	1	1	100%	17
1998	1	1	1	100%	6
1999	0	--	--	---	---
2000	0	--	--	---	---
2001	0	--	--	---	---
2002	0	--	--	---	---

Handcock Ridge portion of the unit. This is likely a function of variable sightability, rather than an actual population decline; however fewer goats surveyed and low productivity will likely result in only one permit offered for the 2004 season. In the Chopaka unit, observers found no goats during a limited survey effort.

Population Status And Trend Analysis

Several years of survey data from the Chopaka Mountain area indicate low productivity, and a herd in decline (Table 3). Goats appeared to flourish in the area after the last major fire in 1919; however, no major fires have occurred since. A reduction in habitat quality may be responsible for the downward trend. A paint ball marking effort in 1997 produced a population estimate of only 24 animals, with numbers having likely declined further since.

Stable funding has allowed for a consistent survey effort in the Methow Unit for several years. The population appears to be stable, but productivity appears to be waning. Recent data indicates productivity has declined in the short-term. This may

be a result of reduced forage quantity and quality during recent drought years. It could also be indicative of advancing plant succession since the 1985 fires, suggesting a long-term decline in forage resources and a corresponding decline in goat productivity (Table 4). Up until now, herd demographics have been strongest in the Gardner Mountain portion of the unit, where recent fires have had favorable effects on goat habitat.

A small number of mountain goats are widely scattered throughout suitable goat habitat in the western portion of the Okanogan District outside of the established goat units. Little survey work has been done in these areas due to lack of resources. Population size or trend is unknown for these animals, although anecdotal information from outfitters suggests a growing population on Amphitheater Mountain in the Pasayten Wilderness, and more than a dozen animals in

Table 3. Population composition counts from the Mt. Chopaka Unit. K:100 is kids per 100 adults.

Year	Kids	Adults	Population Estimate	K:100
1991	6	26	--	23:100
1992	4	28	--	14:100
1993	2	18	--	11:100
1994	3	9	--	33:100
1995	--	--	--	--
1996	4	16	--	25:100
1997	2	11	24	18:100
1998	--	--	--	--
1999	--	--	--	--
2000	2	10	--	20:100
2001	0	2	--	0:100
2002	3	6	--	50:100
2003	0	0	--	--

the Isabella Ridge area, as well as scattered bands of goats in the Chelan-Sawtooth range .

Habitat Condition And Trend

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

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

Much of the district’s goat habitat is in wilderness areas. Thus, changes in habitat quality will occur primarily through natural stochastic events such as wildfires and avalanches, rather than human intervention.

One such event occurred this year when a lightning-caused wildfire burned over 20,000 acres of goat habitat in the Methow Unit. This fire burned much of the known range of the Hancock Ridge band. In the short-term, this fire may reduce winter forage availability; however recent warm and wet fall weather may stimulate vegetation regrowth and mitigate for this somewhat. In the long-term, the fire is expected to improve foraging conditions for mountain goats, which may in turn improve goat productivity. The extent, if any, of direct goat mortality from the fires is unknown. Spring survey flights may provide insight.

Management Conclusions

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

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

Productivity in the Mt. Chopaka Unit remains poor, and the population is likely in decline. As a result, harvest should remain suspended until reliable survey data over successive years indicates compliance with statewide population and productivity thresholds. This herd is an important wildlife resource for both consumptive and non-consumptive recreation. Land managers should explore the feasibility of using prescribed burns to enhance existing goat habitat, and improve herd productivity.

Table 4. Population composition counts from the Methow Unit. K:100 is kids per 100 adults.

Year	Kids	Adults	Population Estimate	K:100
1994	6	25	--	24:100
1995	--	--	--	--
1996	16	41	--	39:100
1997	20	49	--	41:100
1998	--	--	--	44:100
1999	--	--	--	--
2000	11	36	--	31:100
2001	10	50	--	20:100
2002	19	61	--	31:100
2003	8	45	--	18:100

MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 2

Goat Units: 3-6 , 3-7, 3-9, 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 2002, there were 9 permits spread over the 5 units (Tables 1-5). All 1 permit holders were successful.

Surveys

Tables 1-5 show survey results for Goat units that are presently open for hunting. Historically goat surveys were conducted in June and/or September. September surveys tended to yield the higher counts, but conflict with other surveys and hunting seasons. Years with the lowest counts were typically June surveys.

In 2003, a fixed-wing survey was conducted in the Bumping Unit July 9th and 10th. Helicopter surveys of all units open to hunting were conducted July 15, 17, 25 and August 15th. Surveys were conducted from sunrise until 9 am. Goats seemed most active and visible during the early morning hours. Naches Pass was resurveyed on September 25th with a combination of helicopter and ground observers.

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. Historic survey timing and technique within the region has not been consistent enough to allow for meaningful trend analysis. The best we can do is guess at trends from the available data and

interviews with hunters, guides, and others people knowledgeable on goats.

The Tieton River and Goat Rocks (Region 5) population appears to be stable or increasing. The 2002, only 10 goats were on the Tieton River side of the crest (Table 1). The total population was 213, which is comparable to past years. The Yakama Indian Nation surveyed the reservation and found additional goats, including over 75 on Mount Adams, which is only 10-20 miles from Goat rocks Wilderness. Small numbers of goats are also known just east of the surveys area. Depending on where the boundary is drawn, the population of goats may exceed 300 in the area.

The status of the goats in the Bumping unit (3-7) is unknown. The Bumping hunters in 2001 reported a record number (185 per hunter) of goats (Table 2) while surveys have not indicated any obvious pattern over the past 10 years (Table 7). The unit is difficult to survey because of abundant hiding cover. There has also been confusion among hunters and guides on boundaries. Some believe goat area 3-7 includes all off GMU 356 (Bumping) and were counting goats outside the unit.

In 2003, the helicopter survey of 3-7 documented 83 goats, while the 20 and 22 goats were seen on fixed-wing surveys. No one survey documented all the goats and a composite of the surveys suggests 90-115 goats. One of the 2002 hunters accidentally hunted American Ridge (outside of 3-7) and reported 30-35 goats on American Ridge. An enforcement officer also reported goats on the ridge in 2003. People knowledgeable about the area believe the American Ridge goats travel to and from Mt. Rainer National Park. Based on what is currently known, the "population" of the unit could approach 185 if all of GMU 356 is included.

Harvest in the early 1990's in Bumping averaged 10% of the highest count (78) while the kid:adult ratio averaged 18:100. This harvest may have been high enough to cause a population decline. Since 1995, harvest has averaged <3% of the peak count (77) while the kid ratio has averaged 33:100.

The number of goats seen on surveys in the Naches Pass unit has fluctuated between 118 and 21 total goats (Table 3). There has been a downward trend in the number of adults seen since 1995. Over 50 adults have not been documented since 1997. Only 36 goats were seen in 2003. Hunter reports from the unit have been variable but also seem to indicate a declining population

(Table 3). Harvest in the early 1990's average 6% of the high count while recruitment averaged 24 kids:100 adults. Harvest may have been excessive in the area.

The 3-6 and 4-38 goats undoubtedly intermingle. The largest groups are typically within a few miles of the boundary. In 2003, both units were surveyed at the same time in July and September. In 4-38, only 11 goats were seen in July and none in September. It is unknown if the large increase in overall count in September was due to better visibility or movement of goats into the area, possibly from unit 3-10.

The low number of goats seen in 3-7 is a concern. Hunters have not reported over 50 goats since 1990 and only the September survey yielded over 50 adults. Four permits were issued for the area (Units 3-6, 4-38) in 2002. Cougars have been documented with the wintering goats. Units 3-6 and 4-38 should be considered one herd.

Blazed ridge (3-10) has only been surveyed and hunted since 1996 (Tables 4). Results have been extremely variable with no distinct trend. Harvest has averaged 2.5% of the maximum count (139 in 1997) and kids per adult has consistently been >32:100. The survey count declined dramatically from 1997-2002, but rebounded in 2003. Blazed Ridge and Naches/Corral pass Goats are only 6 miles apart. It is likely that some of the variation in counts maybe due to migrations.

Surveys in the Kachess Ridge unit indicate a population decline (Table 5). Flights in 2002 only documented 24 goats. The goats are often in or near heavy timber and large number of animals could easily have been missed. However, from 1975-1981, 32 goats were taken from Davis and Goat Peaks (small area just north of the unit). Recent aerial surveys and interviews with people who spent significant ground time in the area suggest few if any goats on Davis and Goat mountains. The benchmark of 50 adults has never been documented and hunting was discontinued in 2003. Cougar are known to frequent the area and maybe suppressing the low population. The Kachess Goats are only 4 miles from Blazed Ridge Animals. Historically, the populations were probably one. When I-90 was built in the 1960's, any mixing of the goats was limited. The traffic volume in modern times makes any crossing unlikely.

Habitat Condition And Trend

The majority of goats in the Bumping, Tieton and Naches Pass units summer in Wilderness Areas where populations were thought to be more influenced by weather than changes in habitat. However, the active suppression of wildfires has probably reduced open meadow habitat. Heavy 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 has probably negatively influenced potential wintering 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.

Management Conclusions

Goat populations in Region 3 may be declining. Historical harvest probably exceeded our current goal of 4% of a healthy and stable population. 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. Artificial boundaries should be ignored in determining realistic "populations". The Tieton unit was a good example in 2002 of how animals do not recognize artificial boundaries. Cooperation and data sharing with the Y.I.N. will expand our knowledge of the goat population in the area. The Naches and Corral Pass Units should also be considered one population. Isolated population such as Kachess, may need enhancement. The resources for surveying and managing goats does not meet the current need. Surveying by fixed wing aircraft maybe an efficient way to survey more area. If heavy timber is important to goats, populations such as Blazed Ridge may be in trouble.

Table 1. Summary of harvest and survey information for goat Unit 3-9 Tieton

Harvest Information					Survey Data			
Year	Permits	Hunters	Goats		Kids	Adults	Total	K:100
			Harvest	Seen/Hunter				
1990	5	5	4	27				
1991	5	5	4	13	7	21	28	33
1992	5	5	3	22				
1993	5	2	2	24	11	39	50	28
1994	5	5	4	49	11	21	32	52
1995	3	3	3	53	9	72	81	13
1996	5	5	4	28	30	60	90	50
1997	1	1	1	46	17	73	90	23
1998	3	3	3	53				
1999	3	3	3	7				
2000	3	3	3	43	23	81	104	28
2001	3	3	2	19	29	84	113	25
2002	3	3	3	39	4	6	10	67
2003	3				No survey			

Table 2. Summary of harvest and survey information for goat Unit 3-7 Bumping River

Harvest Information					Survey Data			
Year	Permits	Hunters	Goats		Kids	Adults	Total	K:100
			Harvest	Seen/Hunter				
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				24	59	83	41

Table 3. Summary of harvest and survey information for goat Unit 3-6 Naches Pass

Harvest Information					Survey Data			
Year	Permits	Hunters	Goats		Kids	Adults	Total	K:100
			Harvest	Seen/Hunter				
1989					24	94	118	26
1990	8	7	7	65				
1991	8	5	4	25	10	42	52	24
1992	8	8	8	34	11	86	97	13
1993	10	9	9	26	5	18	23	28
1994	10	8	7	31	13	27	40	48
1995	1	1	1	40	9	78	87	12
1996	10	9	7	36	23	58	81	40
1997	1	1	1	15	10	55	65	18
1998	3	3	3	34				
1999	3	3	3	36				
2000	3	3	3	22	21	48	69	44
2001	3	2	2	29	3	18	21	17
2002	2	2	2	18	18	41	59	44
2003	1				12 (18)	22 (62)	36 (80)	55 (29)

() September Survey

Table 4. Summary of harvest and survey information for goat Unit 3-10 Blazed Ridge

Harvest Information					Survey Data			
Year	Permits	Hunters	Harvest	Goats Seen/Hunter	Kids	Adults	Total	K:100
1991					9	22	31	41
1992								
1993								
1994								
1995								
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				27	66	93	29

* Includes raffle permit hunter

Table 5. Summary of harvest and survey information for goat Unit 3-11 Kachess Ridge

Harvest Information					Survey Data			
Year	Permits	Hunters	Harvest	Goats Seen/Hunter	Kids	Adults	Total	K:100
1991					21	39	60	54
1992					7	18	25	39
1993					14	44	58	32
1994								
1995								
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
2002	0				No	Survey		

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

MIIKE DAVISON, District Wildlife Biologist

Population Objectives/guidelines

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

Hunting Seasons And Harvest Trends

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

Surveys

An aerial mountain goat survey was flown on September 9, 2002 in the Shuksan Mountain area of Whatcom County. This was a cooperative effort involving WDFW, National Park Service and the N.W. Tribal Commission. The survey was conducted by helicopter using a Hughes 500-D aircraft with a representative from each agency on board. The Shuksan area is a relatively remote and topographically extreme region with limited trail access and no substantial road systems. There had been no previous aerial surveys conducted in this geographic area. A

total of 133 goats were classified (113 Adults, 20 Kids). The number of kids observed represents 17.7% of the total goats observed and is considered a moderately low reproductive rate for this population.

Population Status And Trend Analysis

The status of mountain goat populations in north Region 4 GMU's is not well documented. The majority of historical information regarding goat numbers and distribution have been derived from harvest report cards and questionnaires returned by permitted hunters. Goat management units 4-2, 4-3, 4-4 and 4-5 collectively encompass the Mt. Baker range in Whatcom and Skagit Counties. Harvest in these units during the period 1969-85 totaled 121 animals with an average harvest of 13 goats per season. For the period 1986-95, harvest totaled 26 animals with a 6 goat per season average. By 1996, all of the Mt. Baker GMU's were closed to hunting due to declines in harvest and goats reported by permit hunters.

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

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 mt. 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.

Habitat Enhancement

Habitat enhancement for mountain goats has not been implemented in any of the north region 4 in over 8 years. Budget restraints for both the U.S. Forest Service and National Parks Service limit the opportunities for prescribed burn programs in the foreseeable future. Opportunities for other types of enhancement efforts such as road and trail closures, trail removal, mineral block placement, or site fertilization projects may be possible in the future but will require additional research to define existing habitat utilization patterns of specific goat populations and a better understanding of human disturbance issues.

Management Conclusions/Recommendations

Recommendations for enhancing management capability for mountain goats in north Region 4 units are:

1. Increase aerial herd composition surveys to include all GMU's currently closed to hunting. Surveys should be conducted for a minimum of 3 consecutive years in each goat management unit.
2. Population modeling research should be conducted in existing high density goat management units in order to establish a formulated population estimate technique necessary to drive the decision making process for re-establishing hunting.
3. Update existing GIS(Landsat) habitat maps for mountain goat units in north Region 4.
4. Identify and evaluate potential re-introduction sites in historical goat use areas currently unoccupied.
5. Continue to evaluate environmental contaminants, parasite loading and diseases, predation, and human disturbance as the potential causes of current population declines in many goat management units in Whatcom and Skagit counties.

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MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 5

Goat Rocks, Smith Creek, Tatoosh

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Population Objectives/guidelines

Mountain goats (*Oreamnos americanus*) are prized in Washington as both a game animal and for viewing purposes. Region 5 of the Washington Department of Fish and Wildlife (WDFW) has three mountain goat population management units; Tatoosh (Goat Unit 5-2), Smith Creek (Goat Unit 5-3), and Goat Rocks (Goat Unit 5-4). 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 more conservative in 2002: Smith Creek, 1; Tatoosh, 3; and Goat Rocks, 3.

Hunting seasons in all three units have traditionally been the last two weeks of September and the entire month of October. In 2002 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 Goat Rocks Unit and Tatoosh unit may be declining (See Surveys below). Prior concern over low recruitment or increasing adult mortality in the Goat Rocks Unit led to a reduction in permits from 10 to 7 in 1998 and from 7 to 3 in 2001. 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 2002 were good 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 2002 was down from the previous two years (Table 1). Historically, success rates in the Goat Rocks Unit approach 100%. This was not the case in 2002. 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.

Surveys

From 1993-97 surveys were concentrated in the Smith Creek Unit. A cooperative project between the Gifford Pinchot National Forest-Cowlitz River District and WDFW allowed for the use of helicopter surveys in Smith Creek. The results of those surveys indicated that the conservative permit allocations in the unit were sustainable. Currently, survey results may indicate that

Table 1. Hunter survey summary statistics for Region 5 mountain goat harvests, 1993-2001.

Unit	Year	Permits issued	Harvest*	Success(%)	Avg goats seen (\pm S.E.)	Kid:Adult seen (\pm S.E.)	Avg days to harvest a goat
Smith Creek	2002	1	1	100	30(n/a)	23(n/a)	5.0
Smith Creek	2001	1	1	100	17(n/a)	70(n/a)	12
	2000	3	2	67	16 \pm 4	60 \pm 23	14.5
	1999	3	2(2)	100	4 \pm 3	25 \pm 20	1.0
	1998	3	2	67	21 \pm 4	36 \pm 24	7.7
	1997	3	1(2)	50	25(n/a)	67(n/a)	9.5
	1996	5	2	40	42 \pm 10	26 \pm 15	12.5
	1995	5	2(4)	50	24 \pm 4	14 \pm 14	22.5
	1994	3	2	67	17 \pm 8	28 \pm 24	6.0
	1993	3	2	67	53 \pm 6	59 \pm 30	11.0
Goat Rocks	2002	3	2	66.7	144(n/a)	28(n/a)	5.0
	2001	3	3	100	44(n/a)	26(n/a)	4.3
	2000	7	6(6)	100	55 \pm 30	28 \pm 6	3.2
	1999	7	7	100	52 \pm 22	20 \pm 13	2.7
	1998	7	7	100	32 \pm 12	43 \pm 19	3.2
	1997	10	9(9)	100	19 \pm 4	30 \pm 20	2.8
	1996	10	6(9)	67	55 \pm 9	36 \pm 17	5.8
	1995	10	10	100	40 \pm 7	42 \pm 23	2.2
	1994	10	10	100	46 \pm 8	39 \pm 19	2.3
	1993	10	10	100	37 \pm 7	39 \pm 21	1.9
Tatoosh	2002	3	2	66.7	21(n/a)	23(n/a)	12.5
	2001	3	1(2)	50	4(n/a)	29(n/a)	4.0
	2000	5	2	40	14 \pm 4	40 \pm 10	10.0
	1999	5	2(3)	67	22 \pm 12	35 \pm 25	18.0
	1998	5	2(4)	50	15 \pm 7	54 \pm 28	7.5
	1997	5	1	20	9 \pm 3	16 \pm 16	8.0
	1996	5	1(3)	33	9 \pm 7	37 \pm 32	35.0
	1995	5	3(4)	75	7 \pm 3	28 \pm 22	6.0
	1994	5	2	40	3 \pm 1	33 \pm 33	15.0
	1993	5	2	40	3 \pm 2	15 \pm 15	12.5

* Numbers in ()'s indicate number of hunters, if less than permits issued.

the population is not maintaining its numbers, and may be in decline (See Table 2).

A question arises from these aerial count results. What is the level of sightability bias associated with the surveys? Previous studies have attributed estimates of bias ranging from 59% (Brent 1960) to 75% (Adams

and Bailey 1982) of the total population. Houston et al. (1986) determined bias estimates of 0.66 for helicopter surveys in the Olympic National Park. In open habitats, such as Goat Rocks, aerial surveys are likely capturing upwards of 60% of the total population. In more timbered areas, such as Smith

Table 2. Survey results of Mountain Goat flights, 1998 - 2002.

Goat Unit	Adult	Yearling	Kid	Unknown	Total	<u>Kid:Adult</u>
5-2 <u>Tatoosh</u>						
2002	5	3	1	1	10	11:100
2001	6	1	2		9	33:100
2000	9		2		14	22:100
5-3 Smith Creek						
2002	8	3	6		17	54:100
2001*						
2000	23	0	10		33	43:100
1999	6	2	2	1	11	33:100
1998	3		1		4	33:100
5-4 Goat Rocks						
2002**	168		36		203	21:100
2001	79		13		92	16:100
2000	50		12		62	24:100
1999	20	2	9	8	39	45:100
1998	6		2	6	14	33:100

* No survey in 2001 due to poor weather conditions.

** Survey combined Goat Rocks and Tieton River units

Creek, the percentage is likely lower than that reported by Brent (1960).

Beginning in 2002, the management of the Goat Rocks and the Tieton River were combined. Data from a combined survey and an analysis of previous surveys found that most goats were within 5 miles of the common boundary of these two units and double counting was very possible. This combination will hopefully more accurately reflect population trends and provide a better management strategy for the population

Population Status And Trend Analysis

Goat populations in Tatoosh seem to be declining. Present permit allocation may need to be reduced to encourage a resident population to flourish. A reduction in permit levels may increase goat numbers that reside within the unit year round.

The number of goats seen by hunters has increased as of late in the Smith Creek unit. Aerial survey for 2002 found few goats and low productivity. This unit has historically been over-harvested and will require scrutiny to determine if harvest should be adjusted further.

Population status in the Goat Rocks is unclear. Although success rates have typically been 100%, declining productivity and the residual effects of 2 consecutive heavy snowfall winters in the recent past may be responsible for a decline in the population. However, the 2001 survey numbers were higher and the 2002 survey observed the highest number of goats in the recent past.

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. 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.

Research is needed to develop population estimates and models for the goat populations in Region 5. Research efforts recently begun in the Goat Rocks and Smith creek units may generate critical information on goat sightability needed to improve survey technique.

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. Between-year variation in hunter observed ratios within each goat unit is very significant ($B_c = -845.2$, $P < 0.001$). This is further evidenced by the large confidence intervals around the estimates (Table 1). This is likely due to hunters observing and counting the same groups of goats repeatedly, variability of days spent hunting, some misclassification, 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.

Translocation Recommendations

None are needed nor recommended.

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Bighorn Sheep

BIGHORN SHEEP STATUS AND TREND REPORT Statewide

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

Population objectives and guidelines

The population objectives for bighorn sheep herds are to maintain each herd at levels indicated in Table 1 and to monitor herds at a level where a 20% change in population size can be detected in 3-years or less (Game Management Plan 2002). The harvest objective for bighorn sheep is to maintain a harvest success that averages >85% over a 3-year period, while at the same time bighorn population size remains stable or increasing. Strategies and harvest thresholds to obtain

Table 1. Population size objectives for specific bighorn sheep herds.

Herd	Desired Population ^b
Hall Mountain ^a	40-70
Asotin Creek ^a	50-60
Black Butte ^a	300
Wenaha ^a	140
Cottonwood Creek ^a	50-60
Tucannon	60-70
Vulcan	80-110
Mt. Hull	55-80
Sinlahekin	50
Swakane	50-60
Quilomene	250-300
Umtanum(+Selah Butte)	250-300
Cleman Mountain	140-160
Lincoln Cliffs	60-70
Lake Chelan	100-150
Tieton River	75-150
Total	1,750-2,130

^a Rocky Mountain bighorn sheep

^b Based on biologists estimates of habitat capacity, including forage, escape cover, and water sources

these objectives are described in the WDFW's Game Management Plan (2002).

Hunting seasons and harvest trends

Bighorn sheep hunting opportunity in Washington was limited by permit-only hunting. Permit availability, and therefore hunter opportunity, has been high over the last 2 years as bighorn numbers increase (Figure 1). Twenty general season permits, one auction permit, and one raffle permit were available in six different sheep management units for 2002 and a total of 6,364 applicants entered the drawing. The 2002 bighorn sheep general season provided 26 days (September 15 to October 10) of recreational hunting

opportunity, and hunters had the choice of any legal weapon to harvest any bighorn ram (no curl restrictions).

The bighorn sheep hunting season in Washington occurred relatively early in the year, so weather wasn't much of a factor in hunter success. Of the 22 permits available in 2002, all 21 individuals reported that they hunted bighorn sheep. A total of 21 sheep were killed for a hunter success rate of 95.5%.

Surveys

All bighorn sheep units open to hunting in 2002 were surveyed. Surveys also were conducted in all non-hunted populations, including the 4 herds of the Blue Mountains. Survey efforts in this area continue to be a priority as we attempt to document population recovery from the 1995 *pasteurella* outbreak. Both ground counts and aerial surveys were used to survey and classify sheep as lambs, ewes, or rams. Rams were further classified as yearling, less than 3/4 curl, or greater than 3/4 curl. Surveys were conducted at differing times throughout the year, with a general pattern for most regions to survey lamb production in early summer and total herd composition in winter.

Population status and trend analysis

Rocky Mountain bighorns in the Blue Mountains

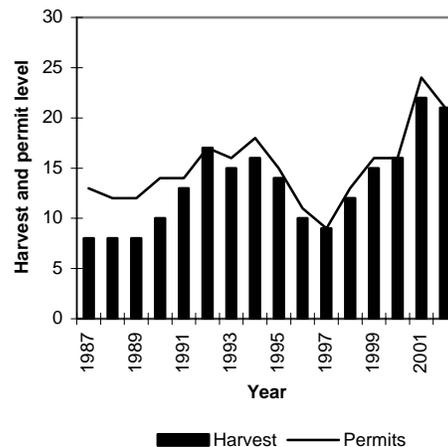


Figure 1. Trend in bighorn sheep recreational hunting opportunity in Washington.

Table 1. Population trend of bighorn sheep in Washington State, 1994-2001.

Sheep Herd	Year										Comments
	1994	1995	1996	1997	1998	1999	2000	2001	2002		
Rocky Mountain Bighorn Sheep											
Hall Mountain	33	30	32	27	25	29	26	23	--	Low lamb & ewe survival; terminating winter feeding	
Asotin Creek	15	12	13	13	30	34	38	40	36	Low lamb survival; intermix with domestic sheep	
Black Butte	215	50	45	54	64	60	60	60	55	Improved lamb survival; domestic-bighorn sheep concern	
Wenaha	110	90	50	69	55	60	60	60	65	Improved lamb survival; stable population below objective	
Mt. View	60	45	18	23	23	32	27	28	25	Low lamb survival; area over grazed	
<i>Subspecies total</i>	433	227	158	186	142	215	211	211	181		
California Bighorn Sheep											
Tucannon	50	45	50	50	42	30	27	18	11	Scabies severely impacting herd; herd near extinction	
Vulcan	69	61	43	52	24	24	19	17	22	Herd rebounding from <i>Muellerius capillaris</i>	
Mt. Hull	--	55	50	60	--	70	62	65	67	Herd appears healthy and should begin to expand	
Sinlahekin	--	--	37	32	32	32	25	32	37	Herd appears to be rebounding	
Swakane	30	30	38	25	30	36	35	51	--	Interaction with domestic sheep is a threat	
Quilomene	50	70	90	135	143	164	165	165	165	Herd stable and healthy	
Umtanum	200	150	150	150	150	150	100	130	160	Herd stable and healthy	
Selah Butte	17	32	43	58	43	47	73	60	10	Herd stable and healthy; metapopulation with Umtanum	
Cleman	55	60	65	100	117	135	156	141	171	Herd stable and healthy	
Lincoln Cliffs	35	45	65	90	102	88	95	--	--		
Lake Chelan	--	--	--	--	--	15	50	50	67	Herd stable; recent fire in portion of sheep habitat	
Tieton	--	--	--	--	11	25	46	67	70	Herd growing; chance of interaction with domestic sheep	
<i>Subspecies total</i>	506	548	631	752	694	816	853	796	780		
Total	939	775	789	938	836	1,031	1,064	1,007	961		

continue to struggle as they recover from the 1995 *pasteurella* outbreak. Lamb mortality has remained high in 2001 and ewe survival has declined in several herds; however, the total sheep population has remained fairly stable (Table 1). California bighorn populations remained stable in most herds. The population of California bighorns now numbers approximately 780 sheep (Table 1).

Washington Department of Fish and Wildlife continued cooperative work with the Foundation for North American Wild Sheep, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, U.S. Forest Service, and the Bureau of Land Management on restoration of bighorn sheep within Hells Canyon. Project activities included monitoring lamb production and mortality, sightability surveys, and disease investigations related to domestic-bighorn sheep.

Habitat condition and trend

Range conditions for bighorn sheep were fair to poor in most units, with the exception of Mount Hull where the forage is rebounding from a recent fire. Noxious weed invasion, primarily yellow-star thistle, continued to be a major concern for most bighorn sheep ranges (particularly in the Blue Mountains). Grazing also is a concern in several areas of the Blue Mountains and Yakima River basin.

Management conclusions

Bighorn sheep management in Washington centers on three main issues at this time: minimizing disease

outbreaks, increasing forage conditions, and establishing new self-sustaining herds.

Disease outbreaks associated with domestic-bighorn interactions is the primary concern for several herds. Disease has decimated or threatens at least 6 bighorn sheep herds at present. For those herds, eliminating the risk of disease transmission between domestic and bighorn sheep is the priority.

Noxious weed control is important for maintaining quality forage habitat for sheep and aggressive programs aimed at eliminating invading species and restoring native grasses are essential. Noxious weed control can be accomplished only in conjunction with better overall range grazing practices. Where the potential exists for conflicts between bighorn sheep and domestic sheep, particularly on federal lands, we should seek cooperative agreements that place a priority on the restoration of native species (i.e., bighorn sheep).

Restoration of bighorn sheep should remain top priorities. Several herds may need augmentation if they are to rebound from apparent stagnation.

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 1

Blue Mountains

PAT FOWLER, District Wildlife Biologist

PAUL WIK, Wildlife Biologist

Population objectives and guidelines

Five herds of bighorn sheep inhabit the Blue Mountains; Tucannon, Mt. View, Wenaha, Black Butte, and Asotin Creek herds. Four herds are included in the Hells Canyon Initiative, which is a cooperative working group that includes Idaho Dept. of Fish and Game, Oregon Dept. of Fish and Wildlife, U.S. Forest Service, BLM, Nez Perce Tribe, and Foundation for North American Wild Sheep. Population management objectives for each herd are based on habitat conditions within the herd range of each population. The overall population objective for the Blue Mountains is 500-550 bighorn sheep; Tucannon herd-60, Mt. View herd-60-70, Asotin herd-75-100, Black Butte herd-150-200, Wenaha herd-90+.

Hunting seasons and harvest trends

Permit controlled hunting was terminated in the Blue Mountains after the *Pasteurella* 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. Hunting will not be implemented until bighorn sheep populations meet criteria established in the Bighorn Sheep Management Plan.

Nez Perce tribal harvest of bighorns from the Asotin herd has occurred in recent years. Tribal members are known to have harvested four rams in the Asotin Creek herd in 2002, including three Class-4 rams. This reduced the number of Class-4 rams in the population to one. Tribal hunters have taken four Class-4 rams (five rams total) in the last two years.

To date, the Nez Perce tribe has not regulated or monitored harvest. These known losses could be

considered the minimum number taken by tribal members. In 2003, the Nez Perce Tribal Wildlife Committee recommended closing the Washington portion of their treaty area to bighorn sheep hunting by tribal members, which would be a major step forward in tribal cooperative management, if it is implemented.

Surveys

Aerial surveys are conducted using sightability protocol. A sightability model specific to the Hells Canyon area is currently being developed.

Population status and trend analysis

Aerial surveys are conducted in March 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. Telemetry monitoring is done on a regular basis. Surveys conducted for the five herds from 2002 to early 2003 resulted in a count of 188 bighorn sheep; 96 ewes, 38 lambs, 54 rams for a ratio of 56 rams and 40 lambs per 100 ewes (Table 1.).

Lamb survival has been a major problem since the *Pasteurella* die-off in 1996. Each year seems to produce a different level of lamb survival. In 2002, lamb survival improved in the Black Butte, Wenaha, and Asotin herds with lamb ratios ranging from 41-54 lambs/100 ewes. However, lamb survival in the Tucannon and Mt. View herds was poor, with ratios of 0 and 22 lambs/100 ewes, respectively. 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 *Pasteurella* die-off, which resulted in few adult rams in the population for several years. Low

Table 1. Bighorn Sheep Population Trend and Herd Composition, Blue Mountains 1994-2003 [() indicates number of Class-4 rams in > 3/4 segment].

Year	Lambs	Ewes	Y1	Rams		Total	Count Total	Population Estimate	Per 100 Ewes R:100:L
				< 3/4	> 3/4				
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

lamb survival resulted in poor recruitment of rams into the population. The number of Class-4 rams in the population has started to increase, but is still much lower than before the die-off (Table 1.).

Habitat condition and trend

Habitat conditions are moderate to good in most areas. However, the spread of noxious weeds, mostly yellow-star thistle is threatening herds in the Snake River and Grande Ronde river drainages.

Disease and parasites

The pasteurellosis epizootic continues to plague this herd, resulting in poor lamb survival. Lamb survival usually takes from 3-8 years to return to normal levels. One lamb recovered in May of 2002 died from broncopneumonia. The presence of domestic sheep and goats within and adjacent to bighorn sheep range presents a constant and substantial risk of another *Pasturella* epizootic.

Other government agencies have encouraged landowners to use domestic goats for weed control. The WDFW will work closely with these agencies to discourage this program in areas near bighorn sheep range.

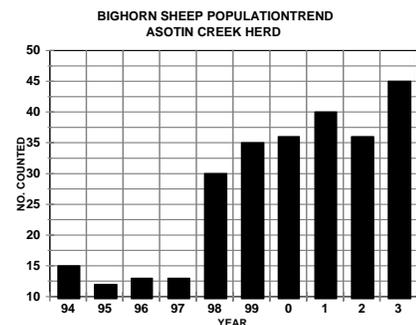
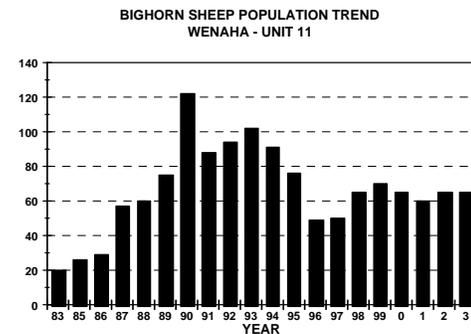
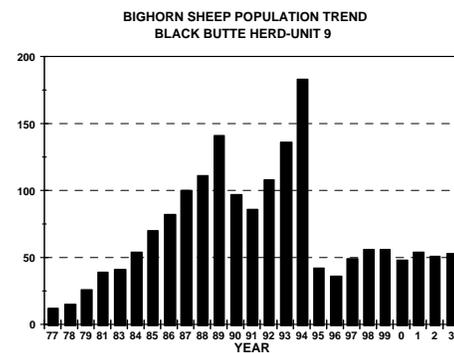
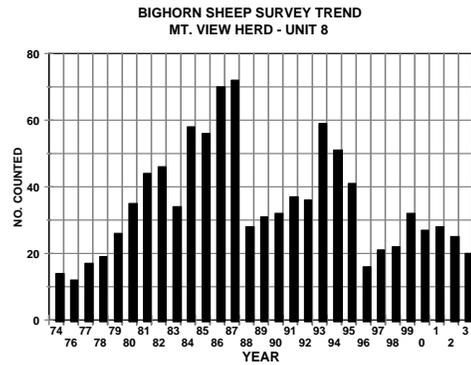
Scabies continues to be a problem in all five herds. The Tucannon herd has suffered a severe decline due to scabies infecting this population in 1999.

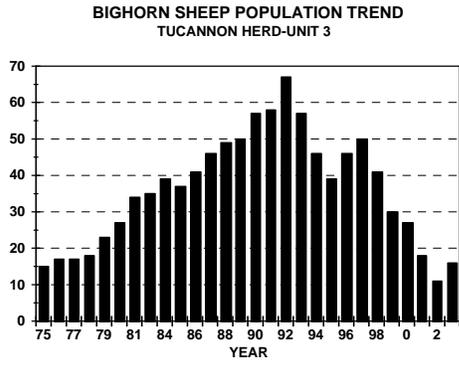
Management conclusions

Bighorn sheep herds in the Blue Mountains appear to be slowly recovering from the *Pasturella* die-off that occurred in 1995-96. Low lamb survival has plagued three of the populations impacted by the *Pasturella* outbreak. The Tucannon herd escaped the *Pasturella* die-off, but did suffer a major decline due to problems associated with scabies. The Asotin herd was not impacted by the *Pasturella* outbreak, but still does not meet population thresholds required to establish recreational hunting seasons; this herd has been hunted in recent years by tribal members. Each herd suffers from various problems that limit its ability to increase in numbers.

The presence of domestic sheep and goats in areas adjacent to and within individual herd ranges poses a substantial risk to bighorn sheep populations in southeast Washington. This risk will undoubtedly result in another *Pasturella* outbreak sometime in the future, unless a program can be developed to discourage rural residents near bighorn sheep range from acquiring and raising domestic sheep and goats.

None of the herds in the Blue Mountains meet the criteria listed in the Bighorn Sheep Management Plan for establishing hunting opportunity. In the future, as each herd meets the criteria, hunting opportunity may be offered.





BIGHORN SHEEP STATUS AND TREND REPORT: REGION 1

Hall Mountain

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

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

As traditionally carried out since the early 1970s, ground surveys at the Noisy Creek winter feeding station were used in late 2002 and early 2003 to estimate the total number of sheep, sex ratio, and lamb production (Table 1). Similar efforts counting and classifying bighorn sheep in British Columbia, which occasionally mix with the Hall Mountain herd during summer months, were also carried out over the 2002-2003 winter. Count totals at a winter feeding station along Canada Highway 3 included 7 lambs, 20 ewes, and 8 rams for a lamb/ewe/ram ratio of 35 L : 100 E : 40 R.

The U.S. Forest Service (Sullivan Lake Ranger District, Colville National Forest) regularly monitored survival and movements of a number of Bighorn Sheep from the Hall Mountain Herd by radio telemetry from 1995 through 1999 (Baldwin 1999, Aluzas 1997, and Bertram 1996). Since the year 2000 radio-tracking has been accomplished only intermittently. The latest radio-tracking was from Salmo and Sullivan Mountain Fire Look-outs on July 1, 2003. Radio signals were received from three ewes. Of the 21 total bighorn sheep that were fitted with radio transmitters beginning in December of 1995, there have been 13 confirmed mortalities through September of 2003. These mortalities included 7 rams and 6 ewes. Three other radio-collared sheep are of unknown status as radio contact has been lost since the year 2000. Four of the remaining 5 radio-collared sheep have been monitored as recently as this year (Table 2).

This herd of bighorn sheep tends to spend every winter from early December through February primarily on the west slope of Hall Mountain, with some use of the south slopes above Sullivan Creek to the north. Occasionally individual radio-marked or ear-tagged sheep

go to the Canada Highway 3 feeder, which is within a few miles of the international border. In the early spring the sheep begin dispersing to high mountains and ridges north of and including Hall Mountain. By summer bighorn sheep are typically found on Sullivan Mountain, Salmo Mountain, Crowell Ridge, Gypsy Ridge, and the Watch Lake Basin. Radio-telemetry has determined that the sheep do not make just one annual round-trip migration between summer and winter ranges. Several sheep move between Hall Mountain and the high country north three or more times between the spring and fall. Some Hall Mountain bighorn sheep also summer in the vicinity of Kootenay Pass, Snowy Top Mountain, and other high mountains and ridges in British Columbia, Canada.

Population status and trend analysis

The Hall Mountain bighorn sheep herd has not recovered to its population level in 1993, the last year that animals were transplanted out of the herd (Table 1). For the ten years since 1993, only in two, 1998 and 2002, has the lamb to ewe ratio met the objective of at least 50 : 100. In addition the total sheep count at the Noisy Creek Feeder has been below 40, the minimum population objective, every year since 1993. In 2001 the sheep count was 23 at the Noisy Creek Feeder entering the winter but 18 or less by the end of the winter, with no lambs known to have survived. Also in 2001 the sheep count at the feeder was the lowest count since 1978. One lamb was observed killed by cougar and the other 3 lambs were missing by winters end. In 2002 the sheep count was one higher with 24 total at the feeder. More encouraging, however, was the substantially improved lamb ratio. Lamb survival through the winter appeared better too as 4 ewes with 4 yearling lambs were seen at the site in May 2003.

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, Crowell Ridge, and Gypsy Ridge, non-forested escape terrain appears significantly limited and fragmented. Sheep migrating between these and other peaks and ridges have to go through dense forest where they may be highly vulnerable to predators. In October

Table 1. Population composition counts of Hall Mountain Bighorn Sheep since herd establishment in 1972 (Note that subsequent to the original release of 18 sheep in 1972, there has been only one release of two adult ewes which occurred in 1981. There have been 85 sheep translocated out of this population over nine separate years. In addition, a number of 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).

Year	Lambs	Ewes	Rams	Count Total	Number Translocated			Ratio
					Lambs	Ewes	Rams	Lambs:100 Ewes:Rams
1972	0	13	5	18				0 : 100 : 38
1973	ND	ND	ND	ND				ND
1974	7	ND	ND	19				ND
1975	5	ND	ND	22				ND
1976	2	7	5	14	2	5	2	29 : 100 : 71
1977	ND	ND	ND	ND				ND
1978	5	10	6	21				50 : 100 : 60
1979	8	ND	ND	27				ND
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

ND = Insufficient data available.

of 2000, the U.S. Forest Service did a controlled burn on approximately 100 acres of shrub field habitat on the southwest slopes of Hall Mountain (Suarez 2001). The objectives for this burn are to rejuvenate decadent shrubs and reduce conifer encroachment, thus enhancing forage and travel opportunities for ungulates including bighorn sheep.

Watchable wildlife area

Cougar frequented the bighorn sheep winter feeding site near Noisy Creek Campground for two consecutive winters prior to the 2002-2003 winter. Each year cougars killed sheep near the feeder and displayed high risk behavior that posed a potential public safety problem, necessitating emergency closures of the viewing site. Cougars at times slept in the hay barn and frequented the parking lot and access trail. While cougars were present the sheep returned to their natural protective rocky terrain

on the slopes of Hall Mountain and were not available for viewing.

By mid January of 2002 the Hall Mountain bighorn sheep population had apparently lost all 4 of the lambs that were observed at the feeder. The population declined to less than 20 sheep and the viability of the population appeared to be threatened by the feeding operations and efforts to provide public viewing. The Washington Department of Fish and Wildlife and the U.S. Forest Service Sullivan Lake Ranger District made the decision to phase out this bighorn feeding and viewing site to lessen the impact of predation on the herd and reduce the risk to public safety.

Feed was provided to the sheep for public viewing for only one month, from December 15, 2002 to January 15, 2003, allowing regular visitors to be advised of the changes for the future. The feeding station and corral trap

facility were dismantled in the spring of 2003. There will be no feeding during the winter of 2003-2004. It is believed that the sheep will subsist adequately on natural forage and be less vulnerable to predation when they are spread out in more natural rugged terrain with greater escape opportunity.

Augmentation and translocation

Trapping was not attempted last winter and no efforts were made to either supplement or translocate Hall Mountain bighorn sheep in 2002-2003. 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

The Hall Mountain Bighorn Sheep Herd has not recovered in population and lamb recruitment levels sustained up into the early 1990's. Lamb recruitment has generally been below objective since 1993 and even adult mortality has been abnormally high. Also since 1993 the number of sheep observed at the Noisy Creek Feeding Station has declined to levels near the original translocation number of 18 in 1972. Mitigating these negative trends, however, is the presence of the nearby group of bighorn sheep in British Columbia, Canada which creates a metapopulation. The adjacent herds can exchange genetically as well as replenish one another

following a crash or decline in one or the other.

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 in 2003. The shortened viewing opportunity from mid December 2002 to mid January 2003 provided a phase-out for both viewers and the sheep. Sheep presence had been far less predictable due to their avoidance of cougar near the feeder so visitation had been dropping off considerably. It is believed the sheep will do as well as other big game in the area on natural forage and be less vulnerable to cougar predation in their natural escape terrain.

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Table 2. Radio-telemetry tracking of Bighorn Sheep from Hall Mountain and their status as of the year 2003.

Ear Tag Number	Month / Year Radio-Tagged	Sex	Capture Age	Status as of 2003
Orange 12	12/1995	M	10+	Mortality in July 1997.
Yellow 28	12/1995	F	2.5	Observed at Canada Highway 3 Feeder on 01/24/2001.
Yellow 30	12/1995	F	2.5	Mortality in July 1998.
Scarlet 12 (formerly Red 11)	02/1996	M	4+	Mortality in fall of 2000.
Red 14	02/1996	F	4+	Killed 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 from Salmo Mtn. on 7/1/2003.
None	12/1996	F	4+	Mortality in September 1997.
None	12/1996	M	4+	Unknown - latest signal at Hall Mountain in early 2000.
Red 16	12/1996	M	2.5	Unknown - last detected at Hall Mtn. on 10/10/1997.
None	12/1996	M	4+	Unknown - last detected at Hall Mountain in early 2000.
Green 8	12/1996	F	2.5	Radio signal received from Salmo Mtn. on 7/1/2003.
Lavender 51	01/1999	F	4+	Mortality in March 2000.
Lavender 52	01/1999	F	4+	Radio signal received from Salmo Mtn. on 7/1/2003.
Lavender 54	01/1999	F	6.5	Observed at Noisy Creek Feeder on 1/3/2003.
Lavender 58	01/1999	M	4+	Mortality in June 2000.
Green 18	01/1999	M	4.5	Mortality in September 2000 on Sullivan Mountain.
Scarlet 10	01/2000	F	Adult	Found dead on lower Hall Mountain in September 2002.
Scarlet 11	01/2000	M	Subadult	Found dead at the Canada Hwy. 3 Feeder on 12/7/2001.

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BIGHORN SHEEP STATUS AND TREND REPORT 2001: REGION 1 Lincoln Cliffs

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

Population objectives and guidelines

The management objective for the Lincoln Cliffs herd is to increase bighorn sheep numbers to a self-sustaining population capable of supporting both consumptive and non-consumptive recreation. The population objective is to reach a self-sustaining population size of 70 or more bighorn sheep, with a maximum of 95-100.

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 big horn sheep been reported as far east as Porcupine Bay on the Spokane Arm of Roosevelt Lake and to the east side of Banks Lake in Grant County, and as far west as Neal Canyon. Within the last five years, it appears the sheep now occupy two main areas throughout the year – the original Lincoln Cliff area, and 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.

Hunting seasons and harvest trends

Interest in bighorn sheep hunting in the Lincoln Cliffs area has increased since the first hunt in 1997 when 527 hunters applied for the single permit. In 2000 there were 1,078 applicants, in 2001, 1100, and in 2002, 1352.

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%. The ram harvested this year was 6.5 years old with right and left horn lengths of 35.4 and 33.4, and right and left horn circumferences both at 14. From 1997 to 1999, hunters spent an average of 6 days hunting, in 2000, 2001, and 2002 hunters spent an average of 3 days hunting.

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 and effort is being made to conduct aerial surveys two surveys annually – one in the spring and one in early winter.

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 surveys whenever possible.

Population status and trend analysis

The Lincoln Cliffs population was started with an introduction of eleven California bighorns from Northwest Trek in December 1990. Three additional sheep from Vulcan Mountain were released in March 1991 and 5 from Kamloops, British Columbia in 1996.

Following the release of bighorn sheep into this area the population showed an increase each year and tripled in numbers after 4 years. By 1996 the population objective level of 60 to 70 bighorns was reached with 65 animals observed during the fall ground survey. The population reported peaked at around 100 animals in June 1998 (ground survey, G.J.Hickman).

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, known mortalities since 1996 total 13 animals – 11 rams and 2 ewes. Therefore, from 1996 to 2001, approximately 42 sheep were removed from the population – 13 rams and 29 ewes.

With this high number being removed, and the

Table 1. Lincoln Cliffs Bighorn Sheep Herd Composition Surveys.

	Total				Unclass-	R:100EL
Year	Sheep	Rams	Ewes	Lambs	ified	ratio
1992	20	-	-	-	20	-
1993	26	6	13	7	0	45/100/57
1994	35	8	17	10	0	47/100/59
1995	45	11	21	11	1	52/100/52
1996	65	15	33	16	1	46/100/48
1997	90	23	42	25	0	55/100/60
1998	102	16	49	37	0	32/100/76
1999	88	25	44	18	1	56/100/41
2000	95	21	46	29	0	47/100/69
2001	No Survey Conducted					
2002	36	19	13	4	0	161/100/32
2003	53	13	27	13	0	57/100/67

subsequent low number of sheep observed by the permit hunter in 2001, along with the low numbers recorded from both the aerial survey and the ground surveys in 2002, it became obvious that the population may not have recovered from the removal of ewes for translocation to other areas. The ewe population had declined to an estimated low of around 20-25, with an estimated 19 rams.

As a result, 15 sheep were translocated from Nevada to the Lincoln Cliffs area in January, 2003 – 12 ewes, 1 ram, and 2 lambs. Two of ewes from Nevada were found dead in the spring of 2003. The population in early 2003 is estimated to be around 60 animals. Future population surveys will be facilitated, by the radio collaring of thirteen of the 15 sheep translocated in 2003.

Habitat condition and trend

A continuing threat to the sheep at Lincoln Cliffs is the increasing development of recreational and permanent housing in the Lincoln Cliffs area, which in the past few years has accelerated and brought more people and more roads to this sheep site. Habitat within the range of the Lincoln Cliffs herd is in good condition. There is no competition with domestic livestock at the present time. However, it is important to remain vigilant, since three domestic sheep were discovered to have escaped in the area of Sterling Canyon, but follow up observations indicate they did not survive. In the future, we will attempt to distribute 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. Pregnancy tests conducted were positive for adult ewes.

Wildlife damage

We have not received damage complaints related to bighorns in the Lincoln Cliffs area. However, the local human population and associated construction of

new housing, splitting or parcels all increase the future potential for sheep-human conflicts.

Management conclusions

The herd is now estimated to number around 60 animals. This population level is currently below the management objective (70 sheep) for the Lincoln Cliffs herd as stated in the Bighorn Sheep Herd Plan (2002). With the augmentation of the herd in January of 2003, we believe the minimum population objective will be reached by the spring of 2004.

With the increase in human population density in and around Lincoln Cliffs and the augmentation, extra effort will be taken to monitor herd numbers and sex ratios in the next few years.

Permit controlled hunting for rams will be continued in 2003-2004.

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 1 Vulcan Mountain

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

Population objectives and guidelines

California Bighorn Sheep were introduced to the Vulcan Mountain area of northern Ferry County, Washington in 1971. Eight Bighorn Sheep (2 rams and 6 ewes) were trans-located from the Colockum State Wildlife Area to U.S. Bureau of Land Management (BLM) land near Little Vulcan Mountain. Four more California bighorn sheep were trans-located into the Vulcan area from John Day, Oregon in 1990. That same year the population peaked above landowner tolerance levels; Consequently three sheep were taken from the Vulcan Herd in 1991 and moved to Lincoln Cliffs in Lincoln County, Washington. In 1993 eleven sheep were trans-located from Vulcan to the Quilomene State Wildlife Area. On January 13, 2003 five California Bighorn Sheep captured near Winnemucca, Nevada were released at Vulcan including 4 ewes and 1 yearling ram. All five of these sheep were fitted with radio-collars for subsequent tracking.

The population goal for the Vulcan Mountain Herd is to maintain 80-110 animals on the available range. These Bighorn Sheep use private rangeland a considerable amount of time, which has been a contentious issue with ranchers in the past when the population was higher. The population has declined in recent years and is currently below the population goal. Sport hunting has been a traditional consumptive use for this herd and an activity that is co-managed with the Colville Confederated Tribes (CCT).

Population status and trend analysis

Since introduction of the Vulcan Mountain Bighorn Sheep Herd, the population has been surveyed almost every year to determine composition and trend. Since 1990 this survey effort has been standardized and carried out in the fall months usually coinciding with rams in rut. The survey is conducted along an automobile route on the Customs and Kettle River County Roads as well as from private, primitive roads into Moran and Cummings Creek Meadows. Observations are accomplished by binoculars and spotting scope from points along the route. The entire sheep range is surveyed, however, not every sheep is expected to be seen as their range is heavily timbered, mountainous, and rocky which impedes visibility. The

most recent survey accomplished on November 5, 2002 resulted in observations of 9 rams, 8 ewes, and 5 lambs (Table 1). On November 19, 2002 WDFW personnel observed a group of 28 sheep. With this observation and those by Luttich, USFS we estimate the fall 2002 total sheep population at 35 (Luttich, 2003).

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). Especially 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 two lambs were recruited that year. In June of both 2001 and 2002 eight young lambs were observed of which at least five were recruited into the fall population for both years. In June of 2003 at least 10 lambs within a group of 29 sheep were observed by a BLM forestry work crew in the Moran Meadow area (Paulson 2003).

Hunting seasons and harvest trends

Both general public hunters (state) and members of the Colville Confederated Tribes (CCT) have hunted Bighorn Sheep within the Vulcan Mountain Unit. Biologists annually confer prior to developing their respective permit recommendations. Recreational permit-only hunting began in 1981. From that year through 1999 there were 49 Bighorn Sheep legally harvested from the Vulcan Unit including 48 rams and 1 ewe (Table 2). Due to low herd population and recruitment levels hunting was suspended by both the State and CCT after 1999.

Herd health and productivity

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

Table 1. Annual population composite counts of the Vulcan Mountain Bighorn Sheep Herd since introduction in 1971.

Year	Lambs	Ewes	R a m s				Total Sheep	Ratio Lambs : 100 Ewes : Rams
			Yearling	<3/4 curl	>3/4 curl	Total Rams		
1971	0	6	-	-	-	2	8	0 : 100 : 33
1972								
1973								
1974								
1975								
1976								
1977								
1978								
1979								
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

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

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 *Muellerius capillaris*, the lungworm of domestic goats rather than *Paralaphostrongylus* (Gajadhar 2002). Domestic goats were known to share part of the Vulcan Bighorn Sheep range. The parasite *Muellerius 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 *Muellerius capillaris*, likely succumbed to pneumonia that this parasite causes (Hall 2002).

Natural resource managers with both the Washington Department of Fish and Wildlife (WDFW) and the U.S. Bureau of Land Management (BLM) have distributed anthelmintic treatment mineral blocks across the Vulcan Bighorn Sheep range in hope of reducing the parasite loads. We are not sure if the improved health and productivity of the

remaining Bighorn Sheep is the result of their use of these blocks, better overall nutrition and less stress due to the lower overall sheep population, or some inherent immunity amongst the survivors.

Range use and habitat enhancement

In April of 2002 three of the Vulcan Bighorn Sheep, two rams and one ewe, were fitted with radio collars. An additional resident ewe was captured on January 7, 2003 and fitted with a radio collar. In January of 2003 five Bighorn Sheep from Nevada were fitted with radio collars and released at Vulcan. Monitoring since that time has shown little movement in range amongst these sheep. There have been two documented mortalities; one ewe and one ram, both from the recent Nevada translocation. Cause of death has not been determined but observations at the mortality site suggest other than predator (Luttich 2003).

In the past six years several projects to enhance habitat for the Vulcan Mountain Bighorn Sheep have been accomplished. These include broad range weed control, forage plant seeding, water source development, and temporary fencing at Moran Meadow to better control cattle grazing. Partners accomplishing these projects include local private landowners Richard Strandberg and Jim Olson, the Foundation for North American Wild Sheep (FNAWS), the Safari Club International (SCI), the Inland Northwest Wildlife Council (INWC), the U.S. Forest Service (USFS), the BLM, and the WDFW.

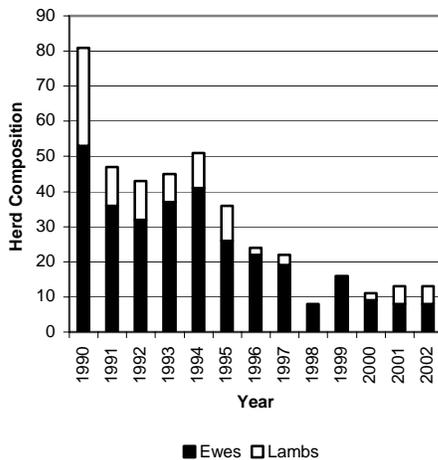


Figure 1. Vulcan Mtn. Bighorn sheep ewe and lamb composition, 1990-2002.

Table 2. Summary of State and Colville Confederated Tribes (CCT) Bighorn Sheep harvest information in the Vulcan Mountain Unit. The CCT began this hunt in 1995.

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	---	---
2000	State	0	None	---	---
2000	CCT	0	None	---	---
2001	State	0	None	---	---
2001	CCT	0	None	---	---
2002	State	0	None	---	---
2002	CCT	0	None	---	---

* Total horn length in inches

Management conclusions

The Vulcan Mountain Herd of Bighorn Sheep appears to have recovered in health and is now recovering in population. Nevertheless a population bottleneck of probably fewer than 25 animals occurred between 1998 and 2001. The Vulcan herd was augmented with five new sheep from Nevada in early 2003. Two of these have been found dead and there was no evidence predators were involved (Luttich 2003). None of the four resident collared sheep have died. At this point the mortalities remain a mystery but we can say that it does not appear cougar predation has been a factor in the survival of the sample of 9 collared sheep.

The population has increased to a fall 2002 estimate of 35 sheep. Lamb ratios on the annual survey have improved and a June 2003 observation of at least 10 new lambs is encouraging. With good lamb recruitment, the Vulcan herd should return to the

population goal of 80 – 110 animals within a few years. Limited entry hunting will need to be implemented to keep the herd from over-populating. In addition habitat protection and improvement involving a collaborative effort of the private landowners, the federal (BLM and USFS) land managers, and wildlife supporting organizations (FNAWS, SCI, INWC) should continue to be a high priority for the long-term success of this herd.

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BIGHORN SHEEP STATUS AND TREND REPORT: REGION 2 MT. Hull and Sinlahekin

SCOTT FITKIN, District Wildlife Biologist

Population objectives and guidelines

Both the Mt. Hull and Sinlahekin herds are being managed for steady population growth for as long as available resources will support increased numbers. A conservative, any ram permit harvest also is allowed to the extent it is compatible with population growth objectives.

Hunting seasons and harvest trends

WDFW issued no permits in 2001 or 2002 for the Mt Hull or Sinlahekin Units (Table 1). Ram numbers and age structure in the Mt Hull herd had still not recovered since the July 2000 fire. Mt Hull surveys in 2002 showed an improvement in the ram cohort and a single ram permit will be issued in 2003. The Sinlahekin Unit remains closed to hunting.

Surveys

Biologists conducted helicopter surveys of the Sinlahekin Unit in late March 2002, and the Mt Hull Unit in November 2002. Observers counted 34 sheep in the Sinlahekin unit; the highest number seen in seven years (Table 2). No sheep were incidentally located in the Sinlahekin Unit during the annual Mountain Goat survey in June 2003. However, 13 sheep were observed northwest of the Sinlahekin Valley on the slopes north of Toats Coulee Creek in July 2003. Bighorn sheep use of habitat to the northwest of the Sinlahekin Valley now seems well established. This is particularly true in the winter and spring.

Table 1. Summary of harvest information for bighorn sheep in the Mt. Hull Unit.

Year	Permits	Harvest	CCT ^a	
			Permits	CCT Harvest
1990	0	--	0	--
1991	0	--	0	--
1992	2 ram	2 rams	0	--
1993	1 ram	1 ram	0	--
1994	1 ram	1 ram	0	--
1995	1 ram	0	1 ewe	0
1996	1 ram	1 ram	1 ewe	0
1997	1 ram	1 ram	1 ewe	0
1998	1 ram	1 ram	1 ewe	1 ewe
1999	1 ram	1 ram	1 any	1 ram
2000	0	--	1 any	0
2001	0	--	1 any	0
2002	0	--	1 any	0

^a CCT=Colville Confederated Tribes

Aerial surveys located and classified 61 sheep on Mt Hull, including four rams $\geq \frac{3}{4}$ curl (Table 3). Supplemental ground surveys by Foundation for North American Wild Sheep (FNAWS) members produced similar results.

WDFW intends to survey both the Mt. Hull Unit and Sinlahekin Unit in the fall of 2003 in conjunction with annual deer survey efforts.

Population status and trend analysis

Observational data suggests that the Mt. Hull herd grew fairly steadily following reintroduction in 1970. Numbers were highest in the late 1980s and early 90s during a spell of mild winter weather, peaking in 1991 at 80-90 animals. The population declined slightly in the early 1990s, particularly following the severe winter of 1992-93. Herd numbers slowly rebounded through 1999-2000 to an estimated 66 animals. The population suffered a temporary setback during the fire of 2000. Most of the mature ram cohort disappeared. In 2001 WDFW augmented the Mt. Hull herd with 8 ewes and 3 rams. This herd was again augmented in 2003 with 5 additional animals. Ram numbers and age structure are currently rebounding and a harvest permit will be re-established for the 2003 Bighorn Sheep season based on survey data.

The long-term outlook for the Sinlahekin herd may be improving, at least temporarily. Initially, the herd grew rapidly following reintroduction in 1957. High productivity and continued expansion allowed for translocation of sheep to other ranges in Washington. During the 1990s, the population declined, incurring particularly heavy losses during the winter of 1992-93. Herd demographics have improved in the last few years, including productivity and ram numbers. This is likely a function of the herd expanding its range into previously unused habitat. Further improvements in these parameters may allow for future harvest.

In 2003 WDFW augmented the Sinlahekin herd with 10 animals from Oregon to improve genetic diversity and bolster production. Range use and health of the transplanted animals are being monitored.

Habitat condition and trend

Over-winter survivorship for all sheep in the Okanogan District likely was high during the mild winter of 2002-03. Sheep appear to have established habitual use of new winter and spring ranges to the

Table 2. Population composition counts from the Sinlahekin area. <3/4 = less than 3/4 curl rams, >3/4 = greater than 3/4 curl rams, and L: 100:R is lambs (L) and rams (R) per 100 ewes (100).

Year	Lambs	Ewes	Rams		Total	Unknown	Count Total	Population Estimate	L: 100:R
			<3/4	>3/4					
1990	--	--	--	--	--	--	--	--	--
1991	--	--	--	--	--	--	--	--	--
1992	6	30	--	--	15	0	41	--	20:100:50
1993	2	17	--	--	4	0	23	--	12:100:24
1994	1	21	--	--	1	0	23	--	5:100:5
1995	9	24	5	6	11	0	44	--	46:100:46
1996	2	20	7	0	7	0	29	30-45	20:100:35
1997	--	--	--	--	--	--	--	25-40	--
1998	--	--	--	--	--	--	--	25-40	--
1999	0	0	0	0	0	0	0	25-40	--
2000	--	--	--	--	--	--	14	20-30	--
2001	6	16	4	0	4	3	29	30-35	38:100:25
2002	8	20	6	0	34	0	34	35-40	40:100:30

North and West of traditional range on the eastern side of the Sinlahekin Valley.

In the 1990s, reduced winter range quantity and quality may have been a limiting factor for the Sinlahekin herd. It may also be that year-round habitat quality on traditional range is significantly degraded. The amount of available sheep habitat in the traditional use area has likely declined due to tree encroachment and successional progression. Range quality may also have declined. This combination would reduce carrying capacity. Intensive competition with livestock and corresponding invasion by noxious weeds, particularly diffuse knapweed likely also contributed to this trend.

Rams appear especially vulnerable to range condition, and appear to be in rather poor health overall throughout the 90s. Five mature rams succumbed to severe winter weather in 1992-93, and skulls collected from carcasses suggest individuals may not develop much beyond a 3/4 curl before succumbing to old age.

Much of the sheep forage habitat for the Sinlahekin herd is not under WDFW control. Bighorn are poor competitors and can escape livestock

competition only in the steepest areas where soils are thin and forage limited. The DNR maintains heavy cattle grazing on its permits in sheep range, and most of the adjacent private land is intensively grazed. These pressures are likely to continue, and have been exacerbated by recent drought. Recent herd expansion into new habitat may mitigate for these problems initially. The long-term prognosis; however, is not promising, unless current land management practices are improved.

The best hope lies in range enhancement projects pursued cooperatively on both state and private lands. An extensive prescribed fire program is planned for the Sinlahekin Wildlife Area, primarily to enhance deer winter range. This effort, combined with an aggressive weed control program should also improve forage conditions on some sheep range. Biological control of diffuse knapweed has been particularly effective. Additional resources may be available through the recently initiated Okanogan-Similkameen Conservation Corridor Project that will foster appropriate land stewardship on public and private ground.

Table 3. Population composition counts from the Mt Hull area. <3/4 = less than 3/4 curl rams, >3/4 = greater than 3/4 curl rams, and L: 100:R is lambs (L) and rams (R) per 100 ewes (100).

Year	Lambs	Ewes	Rams		Total	Count Total	Population Estimate	L: 100:R
			<3/4	>3/4				
1990	--	--	--	--	--	--	80	--
1991	--	--	--	--	--	--	80-90	--
1992	0	26	1	7	8	34	80	0:100:31
1993	0	17	2	7	9	26	--	0:100:53
1994	5	28	2	8	10	53	--	18:100:36
1995	11	16	6	11	17	44	55	69:100:106
1996	0	5	10	6	16	21	40-60	0:100:320
1997	8	25	--	--	8	41	55-65	32:100:32
1998	--	--	--	--	--	--	--	--
1999	19	24	15	8	23	66	70	80:100:96
2000	21	30	9	0	9	60	60-65	70:100:30
2001	10	30	15	4	19	59	60-70	33:100:63
2002	11	40	6	4	10	61	65-70	28:100:25

An additional threat to the Sinlahekin herd is a domestic sheep herd existing immediately adjacent to bighorn range at the northeast corner of Aeneas Mountain. Wild sheep are often in close proximity to this flock. Past research indicates a high endemic level of parasitism and disease in the Sinlahekin herd. Existing nutritional stress on the bighorns enhances vulnerability to pathogens, and the potential for chronic disease infection is high. A stochastic event such as the contraction of a highly virulent disease strain could eliminate the Sinlahekin population.

By contrast, the Mt. Hull range generally remained in good shape and the available habitat is rebounding nicely in the wake of the 2000 fire. Sheep foraged extensively within the fire perimeter this past season, taking advantage of early successional conditions.

Livestock competition and noxious weed invasion are generally less of a problem on Mt Hull than in the Sinlahekin. Even so, the fire could increase the likelihood of weed invasion, so continued weed control vigilance is important.

Management conclusions

Mt. Hull Herd. The Mt. Hull herd appears healthy. Good productivity and improving demographics should easily support the anticipated harvest of two rams annually in the long-term. In the short term, ram demographics have improved enough to reinstate one WDFW any ram permit. The population should climb to the historic high, perhaps beyond, depending on the success of interagency habitat enhancement projects and fire recovery.

Sinlahekin Herd. Both bighorn sheep numbers and range quality on Aeneas Mountain have undergone declines. Recent weed control strategies are producing improvement. A continuation of these efforts, plus additional aggressive habitat enhancement projects are needed to insure the long-term health of the herd and the range. Management should focus on reducing competition with livestock, reclaiming land colonized by noxious weeds, and reintroducing periodic fire into the landscape. Also, the incidence of disease in the herd should be closely monitored due to proximity of a domestic sheep herd.

Despite conditions on Aeneas Mountain, overall herd demographics are improving. This is likely a result of herd expansion into previously unused habitat and augmentation efforts. These animals will need to be closely monitored given the proximity of a domestic sheep band. As sheep move north on Chopaka Mountain, competition with mountain goats may also be a concern.

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 2 Swakane Canyon 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 and the north shore of Lake Chelan. There are also a few bighorns from the Quilomene herd that use the south part of the District in the Colockum Creek and Squilchuck Creek watersheds.

Management objectives for the Wenatchee District bighorns are to (1) increase the size and range of existing populations; (2) ensure genetic strength by augmenting existing populations with bighorn from other areas; (3) minimize risk of disease to bighorn by eliminating overlap with grazing allotments of domestic sheep on public land, and provide information to the public about the importance of keeping these species apart; (4) reintroduce bighorn to historic but unoccupied habitat within the District; and (5) provide public viewing opportunities.

There were an estimated 59 bighorns in the Swakane herd in June 2003. 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 90-

100 animals in June 2003, and the population objective for the herd is 200 adult sheep.

Hunting seasons and harvest trends

In 1999, the first ram permit was offered for the Swakane herd, followed by one permit per year for 2000-2001. The hunting season runs September 15-October 10. All of the hunters have been successful at killing a trophy ram ($\geq 3/4$ curl). For 2002, one permit was offered for the Swakane and the auction hunter also hunted the area. Both hunters took large $\geq 3/4$ curl rams. Only one permit was offered for the Swakane in 2003, to ensure a sufficient number of older rams for public viewing. No hunting will occur in the Chelan 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 on incidental reports from Washington Department of Fish and Wildlife personnel, permit hunters, and the public (Table 2). Radio transmitters would help locate groups of sheep and improve survey data. From July 2002 through September 2003, two reports were used to develop the minimum population estimate for 2003:

- 1) First half of July 2003, 26 ewes and 13 lambs using oat field in Swakane Canyon.
- 2) June 3, 2003, AHE volunteers counted 20 rams in three groups during coordinated volunteer survey.

On June 24, 2003, the Lake Chelan herd was surveyed by helicopter, using radio-telemetry to locate collared sheep. Telemetry proved invaluable for finding sheep that were hiding in timber or rocky habitat. Seventy-nine sheep were found. Composition consisted of 5 rams (1 $> 3/4$ curl, 4 $< 3/4$ curl), 54 ewes, and 20 lambs (Table 3).

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 average between

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
February 11, 2000	4 ewes, 1 female lamb	Quilomene, WA
February 16, 2000	2 rams (1 2-year-old, 1 3-year-old)	Clemons Mtn., WA
March 18, 2000	15 ewes, 3 rams (2 2-year-olds, 1 3-year-old), 3 male lambs	Kamloops, B.C.
January 31, 2001	3 ewes (2 ad., 1-1 1/2 years old), 3 male lambs	Clemons Mtn., WA
Total	53 sheep	

Table 2. Population composition of the Swakane bighorn sheep herd (yrl = yearling), Chelan County, 1992-2003.

Year	Rams					Total rams	Total sheep	Population estimate	Lambs: 100 ewes	Rams: 100 ewes
	Lambs	Ewes	Yrl	<3/4 curl	≥3/4 curl					
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	3	12	27	30	100	200
1996	3	19	2	8	6	16	38	38	16	84
1997	2	4			2	2	8	25	50	50
1998	3	9		7	4	11	23	30	33	122
1999	4	20		5	7	12	36	36	20	60
2000	5	14	1	1	8	10	29	35	36	71
2001	9	23	3	6	10	19	51	51	39	83
2002	10	25	2	9	8	19	54	54	40	76
2003	13	26	3*	5*	8*	20*	59	58**	50	77

*20 rams observed on coordinated volunteer survey June 3, 2003, but only 12 classified
 ** Post-season 2003 estimate (1 ram harvested 2003)

1992-2000. The increased numbers in 2001 resulted from a new alfalfa field in the Swakane, which attracted ewes and lambs, facilitating detection. This trend has continued in 2002 and 2003. It is likely increased sightability, rather than population growth, accounts for 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 10 lambs was produced in 2002, compared to the average of 4.4 lambs for 1992-2001.

Proliferation of residential developments and associated ornamental plantings along the west shore of the Rocky Reach pool appears to be enticing bighorns to cross Highway 97-A with increasing frequency. For over 20 years, no bighorn mortalities attributable to vehicle collisions were documented; in the past 4 years, at least 5 Swakane bighorns have been killed by vehicles on Highway 97-A, and both the Washington Department of Transportation and State Patrol have contacted the Wenatchee field office due to concerns with increased frequency of bighorns on this highway.

The Chelan herd has exhibited rapid population

growth typical of a founder population in excellent quality, unoccupied habitat. Disease and wildfire concerns have not to date resulted in observed impacts to the population. Lamb survival has been high. Seventy-nine sheep were observed during the June 2003 survey. In late June, 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 on the aerial survey. The population is estimated to be 90-100 in June 2003.

There are probably less than 20 bighorns that use the Colockum and Squilchuck watersheds within the Wenatchee District. These sheep are part of the Quilomene herd.

Habitat condition and trend

Habitat conditions for both Swakane and Chelan bighorns are excellent, in part due to the high frequency of fires. Fires reduce tree and shrub cover and increase the abundance of grasses and forbs, which in turn benefit bighorns. During summer 2001, the Rex Creek fire on the north shore of Lake Chelan burned

Table 3. Observed population composition and minimum estimated population of the Lake Chelan bighorn sheep herd, Chelan County, 1999-2003.

Year	Rams					Total rams	Total sheep	Lambs: 100 ewes	Rams:100 ewes	Population estimate
	Lambs	Ewes	Yrl	<3/4 curl	≥3/4 curl					
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	67
2003	20	54	0	4	1	5	79	37	9	90-100

over 53,000 acres. But only a small portion of this burn was 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 bighorn habitat of grass, bitterbrush, mixed brush, and ponderosa and lodgepole pine. In October 2002, at least 25 bighorns reportedly moved up-lake to the Point-No-Point area of the Rex Creek burn to take advantage of the new forage. Supplemental feeding of airlifted alfalfa hay was done in November 2002, to ensure survival of the transplanted herd of bighorns. Winter conditions were extremely mild, and the alfalfa was not utilized to a large degree. Weed surveys were conducted in July and August 2003, to ensure this effort did not introduce new weed species to the Lake Chelan basin. Forage quantity and quality appear to have improved greatly for sheep in spring 2003, following the release of nutrients from both the fires.

The Dinkelman fire in the Swakane area, which burned in 1989, proved beneficial to the bighorns in this area. In Swakane Canyon, several fields were 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, 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.

Wildlife damage

Two reports of agricultural damage attributed to bighorns were received. 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. Neither complaint resulted in a claim for compensation.

Augmentation and habitat enhancement

Additional bighorns may be added to the Chelan herd depending on the availability of sheep for transplanting. Augmentation was postponed for winter 2002-03 due to limited forage as a result of the Deer Point fire. For Swakane, augmentation is necessary to achieve the population objective for the herd, given the stagnant nature of the population. However, because Swakane bighorns have a documented history of intermixing with domestic sheep from nearby grazing allotments, the risk of *Pasteurella pneumonia* for

bighorns would likely increase as the herd expands in size. WDFW and the Wenatchee National Forest are working on a memorandum of agreement for management of conflicts related to bighorns and domestic sheep.

The Mosses Coulee area in Douglas County offers potential habitat for bighorn reintroduction. Much of the area is privately owned, but the proportion in public ownership has increased in recent years. A long-term agreement with landowners to refrain from keeping 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. Domestic sheep were twice reported and once confirmed in the core area 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 are currently developing a Memorandum of Understanding concerning bighorn management. These efforts are expected to reduce overlap and conflicts between domestic sheep and bighorn. The Swakane herd would benefit from augmentation, but such efforts will be postponed until domestic sheep conflict issues are resolved.

The Swakane bighorn population is somewhat unique in being highly accessible to the viewing public along Highway 97-A during the winter months. Viewing opportunities, in particular large adult rams, are highly valued by a largely nonconsumptive viewing public. Harvest management should be conservative to maintain this viewing opportunity.

Aerial surveys of bands located with radio-telemetry presents the best opportunity to monitor the status of both the Swakane 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.

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 3 Quilomene, Cleman Mountain, Umtanum, Selah Butte, and Tieton

JEFFREY BERNATOWICZ, District Wildlife Biologist

Population Objectives and Guidelines

The statewide goals for bighorn sheep are: preserve, protect, perpetuate, and manage bighorn sheep and their habitats to ensure healthy, productive populations; 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; manage for sustained yield. Numerical goals for each herd are provided in tables 2–5.

Hunting Seasons And Harvest Trends

Region 3 supports four populations of California Bighorn: Tieton, Cleman Mountain, Umtanum/Selah Butte, and Quilomene. Hunting is permit, ram only and occurs in all units but Tieton. The number of permits and harvest are given in table 1.

Surveys

Historically, most surveys were flown via helicopter in June. In 2002, Quilomene, Umtanum, Selah Butte, and Tieton were flown in October. In 2003, the aerial surveys were conducted in August. Clemans Mountain is ground surveyed in June. Clemans Mountain sheep are also counted on a feedlot during the winter. 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, the annual count has been declining. It is unknown if sheep have dispersed from the historic area, been missed on surveys, or died off. Bands of domestic sheep have been seen within 5 miles of the bighorns in recent years.

The Cleman Mountain population was established in 1967 with eight animals. The herd grew rapidly to over 100 animals (Ellis Bowhay, Pers. Comm. 1998) and then crashed and stagnated in the late 1980s. The decline and stagnation was probably a result of disease. A portion of the population was captured, tested, and treated with antibiotics in 1990. Augmentation included 27 animals from 1989-96. Production and herd growth have increased and exceeded to population goal of 150 animals in 2000 (Table 2). In January 2001, 11 ewes and 7 young rams were captured and moved to herds in Region 2. June surveys documented 203 sheep in 2002.

The Umtanum herd was established in 1970 with the release of eight animals. Within 15 years the population grew to an estimated 200 animals and sheep crossed the Yakima River. Originally, sheep on the east side of the river were considered a separate herd (Selah Butte). Surveys have shown large numbers of animals crossing the river in both directions annually and it is now considered one herd.

Population estimates for Umtanum/Selah Butte have varied between 170 and 200 animals since 1989 (Table 4). Dispersal, winter mortality, and the removal of 52 sheep for augmenting other populations are suspected for causing the fluctuation. The past 3 years the count has been approximately 170 animals with lamb production similar to Clemans. It is unknown why more animals aren't being documented.

The Tieton River herd has been established with the release of 54 sheep from 1998-2002. Documented losses have included 8 ewes and 3 rams emigrating, 1 ram poached, 1 ewe predated (probable bear), and 3 road kills (2 ewes, 1 lamb). A total of 51 lambs have been produced in 6 years. In 2003, 70 sheep were seen on the survey and the population is estimated at 80.

Habitat Condition And Trend

Forage resources vary annually with moisture. The past 2 summers have been drought conditions.

Noxious weeds are present on all sheep ranges especially along roadways. It is important to continue management of these areas to prevent further invasion of noxious weeds. Small fires in the Yakima Canyon have reduced shade and escape cover in the primary lambing area, but the regenerated grasses are providing abundant food. Re-growth from a fire in the Tieton has attracted 50 of the known sheep in the herd.

Augmentation/habitat Enhancement

In the past 5 years, reintroduction/augmentation efforts have focused on the Tieton. Fifty-four animals have been released in the area. The source of the sheep has been Quilomene, Umtanum, Selah Butte, Lincoln Cliffs and John Day, Oregon. In 2001, 11 sheep from Lincoln Cliffs were released at the south end of the Yakima Canyon. Mineral blocks have been put out within the range of all 5 herds. Three guzzlers were installed in the Tieton in fall 2002 in cooperation with the USFS. Sheep at Clemans Mt. are feed during the winter.

The bighorn sheep population in Region 3 is healthy and growing. However, the history of bighorn sheep in Region 3 has been one of boom and bust. Historical declines have likely been associated with disease, particularly *Pasteurella H.*, which is transmitted by domestic sheep. The probability of another disease outbreak is high. Domestic sheep have been documented either with, or within a few of wild sheep in every herd in the Region. In addition, bighorns, particularly young rams, have been

documented in or near domestic sheep grazing allotments. Private rangelands within/bordering areas frequented by bighorn sheep in the Quilomene, Umtanum/Selah Butte, and Tieton, which are idle, or grazed by cattle, could be converted to domestic sheep.

Domestic goats have increased dramatically in the area in the past 5 years. It is unknown if the goats harbor diseases or parasites harmful to bighorn sheep, but herd declines have coincidentally occurred after contact with domestic goats in other parts of Washington. In 2003, bighorn sheep from both Umtanum/Selah Butte and Clemans were documented with or near domestic goats. The 2 bighorn rams known to have contacted domestic goats were captured and sent 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 5 years. Increasing the recreational harvest, including ewes, will probably be need in the near future. Periodic testing for parasites and diseases is also recommended.

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

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

Table 2. Quilomene June Population Composition.

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	250-300

Table 3. Clemans Mt. June Population Composition.

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	150-160

Table 4. Umtanum/Selah Butte June Population Composition.

Year	Lambs	Ewes	Total Rams	Adult Rams	Total Count	Estimated Population	Desired Population
1989						170	
1990						180	
1991						190	
1992						190	
1993	32	66	31		129	200	
1994	20	102	29		151	200	
1995	41	83	53		147	175	
1996	34	72	52	0	158	175	
1997	13	61	36	11	110	175	
1998	30	41	37	4	108	175	
1999	26	68	44	0	138	175	
2000	30	60	56	46	146	180	
2001	42	82	40	31	174	190	
2002	27	97	43	23	167	190	
2003	26	94	52	38	172	190	250-300

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	75-150

Moose

MOOSE STATUS AND TREND REPORT: REGION 1 GMUs 101, 105, 109, 113, 117, 121

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STEVE ZENDER, District Wildlife Biologist

Population objectives and guidelines

Moose population management objectives in Washington are to maintain a healthy population and to provide quality-hunting opportunity through limited entry permits.

Hunting seasons and harvest trends

Moose hunting opportunity in Washington is limited by permit. If drawn, it is a once in a lifetime opportunity. There is a mandatory hunter report to be returned to WDFW.

Permit availability and therefore moose hunter opportunity in Washington has increased over the last 15+ years (Figure 1.) Forty-nine permits were available in five moose management units within the Colville District for 2002 including the Kettle Range, Threeforks, Selkirk Mountains, 49 Degrees North, and Huckleberry Range Permit Hunts (Game Management Units # 101/105, # 109, # 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. General permit season dates remained October 1st through November 30th. All moose units were open for the use of any legal weapon to provide eligibility to all hunters for all units and to maintain

hunter weapon choice. Moose hunters in the Colville District units were allowed to take one moose of either sex.

A total of 41 moose were killed including 37 bulls and 4 cows within the Colville District units (Table 1). The hunter success rate in 2002 was 84%, which is almost identical to the previous year. Hunters averaged 10.8 days per moose harvested in 2002, which is the highest rate of effort per moose taken within the last five years. Moose hunting in the fall of 2002 was difficult due to unusually warm and mild weather along with a total lack of snowfall outside of the highest elevations.

Table 1. Colville District (GMUs # 101/105, 109, 113, 117, and 121/124 West) Moose Harvest and Hunter Effort, 1992 - 2002.

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

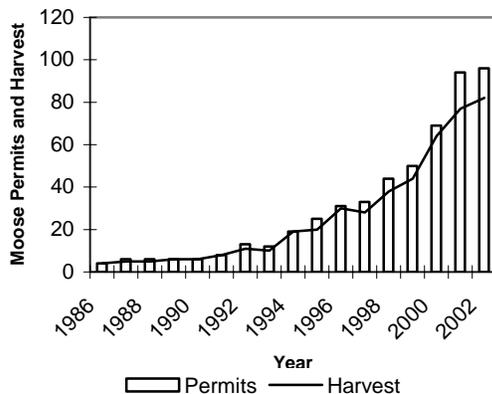


Figure 1. Statewide moose permit levels and harvest, 1986-2002.

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 2002-2003 winter survey was accomplished in the 49 Degrees North and the Huckleberry Range Game Management Units (Table 2). At 19 moose observed per hour of flight time, the rate of moose sightings was higher last winter than for any winter helicopter survey accomplished previously (Table 3). In addition the bull to cow ratio was the highest ever recorded. For the first time the number of bulls observed exceeded the number of cows. The calf to cow ratio was higher than ever recorded as well having

Table 2. Population composition counts of Moose for helicopter-surveyed areas in the 2002 winter.

Area	GMU	Date	Bull	Cow	Calf	Total	B:100C:Ca	Hours	Moose/hour
49 Degrees North	117	12/17/2002	31	35	27	93	89 : 100 : 77	5.0	18.6
Huckleberry Range	121/124	12/19/2002	28	11	7	46	255 : 100 : 64	2.3	20.0
Totals:			59	46	34	139	128 : 100 : 74	7.3	19.0

Table 3. Summary of early winter survey effort by helicopter on Moose within the Colville District from 1994 thru

Year	GMUs Surveyed	Hours Flown	Total Moose Observed
1994	113	n/a	36
1995	113	11.0	43
1996	117	5.0	49
1997	109, 117	8.2	146
1998	113, 117, 121, 124	10.5	92
1999	113, 117	7.0	92
2000	117, 109, 101, 105	9.2	143
2001	113, 117, 109, 121	11.0	97
2002	117, 121/124 W.	7.3	139

74 calves per 100 cows (Figure 2).

On last winters flight survey we classified 46 moose in the Huckleberry Range (GMUs 121/124 W.). We believe this sample is representative of a thriving moose population in an area which also appears to be producing a large surplus of bulls. Hence the permit allocation for the Huckleberry Range was increased from 2 to 4 permits for 2003.

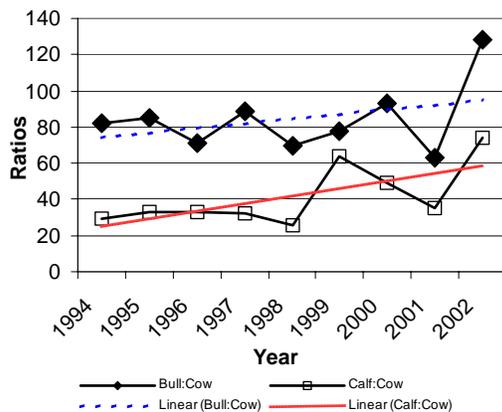


Figure 2. Composition and trends of moose herds as determined by early winter helicopter surveys. Survey areas vary annually.

Moose hunters provide their observations with the mandatory report. Hunters reported observing 370 moose within the Colville District during the 2002 season which yielded a bull : cow ratio of 110 bulls per 100 cows and a calf : cow ratio of 40 calves per 100 cows (Table 4). This ratio is lower in both bulls and calves than our observed ratio from the post-season (early winter) helicopter flights (Table 3 and Figure 2). The high bull ratio is consistent with our flight survey data, however.

Population status and trend analysis

Early winter composition survey flights have been accomplished each year for the last 9 years (Table 3 and Figure 2). The nine-year trend in the bull to cow ratio appears to be fairly stable with a ratio that consistently exceeds 2 bulls for every 3 cow moose. The nine year trend in the calf to cow ration shows a marked increase in the calf ratio, but with substantial variation in the last five years (Figure 2). We believe that limited hunter harvest has not had an appreciable impact on the overall population composition of moose in northeastern Washington.

We monitor age and antler spread of harvested bulls 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 2002, the mean antler spread was down somewhat at 36 inches. The mean spread has

Table 4. Moose hunter observations and days per kill in the Colville District for the 2002 season.

Area	Average Number of Days per Kill	Average Number of Moose Seen per Hunter	Bulls/Cows/Calves	Total Moose	Ratio Bulls : 100 Cows : Calves
Kettle Range	No kill	None	0 / 0 / 0	0	N / A
Threeforks	17.3	4.2	7 / 7 / 7	21	100 : 100 : 100
Selkirk Mtns.	13.8	5.3	60 / 25 / 10	95	240 : 100 : 40
49 Degrees N	7.3	11.5	95 / 115 / 42	252	83 : 100 : 37
Huckleberry Mtns.	8.0	1.0	1 / 1 / 0	2	100 : 100 : 0
Totals:	10.8	7.6	163 / 148 / 59	370	110 : 100 : 40

been lower, however. For instance in 1997 the mean spread was 34 inches. The average age of bull moose taken also declined in 2002 to 5.1 years. This average age has been even lower in half of the previous 10 years. Mostly 2-5 year old bulls were taken in 2002 which has also been the case in 5 of the last 10 years. Given the poor weather conditions for hunting last fall along with the higher rate of effort per moose taken, hunters may have been settling for the first “good” bull they encountered, thus leading to the small decline in average antler spread as well as younger average age.

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, but private lands have continued to be heavily logged. Generally, it appears conditions for moose production

will be optimal for the next few decades.

Our observations during winters with relatively deep snow leads us to believe that mature forest stands for snow intercept cover adjacent to forage areas may be the habitat component most critical to sustaining moose populations over the long term. The 2002-2003 winter was one of the mildest on record. 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 in one or more of the 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 2003 took a modest jump over

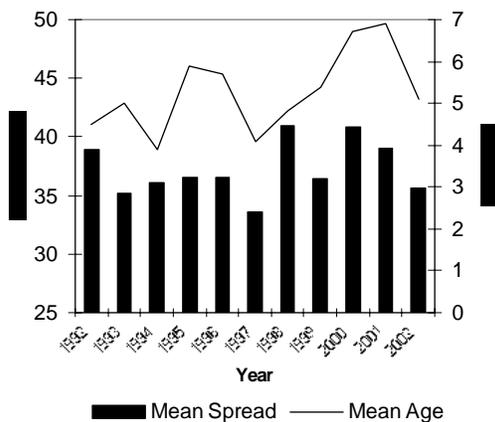


Figure 3. Average age (years) and antler spread (inches) of bull moose harvested within the Colville District, 1992 - 2002.

Table 5. Tooth age and antler spread in inches for harvested bull moose in the Colville District from 1992 through 2002.

Year	Sample Size	Mean Age (years)	Mean Spread (inches)	Yearling	2-5 years old	> 5 years old
1992	5	4.5	39	0%	80%	20%
1993	6	5.0	35	0%	67%	33%
1994	8	3.9	36	0%	75%	25%
1995	8	5.9	37	0%	50%	50%
1996	17	5.7	37	6%	29%	65%
1997	16	4.1	34	13%	56%	31%
1998	22	4.8	41	0%	55%	45%
1999	22	5.4	36	10%	45%	45%
2000	34	6.7	41	0%	37%	63%
2001	32	6.9	39	0%	31%	69%

2002 from 49 to 56 tags allocated within the Colville District. The two most substantial changes included the following: Permit numbers were doubled for the Huckleberry Mountains Hunt from 2 to 4 tags; and Three new tags for antlerless moose only were added for persons with disabilities in the 49 Degrees North Hunt. 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.

MOOSE STATUS AND TREND REPORT: REGION 1 GMUs 124, 127, and 130

Howard Ferguson, District Wildlife Biologist
David P. Volsen, Associate Wildlife Biologist

Population objectives and guidelines

Moose population management objectives in Washington are to maintain a healthy population and provide quality-hunting opportunity through limited entry permits. Increased emphasis on harvest was needed to address moose damage and nuisance activity near the Spokane metropolitan area.

Hunting seasons and harvest trends

Moose hunting opportunity in Washington is limited by permit, and is generally a once in a lifetime opportunity if drawn (this stipulation is waived in 2002 for the Mt. Spokane youth-only permit hunt, raffle and auction hunts). Permit season dates remained October 1 - November 30, 2000. 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.

Forty-five permits were available in the Mt. Spokane and Hangman units, 40 in Mt. Spokane and 5 in Hangman, and a total of 9315 hunters applied for the general permit drawing in 2002. The Hangman and Mt. Spokane units each had an either-sex moose hunt; in addition, two antlerless only moose hunts were conducted in the Mt. Spokane unit.

Forty-two permittees hunted moose in 2002, with participation rates ranging from a low of 85.7% in the Mt. Spokane B antlerless hunt to a high of 100% participation on both the Mt. Spokane A and Hangman any moose hunts. Forty moose were killed (15 bulls, 25 cows) for an overall hunter success rate of 96%. The mean number of days hunted per hunter was 8.2 days (Table 1). The success rate for the youth hunt in GMU 124, Mount Spokane, increased in 2002. Youth hunters (15 years or younger) were 100% successful in 2002 and 60% successful in 2001.

Surveys

During the winter of 1999-2000, standardized aerial surveys of moose in the Mt. Spokane Unit and adjacent units of Idaho was conducted by WDFW ungulate biologist W. Myers, in cooperation with Idaho Fish and Game. Survey data were used to develop a

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

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

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.

Table 2. Moose numbers and density by survey quadrat from 1999 and 2002

Survey Quadrat #	Number of Moose Observed		Density Moose/km ²	
	1999	2002	1999	2002
9		0		0.000
10		5		0.141
11	1		0.021	
12	7	6	0.130	0.111
13	7	7	0.080	0.080
14	20	17	0.727	0.618
15	6	10	0.133	0.222
16*	27		0.241	
17*	7		0.168	
18*	5		0.112	
19*	8		0.080	
100		25		0.762
101		21		0.545

* Survey quadrats primarily in Idaho.

Table 3. Moose observations and herd composition from aerial surveys, 1990 to 2002.

Survey Area	Year	Bull	Cow	Calf	Total	Bull:100Cow:Calf
Mt. Spokane, WA Unit	1990	-	-	-	7	39:100:61
Mt. Spokane, WA Unit	1992	-	-	-	7	50:100:25
Mt. Spokane, WA Unit	1999	8	22	11	41	36:100:50
Idaho-Unit*	1999	6	27	14	47	22:100:52
Mt. Spokane, WA Unit	2002	11	23	8	45	15:100:48
Hangman, WA Unit	2002	5	33	16	46	48:100:35

* Survey unit primarily in Idaho.

Aerial surveys were flown again during the winter of 2002-2003 in some of the same surveys quadrats as 1999. Those units straddling the Washington-Idaho border were not flown in 2002-2003, but two additional quadrats were surveyed in the Hangman unit. 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 three aerial surveys (1990, 1992 and 1999) has increased over time (Table 3); hunting success has averaged over 96% since 1993; 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 not infrequent.

Results from the 2002-2003 surveys of the Mt. Spokane Unit showed a reduction of the number of bulls relative the number of cows and calves (Table 3.). In addition, the mean antler size for bulls harvested in 2002 in the Mt. Spokane unit is 32 inches, while the mean antler size for the Hangman unit is 37 inches and for the Colville District it was 41 inches in 2000 and 39 inches in 2001.

Hunter density is at a functional maximum in the Mt. Spokane Unit 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 a significant increase in the number of moose and percentage of bulls in the population. While moose are apparently expanding their distribution in the district, and the number of nuisance complaints has increased, those increased numbers are occurring on private lands where hunter access is limited.

Habitat condition and trend

Moose prefer 15-25 year old clear-cuts or thinned stands on mesic sites. Generally, in the Mt. Spokane unit, it appears conditions for moose production will be optimal for the next few decades. This unit is made up of private timberlands east and northeast of the Spokane metropolitan area. Timber management practices on private lands from about the past 15 years are providing excellent forage areas for moose. The Mt Spokane unit is largely composed of private timberlands in some stage of succession that is of benefit to moose especially for winter range. 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", according to 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 are at the highest observed density in the district.

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 bulls in the population warrants a less aggressive harvest strategy. Permittee satisfaction with the quality of the hunt is also a concern in the unit, and until hunter access to new areas increases, permit numbers should remain the

same or decrease slightly.

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. Recent surveys of the unit indicate a small increase in hunting opportunity is possible.

Literature cited

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Black Bear

BLACK BEAR STATUS AND TREND REPORT Statewide

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

Population objectives and guidelines

The goals for black bear management in Washington are: 1) maintain sustainable, healthy populations of black bears through all bear habitats, 2) maximizing recreational hunting opportunities consistent with the status of bear populations, 3) minimizing black bear nuisance and damage activity.

Sex ratio and median ages of harvest bears are used as indicators of the overall bear health and vigor, and reflect the impact of harvest levels on bear populations (Table 1).

Table 1. Black bear harvest guidelines (Game Management Plan 2002).

Parameter	Harvest		
	Liberalize	Acceptable	Restrict
% Females in harvest	< 35%	35-39%	> 39%
Median age of harvested females	> 6 years	5-6 years	< 5 years
Median age of harvested males	> 4 years	2-4 years	< 2 years

Hunting seasons and harvest trends

Black bear seasons have changed significantly over the last 8 years. Washington voters passed Initiative 655 (which banned the use of bait and hounds for hunting black bear and the use of hounds for hunting cougar and bobcat) in the November 1996 general election. Therefore, the use of bait and hounds for the hunting of black bear became illegal for the 1997 season. In an effort to mitigate the anticipated

decrease in bear harvest (i.e., post I-655), 1997 bear seasons were lengthened, and bear bag limits were increased in some areas. Legislation also was passed that provided the authority to the Fish and Wildlife Commission to establish reduced costs for black bear and cougar transport tags; an effort to increase the number of bear hunters and, therefore, bear harvest. As a result of these efforts, the 1998-2002 black bear harvest increased above previous levels (Table 2, Figure 1).

Population status and trend analysis

Based on a model using population reconstruction methods and harvest age data, the statewide black bear population in Washington likely ranges between 25,000-30,000 animals. At the Black Bear Management Unit (BBMU) level, bear populations are generally healthy. To maintain these stable populations, modifications to harvest levels are made (on a 3-year basis) as indicated by recent trends in female harvest and median ages (Figure 2).

Surveys

No formal surveys are conducted in Washington for black bears. In the past, Washington Department of Fish and Wildlife conducted bait station surveys as a measure of bear abundance. However, an analysis of statistical power indicated that at the level of survey intensity (limited by funding), we would not be able to detect a change in bear abundance using bait stations. As such, the survey technique was discontinued. Since spring of 2003, 8 adult bears were captured and will be monitored for survival and reproduction to better assess the status of bear populations and impacts of hunting.

Table 2. Statewide black bear harvest, hunter effort and median age information, 1990 - 2002.

Year	Male	Female	Total # of hunters	% Success	Hunter Days	Days per kill	Median Age			
							Males	Females	% females	
1990	NA	NA	NA	NA	NA	NA	2.5	4.5	NA	
1991	876	503	1,379	10,839	13%	84,771	61	3.5	4.5	36%
1992	921	521	1,442	13,642	11%	98,434	68	4.5	4.5	36%
1993	986	521	1,507	12,179	12%	102,558	68	3.5	5.5	35%
1994	654	419	1,073	11,530	9%	110,872	103	3.5	4.5	39%
1995	850	368	1,218	11,985	10%	102,859	84	3.5	4.5	30%
1996	951	359	1,310	12,868	10%	104,431	80	4.5	5.5	27%
1997	546	298	844	11,060	8%	97,426	115	4.5	5.5	35%
1998	1,157	645	1,802	20,891	9%	216,456	120	4.5	5.5	36%
1999	757	349	1,106	37,033	3%	481,319	435	4.5	5.5	32%
2000	777	371	1,148	37,401	3%	296,849	259	4.0	6.0	32%
2001	919	512	1,431	25,141	6%	230,431	161	--	--	36%
2002	1,133	592	1,725	24,844	7%	219,482	127	--	--	34%

Nuisance and damage activity

The total number of black bear-human interactions decreased slightly between 2001 and 2002, from X to X, respectively (Figure 3). Black bear nuisance and damage activity may not be a good indicator of the status of the population, but more likely it reflects environmental conditions. For example, in 1996 we had a late spring with poor forage conditions for black bear, followed by a poor fall huckleberry crop.

Management conclusions

Washington has a unique and challenging situation when it comes to management of our black bear population. Washington is the smallest of the eleven western states, yet we have the second highest human population; a population that continues to grow at record levels. We also have one of the largest black bear populations in all of the lower 48 states. Given that approximately 75% of our black bear habitat is in Federal or private industrial ownership a large portion of core black bear habitat is relatively secure. This means that the long-term outlook for black bear is generally good.

As local bear populations respond to current reduced levels of harvest a greater emphasis on monitoring populations within individual bear management units will be necessary. Continued changes to bear seasons, bag limits, and depredation processes are likely as we seek to minimize levels of human-black bear conflicts by using general season hunting, public education, and depredation control.

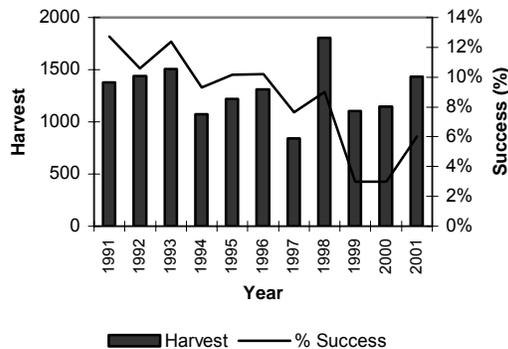


Figure 1. Black bear harvest and hunter success in Washington, 1991-2001.

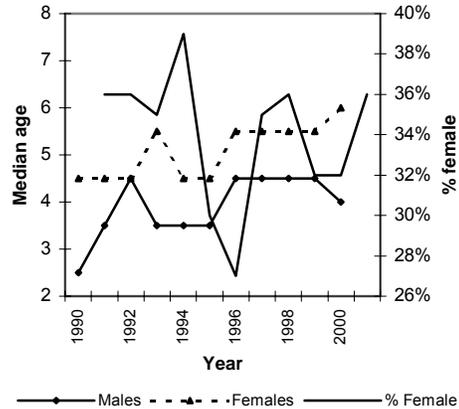


Figure 2. Median ages of harvest bears and % females in harvest, Washington 1990-2001.

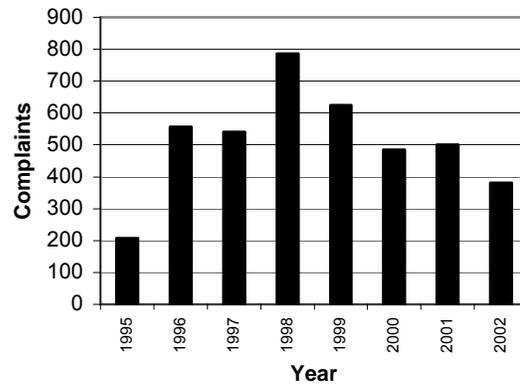


Figure 3. Trend in confirmed human-black bear interactions, 1995-2001 (1995 based on 10 months of data).

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

WARREN MICHAELIS, Wildlife Biologist

Population Objectives And 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 2002 was 227 (Table 1). Estimated total harvest decreased from 2001 and was more consistent with the estimated harvest for 1998 and 1999. About sixty six percent of this total was males and thirty four percent females. Hunter success and days/kill remained nearly equal to that of the 2001 bear harvest statistics (Table 1). The 2002 general black bear season extended from August 1 through November 10 and through use of a damage bear tag hunters could take up to two bears. Damage bear tags were valid in the coastal unit.

Population Status And Trend Analysis

The age distribution of bears harvested in the last five years is listed in Table 2. The median age for black bear harvested in 2002 was determined by cementum annuli from black bear tooth samples submitted by successful hunters. Fifty-four teeth from male bears and 44 from females were aged. The median ages for males harvested in 2002 was 3.5. The median ages of females harvested for 2002 decreased slightly from the previous two years of tooth samples submitted.

Nuisance and Damage Activity

Spring timber damage seasons in Region 6 are on an “as needed” basis. Total take for the 2002 spring season was 70 bears. This was up from the 2001 harvest of 50 bears that were taken as a result from timber damage permits. Nuisance harvest of bears is from animals considered to be a threat to humans or livestock. The number of confirmed complaints are summarized by GMU’s that collectively constitute the coastal BBMU (Table 3).

Management Conclusions

Total estimated harvest of black bears for 2002 (227) declined from the 2001 estimate of 275 bears. Both the 2001 and 2002 harvest estimates were calculated using the new mandatory harvest reporting system. Total estimated harvest of black bears for 2002 remained fairly consistent with previous harvest

estimates. Since 1996, total female harvest has comprised 35 percent of the harvest. This could be a result of the type of hunting method used rather than a function of increased population growth. Here in the Coastal area a common method used by hunters 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 available and more likely to be detected along roads.

Table 1. Region 6 recreational harvest summary 1996-2002. Recreational harvest or does this include damage bears killed?

Year	Male	Female	Total	Days/Kill	Hunter Success
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 1996-2002 (*n*=number of tooth samples).

Year	<i>n</i>	Male age			<i>n</i>	Female age		
		Min.	Max	Median		Min.	Max	Median
2002	54	1.5	15.5	3.5	44	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

Table 3. The number of confirmed 2002 bear damage complaints by GMU in BBMU 1.

GMU	Confirmed
501	0
504	1
506	1
530	1
601	0
602	0
603	0
607	0
612	0
615	0
618	0
621	0
633	1
636	1
638	0
642	4
648	0
651	0
658	0
660	0
663	1
672	1
673	0
681	0
684	4
Total	15

BLACK BEAR STATUS AND TREND REPORT: REGION 3 North Cascades Black Bear Management Unit (BBMU 3)

RUTH L. 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 2002 general season for the North Cascades BMU ran from August 1 through November 30, with a limit of two bears/season. Hunting conditions and access were generally favorable throughout the season.

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. Table 1 shows the median age of bears harvested in 2002, and the percent of females harvested for the year. Median age for both males and females was well above the minimum age targeted for the statewide objective. However, the percentage of females harvested exceeded the desired 40% for the third successive year. Excessive female harvest may reflect the implementation of Initiative 665 in 1997, which eliminated the use of bait and hounds for black bear hunting. The use of bait and hounds enabled hunters to be somewhat more selective in choosing the sex of the bears harvested.

Population status and trend analysis

The three-year trend towards removing more than

40% of females in the harvest may indicate excess pressure on the female population and should be monitored.

Nuisance and damage activity

Twenty-eight depredation permits were issued to industrial timberland owners concerned about tree damage from May-July, 2002, with 16 males and 4 females killed.

Bear sightings and complaints by citizens living along the urban-rural interface continued in all three counties contained within BMU 3. However, these reports rarely resulted in lethal removal of the bear.

Habitat condition and trend

Continued conversion of open space and timberland to houses and supporting infrastructure results in a steady loss of lowland forest habitat for Black Bears. As development proceeds, we expect to see more negative interactions between people and bears.

Access to hunting areas remains challenging as State and privately owned timberlands are gated and restricted to non-motorized uses. Many US Forest Service roads are also being decommissioned. However, limited motor vehicle access could lessen disturbance to bears inhabiting those areas.

Management conclusions

Black Bear harvest increased in 2002 compared to the previous 3 years and the percentage of females harvested exceeded recommended levels (Table 1). These trends should be monitored in coming years.

Table 1. Harvest data for BMU 3, North Cascades, 1995-2002.

Year	Male	Female	Total harvest	Days/kill	# hunters	% Hunter success	median age		% Female harvested
							males	females	
1995	107	46	153	60	1658	8	4.5	5.5	30
1996	130	55	185	63	1733	11	5.5	4.5	30
1997	78	38	116	54	1117	11	6.5	4.5	33
1998	192	91	283	69	2948	10	6.5	3	32
1999	95	62	157	210	3273	5	6.5	8.5	39
2000	118	51	169	108	3065	6	5	7	43
2001	102	47	149	125	2147	6.9	5.5	5	46
2002	119	68	187	95	2083	9	7.5	7.5	57

BLACK BEAR STATUS AND TREND REPORT: REGION 5

South Cascades Black Bear Management Unit (BBMU 4)

DAVID P. ANDERSON, District Wildlife Biologist

Population Objectives and Guidelines

Black bears are managed in western Washington to provide recreational opportunities without detrimentally affecting black bear population levels. 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 \$5, and a median male harvest age of \$2. Bear harvest also is managed in an attempt to reduce timber damage, property damage, and black bear/human interactions.

Hunting Seasons And Harvest Trends

In 2002, hunter success for the general black bear season in the BBMU 4 was (0.04%). This was lower than 2001(0.05%) and considered a moderate level of success for bear hunting . The reported 2002 general season black bear harvest in the BBMU 4 was lower than last year (2001), but still at higher than average levels over the past ten year period. (Table 1). Bear hunter numbers remained similar to 2001 but were lower than the peak years of 1999 and 2000. Total 2002 black bear harvest in BBMU 4 decreased 2001 levels (Table 1).

Depredation Season

In addition to general season hunting, black bear depredation permits continued to be issued to landowners during the spring of 2002 to mitigate timber damage. Approximately 80 bears were taken in association with this program (M. Schlenker, WDFW, pers comm.). This compares to 66 bears that were taken in 2001. The overall effect of the spring depredation permit harvest on bear populations and the benefit these hunts have in the reduction of timber damage needs to be evaluated. Further field work needs to be done to evaluate the number and distribution of permits requested by landowners.

Population Status And Trend Analysis

Harvest data from general season take indicate that current bear harvest levels in the BBMU 4 are within acceptable limits. In 2002, the percentage of females in the harvest was 31% and meets the target level of less than 40% female harvest in the population. Median ages of the female harvest was 5.5 which was also within management goals for BBMU 4 (>5).

Surveys

No bear surveys were conducted in BBMU 4 in 2001-2002. Bear surveys did not rank high in our prioritization of activities for Region 5 in 2002.

Nuisance and Damage

During the time period 1 January to 31 December 2002, enforcement officers responded to a total of 29 black bear complaints, down from 2001. Of these complaints, 2 were responded to by trapping and relocating the problem bear. Of the 2 relocations, both were successful as bears did not returned to the problem area. The remaining complainants were taken care of by working with landowners to solve their problems by reducing bear attractants (ie. garbage). No nuisance bears were removed by lethal means 2002.

As urbanization continues to encroach on bear habitat in BBMU 4 the bear/human interactions will continue to be a problem. 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. Habitat Condition and Trend

Black bear habitat is affected by both timber and land-use practices. Timber harvest in BBMU 4 has remained relatively constant on private timber lands. 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. 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 complaints are expected.

Management Conclusions

Black bear harvest in 2002 decreased by a moderate amount from 2001 levels (Table 1). Acceptable harvest parameters for black bears in the South Cascade Bear Management Unit (BBMU 4) were accomplished in 2002.

Harvest of females was below 40% ,and the median female harvest age was greater that \$5. The median male harvest age in 2001 was above target levels of 2 year olds.

To better evaluate the impacts of the added harvest pressure, WDFW plans to increase the number of tooth

samples returned from the bear harvest, particularly from bears taken during the spring depredation permit hunt. Due to the extremely small tooth sample size the overall effect of spring depredation hunting on bear population demographics is unknown. The continued need for depredation permits on private industrial lands will be monitored by WDFW biologists in cooperation with forest land managers.

Habitat management trends in large-scale forest landscapes will continue to support adequate populations of black bear 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.

Year	Male	Sample	Female	Sample	Sexes Combined	Sample
2002	3.5	39	5.5	14	4.5	53
2001	3.5	45	5.5	29	4.5	74
2000	4.5	27	5.5	17	4.5	44
1999	4.5	32	5.0	8	4.5	40
1998	4.5	28	3.0	16	4.0	44
1997	2.5	7	5.0	14	3.5	21
1996	3.5	21	7.0	18	5.5	39
1995	3.5	32	5.5	8	4.0	40
1994	5.5	13	6.5	5	5.5	18
1993	4.5	31	3.5	23	4.5	54
1992	4.5	26	3.5	14	3.5	40
1991	3.5	33	8.5	23	3.5	56

Year	Male	Female	Total	Success	Hunters	Days Hunted	Days/Kill
2002	134	61	195	0.04	4563	38997	198
2001	156	77	233	0.05	4690	41916	179
2000	127	44	171	0.02	7206	57733	338
1999	71	15	86	0.01	7669	74857	870
1998	95	67	162	0.03	5112	45061	278
1997	36	30	66	0.02	2707	17778	269
1996	127	70	197	0.08	2447	13629	69
1995	70	26	96	0.04	2368	16307	170
1994	97	44	141	0.05	2710	19503	138
1993	97	44	141	0.06	2405	16663	118
1992	84	46	130	0.05	2407	15698	121
1991	92	53	145	0.07	2070	13055	90

BLACK BEAR STATUS AND TREND REPORT: REGION 2 Okanogan Black Bear Management Unit (BBMU 5)

SCOTT FITKIN, District Wildlife Biologist

Population objectives and guidelines

The Okanogan BBMU currently meets the objective of a sustainable well-distributed black bear population. Harvest guidelines are designed to provide maximum recreational harvest opportunity and minimize nuisance and damage complaints, while maintaining population health.

Hunting seasons and harvest trends

The 2002 black bear season in the Okanogan BBMU was from August 1-November 3. Hunting conditions were generally favorable and access remained good throughout the season.

Hunter numbers, harvest, and success continued to climb in 2002 (Table 1). The effect of the new mandatory reporting requirements on these figures is unknown. Estimated harvest is the highest in eleven years, suggesting that in the Okanogan BBMU, low tag fees and longer seasons have successfully mitigated for harvest technique restrictions imposed several years ago.

Population status and trend analysis

Bears have always been a difficult animal to survey and census. Results from recent WDFW black bear research have helped refine statewide population estimates; however, no estimate for the Okanogan BBMU exists.

Past dramatic statewide declines in harvest, combined with the relatively young age structure of harvested bears in the years immediately prior to the hound hunting and baiting ban, suggest black bear numbers declined significantly after the middle part of the century. To what extent this was a function of harvest pressure versus habitat loss is unclear. These statewide trends probably also applied to the Okanogan.

For the past several years, bear numbers have likely improved statewide, as indicated by

improvements in population parameters. Bear population parameters for the Okanogan BBMU have been variable over the last several years. Most recently in 2002, the median age of females harvested of 4.5 has fallen below the minimum management threshold, and percentage of females in the harvest is barely within acceptable limits at 38%. This data suggests changes to season structure may be necessary for next year.

Nuisance and damage activity

Wildlife officers routinely respond to complaints of bears damaging property or potentially threatening human safety near rural residences or campgrounds. The number of complaints varies widely from year to year as a function of weather and changes in natural food availability. Nuisance complaint levels remained low in 2002, with only 16 recorded for BBMU 5. A mild winter, and an acceptable crop of many shrub fruits, despite dry conditions, appeared to provide ample natural forage, and reduce the potential for bears to come into conflict with people while seeking alternative food sources. Conversely, bear nuisance activity increased noticeably in the early spring of 2003, suggesting denning condition of bears may not have been as good as was previously thought. Drought conditions persisted through the summer of 2003, and bear nuisance activity remained moderate.

Habitat condition and trend

At lower elevations throughout bear range in the Okanogan BBMU, human development continually nibbles away at bear habitat, and noxious weeds continue to displace native grasses and forbs. The combination of these impacts is systematically reducing the quantity and quality of black bear spring and early summer habitat components. This is likely to result in increased incidence of human-bear conflict and associated control mortality.

Table 1. Black bear harvest, hunter effort and median age for BBMU 5.

Year	Male	Female	Total	# of hunters	% Success	Hunter Days	Days / kill	Median Age		
								Males	Females	% females
1990	--	--	--	--	--	--	--	2.5	4.5	36%
1991	--	--	--	--	--	--	--	3.5	3.0	36%
1992	54	40	94	990	9%	5,124	55	3.5	3.5	43%
1993	85	42	127	1,153	11%	5,448	43	3.5	3.5	33%
1994	53	29	82	1,384	6%	7,979	97	3.5	2.5	36%
1995	59	12	71	1,047	7%	6,343	89	5.5	8.0	23%
1996	73	24	97	889	11%	4,181	43	2.5	4.5	36%
1997	30	20	50	858	6%	3,967	79	6.5	6.5	38%
1998	62	32	94	1,514	6%	6,823	73	4.5	5.0	34%
1999	49	12	61	3,016	2%	25,763	422	5.5	4.5	20%
2000	17	51	68	3,153	2%	17,258	254	3.5	8.0	75%
2001	77	41	118	1,922	6%	13,905	118	3.0	7.5	35%
2002	90	55	145	2,039	7%	14,077	97	8.0	4.5	38%

On the other hand, successful efforts to recover wild salmonid stocks would increase the bear forage base. Also, black bears are benefiting from more aggressive road management occurring on public lands on behalf of a variety of different wildlife species.

Management conclusions

It appears that recent hound hunting and baiting restrictions briefly reduced hunting pressure and harvest, boosting production and improving population age structure. Hunting pressure and harvest have rebounded in response to lower tag fees and longer seasons, and hunters appear to be adjusting well to the change in regulations governing harvest techniques. As a result, harvest is at an eleven year high. Prolonged drought may also be contributing to bear harvest vulnerability. High harvest, lower than desirable median ages for harvested females, and percent females in the harvest suggest a reduction in harvest is appropriate. Moving the opener to the day after Labor Day would reduce harvest days, minimize conflicts with the non-hunting public and coincide with the adjacent NE Washington BBMU opener.

Threats to habitat continue, and these will affect overall carrying capacity. The effort to pursue more aggressive road management should be supported. This is especially true for habitat at low to mid elevations containing bear spring/summer range, the time and place where bears are often most vulnerable to illegal harvest. WDFW's ongoing land acquisition in the Methow will help protect low elevation habitat and movement corridors. This program should be supported to the fullest extent possible.

All WDFW lands and facilities in bear habitat should be outfitted with bear proof garbage containers. In addition, existing recommendations concerning proper sanitation in bear country should be adopted as regulations and enforced. Other agencies should be encouraged to do the same. Proper sanitation will greatly reduce the potential for bears to become

conditioned to human food, and reduce the potential for human-bear encounters. This will in turn reduce the number of nuisance complaints and associated expenditure of resources.

WDFW should continue to replace older style culvert traps with modern aluminum versions that minimize tooth and claw damage to captured bears. Two state-of-the-art culvert traps for bears are being secured for WDFW through the North Cascades Grizzly Bear Subcommittee.

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	Harvest		
	Over	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 rate decreased from 6.0 percent in 1998 to 1.0 percent in 1999 and 2000. Since the increase in 1999, bear hunter numbers have declined to around 5,300 in 2001 and 2002. In 2002, hunter success was 3.9 percent, with 5,356 hunters.

The harvest of black bears in BBMU 6 ranged between 120 and 339 from 1989 to 2002. In 2002, 209 black bears were harvested, 15 percent higher than the average from 1989-2002 (181). In 2002, the median age of males (5.5 years) and females (8.5 years) and the percent females in the harvest (32%) were within the acceptable and desirable categories (Table 1).

Population status and trend analysis

Harvest statistics indicate the bear population in BBMU 6 is not over-harvested. The percentage of females in the harvest has averaged 31% since 1989, while the median age of male bears harvested has

Table 2. Black bear harvest information and median age of black bears for Black Bear Management Unit 6, 1989-2002.

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 ^a									
1991	126	101	227	2,886	7.8	13,615	3.5	4.0	44
1992	129	84	213	2,847	7.4	13,125	4.5	4.5	39
1993	117	42	159	3,758	4.3	20,780	3.5	5.5	26
1994	93	48	141	2,620	6.0	15,709	4.5	6.5	34
1995	86	35	121	2,724	4.3	12,291	3.5	4.5	29
1996	130	16	146	3,429	4.3	15,317	4.5	7.5	11
1997	102	44	146	4,229	3.5	20,271	4.5	4.5	30
1998	230	109	339	5,661	6.0	38,557	4.5	5.0	32
1999	108	34	142	11,050	1.0	106,157	5.5	4.5	24
2000	87	33	120	9,379	1.0	54,846	4.0	8.5	28
2001	138	73	211	5,283	4.0	42,408	2.5	6.5	35
2002	142	67	209	5,356	3.9	41,302	5.5	8.5	32
Avg.	123	58	181	5146	5	32086	4	6	31

^a No harvest data available.

remained stable and female age has increased. Population models on the statewide scale suggest the bear population is growing slowly. Although median male age reached its lowest point in 2001, 2.5 years, median age of harvested males in 2002 increased to 5.5. Female median age has remained high (6+) for the past 3 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 in 1999 to 2002, despite dry summer conditions from 2000 through 2002.

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 2002 was an average to below average year for huckleberries and other mast.

Large sections of BBMU 6 are in remote or wilderness areas where no habitat alterations occur. Forest management has not changed significantly in recent years. Localized fringe areas have seen an increase in recreational development and orchards. The orchards provide abundant soft mast but create damage situations.

Management conclusions

The black bear population in BBMU 6 appears to be healthy. Trend in age and sex composition of harvested bears will continue to be monitored closely.

BLACK BEAR STATUS AND TREND REPORT: REGION 1 Northeastern Black Bear Management Unit (BBMU 7)

STEVE ZENDER, District Wildlife Biologist

Population objectives and guidelines

The objective for BBMU 7 is to sustain a well-dispersed and healthy 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. Median age of all bears combined should be ≥ 4 years. Median ages of males and females should be >2 years and ≥ 5 years, respectively. The desirable percentage of females in the harvest is $\leq 35\%$ with an acceptable range of 36%-39%. Greater than 39% is considered over-harvest.

Hunting seasons and harvest trends

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 3, the day after Labor Day. The median age for males and females in BBMU 7 was at the minimum threshold in 2001 so season length was not changed for 2002. Trends in age data will continue to be monitored but at the time this report is being written the age data was not yet available from the laboratory for 2002.

While the number of bear hunters remained the same the harvest in 2002 increased by 73 percent from 2001. (Table 1, Figure 1). The 459 bears taken in 2002 also exceeded the past 5-year average harvest of 336 bears. Hunters and landowners reported bears to be numerous,

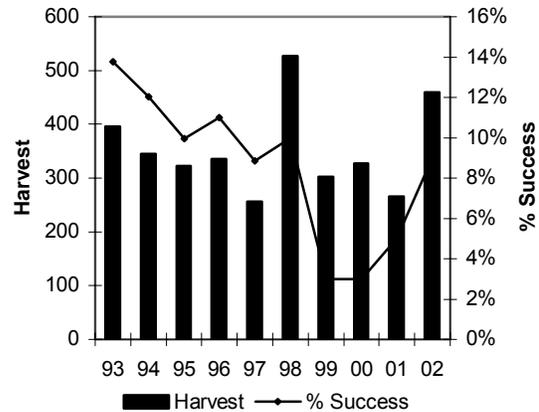


Figure 1. Total harvest and % hunter success, BBMU 7, 1993-2002.

likely at least in part to the relatively low harvest in 2001. Another poor berry crop contributed to bears being dispersed at lower elevations and vulnerable to hunters as the bears raided backyard orchards and other human related sources of food.

Population status and trend analysis

In BBMU 7, the median age of harvested female bears in 2002 increased to 5 (Table 1, Figure 2); so this unit met the minimum harvest guidelines on females (≥ 5) two out of the last three years. The median male age

Table 1. Black bear harvest, hunter effort, and median age, Northeastern Black Bear Management Unit, 1993-2002.

Year	Male	Female	Total	# of hunters	Success	Hunter Days	Days per kill	Median Age		Hunter Rept % Females
								Males	Females	
1993	262	134	396	2,876	14%	14,820	37	2	5	34
1994	183	162	345	2,870	12%	15,391	45	3	4	45
1995	215	107	322	3,240	10%	18,884	59	3	5	38
1996	214	122	336	3,055	11%	17,400	52	3	4	37
1997	166	90	256	2,889	9%	16,171	63	3	4	35
1998	347	180	527	5,301	10%	40,687	77	4	5	34
1999	228	74	302	9,292	3%	92,813	307	3	3	25
2000	210	117	327	9,538	3%	60,127	184	2	5	36
2001	158	108	266	4,967	5%	33,667	127	2	3	41
2002	308	151	459	5,000	9%	34,739	76	2	5	33

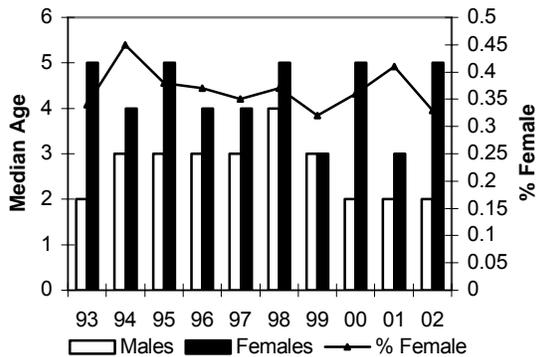


Figure 2. Median ages of harvest bears and % female in the harvest, BBMU 7, 1993-2002.

remained at 2 years, which is just below the harvest guideline of >2 . The median age of all bears combined should be ≥ 4 and BBMU 7 was only 2 years. The percentage of females in the 2002 harvest was 33%; this is within the desired harvest guidelines of $\leq 35\%$.

Nuisance and damage activity

Fish and Wildlife Officers received 175 black bear complaints in the Northeast BBMU in 2002. This is up from 107 in 2001 and 72 in 2000. The highest number of complaints came in from GMU 117 with 39, GMU 121 with 33, GMU 109 with 30, and GMU 101 with 25. Generally three quarters of the black bear complaints will occur in the spring and are fairly consistent from year to year. When natural berry production, especially huckleberries, fail bears seek food where they can find it and that often is in conflict with humans. 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 but the increasing trend in complaints may warrant consideration of increased harvest strategies.

Habitat condition and trend

In the short-term, summer huckleberry production during the last several summers, and especially 2003, has been poor and may result in reduced cub production or survival. The long-term bear habitat condition and trend appears relatively stable. While humans are increasingly moving into bear habitat, people today tend to make more of an effort to learn to avoid conflicts rather than just

eliminate the bear. Conflicts with bears escalate during specific years when huckleberry production fails. Otherwise bears and humans can generally co-exist in the same habitats with help from WDFW providing educational materials, advice and intervention when necessary.

Management conclusions

Landowners and hunters report increasing bear numbers and problem encounters with bears. The harvest in 2002 increased to above average while hunter numbers remained the same. The percentage of females declined to within management guidelines. Median age for females just met the minimum management guideline while male ages are still low. Mean ages for both male and female bears did increase in 2002 though, which implies there are still old bears available but likely there are many young bears too, keeping the median low.

Many people are concerned about the increasing trends in nuisance bear incidents and suggest lengthened seasons to address the problem. Nuisance complaints have been high in 2003 starting in spring and carrying over into the fall so consideration for increased harvest opportunities is warranted. However, this will have to be evaluated with the knowledge that current harvest strategies have apparently resulted in maintaining the population at or below desired bear population management guidelines.

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 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 should maintain conservative bear hunts in this area. WDFW and USFS continue to provide a proactive approach to maintaining black bear hunting in the SGBRZ through information and education to hunters via contacts with hunters in the field and presentations at Hunter Education classes and other community gatherings. Signs that provide information on species identification, bear awareness and do's and don'ts in bear country are posted liberally throughout much of northeastern Washington to remind hunters and campers grizzlies may be present.

BLACK BEAR STATUS AND TREND REPORT: REGION 1

Blue Mountains Black Bear Management Unit (BBMU 8)

PAT FOWLER, District Wildlife Biologist

PAUL WIK, Wildlife Biologist

Population objectives and guidelines

Black bear populations are managed at a level that provides optimal recreational opportunity for both consumptive and non-consumptive users, while minimizing conflicts with other management objectives.

Hunting seasons and harvest trends

Since Initiative 655 was implemented, the general bear season has been lengthened to offer hunters more opportunity, and to achieve an adequate bear harvest. A permit controlled spring bear season was implemented in 1999. The 2002 general bear-hunting season ran for 62 days, from September 3 to November 3. The August portion of the season was dropped due to implementation of a permit controlled spring season.

Hunters harvested a total of 165 bears during the 2002 hunting seasons (Table 1); 104 males, 61 females. The general season harvest totaled 135 bears; 86 males, 49 females. The permit controlled spring season produced a harvest of 30 bears; 18 males, 12 females.

The 2002 general season bear harvest doubled when compared to the 1992-01 average of 67 bears/year.

The composition of the general season harvest consisted of 64% males, a slight increase over 2001. The percentage of males in the harvest in 2000 and 2001 was 48% and 55%, respectively.

A permit controlled, spring hunting season was implemented in 1999 to improve harvest distribution and composition. A total of 384 permits have been issued over the last four years (Table 2). Hunter success from 1999 to 2001 averaged 17%, but success increased to 42% in 2002. Harvest composition for the

spring season has ranged from a low of 60% to a high of 82% males, and averaged 67% males.

The median age of bears harvested in 2002 was 5 years for both males and females; males (N=30), range 1.5-19.5, mean age 7.5 – females (N=20), range 1.5-21.5, mean age 7.8 years.

Nuisance and damage

The number of bear complaints received remained stable at 5 complaints/year since 1999. However, complaints in 2003 appear to be increasing.

Habitat condition and trend

The U.S. Forest Service has implemented the 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; huckleberry fields.

Management conclusions

Black bear populations in the Blue Mountains remain at fairly high levels. The Wenaha-Tucannon Wilderness and Mill Creek Watershed are remote areas that contain high density bear populations. These units supplement the bear populations in adjacent areas.

The permit controlled spring bear season has accomplished two goals, 1.) it has helped to increase the harvest of bears in units that normally receive little general season hunting pressure or harvest, and 2.) has helped distribute the harvest across the Blue Mountains. Combining the general bear season with a permit controlled spring bear season enhances our ability to provide a well-balanced harvest by game management unit.

Table 1. Black Bear General Season Harvest Summary 1992-2002, Blue Mtns., Washington.

Year	Bear Harvest			# of hunters	% Success	Hunter Days	Days per kill	Median Age	
	Male	Female	Total					Male	Female
1992	30	16	46	494	9%	2740	69	1.5	2.5
1993	25	32	57	491	12%	1988	35	6.5	2.5
1994	71	38	109	903	6%	5450	50	2.5	5.5
1995	88	46	134	1024	13%	7363	55	3.5	5.5
1996	43	18	61	1325	5%	8543	140	3.0	4.5
1997	14	14	28	1486	2%	11567	413	10.5	5.5
1998	40	42	82	1566	5%	1567	130	3.0	5.5
2000	16	17	33	2782	1%	16224	492	5.0	3.5
2001	31	25	56	1323	4%	7855	140	3.0	2.5
2002	86	49	135	1478	9%	9026	67	5.0	5.5

Table 2. Spring Bear Hunt Statistics. 1999-2002

Year	Permits	Hunters	Bear Harvest		Hunter Success	Spring Season	General Season
			Males	Females		% Male in Hv.	% Males in Hv.
1999	70	51	5	2	14%	71%	86%
2000	100	82	14	3	21%	82%	48%
2001	108	47	5	3	17%	63%	55%
2002	106	72	18	12	42%	60%	64%
Total	384	252	42	20	25%	67%	63%

Cougar

COUGAR STATUS AND TREND REPORT Statewide

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

Population objectives and guidelines

The statewide cougar management goal is to maintain healthy, self-sustaining cougar populations within each cougar management units (except CMU 9), while minimizing the number of negative human-cougar interactions. In the past, harvest characteristics were used as guidelines for managing statewide cougar populations; as population management was primarily achieved through recreational hunting. Human-cougar interactions are managed through education, capture-removal, depredation permits, and public safety cougar removals. Given current level human-cougar interactions, increasing harvest opportunities in high complaint areas is a priority.

Hunting seasons and harvest trends

Cougar seasons have changed significantly over the last several years (Figure 1). During the November 1996 general election, Washington voters passed initiative 655 which banned the use of hounds for hunting cougar and bobcat, and the use of bait and hounds for hunting black bear. Initiatives become effective 30 days after passing in Washington, therefore, the use of hounds for hunting cougar became prohibited 8 days into the 1996 cougar permit season. In an effort to mitigate the anticipated decrease in cougar harvest (i.e., post I-655), permit-only seasons were replaced with general seasons, cougar seasons were lengthened from approximately 6 weeks to 7 and one-half months, and bag limit was increased from 1 to 2 cougar/year. Legislation was also passed that provided the authority to the Fish and Wildlife Commission to establish reduced costs for cougar and black bear transport tags. With these efforts, annual cougar harvest during post I-655 years has ranged within similar levels as pre I-655 years (Figure 1).

Population status and trend analysis

Due to the elusive nature of cougars and their relatively low densities, no statewide survey is conducted to determine cougar population status. Rather, the status of cougar populations are estimated using several methods, including: survival of radio collared cougar, computer population models, harvest characteristics, and trends in human-cougar interactions.

Based on population reconstruction models, harvest age data, the statewide cougar habitat

estimates, the cougar population in Washington is likely between 2,400–4,000 animals, and cougar population size is likely declining in a few areas of the state (Figures 2-4).

Typically, the status of local or regional cougar populations are monitored via hunter effort and success, median age data, and percentage of females in the harvest; but only when viewed over several years with consistent harvest methods. Due to the changes in harvest methods during the last several years (predominantly hound hunters during pre I-655 years versus entirely spot-stalk hunters during post I-655 years), no reliable trend data exist to accurately assess regional cougar populations or exploitation levels.

Nuisance and damage activity

With a history of high human-cougar interactions, the Department developed a special cougar removal process to address cougar densities in areas with high levels of human-cougar interactions. Under rules adopted by the Fish and Wildlife Commission, public safety cougar removals occurred in 20 Game Management Units during the Dec 15, 2002–Mar. 15, 2003 removal period. Seventy-six cougar were identified for removal and licensed hunters removed 55 animals (72% success rate). Confirmed human-cougar incidents decreased from 498 in 2001 to 378 in 2002 (Figure 5).

Management conclusions

The statewide cougar population appears to be declining at this time due to objectives to address public safety and protection of property. Given the distribution of cougars in Washington and the projected growth of human populations, interactions between humans and cougars will likely continue. As such, the long-term future of cougar in Washington ultimately rests in our ability to co-exist. Therefore, management efforts should also continue to look for ways to minimize human-cougar interactions, particularly at the local population level.

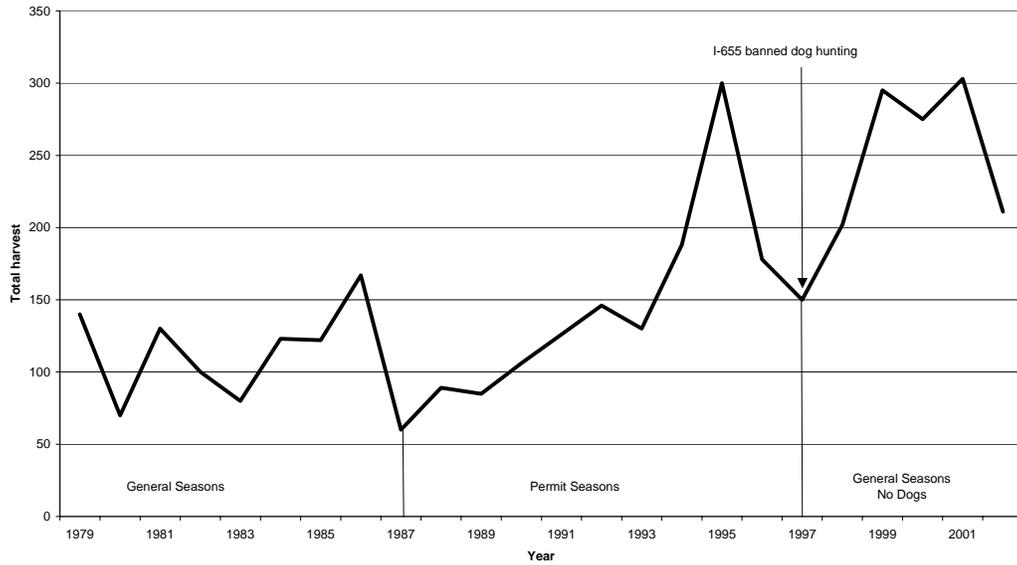


Figure 1. Trends in cougar season structure and harvest in Washington, 1935-2002.

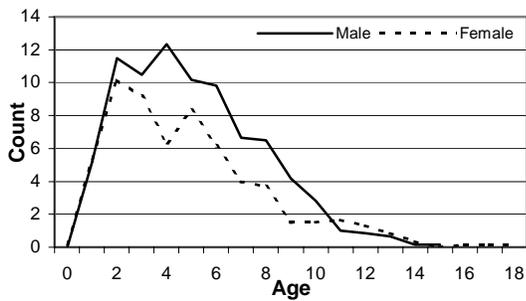


Figure 2. Age structure of harvested cougar using selective harvest methods, 1990-1995, Washington.

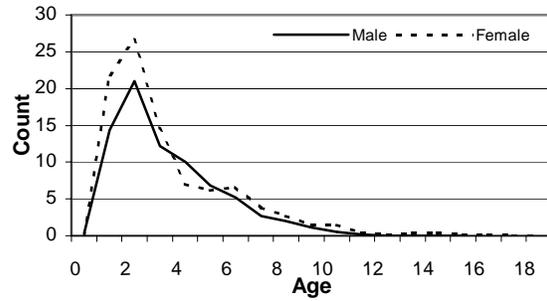


Figure 3. Age structure of harvested cougar using non-selective harvest methods, 1996-2001, Washington.

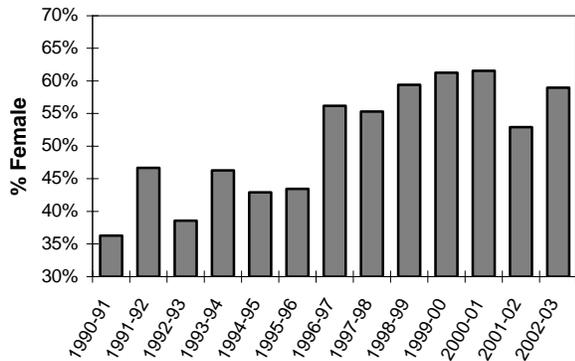


Figure 4. Percent female in statewide cougar harvest, 1990-2002, Washington.

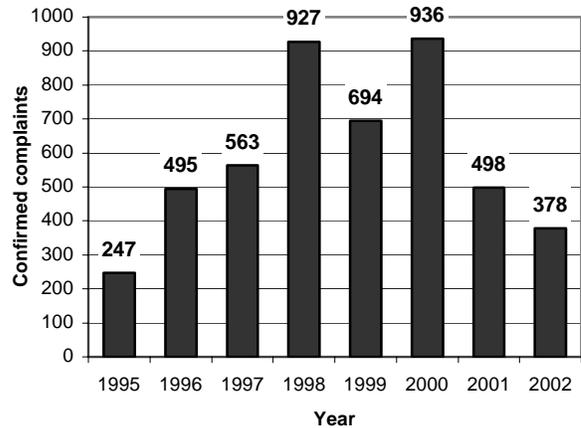


Figure 3. Trend in total confirmed cougar complaints in Washington, 1995-2002 (Includes human safety incidents, pet and livestock incidents, and sightings in suburban or unexpected areas)

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 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 2002 cougar season extended from August 1, 2002 through March 15, 2003. There were no permit or pursuit-only seasons. Since the passage of Initiative 655 the use of hounds in cougar hunting is prohibited.

A total of 15 cougars were taken during the 2002-2003 cougar season in the Coastal Management Unit. Fifty-three percent of the harvest was females. Teeth from 13 harvested cougars (5 males, 8 females) were submitted for aging. The 8 females ranged in age from 1.5 to 11.5 years (median 3.0 years). The 5 males ranged in age from 1.5 to 4.5 years (median 1.5 years). The relatively large yearly fluctuations in age and sex ratio parameters are likely the result of small sample sizes.

Population status and trend analysis

Indirect indications, such as human-cougar interactions, suggest that cougar numbers are still increasing. Table 2 lists human encounters with cougars as well as nuisance and depredation cases for all GMUs in the Coastal cougar unit. Only cases that are confirmed and/or involving reliable witnesses are listed. To be counted as a human – cougar encounter the incident has to occur outside of areas where cougars are expected to occur or the behavior of the cat towards the human is judged to be a potential safety hazard. Reports based on singular sightings alone without depredation or potential threat of injury are not included. This also applies to reports deemed inconclusive.

Management conclusions

Harvest has not increased with increasing 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 efficiency and allow the stabilization of the cougar populations.

Table 1. Cougar hunting harvest and percent females in harvest for 1996-2003.

Year	Hunt Type	Harvest	% Females
1996	Permit Hunts	14	57
1997	Permit Hunts	11	45
1998	General Season	15	60
1999	General Season	24	75
2000	General Season	14	38
2001	General Season	23	48
2002	General Season	15	53

Table 2. Numbers of cougar incidences by GMU in 2002 for the Coastal Management Unit.

GMU	Human Encounter	Depredation/ Nuisance	GMU Total
501	0	0	0
504	0	0	0
506	0	0	0
530	0	0	0
601	0	0	0
602	0	0	0
603	1	3	4
607	0	3	3
612	0	1	1
615	0	0	0
618	0	0	0
621	3	8	11
636	0	0	04
638	0	0	0
642	1	1	2
648	2	0	2
651	0	0	0
658	0	1	1
660	0	1	1
663	1	0	1
672	0	0	0
673	0	0	0
681	0	0	0
684	4	0	4
Total	12	18	30

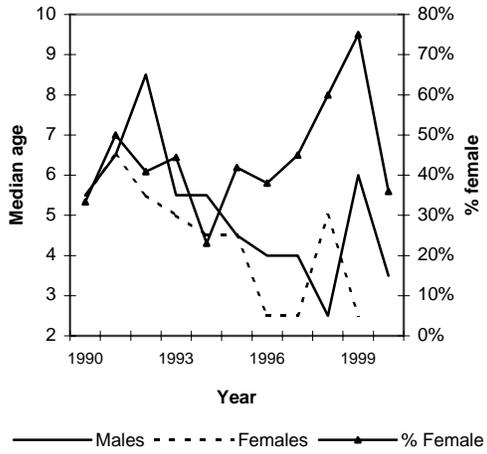


Figure 1. Median ages and percent females of cougar harvest, 1990-2000.

COUGAR STATUS AND TREND REPORT: REGION 4

Puget Sound Cougar Management Unit (CMU 2)

North Cascade Cougar Management Unit (CMU 3)

LEE KANTAR, District Wildlife Biologist

Population objectives and guidelines

The population objectives for the Puget Sound Cougar Management Unit (CMU) is to reduce cougar populations to enhance public safety and protect property and for the North Cascades Cougar Management Unit to maintain a stable cougar population (WDFW 2003). A harvest level that maintains cougar populations slightly below current levels may help reach these objectives.

Hunting seasons and harvest trends

Cougar harvest is often dependent on snowfall and hunter access; therefore, harvest can vary annually. Harvest level and trends for the Puget Sound and North Cascades CMUs are presented in table 1.

The general cougar hunting season was from August 1, 2002- March 15, 2003. A valid big game hunting license that included cougar as a species option was required to hunt.

The passage of Initiative 655 in 1996 restricted the use of hounds to hunt lions. Subsequently, we should theoretically expect a decrease in hunting related mortality and an increase in human related non-hunting mortality (e.g., hit by vehicle, depredation kills etc. Spencer et. al. 2001). Estimation of the number of non-hunting human related cougar mortalities is difficult to predict. However, based on modeling efforts it appears cougar populations will continue to increase about 1.5% per year for the next few years (Bender, unpublished data). This increase is, in part, due to the current regulations governing harvest of cougars. Although it appears cougar harvest has not declined, despite the ban on use of dogs.

Hunting conditions for the 1997 season were characterized by below average snowfall at the lower elevations making tracking of cougars more difficult. In 1998 and 1999 snowfall levels reached record depths at elevations above 2,800 feet, likely forcing cougars to lower elevations thereby increasing vulnerability to hunting. Deep snow conditions at high elevation, the extended seasons, and reduced license fees may have contributed to the increase in harvest in 1998 and 1999. The 2000 season was characterized by record low rainfall and mountain snow accumulation; yet harvest declined only slightly to 29 from the previous three-year average of 32. The following years

2001 and 2002 alternated between above average and below average snowfall respectively.

In the Puget Sound and North Cascades CMU, 22 cougars were killed (all sources combined) during the 2002 season; a decrease of about 22% from 2001 (Table 1). In these CMUs, the average percent female cougars in the harvest for the 7-year period (1990-96) was about 39%, compared to 63% for 1997-98, 69% for 1999, and 64% in 2001-2002. Only in 2000 did the percent female drop notably to 45%. Excessive harvest levels are characterized by a high proportion of females in the harvest (WDFW 1997); however, this statement should be evaluated with caution. The increase in the proportion of females in the harvest may be related to the “random” harvest by boot hunters; in other words deer and elk hunters who harvest a cougar incidentally to their deer and elk hunting efforts. This is contrary to cougar harvest by hound hunters, as they more often had the opportunity to “selectively” harvest cougars. With increasing cougar populations, yearly harvest that includes a high percentage of females should be followed and averaged on a three-year basis prior to evaluation of potential impacts to the population in these CMUs.

Population status and trend analysis

Statewide population status and trend analysis are projected from two methods: 1) habitat availability and cougar numbers based on density of 2.9 lion/100 km² and 2) sex and age ratios, cohort reconstruction, and computer simulation modeling (POPII, Bender, unpublished data). New population monitoring efforts are being put into place starting in 2003.

The 2002 statewide population estimate from population models, habitat availability, and harvest data estimate numbers between 2,400 to 4,000 animals (WDFW 2002). Projections at the CMU level are difficult and less precise, but these CMUs likely have between 275-450 cougars (Spencer, unpublished data).

Cougar populations remain strong even during a period of notable habitat alteration and loss, primarily due to development. While this may appear contradictory, it is likely the result of cougar adaptability and re-colonization of previously unoccupied habitats. Preliminary data suggests cougar adaptability provides them the ability to effectively use

Table 1. Harvest, Depredation, Public Safety Removal, and Other Mortality Sources for Cougars CMU's 2-Puget Sound and 3-North Cascades for Years 1997-2000.

Year	Female					Male					Total
	Hunter Harvest	Depredation Take	Public Safety	Other	Female Total	Hunter Harvest	Depredation Take	Public Safety	Other	Male Total	
1997	14	1	na	1	16	7	0	na	0	7	23
1998	20	0	na	1	21	13	1	na	3	17	38
1999	24	1	na	0	25	10	1	na	0	11	36
2000	10	1	2	0	13	11	2	3	0	16	29
2001	11	0	7	0	18	7	0	3	0	10	28
2002	7	1	6	0	14	6	0	2	0	8	22
Total	86	4	15	2	107	54	4	7	3	69	176

Note: 2000 was first year of public safety cougar removals.

vacant rural, suburban, and limited urban and other marginal forested patches (Spencer, unpublished data). These areas are often classified as designated open space, watershed preserves and riparian corridors. These sites can provide ample interim and potentially long-term alternative prey species, such as raccoon, opossum, coyote, with some areas supporting traditional prey such as deer (Spencer, unpublished data).

Nuisance and damage activity

Cougar damage to private property primarily involves killing and injuring pets and livestock. Little information is available to quantify livestock and pet depredation activities.

The incidents of nuisance cougars reported to the WDFW has recently decreased from a high point in 2000. There were 247 reports in 1995 and a 50% increase to 495 in 1996, by 2000 incidents again nearly doubled to 936. Consequently in years 2001-2002 complaints have dropped significantly to an average of 438 (WDFW 2002). The department has worked hard to address issues surrounding cougars through active management and education

Habitat condition and trend

There are currently about 8,849,668 ha of habitat available to cougars in Washington; the Puget Sound CMU covers 12% of this range (1,052,410 ha). Habitat loss and alteration, coupled with human population growth, can have significant long-term negative impacts to wide-ranging carnivores such as cougars. These impacts will likely be most significant in the rapidly urbanizing western counties in the Puget Sound CMU. For example, in King County alone there are approximately 9,750 homes constructed to house the 16,285 new people every year, much of this construction will occur in the suburban and rural areas currently occupied by cougars. King County is projected to have an additional 146,250 homes and 244,275 people by the year 2010 (King County Comp. Plan 1994). This will have effect cougar habitat availability, juvenile and adult survival, and population

levels.

Management conclusions

There are currently about 8,849,032 ha (21,872,532 acres) of cougar habitat within the overall range of cougars in Washington State; these CMUs cover about 23% of this range, or about 1,673,000 ha. Much of the western portion of this cougar habitat is adjacent to major metropolitan areas (e.g., Seattle, Tacoma, and Everett) and within dispersal range of subadult cougars. These rapidly urbanizing areas pose unique circumstances that affect cougar survival including: 1) reduced capacity of the landscape to support cougars, 2) increased potential for human-cougar encounters, 3) increased intra-specific cougar interactions and mortality, and 4) increased likelihood for non-hunting human-related cougar mortality (hit by vehicle, depredation kills etc.).

Currently, more than 42% (2,248,000 people) of Washington's State's 5,335,000 total populations live within the Puget Sound CMU. Continued human population growth and subsequent habitat loss will have a profound effect on the population dynamics of cougars and their viability as well as our ability to balance tolerance of cougars with public safety concerns.

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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 2002 to 15 March 2003. The bag limit was one cougar. The suspected reduction in cougar harvest after the passage of Initiative 655, which banned the use of hounds, has not been manifest in the South Cascades Cougar Management Unit (Table 1). Harvest report cards and pelt sealing records indicate that cougar harvest in CMU 4 has increased since passage of the Initiative. Harvest in 2002 decreased in comparison to the recent past but is still higher than historical records. The reduced fee structure and combination license structure may be encouraging more hunters to pursue cougar.

Surveys

Because cougars are difficult to survey and budgets are limited, no surveys for cougar were conducted in the CMU 4.

Population status and trend

Based upon harvest and complaint data, the cougar population in CMU 4 is stable to increasing. The prey base and habitat in the unit are well distributed and cougar are probably utilizing most, if not all, available habitat. Nuisance complaints involving cougar are increasing, but no public safety or depredation removals took place in CMU 4. WDFW officers are spending an increasing amount of time responding to cougar sightings and complaints. In the 2001-2002 report period, officers responded to 53 cougar complaints and found 15 of them to be credible or verified.

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

The recent high level of cougar harvest may have reached a plateau in CMU 4, indicating the modification in lawful hunting methods in conjunction with an increasing human population may result in a stable level of cougar-human conflicts. Increasing urbanization will force cougar to utilize areas frequented by humans, leading to increased risk for public safety. 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 (CMU), 1994 – 2002.

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

COUGAR STATUS AND TREND REPORT: REGION 3 East Cascades South Cougar Management Unit (CMU 7)

JEFFREY A. BERNATOWICZ, District Wildlife Biologist

Population objectives and guidelines

Management objective for East Cascades Cougar Management Unit (CMU 7) is to maintain a cougar population at a socially acceptable level while providing recreational opportunity.

Hunting seasons and harvest trends

Fourteen cougar were taken during the 2002-03 season (Table 1). The harvest has increased since 1997 when the use of dogs was prohibited. The increase in female take is of concern. The 8-year average harvest is now 9 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, but is still limited in distribution and size.

Nuisance and damage activity

Nuisance and damage activity in CMU 7 was low. No cougar have been moved or harvested for depredation or threats to public safety.

Habitat condition and trend

Cougar populations in CMU 7 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 7. 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 7, but suggests the population is growing. There are few nuisance or damage complaints. Harvest has increased since the ban on hounds for cougar hunting. The increase in percent females needs to be monitored.

Table 1. Cougar harvest in CMU 7.

Year	Hunt Type	Harvest	% Females
1995	Permit only	8	37
1996	Permit/General	0	NA
1997	General Season	3	100
1998	General Season	8	25
1999	General Season	9	22
2000	General Season	14	61
2001	General Season	16	53
2002	General Season	14	44

COUGAR STATUS AND TREND REPORT: REGION 1 Northeastern Cougar Management Unit (CMU 8)

STEVE ZENDER, District Wildlife Biologist

Population objectives and guidelines

Long-term objectives are to maintain healthy cougar populations within the Northeast Cougar Management Unit (CMU 7) while limiting numbers compatible with public safety and property protection. Opportunity for recreational hunting is provided at levels consistent with achieving these objectives. Current cougar populations threaten public safety and property thus special permits to hunt with hounds (Public Safety Cougar Removal permits) were issued for specific areas within some Game Management Units.

Hunting seasons and harvest trends

Hunting season in the Northeast CMU was consistent with the statewide season of August 1, 2002 - March 15, 2003. The season limit on cougar remained at 2 per hunter during the 2002 – 2003 season.

A total of 38 Public Safety Cougar Removal (PSCR) permits were issued in CMU 7 in 2002.

The 2002-2003 cougar harvest levels declined significantly for the first time in several years (Figure 1). Recreational hunters took 52% (47) of the total harvested cats. Depredation hunts and other mortalities accounted for 14% (13), and special PSCR hound hunts accounted for 33% (30). While the number of cougar killed has declined the percentages in each category have changed little from 2001.

The greatest harvest occurred in GMU 101, Sherman with 20 cougar taken, and followed closely by the neighboring unit to the west, GMU 204, Okanogan East with 17 taken. PSCR harvest accounted for a significant

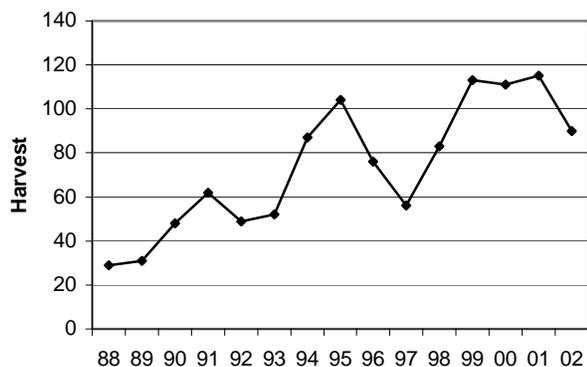


Figure 1. Cougar taken by hunters, depredation, and other means, CMU 7, 1988-2002.

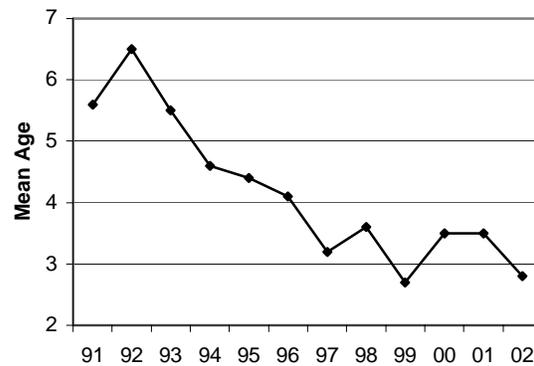


Figure 2. Mean age of harvest cougar (sample size range from 30 - 92, CMU 7, 1991-2002).

portion of this mortality as 17 total permits were issued for these two units. High harvests in some of the units that led the harvest in 2001 may account for the much lower harvests in 2002, e.g., GMU 109 dropped from 21 to 9, and GMU 113 dropped from 15 to 7.

Human safety and wildlife damage

Wildlife Officers received 188 public contacts regarding complaints or encounters with cougar in the Northeastern CMU during the 2002 calendar year. Most of these are sightings and nuisance complaints from a reliable witness; others were depredation on livestock or attacks on pets. This represents an increase from the 159 in 2001 but still much lower than the 291 recorded in 2000.

Population status and trend analysis

The percentage of females in the harvest exceeded males again in 2002 as it rose to 64% from 52% in 2001 (Table 1). In the past 5 years the total percent female harvest has been 61% (N=501). The mean age of harvested cougars in the Northeastern Unit dropped to 2.8 in 2002 (Figure 2).

Problem encounters with cougar in the Northeastern CMU remained high in 2002, actually increasing 18% over 2001. Success rates for PSCR permits were also high at 79%.

Habitat condition and trend

Deer populations remain at moderate population levels with the highest densities, especially white-tailed

deer, in the lower elevations and agricultural areas. The deer population trend has been stable so this is likely to have a moderating effect on cougar populations as well.

The turkey population has increased dramatically in much of the Northeast unit in the last several years and may be providing a significant alternate prey source that has not traditionally been available.

Management conclusions

The cougar harvest declined in 2002 to 90 cats taken in CMU 7 relative to the previous 3-year average of 113 (20% decline). Cougar sightings and complaints remained high in 2002 though so that resulted in 38 PSCR permits issued for hound hunts during the 2002-2003 winter.

It appears the mortality rate on cougar in the Northeast CMU 7 has been high in the last several years and data this year suggests that trend continues. Given we saw a decline in harvest, and over 60% of the harvest in the last

5 years has been female,

Table 1. Cougar harvest, depredation, public safety removal and other mortality, CMU 7, 1994-2002 * Other Take includes Public Safety Removal Harvest beginning in year 2000

Year	Female			Male			Combined Harvest (Includes Unknown sex)			Percent Female
	Hunter Harvest	Other Take	Female Total	Hunter Harvest	Other Take	Male Total	Hunter Harvest	Other Take	Total Harvest	
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%

and the average age of harvested cougar dropped to a near record 2.8 this year, it appears the over-all population is being suppressed.

With the relatively high incidence of complaints regarding cougar though, there will be similar levels of PSCR permits issued for the 2003 winter with the intent of further suppression of the population to reduce the threat of cougar to public safety and property loss.

COUGAR STATUS AND TREND REPORT: REGION 1 Blue Mountains Cougar Management Unit (CMU 9)

PAT FOWLER, District Wildlife Biologist
PAUL WIK, Wildlife Biologist

Population objectives and guidelines

The cougar population in the Blue Mountains appears to have stabilized at a high level over the last few years, and is still above historical population levels of the 1970's and 1980's. Cougar populations will be managed at a level to provide both consumptive and non-consumptive recreational opportunity, while minimizing conflicts with the public and other management objectives.

Hunting seasons and harvest trends

Cougar hunting seasons have changed significantly over the last 20 years, from general seasons, to permit controlled seasons, to seasons where dogs could no longer be used. Since Initiative 655, the cougar season has been expanded and runs a total of 228 days, from August 1 to March 15.

The 2002 hunting season produced a harvest of 13 cougar for the Blue Mountains (Figure 1.), compared to 19 in 2001, a 32% decline. Since Initiative 655 was passed, the annual cougar harvest has ranged from 7 - 34, with an average of 17 cougar/year. This is exactly the same average harvest attained during the permit controlled cougar hunting era of 1987-1996, and considerably higher than the pre-permit era of 1974-1986 (2 cougar/year).

The increased cougar harvest since the implementation of Initiative 655 can be attributed to several factors, 1.) reducing the price of cougar tags allowed more hunters to possess cougar tags while hunting deer and elk, which has increased the harvest during the general deer/elk seasons, 2.) more hunters appear to be hunting specifically for cougar during the winter months, and 3.) the higher cougar population results in more hunter/cougar contact. Hunters are also improving the techniques used for hunting cougar without the aide of dogs. Tracking cougar in fresh snow has become a favorite method. Hunters are also developing new methods of using calls to attract cougar, and being highly successful.

When hounds were used to pursue cougar, males dominated the harvest. However, since hounds were outlawed, females have comprised a much larger percentage of the harvest. During the permit controlled hunting era (1986-96) when dogs were legal, the percentage of females in the harvest averaged 43%.

Since 1997, the percentage of females in the harvest has increased dramatically, ranging from 61% to 78%, and averaging 69%. The increase in female cougar in the harvest is a direct reflection of the hunting opportunity available, and methods used to harvest cougar. Hound hunters prior to 1997, had the opportunity to determine if the cougar treed by there hounds was a male or female, and large enough to satisfy the hunter. Today, much of the harvest occurs during the deer and elk season when hunters harvest cougar on an opportunistic basis, not paying much attention to whether the cougar is male or female. Hunters tracking cougar in the snow, or using predator calls probably do not hesitate to harvest a female cougar (Table 1).

The 2002 cougar harvest was evenly split between the east and west Blue Mountains; west-6 cougar, east-7 cougar. No cougar were harvested in GMU-169 (Wenaha-Tucannon Wilderness), but we do receive numerous sightings, and some complaints about the number of cougar in this area.

Population status and trend analysis

The WDFW does not conduct surveys of cougar populations, but the population in the Blue Mountains appears to have stabilized at a higher level than occurred in the 1970's and 1980's. Local residents continue to report numerous sightings, and complaints from citizens reporting sightings near homes and towns are common. A few instances of cougar attacking or killing livestock still occur. As long as deer populations remain at fairly high levels, the cougar population should remain fairly stable.

Nuisance and damage complaints

Cougar nuisance and damage complaints still remain at higher levels than occurred during the 1970's and 1980's. Cougar complaints averaged 37 per year between 1998 and 2000. In 2002, agents responded to 27 complaints in the Blue Mountains. Prior to 1990, cougar complaints and sightings were rare in southeast Washington.

Management conclusions

Cougar populations in the Blue Mountains appear to have stabilized, but remain at a high level. Hunting seasons should remain fairly liberal in order to

maximize recreation and hold the cougar population at a level that doesn't result in an increase in damage complaints.

Table 1. Cougar Harvest Trend 1992-2002, 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	64%

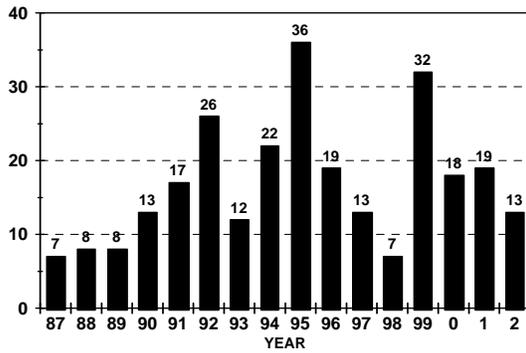


Figure 1. Blue Mountains cougar harvest 1987-2002.

Mourning Dove
and
Band-tailed
Pigeon

BAND-TAILED PIGEON AND MOURNING DOVE Statewide

DON KRAEGE, Waterfowl Section Manager

Population objectives and guidelines

Pacific Coast band-tailed pigeons and mourning doves are managed cooperatively with the U.S. Fish and Wildlife Service (USFWS) and western states through the Pacific Flyway Council (PFC). The PFC has developed management plans for these populations, and has established a population objective for band-tailed pigeons in Washington as the five-year average call-count survey index for 1980-84. This objective is based on a population level capable of sustaining recreational harvest. The current three-year average call-count index must be above this level to provide a hunting season. PFC is currently working to develop a population objective for mourning doves.

Hunting seasons and harvest trends

The band-tailed pigeon season was closed in Washington from 1991-2001. A limited season was reopened in 1992, with season dates of September 15-23 and bag/possession limits of 2/4. The mourning dove season has run September 1-15 since 1980, with bag/possession limits of 10/20.

Surveys

The call-count survey was initiated in 1975, and was patterned after the mourning dove survey. WDFW also participates in the annual mourning dove survey coordinated by USFWS. This report describes the results of band-tailed pigeon call-count surveys completed in the summer of 2002 and mourning dove surveys completed in the late spring of 2003.

Methods

Band-tailed pigeon call-count survey. The band-tailed pigeon call-count surveys are similar to mourning dove call-count routes. A total of 50 routes, 5.7 miles in length comprise the survey, conducted in western Washington below 1,000 ft. elevation. Surveys are completed during a 16-day period beginning the Saturday closest to June 21. Routes are distributed fairly uniformly throughout western Washington, and are selected based on logistics concerns in known or likely band-tail habitat. Routes are started exactly 10 minutes before sunrise and are made up of 20 listening stations along roads. At each stop observers record the time at the stop, the number of individual band-tails heard calling, the number of band-tails seen, the disturbance level, and any

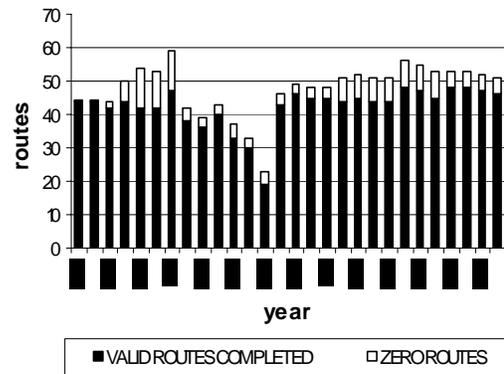


Figure 1. Call-count survey routes, 1975-2002.

comments related to conditions at the stop. Additional details on survey design can be found in Jeffrey (1989).

Routes that have band-tails present and subsequently are without band-tails for a three-year period are relocated in the vicinity of the existing route, and are added to the database as an automatic zero (without additional survey) for use in the data analysis. New routes without band-tails present are relocated without further consideration. Routes were evaluated in 1988, 1992, 1996, and 2000 to determine which were to be relocated, dropped, or converted to automatic zeros.

Data are entered into the WDFW mainframe computer by data entry staff and then are evaluated to ensure that routes were conducted within allowable survey dates and start/stop times. Beginning in 1992, data from acceptable routes completed and zero routes have been sent to USGS in Laurel, MD (Bill Kendall) for analysis using route regression programs developed for the mourning dove survey (Sauer *et al.*, 2003). The number of acceptable routes completed and zero routes are shown in Figure 1.

Mourning dove call-count survey. The mourning dove survey was completed between May 20-31, following methods in Dolton and Smith (2003). Cooperators from WDFW, USFWS, Yakama and Colville Tribes, and Chelan P.U.D completed routes. Data were sent to USFWS in Laurel, MD.

Band-tailed pigeon harvest. Band-tailed pigeon hunters were required to obtain a special hunting authorization and submit a harvest report following the season. Harvest was estimated using a two-wave sampling design to account for non-response bias.

Mourning dove harvest. Mourning dove harvest was estimated as part of the statewide hunter survey conducted by WDFW (WDFW 2002).

Results

Band-tailed pigeon call-count survey. The Washington call-count survey results are presented in Table 1 and Figures 1-2. The three-year average index of 2.79 was above the 1980-84 population objective index (this index varies each year because of route-regression analysis methods, but was 2.24 for the 2002 analysis).

Mourning dove call-count survey. The mourning dove analysis and report were completed by Dolton and Smith (2003).

Mourning dove harvest. Harvest in 2002 was estimated at 68,622 doves, down 12% from 2001. Hunter numbers were estimated at 5,660, down 5% from 2001. Number of days hunted was 15,986, down 8% from 2001.

Band-tailed pigeon harvest. A total of 522 hunting authorizations were issued for the 2002 season, and an estimated 187 persons hunted. Total harvest was estimated at 273 band-tails, with 357 days hunted (successful hunters only).

Population status and trend analysis

Table 1 and Figure 2 show that based on the call-count survey, the band-tailed pigeon population has stabilized since 1975, and has generally increased recently. The route regression method is not as precise in determining short-term trends, as evidenced by the large confidence intervals for the two-year trends in Table 1. The large spans of these intervals are caused by low sample size due to changing observers from year to year. However, the confidence intervals for the long-term trends are much narrower, pointing to the utility of the survey in monitoring the population.

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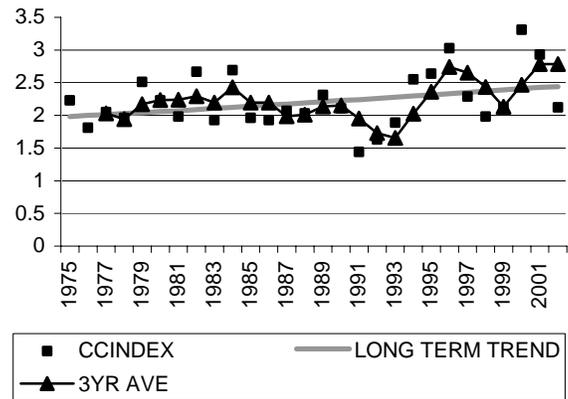


Figure 2. Band-tailed pigeon call-count survey trends

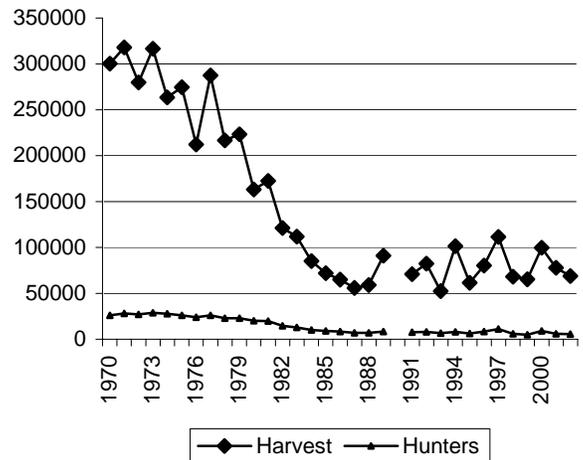


Figure 3. Dove harvest and hunter trends.

Start Year	End Year	Change	Lower 90% CI	Upper 90% CI	Routes Used	Sign. level
1975	1992	-7.8%	-14.0%	-2.0%	63	p<0.05
1991	1992	10.1%	-50.0%	75.0%	11	n.s.
1975	1993	-6.0%	-11.0%	-1.0%	65	p<0.05
1992	1993	44.0%	-49.0%	152.0%	13	n.s.
1975	1994	-3.4%	-8.2%	1.4%	69	n.s.
1993	1994	71.0%	1.4%	141.0%	24	p<0.05
1975	1995	-2.7%	-9.8%	4.5%	70	n.s.
1994	1995	12.1%	-31.3%	55.3%	12	n.s.
1975	1996	-0.8%	-6.5%	4.9%	59	n.s.
1992	1996	24.3%	10.4%	38.2%	30	p<0.01
1995	1996	36.4%	-35.9%	108.7%	18	n.s.
1975	1997	-0.8%	-6.0%	4.3%	62	n.s.
1993	1997	8.9%	0.2%	17.6%	32	p<0.10
1996	1997	-14.3%	-35.4%	6.7%	18	n.s.
1975	1998	-1.5%	-5.5%	2.4%	65	n.s.
1994	1998	2.1%	-8.7%	13.0%	34	n.s.
1997	1998	-11.0%	-45.8%	23.9%	11	n.s.
1975	1999	-0.1%	-4.1%	3.8%	67	n.s.
1995	1999	-3.3%	-11.5%	4.9%	38	n.s.
1998	1999	26.7%	-19.7%	73.1%	14	n.s.
1975	2000	-0.3%	-6.2%	5.5%	70	n.s.
1996	2000	5.9%	-2.3%	14.1%	41	n.s.
1999	2000	21.1%	-12.5%	54.8%	24	n.s.
1975	2001	1.7%	-2.3%	5.7%	70	n.s.
1997	2001	15.8%	8.0%	23.6%	44	p<0.01
2000	2001	1.8%	-16.6%	20.2%	36	n.s.
1975	2002	0.7%	-3.7%	5.0%	71	n.s.
1998	2002	9.4%	2.6%	16.2%	45	P<0.05
2001	2002	0.9%	-27.5%	25.8%	32	n.s.

Waterfowl

WATERFOWL STATUS AND TREND REPORT

Breeding Populations and Production

RON FRIESZ, Waterfowl Specialist

Introduction

This report summarizes data collected during 2003 for breeding waterfowl populations, duck broods, pond index, and goose nest surveys for the state of Washington. Washington Department of Fish and Wildlife, U.S. Army Corps of Engineers, Yakama Indian Nation, Colville Confederated Tribes, Washington Waterfowl Association, and Chelan County Public Utility District collected data.

Duck Breeding Population Survey

Methods

Surveys are conducted annually within the seven strata in eastern Washington: West Okanogan Potholes, Omak-Douglas Potholes, Far East Potholes, Northeast, and Palouse Streams, Columbia Basin Irrigated, and Yakima Irrigated (Fig. 1).

Surveys were conducted on historical transects and sampling quadrats (sections or 1/4-sections)(Fig. 1). Samples are multiplied by weighting factors to provide an index to the total number of breeding ducks and coots within the defined areas (Table 1). Weighting factors are determined from the proportion of areas within the strata that are sampled. Observations are treated as complete counts within sampling units (transects or quadrats) with no corrections for visibility bias. Surveys are conducted by ground counts, except helicopter counts are used for the 1/4-sections in the Columbia Basin Irrigated strata.

In 1997, breeding duck surveys were initiated in western Washington using a stratified random quadrat design. Survey plots are defined by section lines, or square mile areas, selected at random from strata delineated based on knowledge of breeding duck densities. Most areas are surveyed by helicopter.

Methods for estimating total number of breeding ducks follow the Standard Operating Procedures of Aerial Waterfowl Breeding Ground Population and Habitat Surveys in North America (USFWS & CWS 1987). Breeding populations are estimated by multiplying the number of pairs, lone drakes, and flocked drakes (<5 male birds) by 2, and grouped birds (mixed or >5 males) by 1. Lone hens are multiplied by 1 for redhead, scaup, ring-necked duck, and ruddy duck only. These diver species are known to be late nesters and males significantly outnumber females.

Results: Eastern Washington

The 2003 index of breeding duck populations in eastern Washington was 127,764 (Table 2, Fig. 2), down 4% from 2002 and 21% from the long-term average (Table 2, Fig. 2).

Mallard numbers were 39,843, down 11% from 2002 and 28% from the long-term average (Fig. 3, Table 2). The loss of production appeared to be restricted in the Pothole strata where duck production was down 17% from 2002 and 24% from the long-term average (Fig. 4., Table 3). Production in the Irrigated and Palouse strata was similar to 2002 while the Northeast area showed an increase in duck production of 21%. This may be indicative of displacement of ducks from the pothole areas due to extended impacts from drought conditions during the past three years.

Most of the long-term variability in our breeding duck index has come from surveys in the Potholes area (Fig. 4). This area has inconsistent precipitation patterns and many semi-permanent and ephemeral wetlands. This year 39% of the breeding ducks in all strata were found in the Potholes strata. Even with some recovery in potholes numbers, duck numbers in this stratum were down 17% from 2002, and 24% from the long-term average (Fig. 4, Table 3). The number of ducks in the irrigated strata was similar to the 2002 count, but remains 25% below the long-term average. The reason for the decline in irrigated strata remains unknown, but may be related to more efficient use of water by irrigators resulting in fewer seasonal wetlands within the irrigation blocks. Declines in waterfowl production in the wetlands associated with the wasteway systems (Fig. 5) are believed to be the result of advanced succession of wetland vegetation and the loss of open water habitats preferred by breeding ducks.

The rate of decrease for ducks that actually breed in the Columbia Basin is more substantial than total survey data indicates. The name Breeding Duck Survey is somewhat misleading, since all waterfowl are counted and many do not breed. Along with the decline in common breeding species (Fig. 5), has come an increase in the number of non-breeding scaup. Scaup broods are uncommon, but scaup numbers from our surveys are currently six times higher than they were in the early 1980s (Fig. 3.). These scaup may be

too young to breed, since many do not breed until they are 2 or 3 years old.

The breeding duck population within the Northeast strata increased 21% from 2002 and was slightly above (1%) the long-term average (Fig. 4, Table 3).

Cinnamon and blue-winged teal have not been separated in the long-term database because of differences among observers in recording data. In 2003, it was estimated about 75% of these teal are cinnamon teal. Next to mallards, cinnamon/blue winged teal were the most common breeding duck in eastern Washington until 2002 when gadwalls surpassed them in total numbers. The combined total of cinnamon and blue-wing teal is down 18% from 2002 and 62% from the long-term average (Fig. 3, Table 2). This downward trend has occurred since 1985. In the mid-1980's we had about 4.5 times as many teal as we have currently.

The gadwall numbers were 17% below 2002, but remained 29% above the long-term average. (Fig. 3, Table 2). This population growth of gadwalls seems to have occurred over the past three decades. Between the 1970's and the 1990's the average number of gadwall has increased by 3.5 times with the most noticeable increases during the early 1980's. There may be some correlation of the increased numbers and hunters avoiding the harvest of gadwalls due to misidentification of the similar appearing mallard hens and pintails which have had restrictive bag limits beginning in the mid-1980's.

Redhead numbers were down for the third straight year at 31% below the 2002 population and 50% below the long-term average. This is likely the combined result of the recent drought conditions in the pothole tract areas and loss of suitable open water habitat in the wasteway complexes associated with the irrigation projects. The last year numbers were lower than this year's estimate of 8,117 was in 1978 when there was an estimated redhead population of 7,802.

Results: Western Washington

The western Washington surveys estimated the breeding population index of mallards at 9,099 down 37% from 2002 and 55% from the long-term average. This represents the lowest estimate for mallards since the survey was initiated in 1997. The wood duck breeding index was 3,443 or 2% above 2002 survey and slightly above the long term average (2%) (Table 4, Fig. 6).

Pond Survey

Ponds are counted on 8 transects within the Potholes Area (Fig. 1) during the breeding-duck survey to index water conditions and to monitor the

availability of breeding habitat (Fig. 7, Table 5). The 1997 index was the highest ever recorded. This year the pond index was 6,685 or 31% above 2002 and 2% above the long-term average. This was the first increase in total ponds in four years. The previous cycle of drought years occurred between 1987 and 1992 (Fig. 7, Table 5). The recovery of the pothole habitat did not occur across all pothole strata. There were significant increases in Douglas, Lincoln and western Okanogan Counties, averaging a 39% increase from last year while the number of potholes on the Omak Lake plateau and the Far East tracts continued to diminish with losses of 12 and 3 percent from the 2002 numbers, 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 2003 duck production survey data for the Potholes, Palouse, and Northeast strata indicated a 12% increase in total number of broods observed from 2002 (Table 6), but remained 38% below the long-term average. Brood production was highest in the Okanogan and Northeast tracts where habitat condition experienced significant recovery in terms of available brood waters (Table 7, Fig. 8). Brood production on the Molson-Sidley route more than doubled from the 2002 survey. The brood index for the Columbia Basin was 20% above the 2002 and 13% below the long-term average (Table 7).

Canada Goose Breeding Population Survey

Methods

Canada goose breeding populations are indexed by nest searches conducted within four major geographic areas (Table 8), mainly along the Snake and Columbia rivers. Surveys are conducted annually, biennially, or periodically. Twelve surveys were added between 1975 and 1982. Survey areas have been constant since 1982. Total number of goose nests found is used to index the goose breeding population. Geese are also recorded on the breeding duck surveys (see above). Geese observed during the breeding duck surveys (Fig. 1) are weighted (Table 1) and provide an index to the goose population. Our nest surveys are conducted on areas with high densities of nesting geese. The breeding duck surveys cover a much larger area with low densities of nesting geese. Data from both nest surveys and breeding-duck routes are interpreted together to index Washington's breeding-goose population. Areas with relatively recent goose population expansions, particularly north of Spokane are not surveyed. Geese are counted in the western Washington breeding duck survey.

Results

The 2003 index for the goose-nest surveys showed a 11% decrease from 2002 and is slightly below (2%) the long-term average (Table 9, Fig. 9). This index increased between 1982 and 1987, and has remained relatively stable since (Figs. 9 and 10, Table 9).

Surveys in the Upper Columbia indicated 6% increase in nesting attempts from 2002, and remained slightly above the long-term average (2%) (Table 9, Fig. 10). Most sub-sample areas had declines in nesting attempts except Rocky Reach and Wells Pools that had increases of 18% and 27%, respectively. The 168 recorded nesting attempts at Wells Pool were the second highest since the survey was initiated in 1980 and remains 68% above the long-term average. Rufus Woods Lake had a 12% decrease from 2002. This decrease was attributed to raven predation on one nesting island. The total number of nests found on the Lower Columbia appears to have remained stable since about 1988 (Table 9, Fig. 10). However, incomplete surveys between 2000-2002 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, 373 nests were recorded in 2003, nearly the same as recorded in 2002 (372) and remains 3% above the long-term average. The John Day pool has experienced a 23% reduction in nesting attempts since 1999. This may be attributed to aggressive

invasion of woody vegetation displacing nesting habitat on the islands within the Umatilla National Wildlife Refuge. The Snake River nest surveys were incomplete in 2003; however, the 2002 count of 199 nesting attempts was the lowest since 1999 when 187 nests were counted. The reduced numbers are likely the result of the removal of artificial nesting structures by the U.S. Army Corps of Engineers in their effort to control the urban Canada geese population in the Clarkston area.

The total number of nests found in the Columbia Basin decreased dramatically by 41% from 2002 and 36% from the long-term the long-term average (Table 9). This loss is believed attributable to increased human disturbance to nesting sites on the sand dunes islands on Potholes Reservoir.

The weighted number of geese observed during the breeding duck survey was included in this report since 1995 (Table 9, Fig. 11). This index provides information about the expansion of Canada geese in areas of eastern Washington outside of our traditional goose nest index areas, and provides parallel results to the information obtained from the goose nest index. The 2003 index increased by 2% over 2002 and was 84% above the long-term average.

For western Washington, the population estimates for Canada geese increased 29% from 2002, but remains 25% below the seven-year average of the survey (Table 4, Fig. 12).

Potential Improvements to Waterfowl Breeding and Production Surveys

Breeding Duck Survey

- Expand this report to better cover western Washington
- Expand databases to include older data.
- Explore the possibilities of including data from National Wildlife Refuges and National Forests.
- Clearly delineate strata and check accuracy of weighting factors and sample size.
- Evaluate the goose nest survey areas for accuracy of frequency and completeness of surveys.

Fig. 1. Breeding duck surveys in eastern Washington.

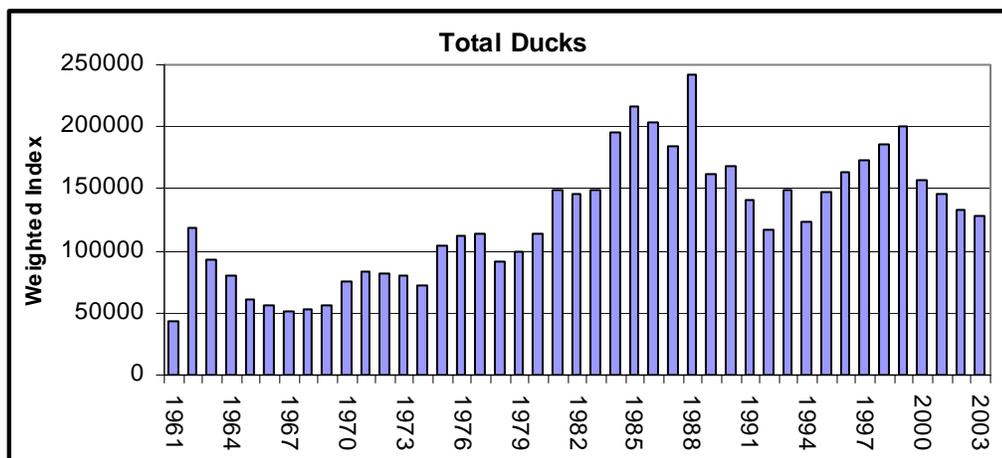
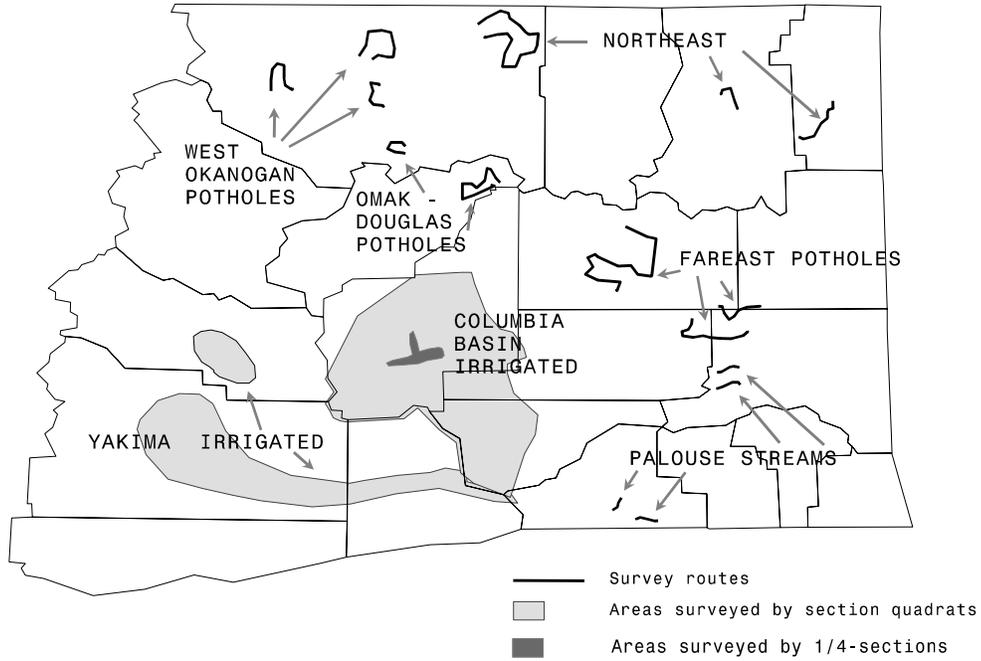


Figure 2. Breeding duck population index for Eastern Washington (1961-2003)

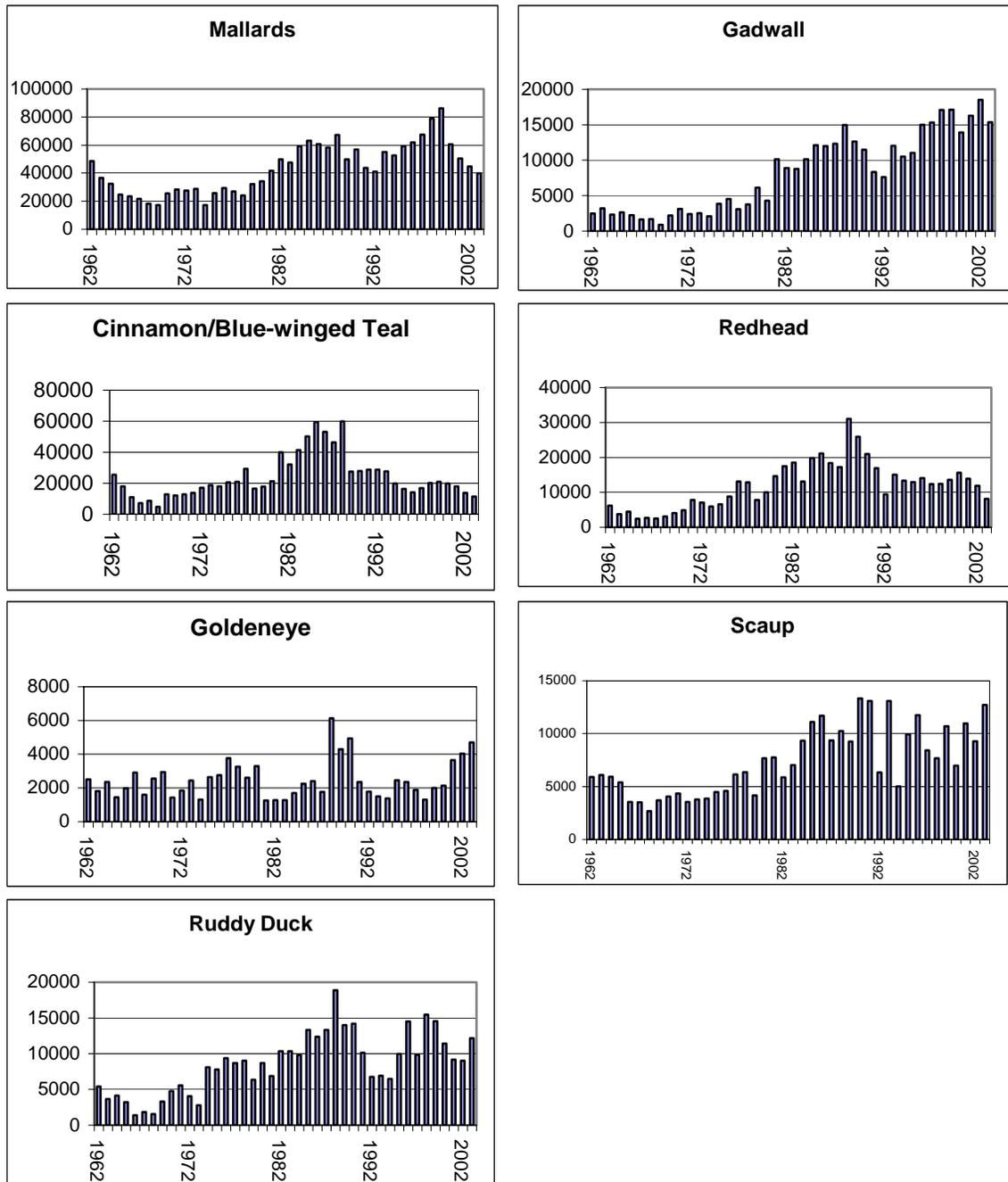


Figure 3. Indices of common breeding ducks in eastern Washington

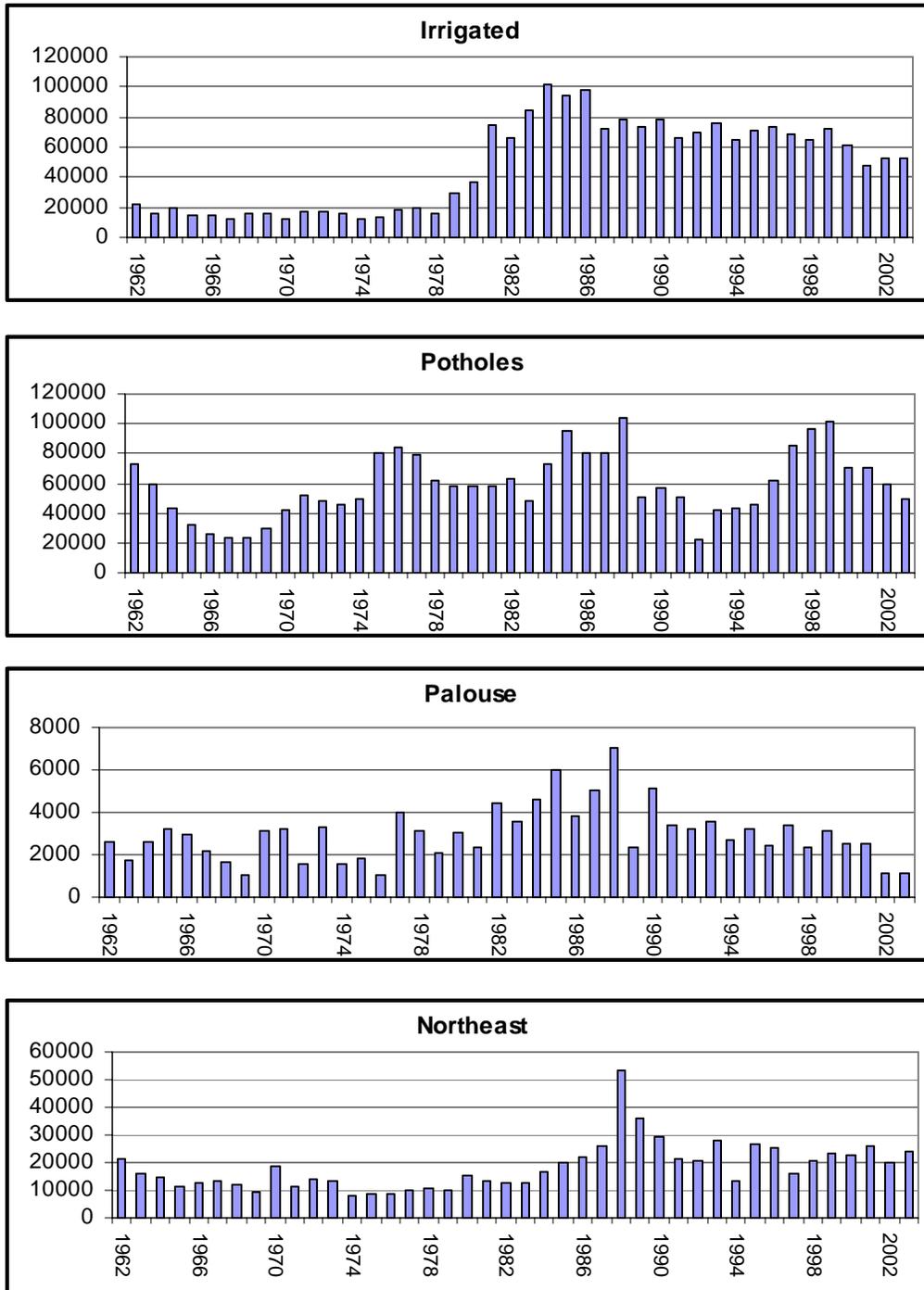


Figure 4. Weighted duck breeding population indexes by eastern Washington strata (1962-2003).

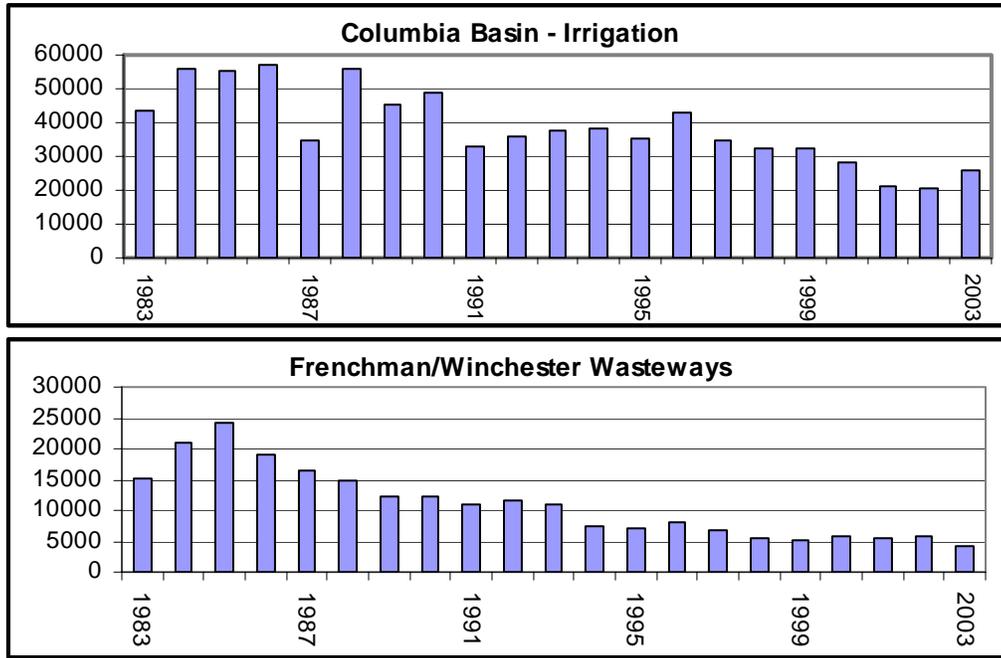


Figure 5. Weighted duck breeding populations in the Columbia Basin (1983-2003)

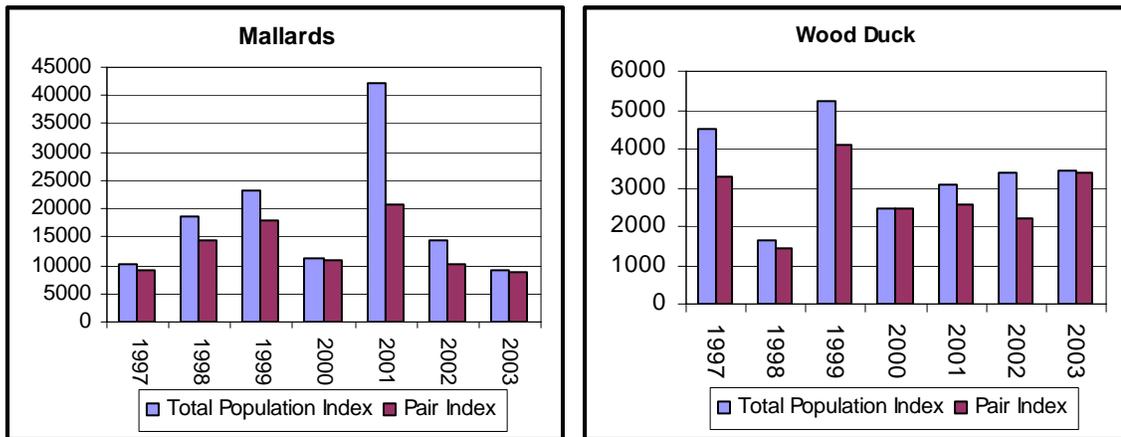


Figure 6. Western Washington breeding duck indices.

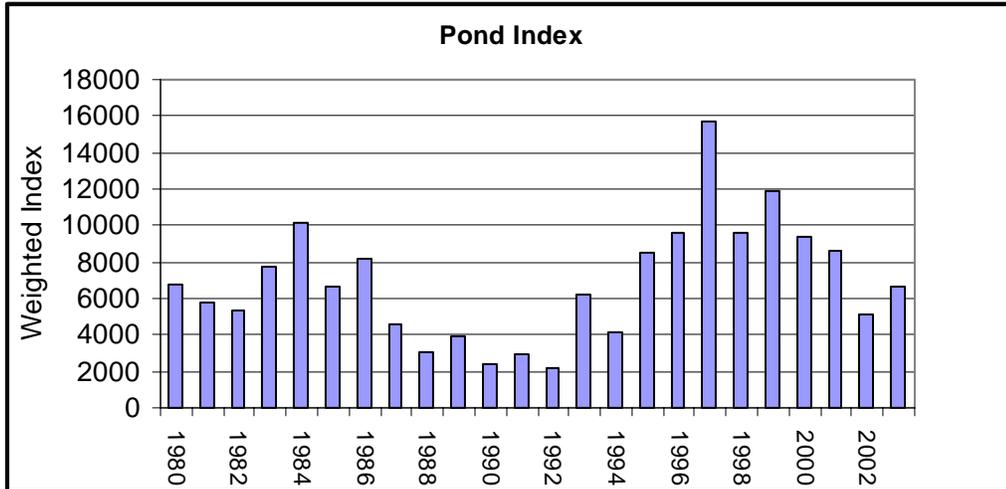


Figure 7. Index to pond numbers in the potholes strata.

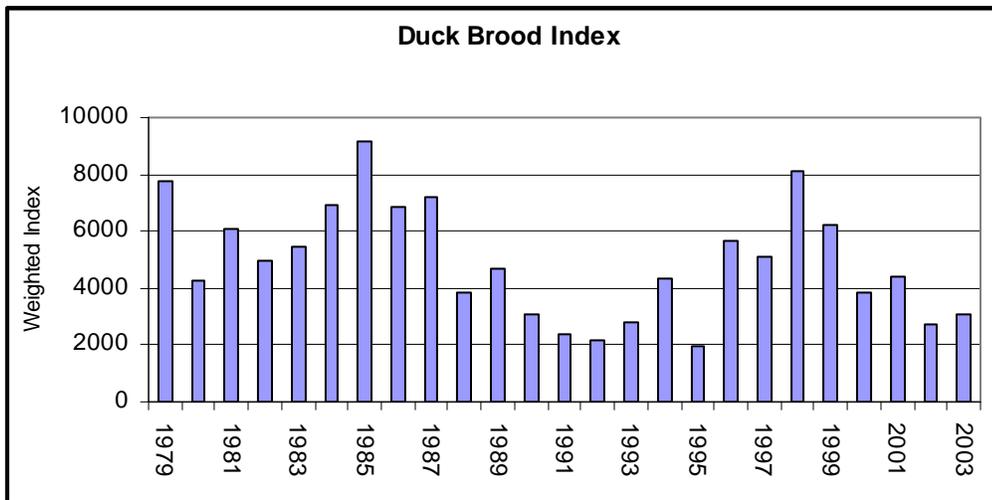


Figure 8. Weighted Duck Brood Index

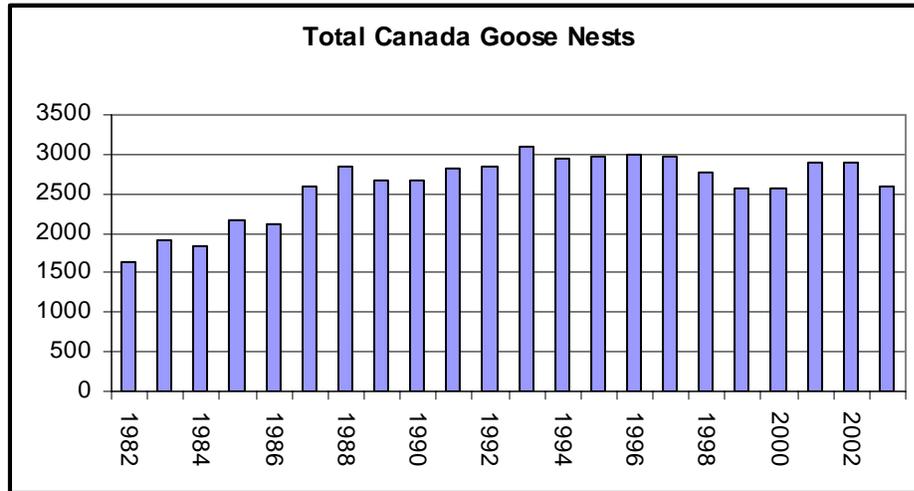


Figure 9. Total goose nests found on Columbia and Snake Rivers and in Columbia Basin.

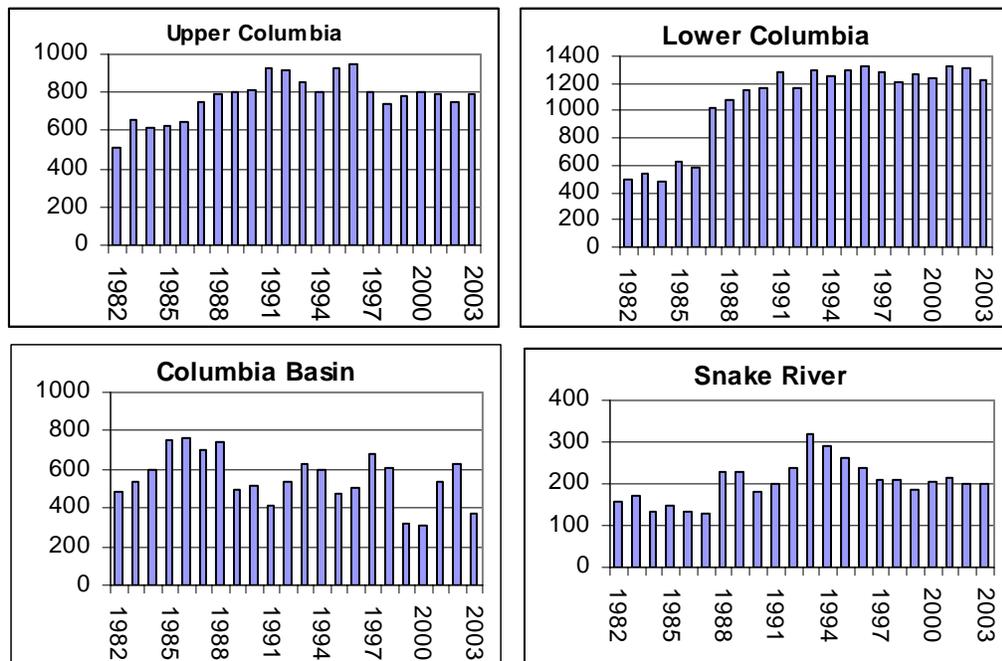


Figure 10. Canada goose nest surveys by strata (numbers of nests).

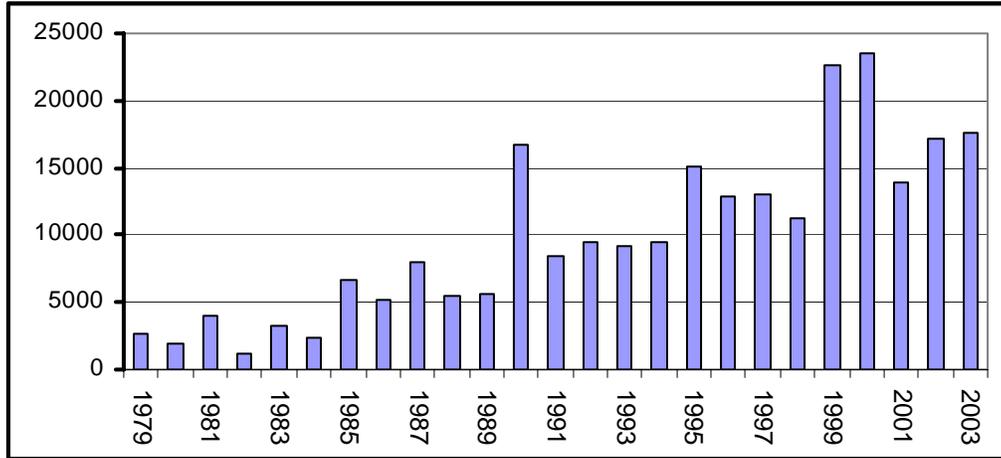


Figure 11. Canada geese counted on eastern Washington duck surveys

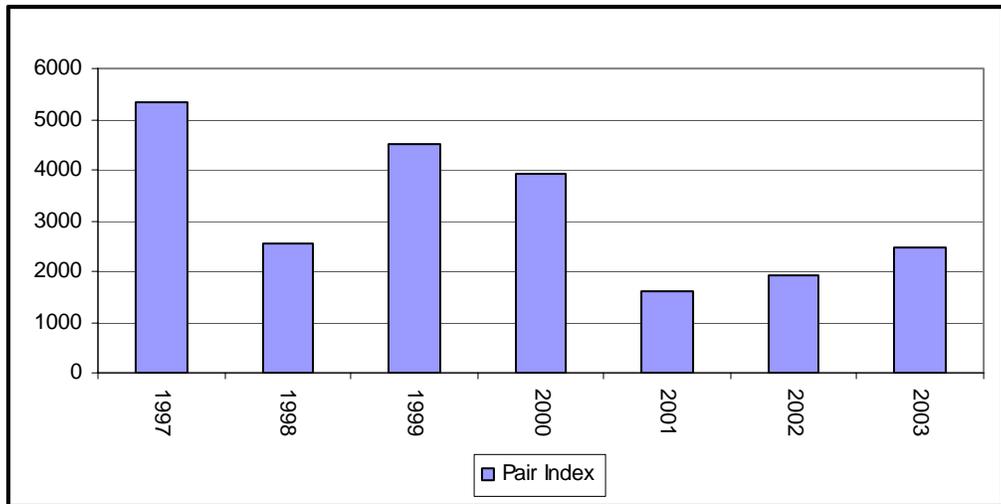


Figure 12. Canada goose pairs counted on western Washington duck surveys.

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	Methow Valley Salmon Creek Sinlahekin	14.06	7.1
		Omak Lake	9.83	10.2
		Douglas County	15.26	6.5
		Far East Potholes	18.69	5.3
	Highland	Lincoln County	Ewan-Revere Sprague-Lamont	47.59
Northeast			25.53	3.9
Palouse Streams		Colville Cusick Molson-Sidley	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 - 21 sections	24.49	3.9	

^aSurveyed by helicopter beginning in 1994

Table 2. Weighted breeding duck population indices by species for eastern Washington, 1996-2003

Species	1996	1997	1998	1999	2000	2001	2002	2003	1979-2002	% Change From	
									Average	2002	Average
mallard	61290	66666	78962	86243	60434	50464	44676	39843	55111	-11	-28
gadwall	14996	15306	17077	17130	13908	16261	18527	15353	11937	-17	+28
wigeon	6010	8392	7039	5721	4523	3593	6501	5028	6125	-23	+18
green-winged teal	3953	7040	3983	3665	3320	3037	2673	1749	3192	-35	-45
bwt+cinn	14080	16903	20228	20916	19848	17931	13717	11274	30051	-18	-62
northern shoveler	6092	11770	12580	14926	9100	8000	5968	7794	6872	+30	+13
northern pintail	1849	2802	2110	2145	970	1018	395	608	1970	+50	-69
wood duck	2056	1584	1836	2496	1841	2223	1863	616	1738	-67	-65
redhead	14042	12363	12399	13568	15584	13915	11831	8117	16236	-31	-50
canvasback	640	1362	619	1032	603	1073	1507	919	784	-39	+17
scaup	11762	8433	7674	10697	6982	10976	9289	12722	9175	+37	+39
ring-necked duck	3815	2490	2490	3835	5100	3931	1405	3063	2860	+118	+7
goldeneye	2358	1877	1308	1993	2126	3643	4036	4713	2501	+16	+88
bufflehead	4886	5355	805	1094	410	826	1606	3034	1211	+89	+151
ruddy duck	14511	9837	15474	14566	11419	9156	9023	12175	10947	+35	+11
merganser	593	270	668	182	161	356	327	757	385	+131	+96
TOTAL	162933	172451	185251	200210	156328	146401	133343	127764	161108	-4	-21
coot	34797	62074	49629	43832	25945	40172	18171	19328	33344	+6	-42
Canada goose	12758	13019	11199	22598	23449	13890	17179	17596	9528	+2	+85

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
1979-2002 Average	967	620	346	3752	1124	6528
% change						
From 2002	+51	+30	-12	+36	-3	+31
From AVG	+59	+9	-38	-4	-43	+2

Table 3. Weighted breeding duck population indices by area for eastern Washington 1979-2003.

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
1979-02 AVG	69835	65653	3465	22154	161108
% change from 2002	+1	-17	+1	+20	-4
from AVG	-26	-24	-64	+1	-21

Table 4. Breeding waterfowl estimates from Western Washington, 1997-2003.

Species	1997	1998	1999	2000	2001	2002	2003	97-02 Average	% Change from 2002	Average
Mallard Population Index	10350	18574	23235	11185	42160	14486	9099	19998	-37	-55
Mallard Pair Index	9046	14545	18012	10953	20732	10108	8928	13900	-12	-36
Wood Duck Population Index	4510	1640	5227	2482	3055	3366	3443	3380	+2	+2
Wood Duck Pair Index	3298	1461	4121	2453	2555	2194	3399	2680	+55	+26
Canada Goose	5351	2541	4499	3935	1613	1922	2470	3310	+29	-25

Table 6. Weighted duck brood indices by species for the Potholes, Palouse and Northeast areas of Washington, 1996-2003.

Species	1996	1997	1998	1999	2000	2001	2002	2003	96-03 Average	% change from	
										2002	Average
mallard	2054	2316	2978	3226	1864	1762	1123	1328	1840	-36	-40
gadwall	277	433	842	332	281	740	383	230	443	-48	-14
wigeon	305	96	93	153	102	153	102	179	309	-33	-68
green-winged teal	474	104	641	306	255	204	77	102	149	-63	-49
blue-winged teal	251	340	466	357	281	281	230	179	691	-18	-68
cinnamon teal	252	131	699	153	51	281	51	26	109	-82	-54
northern shoveler	350	41	406	255	230	357	179	204	194	-50	-8
northern pintail	199	77	342	77	230	128	153	102	142	+20	+9
wood duck	77	128	70	0	51	51	0	0	39	-100	-100
redhead	726	227	684	536	230	128	179	255	500	+40	-65
canvasback	51	0	26	51	26	51	77	128	29	+50	+187
Scaup	5	228	127	102	26	0	0	102	55	-	-100
ring-necked duck	16	26	31	77	0	0	0	26	52	-	-100
goldeneye	97	192	282	332	77	230	26	26	138	0	-81
bufflehead	0	0	0	0	0	0	179	26	7	-86	+243
ruddy duck	500	530	411	255	102	51	0	179	250	-	-28
merganser	15	29	14	26	26	0	0	0	43	-	-100
TOTAL BROODS	5649	5334	8112	6239	3830	4417	2757	3089	4997	12	-38

Table 7. Weighted duck brood indices by area for eastern Washington, 1979-2003.

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	485	919	51	3089	164
1979-02 Avg.	2920	974	883	221	4997	188
% change from	--	--	--	--	--	--
Last year	-16	+58	+100	0	+12	+15
Average	-44	-50	+4	-77	-38	-13

Table 8. Goose nest surveys conducted in Washington.				Annual Rate of Change (% nesting attempts)			
Survey Area	Year Survey Initiated	Agency Conducting Survey	Frequency of Survey	84-88	89-93	94-99	00-03
UPPER COLUMBIA				5%/yr	5%/yr	-3%	1%
Hanford	<1974	Battelle & WDFW	Biennial				
Priest Rapids	<1974	Battelle & 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
McNary	<1974						
John Day	<1974	Umatilla NWR/ Army Corps	Annual				
Dalles	<1974	Army Corps	Annual				
Bonneville	1982	Army Corps	Annual				
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	-3
Moses Lake	1981	WDFW	Biennial				
Potholes Res.	1981	WDFW	Biennial				
Lenore, Alkali, Park	1981	WDFW	Periodic				
TOTAL				11	2	-3	-2
Geese Counted on Duck Surveys				28	8	6	-6

Table 9. Canada goose net survey results in important areas of Washington, (1974-2003) and weighted number of geese observed during duck population surveys (1979-2002).

Year	Number of Nests					Geese observed during breeding duck Surveys
	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	11695
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	1234	629	2915	17179
2003	793	199	1213	374	2579	17596
1984-02 AVE	775	204	1056	561	2594	9528
% Change from 2002	--	--	--	--	--	--
AVG	+6	0	-7	-41	-11	+2
	+2	-2	+14	-36	-2	+85

WATERFOWL STATUS AND TREND REPORT

Winter Waterfowl Populations and Harvest

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Introduction

This report summarizes the 2002-03 waterfowl hunting season regulations, winter waterfowl surveys, and waterfowl harvest. This report compares current data with data collected over the past 25 years. These data are archived and part of a long-term database for Washington Department of Fish and Wildlife's (WDFW) Waterfowl Section. Several of the data sets extend back to the late 1940's.

Population surveys

Methods

The primary survey to determine status of wintering waterfowl in the flyway is the Midwinter Waterfowl Inventory, completed throughout the Pacific Flyway in January. This is a coordinated, comprehensive survey of all-important wintering areas, using a combination of standardized surveys from fixed-winged aircraft and ground observation locations. Waterfowl surveys are combined effort among several agencies, including WDFW, U.S. Fish and Wildlife Service, and Canadian Wildlife Service. However, this survey does not capture migration peaks and full habitat use patterns during other times of the fall/winter period. Because of these limitations, additional surveys are completed from October through March in key wintering areas of Washington, using fixed-wing aircraft and ground survey techniques. Specific age structure surveys are also completed in the north Puget Sound area for snow geese, brant, and swans, along standard ground

observation routes.

Midwinter Waterfowl Inventory Results

WDFW and U.S. Fish and Wildlife Service (USFWS) personnel completed the 2002-03 midwinter waterfowl inventory in January 2003. Washington's data for total waterfowl show decreases of 2% from last year and remained 11% below the 10-year average (1993-2002) (Table 1). The Pacific Flyway midwinter indices for total waterfowl was slightly above 5.6 million waterfowl for a 6.1% increase from 2001-02, but remained 6.7% below the 10-year average (1993-2002) and 15.7% below the long-term average (1955-2002).

The 2002-03 midwinter indices for total ducks in the 11 Pacific Flyway states was 4,328,531 (Fig.2) for a 4.2% increase from the 2001-02 count of 4,155,861, but remained 9.1% below the 10-year average. In Washington, the total duck population was 662,302 a decline of 4.8% below last year's population of 695,408 (Fig. 3). The Washington total duck count represents 15.3% of the flyway population, slightly below the state's 10-year average of 15.6% of the flyway population (Fig. 4).

The mallard total for the flyway was 958,108 for a 1.6% increase from 2002, but remained 26.3% below the 10-year average (1993-2002). The total number of mallards counted in Washington was 325,459, a decrease of 7% from last year and remained 29% below the 10-year average. However, Washington continued to hold a high percentage of flyway mallards at 33.9%

(Fig. 5) and holds a 10-year average of 31.8% of the Pacific Flyway population.

Canada geese are not well represented in midwinter surveys due to their behavior of foraging in widespread agricultural areas, making them difficult to locate during aerial surveys. The highest counts of Canada geese within the Pacific Flyway's Midwinter Survey have occurred within the last 8 years with the highest count on record coming during 1999-00 survey when 498,026 geese were recorded. In 2002-03, the count was 416,110, slightly below last year's count (<1%) and 3.6% below the 10-year average. The number of Canada geese wintering in Washington has been variable over the past 20 years. This variability continued in 2002-03 with a total 67,941 geese counted for a decrease of 23% from 2001-02 indices and 17% 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 overwinter in Skagit, Snohomish, and Island counties of N.W. Washington and the Fraser River Delta, British Columbia have had good reproductive success the past seven 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 on January 23, 2002 in northwest Washington were 70,488, the seventh straight year of population increase and a corresponding, highest number ever recorded in the state (Table 1, Fig. 7). The Skagit/Fraser snow goose population has increased from 45,200 in 1996-97 to 70,488 in 2002-03, an overall 36% increase. For the past seven years snow

goose populations migrating to the Skagit valley wintering grounds are averaging 21.5% juveniles per year. An early winter age/ratio productivity account of snow geese arriving from Wrangel Island in October 2002-03 produced 30.8% juveniles and a juvenile per family average of 2.29 based on a total field count of 200 families with 457 associated juveniles. Post-season juvenile snow goose ground transect counts averaged 28.2% and family averages lowered to 2.16 juveniles per family. In 2002-03, 272 letter/number coded red and white neck collars placed on nesting snow geese on Wrangel Island, Russia were observed and recorded in their winter forage fields and tide flats in the Skagit Valley, Washington. Complete age ratio counts are presented in Table 2.

The number of brant counted during the Washington midwinter survey was 11,455. This represents a 15% decrease from the 2001-02 and 18% below the long-term average (Table 1, Fig. 8). The number of brant counted during the North Puget Sound mid-winter aerial survey on January 7, 2003, Padilla and Samish bays, was 4,880.

In the 1994-95 winter season, it was first observed that gray-bellied or Western High Arctic (WHA) brant arrived in December at Padilla and Samish bays. Since that time, the Skagit county wintering population in December and January has been predominately gray-bellied (WHA) brant. In the early 1990s, Pacific black brant traditionally arrived on the wintering grounds of Padilla and Samish bays by mid-November. Numerous coded brant tarsus bands were observed and recorded at the Swinomish reserve, located in S. Padilla Bay, during the last half of November in 1992, 1993 and 1994. The alpha/numeric/color-coded bands represented four black brant breeding

colonies in the Yukon-Kuskokwim Delta and Prudhoe Bay, Teshepuk Lake, Alaska, Arctic Canada, and Wrangel Island, Russia. By 1996-97, black brant were observed arriving at Padilla and Samish bays later (by the end of November) and in fewer numbers. The trend of fewer black brant wintering in Skagit County bays has continued from 1996-97 to 2002-03, except for 1998-99 when equal numbers of black and gray birds, total 9,345, wintered in Padilla and Samish bays. Several reasons for this phenomenon are possible: (1) the majority of black brant are stopping briefly or bypassing Padilla and Samish bays before continuing south through Puget Sound; or (2) black brant are wintering further north along coastal areas of British Columbia and Alaska, including Izembek NWR. Additional color tarsal band analysis and satellite telemetry may reveal information regarding this trend.

The northern Puget Sound (Skagit, Whatcom, Snohomish, and San Juan counties) mid-winter survey of trumpeter swans in 2002-03 totaled 3,856 birds (see Table 2), which is 29% above the 1996-97 mid-winter census total of 2,726. However, the count for 2002-03 was 11% below the 2001-02 count of 4,343 which was the highest total count ever recorded. Juveniles accounted for 19.2% (Table 2) of the 2002-03 population, and have averaged 15.6% of the population during the last seven years. The average family size was 2.31, taken from a sample size of 52 families with 120 associated juveniles. The northern Puget Sound tundra swan mid-winter survey results from 1996-97 to 2002-03 have remained stable, averaging almost 1,900 birds per year. Juvenile tundra swans during the six-year period averaged about 13% of the total population each year (Table 2).

Lead shot poisoning in wintering trumpeter swans continued to occur in 2002-03, with 142 swan mortalities in north Whatcom County. Swans ingest lead shot as they forage for food and grit in benthic substrates of north Whatcom County or the lower British Columbia mainland. Swan necropsies were conducted on trumpeter swan carcasses. Lead shot ingestion does not appear to be a major factor in the tundra swan mortalities that occasionally occur in Whatcom, Skagit or Snohomish counties.

Periodic Aerial Survey Results

Aerial waterfowl surveys in northern Puget Sound were accomplished by WDFW (Table 2), and surveys in the Columbia Basin were conducted cooperatively between USFWS and WDFW. The highest count in the North Columbia Basin during 2002-03 occurred during the November with 254,497 total waterfowl; for the South Columbia Basin the highest count was in December with 142,116 total waterfowl; and the highest count in Northeastern Puget Sound occurred during the December survey with 270,560 total dabbling ducks (Table 2).

Hunting Season Regulations

The 2002-03 waterfowl harvest was conducted under Washington State regulations (Table 3). Large waterfowl populations in the flyway over the last 5 years has allowed for longer seasons and larger bag limits (Table 4). Under the federal framework, we were allowed the maximum number of days allowed under the Migratory Bird Treaty, 107 days. Our season length was 105 days statewide and two additional days were given for the statewide Youth Hunt on Sept.21-22. The season for northern pintails was restricted to 62 days and the season for canvasback was closed (Tables 3 & 4). The bag-limit was 7 ducks to include not more than with 2 hen

mallards, 1 pintail, 4 scaup, 2 redheads, (canvasback closed), 1 harlequin, 4 scoters, and 4 oldsquaws (Table 3).

The season length between 1988-89 and 1993-94 were the most restrictive in the State's history. Current regulations are among the most liberal ever offered in Washington. Only in 1964-65 and 1970-71 were seasons as long at 107 days on the east side (Table 4).

WDFW instituted a new license format for the 1999-00 hunting season. A small game license and big game license replaced a general hunting license. For people who hunted a variety of small game species, there was little change in total costs. For people who hunted waterfowl exclusively, the new format resulted in an increase in cost. For the 2002-03 hunting season, the Washington Migratory Bird Stamp increased from \$6.00 to \$10.00. The federal migratory bird stamp remained at \$15.00. (Table 4).

Goose hunting regulations have been dynamic in recent years. Changes have resulted from efforts to protect declining populations of particular Canada goose subspecies, increase recreational opportunities on expanding populations of Canada geese, simplify regulations, and address damage/nuisance complaints. The number of goose management areas remained at 5 for 2002-03 (Fig. 1).

Harvest surveys

Methods

Harvest estimates were based on the Game Harvest Questionnaire sent to 10% of the hunting license buyers. Hunters were asked to report the numbers of ducks and geese they harvested by counties. The species composition of the waterfowl harvest was derived from a Daily Waterfowl Harvest Report Card Survey. In this survey, cards were sent to waterfowl hunters prior to the start of the season to record the species of the birds they bagged. These data were

used to tabulate the species composition of the waterfowl harvest (Table 5).

The brant and snow goose harvest is estimated annually using a mandatory harvest report card for each species. Written authorization and harvest reports have been required of brant hunters in all hunt areas since 1990 and snow goose hunters in the primary harvest area (Skagit, Island, Snohomish counties) since 1993. Hunters must return a harvest report card in order to be included in the permit mailing the following year. Harvest reports returned by the deadline are included in the analysis as the 'first wave' of respondents, and reminder postcards are sent out to those not returning reports by the deadline. Responses from the postcard reminder are included as the 'second wave' and then the harvest estimates are computed accounting for the non-response bias.

The harvest of Dusky Canada geese is determined at mandatory hunter check stations, summarized in a separate report.

Harvest Survey Results

The 2002-03 Washington duck harvest of 413,145 was 4.6% lower than the previous year harvest of 432,899. This was the lowest state harvest since the 1994-95 season when 410,781 ducks were harvested (Fig.10). The duck harvest in Washington had declined steadily from over 1,000,000 in the late 1960's, to a low of 242,517 in 1993-94 (Fig. 9). Since that time there had been a slow and gradual increase until the 2001-02 season. Mallards made up 58% of the harvest followed by American wigeon and American green-winged teal with harvest numbers at 14% and 8%, respectively (Table 5).

The total Canada goose harvest for 2002-03 was 49,468 for a 17% reduction from last year's harvest of 59,603 (Fig. 11). This is the lowest harvest of Canada geese since the 1998-99 season when 47,045 were

harvested. In recent years, local production of large Canada geese has increased in Washington and has contributed to the increased harvest during the period from 1987 to 2001. The recent downward trend in the harvest of large Canada geese (Fig. 11) may indicate the production of large geese within the state has peaked and coincides with efforts to reduce populations of Canada geese in urban areas. The harvest of small Canada geese has declined from a record high of 47,270 in 1979-80 to a low of 14,284 in 1995-96. In recent years there has been a minor recovery in the harvest of small Canada geese (Fig. 10), but this year's harvest of 17,923 is the lowest since the 1995-96 season and is 6.5% below last year's harvest of 19,167 (Fig. 11). The reasons for the decline in small goose harvest from the late 70's-early 80's are uncertain. A shift in wintering areas may be occurring from central Washington to the mouth of the Columbia and Willamette Valley. Unfortunately, declines in Washington's small Canada geese have not been well documented. Banding information is minimal and aerial surveys are logistically difficult.

Waterfowl harvest was summarized by WDFW administrative regions (Table 6, Fig. 9). Region 2 continued to have the highest harvest proportion (27.5%) followed by Regions 4 (22.1%) and Region 3 (19.4%).

For the second time in three years, the brant season was canceled in Skagit County during January due to wintering numbers (4,880) below the season threshold of 6000 brant (Table 3). This resulted in a low state harvest of 60 brant for the 2002-03 season (Fig. 12, Table 7). The same Skagit County closure occurred during the 2000-01 season when 108 brant were harvested. Between 1992 and 2002 the brant harvest ranged from a high of 1,534 in 1996 to 440 in 2001

(Table 7). This represented an increase of the brant harvest after the season reopened in 1986-87 (Fig. 12). (The season was closed from 1983 to 1986).

The snow goose harvest in Washington is highly variable (Table 8, Fig. 13). It had been on a negative trend since the mid 1980's. However, the harvest of snow geese increased significantly over the past five years from 969 in 1998 to 2,522 in 2002 (Fig. 13). The snow goose harvest in Washington remains low at 3.4% of the population. The harvest of snow geese in northern Puget Sound is weather dependent. Cold and windy weather forces geese from estuaries to forage inland where they are more vulnerable to hunters. This factor may be of greater importance than annual recruitment, because the erratic annual harvest (Fig. 13) does not follow the number of geese counted in Washington during the midwinter count (Fig.7).

Hunter Numbers

The Washington hunter survey is used to estimate the number of waterfowl hunters in the state. During the 2002-03 season, an estimated 26,375 hunters participated for the lowest estimate of Washington waterfowl hunters on record (Fig. 14). The number followed a 15% decrease in hunters from 2001-02 when 33,883 waterfowl hunters were estimated and a 32% reduction of waterfowl hunters from the 2000-01 season when there were an estimated 38,547 hunters. This recent decline in waterfowl hunters follows a slight increase of hunters through the 1990's. Prior to that there was a steady decline in hunters through the 1980's (Fig. 14).

The estimated average number of ducks harvested per hunter in 2002-03 was 15.7, the highest ever recorded, and represents a 11.7% increase from last year when 14.02 ducks per hunter were harvested. Hunter

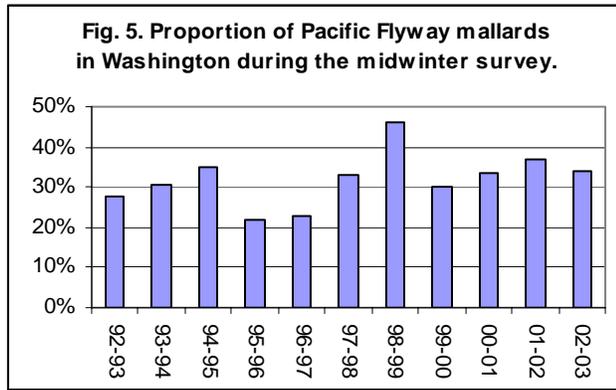
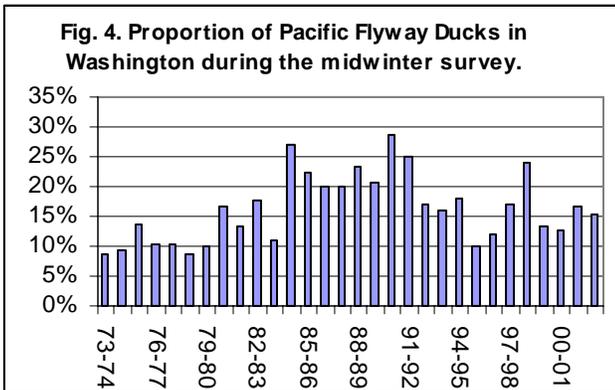
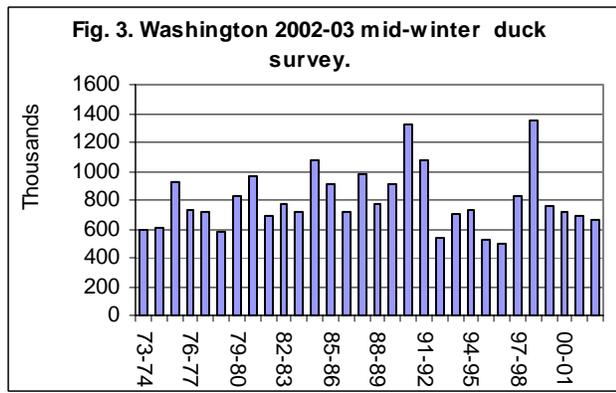
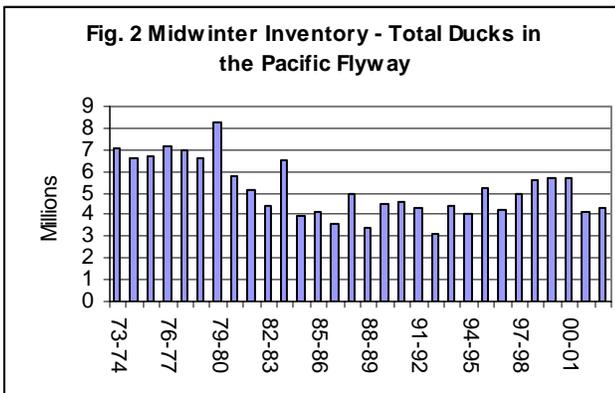
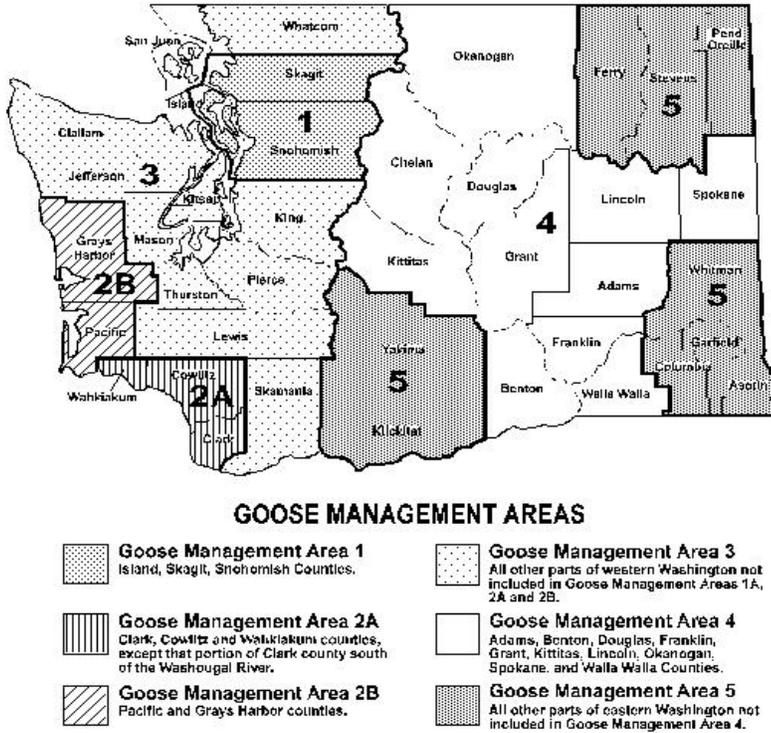
success, based on ducks harvested per hunter per year, has been stable if not on an upward trend for the past 20 years (Fig. 15). Therefore, it appears the downward trend in duck harvest (Fig. 10) is largely a result of hunter numbers (Fig. 14) and not decreased annual hunter success (Fig. 15). The high success rate may indicate that we have retained the most avid and successful waterfowl hunters.

Members of the hunting public often believe the decline in hunter numbers is a result of the restrictive regulations that began in the mid-1980's (Table 4). This may have contributed to the reduced hunter participation (Fig. 14), but the downward trend in hunter numbers began in the early 1980's when there was a 7 duck daily bag limit, no special restrictions on mallards and pintails, and season lengths were 93 west and 100 east (Table 4). The downward decline in hunter numbers is likely a result of changes in social views on hunting and lack of recruitment of new hunters.

The quality of waterfowl hunting opportunities in Washington has been exceptional. Decreased hunter numbers results in lower hunter densities in the field and success has remained stable. In addition, this State is holding a large percentage of the Flyway's ducks. Canada goose regulations have been liberalized and harvest has been increasing since the 1987-88 season. More large Canada geese were harvested in recent years than the previous 20 years. These factors combined demonstrate the value of Washington's waterfowl resources to the state's hunting population. However, a possible decline of quality hunting opportunities found on public hunting areas compared to private hunting clubs designed and managed to attract large numbers of waterfowl that accommodate fewer hunters may also be

contributing to the reduced numbers of waterfowl hunters.

Fig. 1. Washington Goose Management Areas.



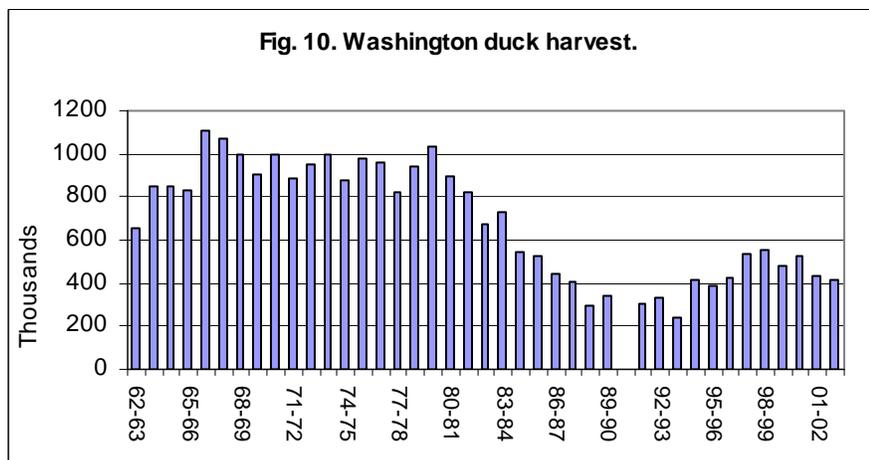
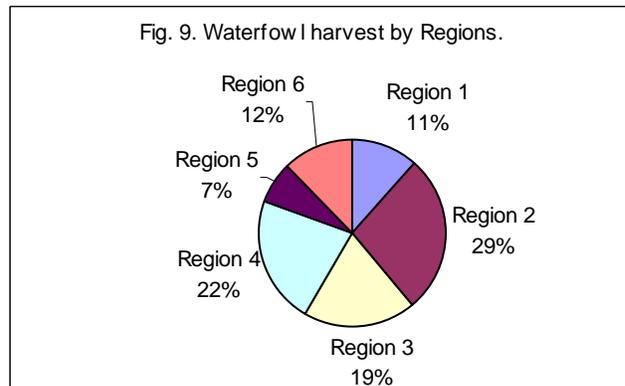
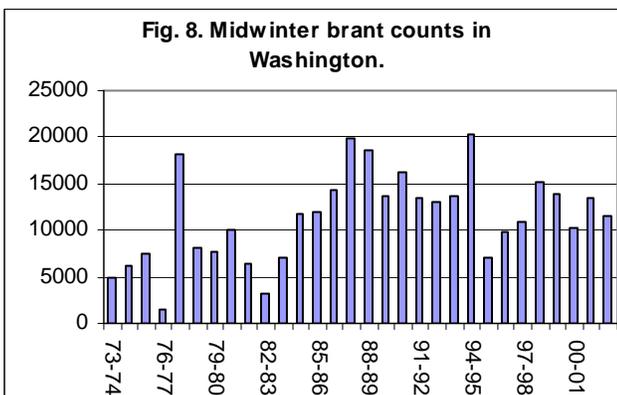
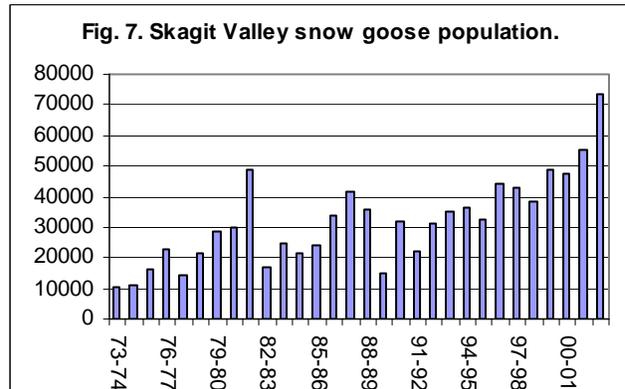
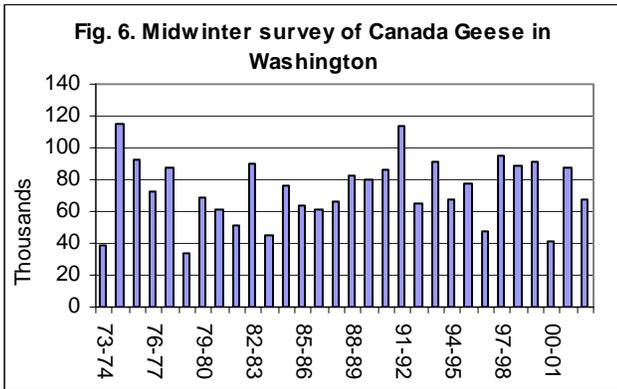


Fig. 11. Washington Canada Goose Harvest

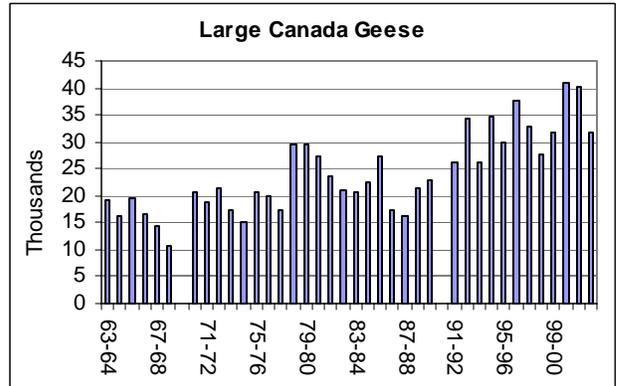
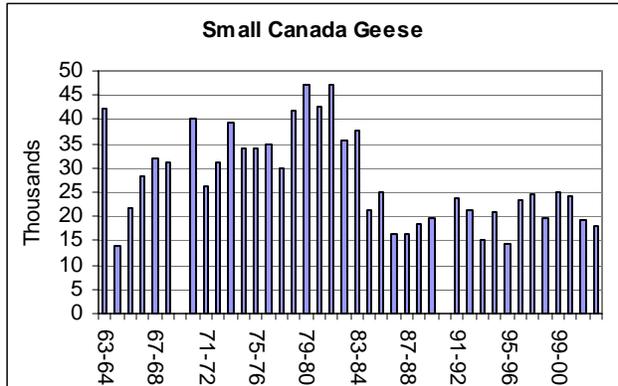


Fig. 12. Washington Brant harvest.

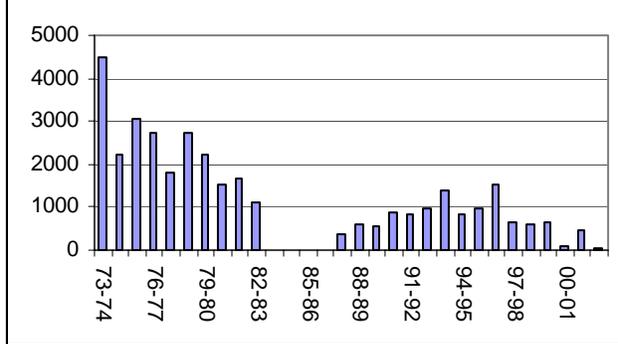


Fig. 13. Skagit Snow goose harvest.

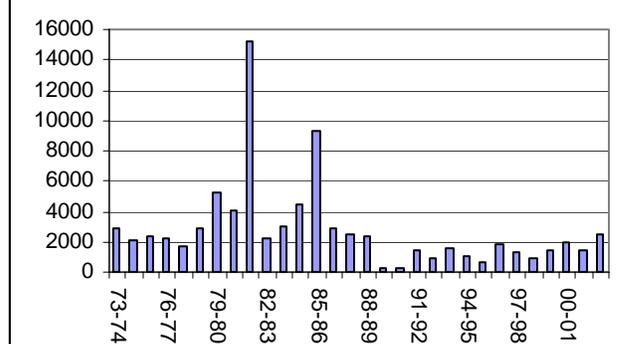


Fig. 14. Washington waterfowl hunters.

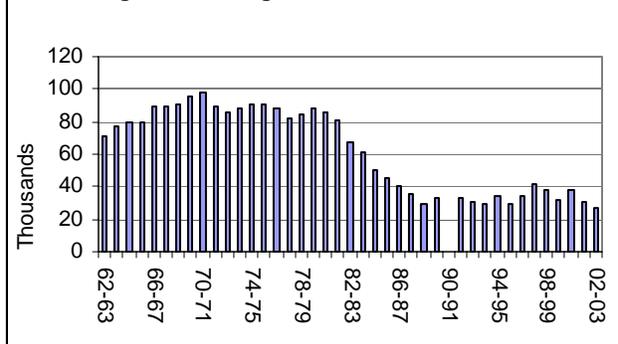


Fig. 15. Duck hunter success rates.

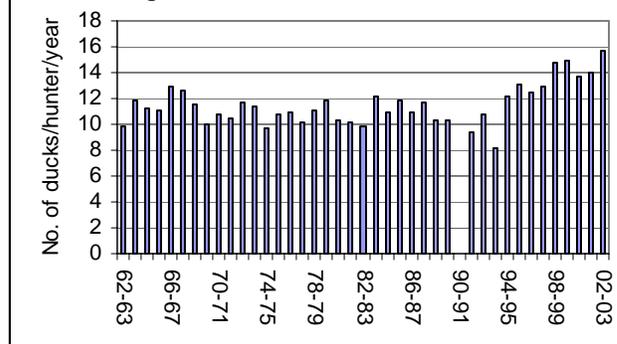


Table 1. Washington Department of Fish and Wildlife Annual Waterfowl inventory- January 2003.

SPECIES	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	03 vs. 02	93-02 ave.	03 vs. ave.
Mallard	211497	421864	419005	310724	240838	547134	979679	442811	356830	348841	325459	-7%	460468	-29%
Gadwall	2218	4556	2565	3165	6304	7482	5243	8043	10571	10595	11391	8%	7213	58%
Wigeon	81998	95801	116748	73771	68478	117536	172049	112926	133465	124301	113838	-8%	121091	-6%
Green-winged Teal	8612	11834	18247	10993	7121	6729	12486	11089	6098	13695	8083	-41%	11499	-30%
B.W. & Cinn. Teal	19	54	425	0	0	0	2	0	0	484	57	88%	104	-45%
Shoveler	571	1060	1305	2310	1313	3100	2890	3036	1358	1852	5801	213%	2460	136%
Pintail	38361	35896	56808	48227	39156	43763	81653	70040	75597	72106	57465	-20%	61907	-7%
Wood Duck	48	381	454	162	30	72	329	84	206	356	59	-83%	218	-73%
Redhead	4673	3744	6779	1517	6782	2495	2335	1505	27918	11353	6867	-40%	7597	-10%
Canvasback	3439	1401	2941	4673	6115	6261	4841	2898	6020	3272	2131	-35%	4399	-52%
Scaup	39719	26590	40644	32261	36545	28684	28274	26933	28833	31970	41832	31%	36229	15%
Ringneck	6526	1419	5456	4314	3782	3327	3240	7488	6386	7306	6457	-12%	5570	16%
Goldeneye	19277	16910	22360	19663	16951	12894	10851	13157	17177	15711	20098	28%	18505	9%
Bufflehead	51571	21317	26724	19441	20818	14780	17185	18017	20647	20266	26426	30%	25719	3%
Ruddy Duck	1918	3588	3372	4248	3417	2712	2476	3819	3075	3457	4966	44%	3705	34%
Eider	0	0	0	0	0	0	0	4	0	0	0	0%	0	-100%
Scoter	30165	23952	35437	26059	26939	21386	21507	20326	15932	16597	14125	-15%	25243	-44%
Oldsquaw	464	356	1550	636	1046	575	645	450	559	423	573	35%	728	-21%
Harlequin	507	750	884	1077	909	791	696	843	603	653	797	22%	851	-6%
Merganser	10282	11212	10971	9830	7039	5750	6653	7762	9535	10564	12325	17%	10192	21%
Unidentified Ducks	19468	16336	8338	8064	4304	7364	3527	2577	1539	1606	3552	121%	7668	-54%
Snow Goose*	30912	34867	36681	32340	44441	42666	38185	48843	47743	55480	73363	32%	48552	51%
White-fronted Goose	0	2	2	25	20	1	0	3	34	21	2	-90%	11	-82%
Canada Goose	65248	90780	67383	76884	47901	95444	88698	91229	41351	88092	67941	-23%	82095	-17%
Brant	13054	13595	20308	7082	9753	10881	15252	13859	10197	13478	11455	-15%	13891	-18%
Tundra Swan**	883	2616	1332	4118	3211	3424	2802	4342	4597	2521	6393	154%	3624	76%
Trumpeter Swan**	55	171	75	3017	2817	2352	3215	3896	4047	4562	4263	-7%	2847	50%
Unknown Swan**	575	129	251	85	103	371	11	402	49	254	168	-34%	240	-30%
Coot	36341	33378	52746	59652	64956	58199	104706	62387	74250	80631	91284	13%	71853	27%
TOTAL	642060	841181	959791	764338	671089	1046173	1609430	978769	904617	940447	917171	-2%	1027507	-11%
*B.C. Snow Geese	2342	12371	5179	7206	806	1418	7759	879	8675	1770	0	-100%	4841	-100%
Skagit/B.C. Total	33254	47238	41860	39546	45247	44084	45944	49722	56418	57250	73363	28%	53393	37%

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

Table 2. 2002-03 waterfowl surveys conducted in the Columbia Basin; waterfowl surveys, snow goose photo counts, aerial brant surveys, age-ratio counts conducted in Northeastern Puget Sound.

North Columbia Basin		Oct. 23	Nov. 15-16	Dec. 10-12	Jan. 9,14
Mallards		21,087	101,033	92,037	88,905
Total Ducks		135,137	226,506	164,189	149,140
Total Geese		35,925	27,583	6,720	8,348
Total Swans		55	408	129	185
TOTAL WATERFOWL		171,117	254,497	171,038	157,673
South Columbia Basin		Oct. 16	Nov. 14	Dec. 18	Jan. 4,7-8
Mallards		16,982	53,888	97,667	92,910
Total Ducks		38,320	72,825	122,421	124,762
Total Geese		10,056	67,805	19,645	3,764
Total Swans		10	68	50	86
TOTAL WATERFOWL		48,386	140,698	142,116	128,612
Northeastern Puget Sound		Oct. 14	Nov. 13	Dec. 5	Jan. 9
Mallards		33,362	101,554	124,610	62,785
Northern pintail		32,110	38,688	60,848	35,028
American wigeon		23,371	30,306	77,250	48,212
Green-winged teal		5,437	5,252	7,852	2,775
Brant					
TOTAL DABBLERS		94,280	175,800	270,560	148,900
Snow Goose Aerial Photo Counts	Date	Skagit/Snohomish	Fraser	Total	% Young
	12-9-02	37,179	35,959	73,138	27%
	1-8-03	70,463	0	70,463	
	1-23-03	70,488	0	70,488	28.2%
Brant Aerial Surveys	Date	Skagit Co.	Whatcom Co.	Total	
	12-18-02	3,940	44	3,984	
	1-2-02	4,880	975	5,855	
Age-ratios obtained from field observations - Northern Puget Sound					
	Date	Sample size	Juveniles		
Brant	12-26-02 ¹	32	6		
Snow Geese (pre-season)	Oct. 2002	400 families	30.8%		
“ “ (post-season)	Jan. 03		28.2%		
Trumpeter Swan	Jan. 2003	3,856	19.2%		
Tundra Swan	Jan. 2003	2,321	15.3%		

¹ Only sample for 2002-03.

Table 3. Waterfowl hunting season regulation summary 2002-03.

	Area	SEASON DATES (inclusive)	Daily Bag Limit	Possession Limit
DUCKS	Statewide	Sept. 21-22, 2001 (Youth hunting only) (a)	7 (b)	14 (c)
		Oct. 5-16 and Oct. 26, 2002 – Jan. 26, 2003, except Canvasback closed Oct. 6-Dec. 14, 2001,	7 (b)	14 (c)
Pintail	Statewide	Sept. 21-22 (Youth Hunting only) (a) Oct. 5-11 and Oct. 26-Dec 17, 2002	1 (b)	2 (c)
Canvasback	Closed Statewide (including youth hunt)			
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 2A , 4, 5	Sept. 7-12, 2002	3 Canada G	6 Canada G
	Goose Mgt. Areas 1 & 3	Sept. 7-12, 2002	5 Canada G	10 Canada G.
	Goose Mgt. Area 2B	Sept. 1-15, 2002	5 Canada G	10 Canada G.
	Statewide, except in Areas 2A & 2B	Sept. 21-22 (Youth hunting only)	4 Canada G	8 Canada G.
	Goose Mgt. Area 1	Oct. 5-24 & Nov. 9, 2002 - Jan. 26, 2003 except snow, Ross, or blue geese may only be taken Oct. 5-Jan. 5, 2003.	4 (d)	8 (e)
	Goose Mgt. Area 2A	8 a.m. – 4 p.m. Nov.27, 2002 and Sat., Sun., Thur. only (except Ridgefield Refuge NWR) Nov. 30 , 2002-Jan. 26, 2003. Ridgefield NWR: Sat., Mon., Wed. only, Nov. 27, 2002-Jan. 26, 2003, except closed Dec. 25, 2002 and Jan. 1, 2003	4 (f)	8 (f)
	Goose Mgt. Area 2B	8 a.m. – 4 p.m. Sat., Sun., Thurs. only Nov. 9-Dec. 29, 2002, except closed on Nov. 28, 2002	4 (f)	8 (f)
	Goose Mgt. Area 3	Oct. 5-24 & Nov. 9, 2002-Jan. 26, 2003	4 (d)	8 (e)
Goose Mgt. Area 4	Sat., Sun., Wed., only Oct. 5-24 & Nov. 9, 2002-Jan. 19, 2003; Nov. 11, 28, 29, 2002; Jan 1, 2002 & everyday Jan. 20-26, 2003	4 (d)	8 (e)	
Goose Mgt. Area 5	Oct. 5-24, & Nov. 9, 2002- Jan. 26, 2002	4 (d)	8 (e)	
Brant	Skagit & Pacific Co.s	Nov. 23, 24, 26, 28, & 29 & Jan . 18, 19, 22, 25 &26, 2003 (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, (canvasback closed), 2 redhead, 1 harlequin, 4 scoters, and 4 oldsquaws.

c) Possession limit: 14 ducks—to include not more than 4 hen mallards, 2 pintails, 8 scaup, 4 redheads, 1 harlequin, 8 scoters and 8 oldsquaws.

d) Daily bag limit: 4 geese – to include not more than 3 snow, Ross' or blue geese.

e) Possession limit: 8 geese – not to include more than 6 snow, Ross' or blue geese.

f) Daily bag limit – to include not more than 1 dusky Canada goose, and not more than 6 snow, Ross' or blue geese;

Possession limit: 8 geese not to include more than 1 dusky Canada goose, 6 snow, Ross' or blue geese;

Season Limit: 1 dusky Canada goose (a dusky Canada goose is defined as a dark-breasted goose (munsell 10YR, 5 or less) Canada goose with a culmen (bill) length if 40-50 mm).

g) Brant Season: If the pre-season wintering population in Padilla/Samish/Fidalgo Bays is below 6,000 (as determined by the winter survey in late December/early January) the brant season in Skagit County will be canceled.

Table 4. Significant historical changes in duck hunting regulations.

Year	Season		Bag Limit		Special Limits		Stamp Fees		Hunting License	Steel shot Regulation
	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 2	1 2	-	7.50	12.00	" "
86-87	86	79	5	5	4 (1 2)	4 (1 2)	5.00	7.50	12.00	Large zones ³
87-88	86	79	5	5	4 (1 2)	1	5.00	12.00	12.00	" "
88-89	66	59	4	4	3 (1 2)	1	5.00	12.00	12.00	" "
89-90	66	59	4	4	3 (1 2)	1	5.00	12.00	12.00	" "
90-91	66	59	4	4	3 (1 2)	1	5.00	12.00	12.00	" "
91-92	66	59	4	4	3 (1 2)	1	6.00	15.00	15.00	Steel statewide
92-93	66	59	4	4	3 (1 2)	1	6.00	15.00	15.00	" "
93-94	66	59	4	4	3 (1 2)	1	6.00	15.00	15.00	" "
94-95	76	69	4	4	3 (1 2)	1	6.00	15.00	15.00	" "
95-96	100	93	6	6	1 2	2	6.00	15.00	15.00	Bismuth added
96-97	100	93	7	7	7 (1 2)	2	6.00	15.00	15.00	" "
97-98	106 ⁵	106 ⁵	7	7	7 (2 2)	3	6.00	15.00	15.00	Tungsten-iron added
98-99	106 ⁵	106 ⁵	7	7	7 (2 2)	1	6.00	15.00	15.00	Tungsten-polymer added
99-00	106 ⁵	106 ⁵	7	7	7 (2 2)	1	6.00	15.00	30.00 ⁴	Tungsten-matrix added
00-01	105 ⁶	105 ⁶	7	7	7 (2 2)	1	6.00	15.00	30.00	Tungsten-nickel-tin added
01-02	105 ⁶	105 ⁶	7	7	7 (2 2)	1	6.00	15.00	30.00	Same as previous year
02-03	105 ⁶	105 ⁶	7	7	7 (2 2)	1 ⁷	10.00	15.00	30.00	TINT ⁸ added

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

⁶Youth 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

Table 5. Waterfowl harvest by species in Washington (2002-2003)¹

Species	No. Harvested	% of total
Mallard	238,534	58%
Northern pintail	12,539	3%
American wigeon	57,830	14%
Green-winged teal	33,833	8%
Other ducks	70,409	17%
Total ducks	413,145	100%
Large Canada	31,545	56%
Small Canada	17,923	32%
White-fronted	278	1%
Snow	3,823	7%
Total geese	56,129	100%
Total waterfowl	469,174	

¹The number of each species harvested is estimated from the Daily Waterfowl Harvest Report Card Survey. The total number of ducks and geese harvested is estimated from the more extensive Game Harvest Questionnaire.

Table 6. Waterfowl harvest by region (2001-02).

Regions	Ducks and Geese Harvested	% of State Total
Region 1	53,326	11.3%
Region 2	129,108	27.5%
Region 3	91,104	19.4%
Region 4	103,936	22.1%
Region 5	34,877	7.4%
Region 6	56,923	12.1%
Total	469,274	100%

Table 7. Brant harvest report summary*.

Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Permit Issued	747	1194	1069	1207	1445	1331	1348	1336	1295	1436	1387
Hunters	319	496	287	343	254	197	243	218	39	187	27
Days (successful)	709	765	484	552	549	326	350	386	59	277	277
Season Days	11	11	6	11	11	5	5	9	5	10	10
Harvest											
Skagit	950	1347	825	918	1493	597	570	581	0	403	18
Whatcom	9	7	0	0	0	0	0	0	0	0	0
Pacific	18	53	23	44	41	59	18	86	108	37	42
Total	977	1407	848	962	1534	656	588	667	108	440	60

Table 8. Snow goose harvest report summary*.

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Permits Issued	2298	2588	2313	2363	2795	3086	3061	3076	3144	3196
Hunters	572	433	221	427	424	341	445	460	407	442
Days (Successful)	1096	664	373	996	812	585	777	1039	953	1217
Harvest										
Island	58	60	57	39	38	29	71	18	4	18
Skagit	677	496	99	381	545	678	815	1058	753	1,419
Snohomish	1124	522	331	1400	749	262	598	919	696	1,084
Total	1859	1078	487	1820	1332	969	1487	1995	1453	2522

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

Wild Turkey

WILD TURKEY STATUS AND TREND REPORT

Statewide

MICK COPE, Upland Game Section Manager
 DANA BASE, Wildlife Biologist
 TOM MCCALL, Wildlife Biologist
 JEFF BERNATOWICZ, District Wildlife Biologist
 DAVID P ANDERSON, District Wildlife Biologist

Population objectives and guidelines

Turkeys have been released in Washington over a period of 70 years. The primary objective of these releases was to provide additional hunting recreation. From 1985 to 2002, the Department of Fish and Wildlife (WDFW) conducted an aggressive release project. Since wild turkeys were not native to Washington, three subspecies of turkeys were chosen based on the habitats they would be occupying.

Merriam's turkeys were released in Ferry, Klickitat, Lincoln, Okanogan, and Stevens counties; Rio Grande turkeys were released in Chelan, Kittitas, Yakima, Walla Walla, Garfield, Columbia, Asotin, Lincoln, Whitman, and Okanogan counties; and the eastern subspecies was introduced in Pacific, Cowlitz, Thurston, Lewis, and Grays Harbor counties.

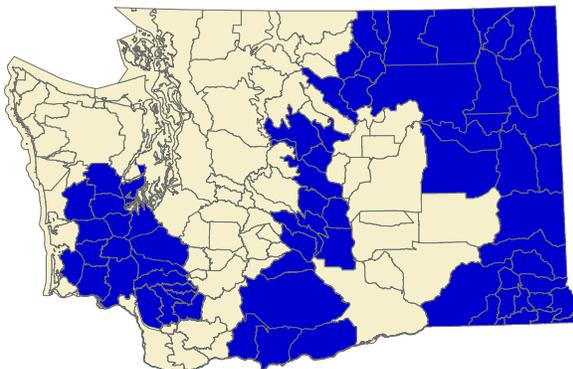


Figure 1. Current distribution of wild turkeys in Washington.

Hunting seasons and harvest trends

Estimated harvest of wild turkeys is based on analysis of mandatory hunter reports. Successful hunters are required to submit a harvest report card with date, location, sex, and age of harvested birds.

Hunting seasons for wild turkeys have varied from a 2-day, fall season in 1965 to the current 31-day spring season statewide and 5-day fall, permit-only seasons in selected counties (which began in 2000). The statewide, April 15 to May 15, spring season was established in 1994. A short, fall season

has existed since 1965. The fall season was held in late November in 1990 and was changed from a general season to a permit-only hunt in 2000. In 2000, the fall hunt dates were moved from late November to early October to avoid overlapping other hunting seasons.

Beginning in 1995 and ending in 2000, hunters could kill one bearded turkey per day from each of three subspecies for a total of three per year. County of kill defined subspecies. Multiple tags could only be purchased prior to the spring hunting season. After the spring season started, only one turkey tag could be purchased. Since the 2001 spring season, hunters have been able to harvest 2 bearded turkeys in most eastern Washington counties and purchase tags throughout the season.

Turkey hunting is open to shotgun and archery hunting only. The use of dogs is not allowed, decoys are legal, and hunting hours are one-half hour before sunrise to sunset.

Current regulations are considered relatively conservative. Spring season timing results in harvest of gobblers after peak breeding. The season ends before most nests hatch, so disturbance is minimized.

Statewide harvest has increased each year since 1991 (Figure 2). In 2002, 15,222 people hunted turkeys, taking a total of 5,009 turkeys. Prior to turkey augmentation activity in the late 1980s, hunter numbers fell to a low of 428 (1987) and turkey harvests averaged 65-birds per year (1983-1987).

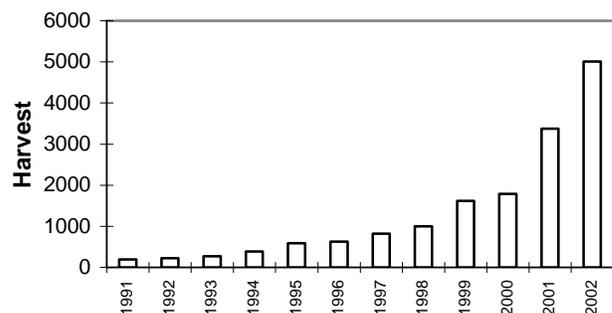


Figure 2. Trend in turkey harvest in Washington, 1991-2002.

Beginning in 2001, turkey hunters were required to report their hunting activity. Hunter reports were collected by Game Management Unit (GMU), a geographic area also used for reporting deer and elk harvest. This mandatory reporting system has produced more accurate estimates of harvest and hunter participation than those estimates made in the past.

To make management of turkey populations more effective, GMUs are grouped into Population Management Units (PMUs). Washington State was divided into 7 PMUs: Northeast (P10), Southeast (P15), North Central (P20), South Central (P30), Klickitat (P35), Northwest (P40), and Southwest (P50). Table 1 shows which GMUs are part of each PMU. Overall harvest has gone up over the past 6 years, however, the rate of increase has been dramatically higher in PMU P10 (Figure 3).

Table 1. Game Management Units included in each Population Management Unit.

PMU	GMU's Included
P10	101-136
P15	139-186
P20	All 200 GMUs
P30	All 300 GMUs EXCEPT GMU 382
P35	GMUs 382,588,578,574,572,568
P40	All 400 GMUs PLUS GMUs 601-627
P50	All 500 GMUs EXCEPT 568-588 PLUS GMUs 633-681

In 2002, 4404 wild turkeys were harvested in Region 1 (PMUs P10 and P15) during the spring general and fall permit seasons combined (Tables 2 and 3). The harvest in Region 1 accounted for 88 % of the statewide turkey harvest (Table 2). The spring season is extremely popular with hunters, and some hunting areas have become so popular that hunter crowding and safety are becoming a concern on opening day and weekends.

In Region 2 (PMU P20), annual turkey harvest from 1992 to 1999 fluctuated between 10 and 22 birds. Since 1999, there has been nearly a 6-fold increase in harvest (21-119) in PMU P20 (Table 2). From 2001 to 2002 harvest increased over 50% (78-119). This increase can be attributed to the release of nearly 700 turkeys during 2001-2002 in Chelan and Okanogan counties. Mild winters and favorable spring weather have translated into good over-winter survival, good poult production, and to natural population expansion. While harvest increased over 50%, hunter numbers only increased 12.5% from 562 to 633.

Turkey harvest in Region 3 (PMU P30) jumped from 10 birds in 2000, to 105 birds in 2002 (Table 2). Harvest was distributed throughout the Region. Mild winters, the release of 574 birds from 1999-2001, and increased hunter awareness undoubtedly contributed to the increased harvest.

Turkey harvest started slowly in Klickitat County in the 1960s but increased to 98 turkeys in 1970. Harvest was relatively stable through the 1970s and early 1980s. But, by 1986, harvest had dropped to <50 turkeys. Harvest reported for PMU P35 has increased substantially since supplemental releases in 1988-89 and reached its highest level of 300 birds during the 2002 season (Table 2). Turkey harvest has gradually increased in Klickitat County as winters have been mild, turkey distribution has increased, as well as hunter effort.

Turkey harvest in the Westside habitats of Regions 5 and 6 (PMU P50) has increased over the last 6 years as a result of the recent releases and increasing hunter effort, although overall harvest is low (54 in PMU P50) (Table 2). Harvest remains low in Lewis, Cowlitz, Skamania, and Wahkiakum counties.

Population status and trend analysis

Turkey releases were documented historically in Asotin and Walla Walla counties in 1929 and 1919. These were likely the eastern subspecies raised on game farms. Turkeys were released again during the 1960s by the Department of Game in Walla Walla and Columbia counties. A total of 18 Merriam's turkeys were released in Walla Walla County on Coppei Creek and 16 were released on W.T. Wooten Wildlife Area. These releases did not result in long-term population establishment.

From 1988 to 1990 Rio Grande turkeys were brought in from Texas and released at several locations in Asotin, Columbia, and Garfield counties. In all, 87 turkeys were released in Asotin County, 40 were released in Columbia County, and 49 in Garfield County. Additional Rio Grande turkeys were trapped in these counties and translocated to other parts of the Blue Mountain foothills including Walla Walla County (34 birds) and along the Palouse River in Whitman County (56 birds). Harvest of Rio Grande turkeys in southeast Washington was 236 in 2000.

Based on harvest trends (Table 2), the Blue Mountains population has expanded significantly. The Blue Mountain foothills seem to provide excellent habitat conditions for Rio Grande turkeys as does the northern half of Lincoln County.

Wild turkeys of the eastern subspecies were released in Stevens County in 1919, but a sustainable

population did not develop. In 1961, 15 Merriam's turkeys were released in the Rice area of Stevens County and a population became established. Birds were subsequently trapped from this population and released throughout the state. Fourteen were released in Ferry County over a 3-year period and 12 birds were released in Spokane County. Initially, turkeys did very well in Stevens County with a fall harvest of 120 birds in 1965. Harvest declined and stabilized near 20/year. By the mid-1980s harvest had declined to about 10 birds/year.

In 1988 and 1989, 170 Merriam's turkeys from South Dakota were released throughout Stevens County. Spring harvest in Stevens County has climbed each year with a record harvest of 761 turkeys in 2000.

During the 1988-89 time period, 32 Merriam's turkeys were also released in Ferry County. Harvest in Ferry County has generally increased from 12 birds in 1992 to 114 turkeys in 2000. Stevens, Pend Orielle and Ferry counties contain good habitat for the Merriam's subspecies.

While the only release records for Pend Oreille County were 60 Merriam's turkeys released in 1996, a few turkeys have been harvested each year since 1993. Fifty-seven turkeys were harvested in Pend Oreille county in 2000. This harvest is attributed to a combination of 1996 releases and birds moving in from adjacent release sites in Idaho and Washington.

Harvest records suggest that populations in Ferry and Stevens counties continue to expand their range and increase in density. This population should continue to expand depending on winter conditions and pine seed production. While severe winter conditions have limited turkey populations in other parts of the United States, the harsh winter of 1996-97 did not appear to significantly impact the northeast Washington population.

Turkey populations in Region 1 continue to expand and should provide high harvests as populations continue to grow. Winters have generally been very mild so there has been excellent carryover from year to year. Turkeys in Region 1 are often associated with wheat stubble fields during winters and winter mortality may be low unless snow is unusually deep for long periods.

Wild turkeys in Region 1 continue to occupy new areas as numbers increase and as trap and translocation projects have removed excess turkeys from areas of concentration. The general trend over the past 10 years has been a steady increase in localized areas in spite of periodic severe winter conditions.

Rio Grande turkeys released in Whitman County

within PMU P15 are expanding into all available habitat in that heavily agricultural county. The Palouse River drainage contains the highest quality feeding and roosting areas for birds in the area.

Eight turkeys were released in Douglas County (PMU P20) from the Stevens County population in 1965. Up to 12 turkeys were harvested from Douglas County per year from 1966 to 1973.

In Okanogan County, the earliest records of turkey releases in Okanogan County occurred in 1931. Merriam's turkeys were trapped in Stevens County and released in Okanogan County in the early 1960s. Four were released on the Sinlahekin Wildlife Area in 1960, six more in 1963, and 10 more in 1966. A total of 9 birds were released on the Methow Wildlife Area in 1967. A few birds were harvested in Okanogan County in 1968 and 1969, but no harvest was reported after that until additional releases were made in the late 1980s and early-1990s.

Thirty Merriam's turkeys were released in eastern Okanogan County in 1989. Records do not indicate any harvest in eastern Okanogan County after these releases. However, Rio Grande turkeys released in western Okanogan County on Chiliwist Wildlife Area have resulted in sustained harvests in this area indicating that the population is probably stable or increasing slowly. The population likely declined as a result of the 1996-97 winter; however, the mild weather of the next three winters is fostering a population rebound. In 2001, 93 Merriam's turkeys from Ferry and Stevens counties were released in Okanogan County, 135 in 2002, and 120 in January 2003.

No population estimate has been made for the Okanogan County turkey population. In 2003, the turkey population in Okanogan County is thought to be continuing to increase and expand their range, due to the mild winter last year and seemingly good chick survival this summer. Turkeys are expanding into drainages west and south of traditionally inhabited areas of the Chiliwist watershed.

Turkeys are also colonizing tributary streams of the lower Methow. At least some of these birds likely originated from releases by private individuals. The subspecies of these birds is unknown. Turkeys also appear to be expanding from Canada onto private land near the border just west of Oroville.

In the mid-1960s, 6 Merriam's turkeys from the Ellensburg Game Farm and 2 from Stevens County were released in to Chelan County. During this same period, 8 Merriam's turkeys from Stevens County were released on to Badger Mountain in Douglas County. A total of 80 Rio Grande turkeys were then released in Chelan County in 1986 and 1988,

followed by 28 Merriam's turkeys in 1990. These releases proved unsuccessful, probably due to the small number of turkeys released and the lack of winter-feeding during harsh winters.

The turkey population in Chelan County is increasing. In 2000, 156 Merriam's turkeys were released in Chelan and northeastern Kittitas counties, augmenting existing turkeys and releases of 220 in 2001, and 76 in 2002. For summer 2003, poult production by radioed hens (2.1 poults per hen, $n=4$) was similar, to the average of 2.2 poults per hen for 2000-2002. Turkey distribution is expanding and broods have appeared as much as 10 miles from release sites in 2002 and 27 miles in 2003. In 2002, survival of radioed hens was greater (79%, 19 of 24) than in 2001 (54%). The radioed birds that died were either killed and/or fed upon by bobcat, cougar, or coyote.

Since 2000, 21% (5 of 24) of the radioed hens have been poached. Poaching appears to be opportunistic with birds being taken at both accessible and less accessible areas. Groups of wintering birds have been as large as 200 turkeys. Based on counts of wintering concentrations of birds, the Chelan and northeastern Kittitas counties' turkey population is estimated at over 1,000 birds.

In Region 3, attempts to establish wild populations of turkeys in Yakima County between 1913 and 1931 were unsuccessful. In all, 94 turkeys were released. These early releases relied on game farm-reared birds of the eastern subspecies.

Oak Creek Wildlife Area was the target of some early releases of wild-trapped turkeys in the early 1960s. Twenty Merriam's turkeys were released, but no significant population was established. In the mid-1960s 4 Merriam's turkeys were trapped from Stevens and Spokane counties and released on Colockum Wildlife Area in Kittitas County. This release did not result in population establishment.

More recent releases in Region 3 began in 1984. Thirty-eight Rio Grande turkeys were released in Yakima County in 1984 and 1985. Harvest and observations concluded that the introduction was not successful.

Although pockets of Rio Grande habitat occur throughout Region 3, the overall habitat is probably better suited for the Merriam's subspecies. From 1999-2001, 574 wild-trapped Merriam's turkeys from Stevens County were released in PMU P30 (Yakima and Kittitas Counties). Harvest indicates the transplant was successful.

In south-central Washington (PMU P35), Klickitat County was one of the first areas in Washington where several early attempts were made

to establish wild turkeys. Between 1930 and 1946, 93 turkeys were released in 4 different attempts to establish a population. These releases did not result in population establishment. Then in 1960, 12 wild-trapped Merriam's turkeys were released. This release resulted in establishment of Washington's largest, most stable turkey population from 1960 through 1990. After suspected population declines by the mid 1980s, approximately 125 Merriam's turkeys were released in 1988 and 1989 in hopes of rejuvenating the population. An additional 92 Merriam's turkeys were released in PMU P35 in 1997 and 1999. No releases occurred in PMU P35 or the other counties of Region 5 since 1999.

The south-central turkey population appears to be relatively stable. Recent increases in harvest may be tied to improved weather conditions in combination with additional birds released in the late 1980s and late 1990s. Recent reports by hunters and local biologists indicate that the population may be expanding its range and increasing in number as previously unoccupied habitats become colonized, especially in Klickitat and Skamania counties. One report this year came from an observation of a turkey near timberline on the south slopes of Mt. Adams in the Cascade Range.

Of special note is the turkey harvest in GMU 578 (West Klickitat). A total of 141 birds were taken in GMU 578 compared to 127 reported for GMU 588, Grayback. GMU 588 has long been considered our primary turkey area in Klickitat County as this was the site of our original release program. Recent harvest data for GMU 578 would indicate the favorable habitat conditions that exists in this unit for wild turkeys.

From 1925 and 1931 several documented turkey releases were made throughout western Washington. Most releases were limited in number and widely scattered. Releases were more numerous in San Juan County with over 35 birds in 3 different releases (over 6 years) and Clark County with 50 birds released in 2 years. In the early 1960s, turkeys were also released on Protection Island in Jefferson county.

The Department of Game trapped Merriam's turkeys in Klickitat and Stevens Counties and released 4 on San Juan Island, 6 in Lewis County, and 12 on Scatter Creek Wildlife Area. In addition, several turkeys were taken from Northwest Trek Wildlife Park and released on Bangor Naval Base property. Most of these releases did not result in population establishment.

In 1987 the Department of Wildlife began releasing wild-trapped eastern wild turkeys in Lewis

and Pacific counties. Thirty-one eastern turkeys were released in Lewis County from 1989 to 1992, and 39 in Cowlitz County. In 1993 and 1994 a few additional (<10) turkeys were trapped in Pacific County and some were moved to Cowlitz County. From 1997 to 2000, Wahkiakum County received 88 eastern turkeys from Iowa and 8 from Pacific and Cowlitz counties. Twelve eastern turkeys from Iowa were released in Cowlitz County in 2000.

Determining population trends for the wild turkey population in PMU P50 is difficult. Sightings of wild turkey continue to increase over the years and sightings in locations away from release sites are also occurring. In addition, turkeys continue to be harvested throughout the season. These factors, considered together, suggest wild turkeys may be reproducing and perhaps maintaining a viable population in PMU P50.

Habitat condition and trend

Most of turkey range in Region 1 is in close proximity to agricultural lands that provide abundant food in the form of waste grain as well as some berries and fruits through winter months. The Blue Mountains area provides excellent habitat for the Rio Grande subspecies. Stevens, Pend Oreille, and Ferry counties contain good habitat for the Merriam's subspecies.

Ponderosa pine nuts are probably the number one winter food source of turkeys in eastern Washington. In Chelan, Kittitas, and Okanogan counties, the density and distribution of ponderosa pines is less than in Ferry and Stevens counties where the largest population of turkeys is found in the State.

In general, occupied turkey habitat in Okanogan County is less productive than some other areas of the state, due to a lack of extensive mast or berry crops. Much of the habitat is intensively grazed, and turkeys may compete with livestock for certain plant foods. In addition, the lack of grain farming in the area may be hampering population expansion.

Most of Region 3 is probably marginal turkey habitat. The forested zone is on the edge of higher elevations and receives significant snowfall. Deep snows in 1992-93 and 1996-97 may have impacted turkey survival in the region. Mild winters the past 3 years have probably benefited turkeys.

Habitat in the lower Yakima Valley around Sunnyside is probably suitable Rio Grande turkeys. The area rarely receives significant snow and food is abundant. However, conflicts with agriculture (e.g., vineyards, orchards) in the area are likely.

Winter conditions in eastern Klickitat County (PMU P35) can sometimes be severe. As an

example, winter 1996-97 may have caused some mortality in resident turkeys that in turn may have triggered the small decline in turkey harvest in 1997. Harvest in 1998 harvest was also low (82 birds) in Klickitat County, but harvest more than doubled from 1998 to 1999 when 178 turkeys were harvested. This increase in harvest suggests the Klickitat County population recovered from the harsh winter of 1996-97.

Although we do not specifically survey habitat conditions related to turkeys in Region 6, conditions should continue to be favorable, as there were no significant changes in habitat management or weather conditions that would have affected turkey survival.

Augmentation and habitat enhancement

Over 800 turkeys were released within PMU P20 (Region 2) from 2000-2003. In 2001, 93 turkeys were released in Okanogan County, 135 in 2002, and 120 in 2003. One hundred fifty-six Merriam's turkeys were released in Chelan and northeastern Kittitas counties in 2000, 220 in 2001, and 76 in 2002. In Chelan County, turkeys were released on WDFW, Department of Natural Resources, and private land between the Colocum Wildlife Area and the Chelan Butte Wildlife Area. Flocks were established every 2-6 miles. Landowners were contacted prior to releases and were enthusiastic about release efforts. No birds were released near populations of sharp-tailed grouse or western gray squirrels, state listed species. This concludes the 2000-2003 Okanogan and Chelan County release plan.

Okanogan County had its first damage complaint in 2003. The landowner had fed birds up until 2 years ago. When the feeding stopped the birds began eating everything they could in the yard. There were 2 additional complaints in the Twisp area, but these involved domestic turkeys. In 2003, Chelan County also experienced its first damage complaint. The landowner was opposed to the release of a nonnative species and was concerned about the birds scratching under his pine trees.

No releases were made 2001-02 in PMU P30. Some winter-feeding occurred either through WDFW, NWTF, local sportsmen, or interested landowners.

During late winter and early spring 2000, 268 eastern wild turkeys from Iowa were released at sites in Thurston, Pacific, Grays Harbor, and Mason counties. There were no new releases in 2002-03.

Management conclusions

Harvest and hunter numbers continue to increase. In 1994 the regulations were changed to allow the harvest of up to three turkeys per year (one from each subspecies). As turkey populations continue to expand in PMUs P10, P15, and P20 (northeast, southeast, and north-central Washington), additional opportunity may be provided. One example of this is expanded fall hunting opportunities in northwestern Washington where we permit numbers have increased from 425 in 2001 to a proposed 1900 in 2003.

Habitat enhancement activities for wild turkeys should focus on food improvements (especially winter foods) in terms of grain, clovers, fruiting shrub, and mast producing tree plantings. These types of plantings would be most helpful in the northern portions of Washington's turkey range and other forested areas where food sources may be limited, especially after winter snowstorms.

Spokane County is seeing an increase of turkeys despite the urban nature of the area. Other areas are currently under expansion of a naturally increasing wild population. Turkey damage complaints are being received from areas of PMU P10 as well as a few reports in north-central and western Washington. Some hunting areas in PMU P10 are becoming so popular that hunter crowding and safety are becoming a concern on opening day and weekends. Fall hunting opportunity has been increased in PMU P10 to provide additional recreation as well as to help address population concerns.

The population of turkeys in south-central Okanogan County appears to be stable or increasing following several mild winters. No changes in the harvest are recommended at this time. The turkey population in Chelan County is expected to continue to increase through natural production. Telemetry work on Chelan County birds has slowed because most of the radios on birds have expired.

Even though deleterious competition between turkeys and other game birds in Washington has not been identified, any augmentation that could potentially put birds in existing sharp-tailed grouse or western gray squirrel habitat should be avoided as a precautionary measure.

Releases of Merriam's turkeys in Yakima and Kittitas counties have increased harvest and hunter participation. Radiotracking and observations indicate the birds have become widespread. Recruitment has been best in Kittitas County. Winter feeding will probably be needed to sustain a huntable merriam's population.

In 1994, regulations were changed to allow the

harvest of up to 3 turkeys/year. Harvest and hunter participation projections are now based on reports received from hunters who are reporting their hunting activity in compliance with the mandatory hunter reporting requirement. Future estimates will also be made using this data.

Following releases of over 600 eastern wild turkeys in PMU P50 (southwestern Washington) since 1998, there have been no plans for further translocations in the near future. Observations and analysis of data (e.g., percent young males in spring harvest) collected over the next several years should determine whether eastern wild turkeys will achieve viable population status.

Experimental releases along the east slope of the Cascades are being monitored to estimate habitat use, productivity, and limiting factors. These releases may eventually lead to successful population establishment. There are currently 3 areas where forested habitat occurs in Washington that are not occupied by turkeys: parts of Spokane County, north Puget Sound, and the Olympic Peninsula.

The completion of a wild turkey population management plan is identified in the recently completed Game Management Plan. The timeline on completion of this plan has been extended to June 2004. This plan will help guide future population expansion as well as population monitoring, and harvest management.

Figure 3. Estimated spring turkey harvest in each turkey Population Management Unit (PMU), 1996-2002.

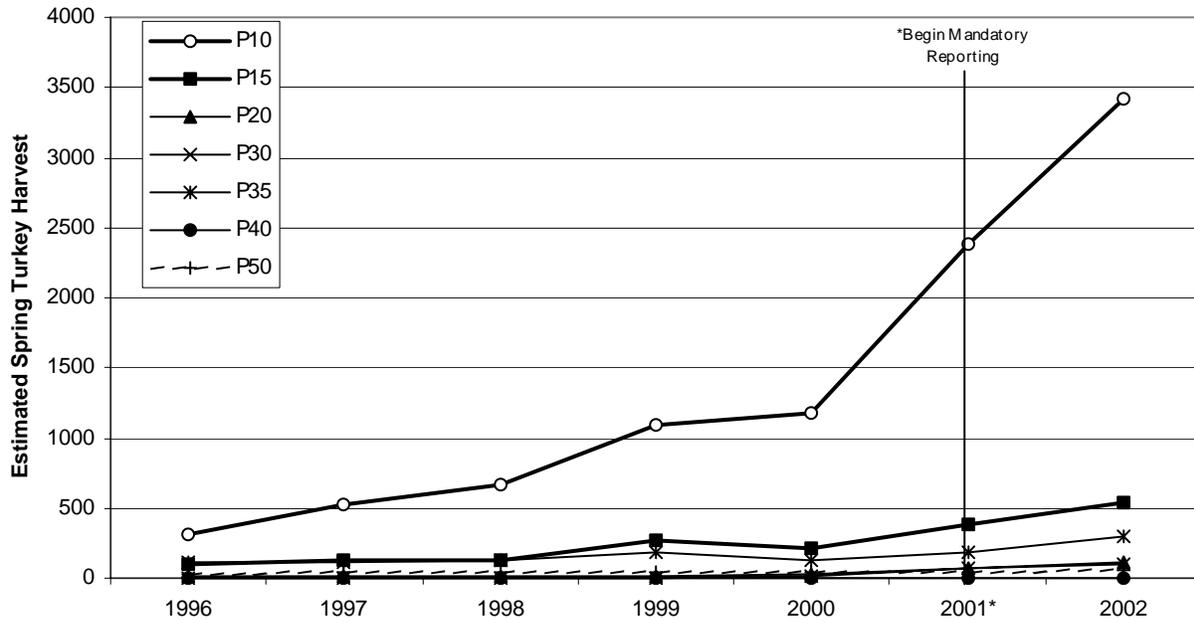


Table 2. Estimated turkey harvest in each turkey Population Management Unit (PMU) 1996-2002.

PMU	1996	1997	1998	1999	2000	2001*	2002
P10	313	519	662	1098	1176	2382	3418
P15	104	123	132	267	214	376	533
P20	21	11	20	21	32	78	119
P30	2	1	0	1	10	73	105
P35	118	109	125	183	134	190	300
P40	4	1	1	0	1	2	7
P50	26	36	40	46	48	47	54
Total	588	800	980	1616	1615	3148	4536

* = first year of mandatory reporting system

Table 3. Estimated fall permit harvest of wild turkeys in each turkey population management unit (PMU) from 2000 through 2002.

PMU	2000		2001*		2002	
	No. of Permits	Fall Harvest	No. of Permits	Fall Harvest	No. of Permits	Fall Harvest
P 10	280	134	451	195	1300	433
P 15	50	26	50	17	50	20
P 20	-	-	-	-	-	-
P 30	-	-	-	-	-	-
P 35	75	16	76	17	75	20
P 40	-	-	-	-	-	-
P 50	-	-	-	-	-	-
Total :	405	176	577	229	1425	473

* = first year of mandatory reporting system.

Pheasant

PHEASANT STATUS AND TREND REPORT Statewide

MICK COPE, Upland Game Section Manager

Population Status

Surveys (crowing count and brood index) conducted between 1982 and 1998 indicate a decrease in pheasant numbers in eastern Washington during that time (Rice 2003). There has been a wide variation in pheasant harvest over the past 50 years. Harvest was at its highest during the mid-to-late 1960's with another peak in the late 1970's when over 500,000 pheasants were harvested statewide. Since that time, pheasant harvest has been steadily declining. By using harvest as an index to population status, pheasant populations in Washington are currently much lower than they were in the 1960's and 1970's (Figure 1).

Over time, harvest estimation techniques have changed due to efforts to increase the precision of the estimates. Harvest estimation techniques did not change between 1984 and 2000, so estimates made during that time should be comparable. Figure 2 indicates a decline in pheasant numbers during that time which is supported by the surveys previously mentioned.

The cause of the increase in pheasant harvest from 1995 to 1997 may be an artifact of the Eastern Washington Pheasant Enhancement Program. Rooster pheasants have been released in the fall since 1997 and harvest estimates may be artificially high when compared to harvest estimates between 1992 and 1996 when no pheasants were released in eastern Washington. Considering this fact, the current population status of wild pheasants may be lower than indicated in Figure 2.

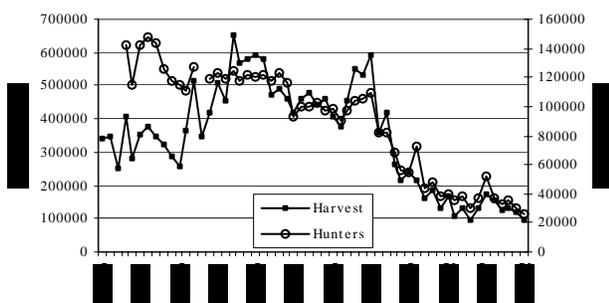


Figure 1. Estimated annual pheasant harvest and hunter participation in Washington 1946-2002.

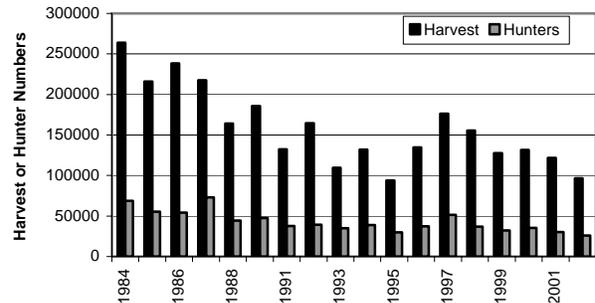


Figure 2. Estimated annual pheasant harvest and hunter participation in Washington 1984-2002.

While indicators show statewide declines (Figures 1 and 2), pheasant populations may not be decreasing in all major river basin in eastern Washington. Harvest estimates for the Snake, Yakima, and Columbia river basins do not reflect the same trends in populations from 1991 to 2002 (Figure 3). While this data has not been statistically tested at this time, differences in pheasant harvest are apparent. For this report, the “Yakima River Basin” consists of Yakima and Benton counties, the “Snake River Basin” is made up of Asotin, Garfield, Columbia, Walla Walla, and Whitman counties, and the “Columbia River Basin” includes Lincoln, Adams, Grant, Douglas, and Franklin counties.

Hunters

Hunter numbers have also dropped dramatically since the late 1960's (Figure 1). A commonly held upland game philosophy is that hunters will participate in relation to the abundance of the targeted species. In the case of pheasant hunting in Washington, peaks in harvest closely mirror hunter participation (Figures 1 and 2).

Cause of Decline

The cause of the decline in pheasant populations in Washington is not definitively known, however, it is likely that several factors are working together to influence the result. Pheasant research in many parts of the United States indicates that loss of habitat is the primary reason pheasant populations decline. Of particular importance are breeding habitat (including nesting and brood rearing habitat), habitat for wintering and habitat that provides escape cover from predators.

According to Washington Department of Fish and Wildlife biologists, alfalfa acreage has increased and has replaced more beneficial agricultural crops. Orchards and vineyards have also replaced potentially beneficial crops in some areas. In addition, wheat stubble (and its associated waste grain) is now tilled under in summer shortly after the wheat is harvested. Farming practices appear to be constantly evolving and most changes have had a negative impact on pheasants.

To some degree, upland game bird fall

population densities, and related harvest, are also dependent on spring weather conditions. Chicks have a difficult time thermoregulating in cold, wet weather, and they need high protein diets (usually from insects) in the spring. Cold, wet springtime weather increases the likelihood of chicks dying of exposure and it often decreases insect availability. In times when pheasant populations are not high, increased mortality due to weather may have an even greater influence on future population densities.

In addition to the factors listed above, pesticide and herbicide use and urban sprawl are also likely contributors to the decline in pheasant populations. The use of pesticides results in the removal of important food resources (e.g. insects). Some pesticides may also have a direct effect on individual pheasants. Herbicides impact plant diversity, which is an important component to quality pheasant habitat. Houses now occupy many of the areas that have pheasants utilized in the past. In some areas of the Columbia Basin, field corners (associated with circle irrigation) now have private residences placed on them, resulting in a reduction in the amount of pheasant habitat available.

Pheasant Management Workshop

A pheasant management workshop was conducted in March 2003. This workshop was developed to collect information that would help identify at least five key pheasant management strategies that would give the greatest chance of successfully increasing naturally occurring pheasant populations in Washington. Experts in the field of pheasant management were brought in to discuss management strategies in areas where pheasant populations historically have been high and to discuss research findings and management programs that may help address population declines in Washington. Approximately 75 people attended the meeting, including general public and state agency personnel.

Invited speakers from Kansas Department of Wildlife and Parks, South Dakota Game Fish and Parks, Iowa Department of Natural Resources, and the Wildlife Management Institute provided information about pheasant management in their states as well as the following recommendations to increase pheasant populations in Washington.

- *Pheasant populations have been declining in many areas of the country.*
- *Changes in farming practices have reduced the quality and quantity of pheasant habitat.*
- *Although loss of habitat may not be the only factor currently affecting populations, expert opinion is that population trends cannot be reversed until proper habitat is in place.*

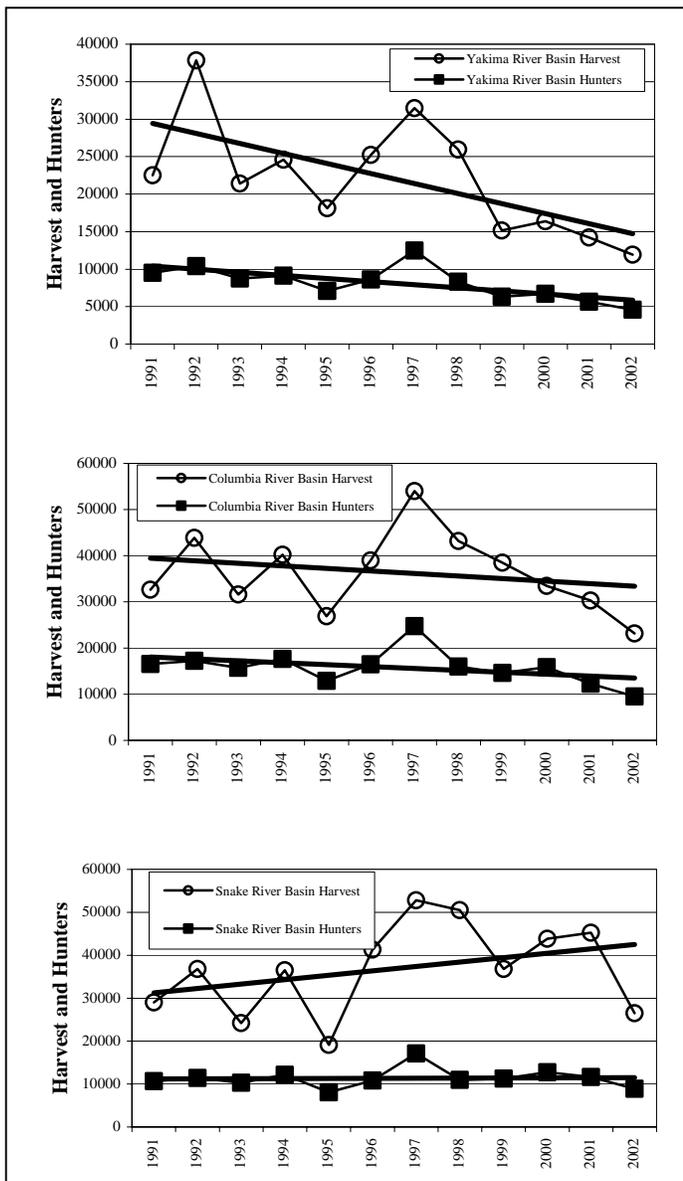


Figure 3. Estimated harvest and hunter participation for the Yakima River, Columbia River, and Snake River basins from 1991-2001.

- *Select areas to focus your efforts. It is better to identify a focus area and be successful there, than spreading human resources, or available funding, too thinly.*
- *Pheasant management needs to take place on a large enough scale to impact populations over the long term. To focus on small, isolated parcels of habitat would be counter-productive.*
- *Within the focus area, determine bottlenecks (limiting factors) and identify the most effective distribution and composition of habitat improvements.*
- *In many places the most limiting habitat type is “production cover” which includes nesting and brood-rearing habitat as well as escape cover. Specifically, pheasants require adequate nesting cover and sufficient insect abundance during brood rearing. Insects often are associated with diverse plant communities with a substantial forb component.*
- *At least 15% of the landscape must be in relatively undisturbed grass or grass-like vegetation (with a significant forb component) to resolve nest success and brood survival problems. Agricultural landscapes with 25% grassland have been shown to provide the optimum production cover. In addition, nesting and brood-rearing habitat should have few if any trees greater than 15-feet in height to reduce the impact of avian harassment and predation.*
- *Evaluate what you need and then determine if you can get the funds to accomplish those tasks. If you cannot get the funding, then scale back the size of the area you wish to impact without sacrificing any of the habitat objectives.*
- *Studies have shown that releasing pen-raised pheasants (both chicks in late summer and hens in the spring) for population establishment is expensive and ineffective.*
- *Rather than focusing on predator control, emphasis should be placed on controlling predation through providing adequate habitat. Studies in Iowa showed that the highest predator populations occurred on the same landscape that supported the highest pheasant populations, both due to excellent habitat.*
- *The 2002 Farm Bill has many programs that can help landowners improve habitat conditions for pheasants and other upland wildlife. While these programs are available, it is important for the State of Washington to work closely with the U.S. Department of Agriculture to make sure local and regional wildlife issues are addressed and to*

- help landowners become involved in the programs that are applicable to their property.*
- *Based on hen survival and nest success, researchers in Iowa have concluded that increasing permanent grass stand acreage increases hen survival and that CRP in large blocks (over 40 acres) is even more beneficial to pheasants than CRP buffer strips.*
- *Improving pheasant habitat on working lands is an important component to the overall picture. If habitat enhancement is not compatible with a farmer’s operation, then there is little incentive for the landowner to participate.*
- *Research has shown that retaining at least 12 inches, and preferably 15 inches or more, of wheat stubble after harvesting can result in higher pheasant densities. This is due primarily to an increase in the broad-leaf, weedy habitat that occupies the field after harvest.*
- *Increased wheat stubble height also can help farmers produce more grain per acre due to increased moisture retention in the soil.*
- *Direct seeding (no-till drilling) can increase soil quality, reduce erosion and increase value of the property for wildlife.*

In California, research is showing that improving brood rearing habitat results in increased densities of pheasants in the fall and subsequent spring (C. Hart, California Department of Fish and Wildlife, Unpublished Data) Techniques being developed in California involve mechanically disturbing an area in the fall and flooding it during the winter to encourage broad leaf, weedy plants. This type of habitat produces the invertebrate prey base that is critical to pheasant chick development and survival.

Management conclusions

Pheasant populations have declined dramatically in recent years and remain at low levels compared to the past. Causes of the decline are not definitively known, however, habitat loss and or alteration is thought to be the primary cause of the decline. In order to address this situation, the following recommendations are made based on the results of the pheasant management meeting held in March 2003:

- *Dedicated WDFW staff is needed to focus on pheasant management and enhancement within identified focus areas of the state.*
- *Work with USDA programs on a statewide basis and work with NRCS staff within the state. Co-locate WDFW staff in NRCS offices to*

- maximize interagency interaction and develop and maintain landowner relationships.
- Pheasant management should be done on a large-scale (i.e., over 60 mi²) and should be focused in areas where meeting desired habitat conditions is most attainable.
 - Focus pheasant management efforts in southeastern Washington, specifically Columbia, Garfield, Walla Walla, and Whitman counties and other areas where adequate rainfall (i.e., over 14 inches) is conducive to supporting desirable, appropriate plant communities.
 - Farm Bill implementation:
 - Work with NRCS local working groups.
 - Work closely with landowners. Help provide technical assistance for all USDA Farm Bill programs as well as other federal and state funding sources (e.g., Salmon Recovery Funding Board and Eastern Washington Pheasant Enhancement Program).
 - Integrate as many fund sources as possible (including state, non-government organization (e.g., Pheasants Forever) and Federal funds (Farm bill and others (e.g., salmon recovery)) to accomplish habitat improvement goals.
 - Emphasize the development of adequate pheasant “production cover”, including stressing the importance of quality brood rearing habitat.
 - Small habitat projects need to integrate with the overall habitat needs for a larger area.
 - Develop pheasant population monitoring protocols in areas of emphasis. Where applicable, monitor to determine the benefits pheasant habitat management has on other wildlife species (e.g., threatened and endangered species).
 - Target hunter access improvement opportunities within the focus area.
 - Efforts to increase pheasant populations on irrigated lands of eastern Washington should focus on working with the NRCS to identify ways for landowners to participate in Farm Bill Programs.
 - Options may be limited to establishing Continuous CRP (CCRP) buffers, wetland enhancement projects, and other projects focusing on upland areas associated with some type of open water or wetland.
 - Work with NRCS local working groups and local Conservation Districts.
 - Releasing pen-raised pheasants in eastern Washington is important to some hunters. WDFW will continue to release pen-raised pheasants, however, these releases will not be part of focused pheasant population management for the state.
 - Work with Washington State University (WSU) and the Extension Agent Program to help develop and promote farming practices that are beneficial to pheasants and retain or improve profitability for the landowner. This would include, but not be limited to, field preparation, seeding, and harvesting.
 - Discuss Kansas State University and Kansas Wildlife and Parks research findings and see how they may apply to Washington.
 - Work together with WSU and the Pacific Northwest Direct Seed Association to help identify additional locations for direct seeding.
 - Pheasant habitat on WDFW owned or managed lands may be targeted as habitat improvement demonstration areas.
 - Focus on developing quality pheasant habitat that does not require intensive, ongoing maintenance.

Literature Cited

- Rice, C.G. 2003. Utility of Pheasant Call and Brood Counts for Monitoring Population Density and Predicting Harvest. *Western North American Naturalist*.63(2):178-188.

PHEASANT STATUS AND TREND REPORT: REGION 1 Snake River Basin

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

Population objectives and guidelines

Pheasant management objectives are outlined in the Upland Bird Plan (WDFW 1988). The overall objective is to maintain well-distributed populations and maximize recreational opportunity. Primary objectives include 1) Increase populations above the 1980-85 average. 2) Increase hunter recreation days to 338,000 statewide. 3) Maintain the statewide harvest at the 1980-85 level of 371,000 birds per year, at a hunter success rate of 4.5 birds per year.

Hunting seasons and harvest trends

The eastern Washington general pheasant season ran from October 5 to December 31, 2002. In addition, a juvenile season ran for two days in late September. The bag limit was 3 cocks per day. Opening the upland bird season in early October is causing conflicts with landowners and muzzleloader deer and elk hunters.

The pheasant harvest in Region One was at its peak from 1946 to 69, with an average harvest of 107,100 pheasants per year. The harvest has continued on a downward trend for the last 30 years. Compared to the previous 24-year average, the harvest during the 1970s declined 23% to 82,687 pheasants/year, 26% in the 1980s to 79,639 pheasants/year, and 63% in the 1990s to 40,074 pheasants/year (Figure 1.). The Regional pheasant harvest in 2002 decreased 37% from 2001, with a harvest of 34,427 pheasants.

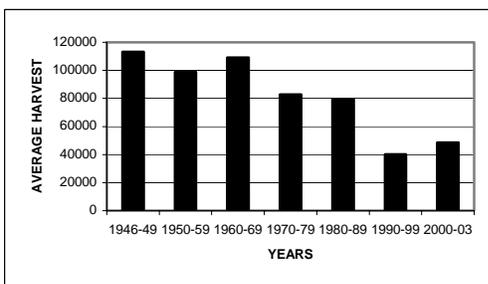


Figure 1. Region 1 pheasant harvest trend.

Although hunter trend information is limited, from 1986-1997 the number of pheasant hunters in Region One has cycled from a high of 20,000 in 1986, to a low of 9,500 in 1995, to 19,172 hunters in 1997, and back down to 13,109 in 2001 and 10,192 in 2002 (Figure 2).

Hunter participation is probably influenced by several factors, including pheasant abundance.

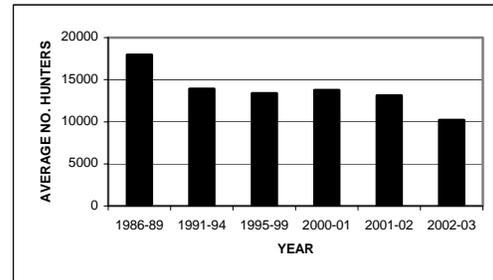


Figure 2. Region 1 pheasant hunter trend.

Hunter success in Region One varies from year to year. During the period 1986-89 and 1991-95, pheasant hunters averaged 2.9 and 2.7 birds/hunter., respectively. From 1996-2000, pheasant hunters enjoyed increasing success with an average of 4.0 birds/hunter. In 2001-2002 the hunter success rate was 3.4 birds/hunter. (Figure 3).

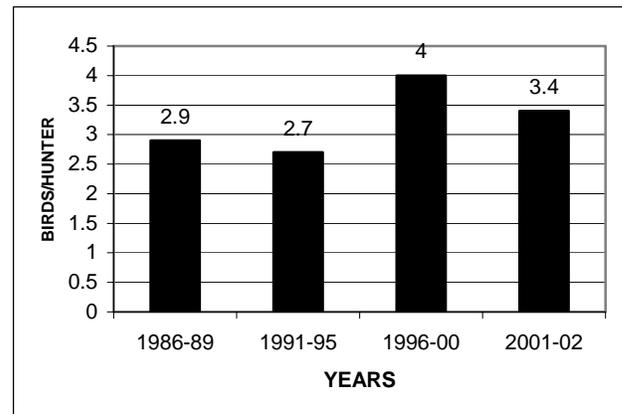


Figure 3. Region 1 pheasant hunter success reported as birds harvested per hunter.

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) Production counts in late July and August. Spring surveys to determine sex ratios and broodstock carryover were discontinued in 1996. Time constraints,

lack of personnel, and questionable value of the data have resulted in pheasant surveys being discontinued in Region One. In the past, pheasant crowing counts were conducted in late April and early May if weather conditions and time allow. Pheasant production surveys were conducted in late July and August. All surveys were conducted on established routes.

Although crowing counts were conducted for many years, habitat conditions have changed along most of the routes, as well as the hearing level of individuals that have historically run the same routes, which makes the value of the data suspect. Production surveys along established routes have provided information on the number of pheasants observed per survey (obs.-day), and the level of production for the year, but analysis of the data indicated the statistical reliability of the data was highly suspect.

Population status and trend analysis

Based on past surveys and harvest trends, pheasant populations have declined significantly over the last 30 years. The primary factor for the decline in pheasant populations is loss of habitat due to development and agricultural practices. In areas where alfalfa is a major crop, the first cutting usually occurs during the peak of nesting (mid-May) and results in a heavy loss of nests and young. Another factor that may have a significant impact on the pheasant population is the dramatic increase in predator populations, both numbers and species. Predation combined with fragmented habitat may be focusing negative factors on the pheasant population, which prevents a long-term increase. Agricultural chemicals may have an as yet undetermined influence on the health of upland bird populations.

Weather conditions during the nesting season are also a significant factor that impacts the annual pheasant population. Cold, wet conditions during the peak of hatch can result in very high mortality of young pheasants, decimating annual production. Production can be down in one area and up considerably in another area due to variations in weather patterns during the nesting season.

The 2002 nesting season was apparently less successful than previous years. Wet weather during the nesting season may have impacted productivity. The pheasant population apparently declined in 2002, and remains well below historic levels.

Habitat condition and trend

Habitat conditions over the past 30 years have declined due to many factors, including land development, changing agricultural practices, and noxious weed invasion. However, habitat for upland birds has improved in recent years with the implementation 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. This program will provide large areas of suitable habitat near agricultural croplands, enhancing habitat conditions for pheasant, non-game and other species over the next 8-10 years.

Augmentation and habitat enhancement

The Upland Habitat Restoration Program has developed over 8000 acres of upland bird habitat in the southeast and central districts. The Conservation Reserve Program has made an enormous contribution to improving wildlife habitat in Region One.

Management conclusions

Pheasant populations in Region One are affected by numerous factors that hold the population below management objectives. Land development, changing agricultural practices, pesticides, noxious weed invasions, fragmentation of habitat, and conflicts with other species may prevent significant increases in the pheasant population in the foreseeable future.

PHEASANT STATUS AND TREND REPORT: REGION 2 Columbia Basin

JIM TABOR, District Wildlife Biologist

Population objectives and guidelines

Population objectives for pheasants in Columbia Basin include:

1. Maintain a viable population that will provide hunting opportunity and harvest.
2. Increase population size above that of the past 5 years.

Hunting seasons and harvest trends

Pheasant hunting seasons and bag limits in the Columbia Basin remained stable 1984-98 when seasons extended from the first Saturday after October 10 to December 31 with a daily bag limit of 3 cock pheasants and a possession limit of 15. In 1999, the season opened on October 9 and remained unchanged in other respects. In 2002, the season opened on Oct. 5.

In Grant and Adams counties, the number of pheasant hunters declined 52% in the 9-year period from 1987 to 1995, increased slightly in 1996, and increased substantially in 1997 (Table 1). The number of hunters decreased 8% from 2001 to 2002. The trend in hunter numbers is very similar for both counties.

Even with the restriction of cock-only harvest, sex ratios in the Basin averaged 2.8 hens/rooster from 1993 through 1998. This low sex ratio indicates that cocks could be harvested at a higher rate without reducing breeding efficiency, productivity, or population growth.

Table 1. Number of pheasant hunters in Grant and Adams counties, Washington, 1987-02.

Year	Grant	Adams	Total
1987	11,948	4,099	16,047
1988	9,052	2,793	11,849
1989	10,615	2,688	13,303
1990	--	--	--
1991	7,630	2,337	9,967
1992	8,321	2,644	10,965
1993	7,655	2,151	9,806
1994	8,439	2,443	10,882
1995	5,947	1,749	7,696
1996	7,482	2,486	9,968
1997	12,207	4,392	16,559
1998	7,560	2,536	10,096
1999	6,748	2,262	9,010
2000	7,745	2,507	10,252
2001	5,817	1,765	7,582
2002	5,645	1,314	6,959

Table 2. Pheasant harvest in Grant and Adams counties, Washington, 1984-02.

Year	Grant	Adams	Total
1984	43,921	14,991	58,912
1985	36,225	10,299	46,524
1986	35,932	11,804	47,736
1987	37,631	11,222	48,853
1988	22,928	7,111	30,039
1989	27,322	7,622	34,944
1990	--	--	--
1991	15,116	4,206	19,322
1992	20,819	7,267	28,086
1993	14,046	4,422	18,468
1994	18,117	5,001	23,118
1995	11,029	3,798	14,827
1996	15,667	7,790	23,457
1997	27,034	9,769	36,803
1998	22,391	5,602	27,993
1999	17,083	6,462	23,545
2000	17,686	4,948	22,634
2001	14,028	4,848	18,876
2002	12,798	2,397	15,195

Hunting conditions in the Columbia Basin appear to change only moderately from year to year or on a “short-term” basis. Type of crops grown, timing of harvest, crop residues left in the field, and amount of ground left untilled affects hunter use and success and has changed rather dramatically over the long term. Most pheasant hunting in Columbia Basin occurs on private farmland. The long-term trend shows a decrease in amount of effective pheasant hunting cover in the irrigated farmland.

An unknown, but likely significant, amount of pheasant hunting occurs on the Columbia Basin Wildlife Areas, private lands under agreement with WDFW’s hunter access program, and on lands owned and/or managed by WDFW under the Upland Wildlife Restoration Program (UWRP). The hunter access program in Grant and Adams counties included 192 cooperators with a total of 369,516 acres of hunting access in 2001. The UWRP manages 37 parcels totaling 1,717 acres available to hunters.

During the 19-year period from 1984 to 2002, harvest declined 74% (Table 2). In 2002, harvest decreased 51% from that of 2001 in Adams Co. and 9% in Grant Co., resulting in an overall decline of 19.5 % to 15,195.

Pheasant hunter success (pheasants harvested/hunter day), in both counties combined, ranged from a high of 0.67 in 1996 to a low of 0.40 in 1991 with an average success rate of 0.50 from 1986 to 2001. In 2002, the success rate was 0.43 pheasants/hunter day, a 17% decrease from 2001 and the previous 16-year average (Table 3).

Table 3. Pheasant hunter success rate (pheasants harvested/hunter day), Grant and Adams counties, Washington 1986-02.

Year	Grant	Adams	Total
1986	0.57	0.69	0.63
1987	--	--	--
1988	0.57	0.66	0.62
1989	0.53	0.69	0.61
1990	--	--	--
1991	0.38	0.41	0.40
1992	0.53	0.58	0.56
1993	0.42	0.62	0.52
1994	0.46	0.52	0.49
1995	0.46	0.51	0.47
1996	0.53	0.87	0.67
1997	0.41	0.53	0.43
1998	0.64	0.62	0.63
1999	0.46	0.59	0.53
2000	0.46	0.53	0.47
2001	0.47	0.61	0.50
2002	0.44	0.41	0.43

Surveys

Data are obtained annually in irrigated farmland portions of Grant and Adams counties to provide indices to breeding population size and production of chicks. The population index is useful in determining long-term trends and major short-term population changes. The production index is a predictor of hunting prospects and may provide information useful in determining reasons for annual changes in population size.

Until 1997, 6 permanently established crowing count routes along farm roads and highways in Grant and Adams counties' irrigated farmland were surveyed twice annually (≥ 1 week between surveys) between April 25 and May 15. Only 1 route (Warden) was surveyed 1997-2003. The index is presented as the mean number of crows per stop and is assumed to represent the number of roosters present.

Pheasant sex ratio surveys (counts) were made in farmland areas adjacent to established crowing routes annually through 1999. Data from all survey sessions in an area were totaled for an estimate of number of hens/rooster. Only 1 area was surveyed for sex ratio counts from 1997 through 2003. This area was

adjacent to the Warden crowing route. There were 3.3 hens/rooster in the spring of 2003. The 2003 index to breeding population size of hens (brood stock index) decreased 18% from that of 2002 (Table 4).

Table 4. Pheasant breeding population indices for The Columbia Basin Irrigation Project, Washington 1996-2003.

Year	Crows/ Stop	Hens/ Rooster	Broodstock (Hen) Index*
1996	6.2	1.8	11.2
1997	13.9	3.1	40.5
1998	8.5	3.0	25.8
1999	13.4	4.0	53.6
2000	3.9	--	--
2001	5.5	2.5	13.8
2002	5.9	3.4	20.1
2003	5.1	3.3	16.5

* Crows/Stop x Hens/Rooster. Assuming calls from roosters could be heard if the rooster was within 0.5 miles, the hen index is an estimate of the number of hens/502 acres.

The production index was derived from surveys of 6 permanently established pheasant brood routes located in the same general areas as crowing count routes through 2002. The production index was the number of broods or chicks seen per observation day. The pheasant production index for 2002, as measured

Table 5. Pheasant production index for the Columbia Basin Irrigation Project, 1990-2002.

Year	Broods/ Obs./Day	Chicks/ Obs./Day	Tot.Ph./ Obs./Day	Percent Juvenile	% hens w/ Brood
1990	3.2	12.1	18.6	65	63
1991	1.1	3.9	7.0	56	58
1992	2.5	11.3	14.9	77	81
1993	1.8	7.9	10.5	75	94
1994	3.0	13.3	16.9	79	94
1995	1.4	6.4	9.6	66	71
1996	2.8	13.6	16.6	82	89
1997	1.2	6.3	8.5	74	62
1998	3.8	21.8	25.4	86	95
1999	1.4	4.4	6.7	66	73
2000	1.5	6.9	9.2	75	84
2001	1.5	4.8	6.4	75	89
2002	1.7	6.6	8.1	79	87

by the number of chicks observed /day on the 6 brood routes, increased 38% from that of 2001 (Table 5). The increased production of chicks was probably due primarily to the larger breeding population in 2002. The pheasant production index in 2002 was 30% below the 1990-2001 average.

Population status and trend analysis

The pheasant population in the Columbia Basin Irrigation Project has plummeted since the early 1980's. The decline has been dramatic with very few single-year hints of possible slowing of downward trend or possible recovery. In the early 1980's, the hen population at the beginning of nesting season was estimated to be in excess of 100/section. The mean hen index for 1983 and 1984 was 141hens/502 acres (area within a 0.5 mile radius) or 181 hens/section (640 acres). In the spring of 1996, hen density was estimated to be 14/section, an all-time low. Spring hen numbers increased to 52/section and 69/section in 1997 and 1999, respectively. Hen numbers declined to a much lower level by 2003 (Table 4). Breeding season rooster density declined concurrently with hen density. Density of roosters in the early 1980's was approximately 20/section. In 2003, rooster density was approximately 5.1/section.

Habitat condition and trend

The winter of 2002-03 was mild. Little snow fell and temperatures were above normal for most of the winter. Pheasant survival over-winter was likely good. Weather during May and June 2003 was conducive for pheasant production.

Loss of permanent cover (untilled land) in the irrigated part of the Basin continues. Conversion of small fields with fence rows, ditches, and other adjacent cover to large circle irrigated fields is probably the major loss of habitat. Another major loss of pheasant habitat is the construction of homes and farm buildings. This activity has greatly accelerated in recent years.

Increased acreage of alfalfa hay has replaced potentially beneficial agricultural crops. Management practices associated with alfalfa lead to increased mortality for pheasants, especially hens, chicks, and nests. Orchards and vineyards have also replaced potentially beneficial crops. Wheat stubble (and its associated waste grain) is now tilled under by most farmers in summer shortly after the wheat is harvested. In addition, Columbia Basin farmers have reduced the acreage planted to small grain crops. Farming practices appear to be constantly evolving and most changes have a negative impact on pheasants.

Augmentation and habitat enhancement

Since 1998, one of UWRP's main focus was installing guzzlers in conjunction with CRP; 4 were installed in 2002, bringing the total to 413 guzzlers installed on private land. In addition to guzzler installation, the UWRP planted 6000 shrubs,

maintained existing habitat developments, conducted extensive weed control on the UWR sites, established food plots, maintained alfalfa nesting plots, and established and maintained grass cover plots. The program managed three agricultural leases for share cropping and habitat maintenance.

In 2002, approximately 4,800 game farm rooster pheasants were released at 24 locations during autumn (4 release dates) in Grant and Adams counties. The intent of these releases was to provide increased hunting opportunity for pheasant hunters.

Management conclusions

Pheasant populations in the Columbia Basin have declined dramatically in recent years and remain at very low levels compared to the pre-1990's. Documented causes of the decline do not exist. The lay public and wildlife managers alike frequently voice speculation as to reasons for the decline. In reality, very little objective information specific to identification of potential causes of the decline is available.

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

MIKE LIVINGSTON, District Wildlife Biologist

Population objectives and guidelines

Primary objectives of pheasant management are to maintain well-distributed populations and to provide appropriate levels of hunting recreation. Statewide objectives were last set in the 1988 Upland Bird Plan. Objectives in 1988 included: (1) increase hunter recreation days to 338,000 statewide; and (2) maintain the statewide harvest at the 1980-85 average level of 371,000 birds per year with a success rate of 4.5 birds per hunter per year. In 1986, there were 117,630 recreation days in Region 3. The 1980-85 harvest average in Region 3 was 100,000.

Hunting seasons and harvest trends

Hunter participation was the lowest reported during the 16-year period 1986-2002 (Figure 1). Participation was down 14% from 2001 and down 46% from the 10-year average. Effort of 38,242 recreation days was 14% below last year and 66% below the objective. Harvest decreased 13% from 2001 and was 83% below the goal of 100,000.

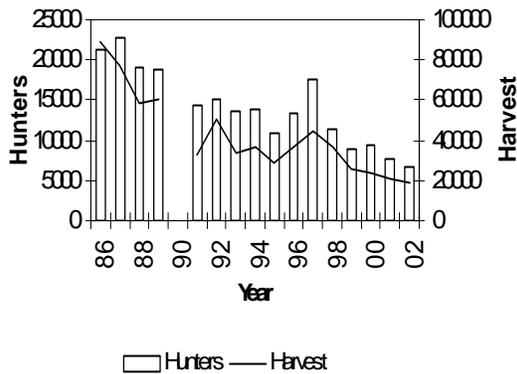


Figure 1. Pheasant hunters and harvest, 1986 -2002

Hunter success, as measured in pheasants harvested per day, has ranged from a high of 0.68 in 1986 to a low of 0.41 in 1991 and 1993 (Figure 2).

Hunter success has changed only minimally during the period 1999 through 2002. It increased by 1% between 2001 and 2002 and was 11% below the 10-year average.

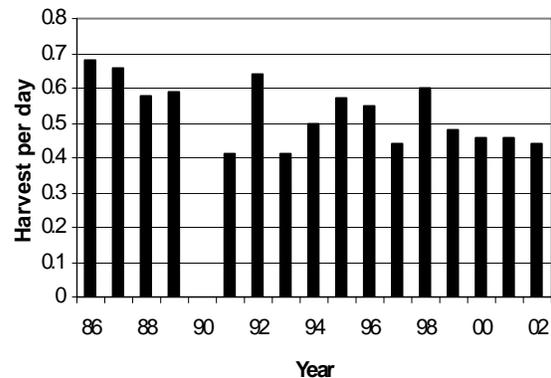


Figure 2. Pheasant harvest per day, 1986-2002.

Surveys

Brood count surveys were discontinued in Region 3 in 1999. The post-hunting season questionnaire used to estimate harvest currently provides the best estimate of population status. Since the Pheasant Enhancement Program began in 1997, pen-raised roosters have been released and subsequently reported in the hunters' bag. By including pen-raised pheasants in the harvest, inferences made about population status are likely biased high and should be made with caution.

Population status and trend analysis

Harvest data indicate the population has declined dramatically since the 1980s (Figure 1). For the fourth straight year, total pheasant harvest was the lowest on record in 2002. The reason for the decline is likely habitat loss due to changing agricultural practices and urban sprawl. The downward population trend is likely to continue along with the expected decline in habitat availability.

Habitat condition and trend

Pheasant habitat has declined for decades and continues to do so. Changes in farming practices, particularly in irrigated agriculture, has been the main cause of habitat degradation. Grain, pasture, and alfalfa fields have been converted to high-value crops such as orchard, vineyard, and hops. Cleaner farming practices have removed cover bordering fields, riparian areas, and irrigation canals. Forbs, weed seeds, and insects promote pheasant survival, but herbicides and

pesticides are heavily used to keep crops free of weeds and insects. Agricultural crops do not provide enough year-round food or cover. Vineyards and hop fields are typically kept free of ground cover, and grass cover within orchards is usually mowed.

Urban development has also negatively affected the pheasant population in Region 3. Homes have been built in areas that historically provided pheasant nesting and hunting opportunity. This trend is expected to continue as the state's human population continues to increase.

The federal Conservation Reserve Program (CRP) has not benefited pheasant habitat in the Yakima Basin as it has in other areas of the state. In Washington State, the CRP has paid farmers to convert over 1 million acres of highly erodible dryland wheat fields to permanent grass, forbs, and shrub cover. Because most agriculture in the Yakima Basin is irrigated, few acres have been enrolled in CRP and few benefits to pheasant habitat have been realized.

One of the last strongholds for pheasant in Region 3 is the lower Yakima Valley. 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 2002 with the releasing of approximately 4750 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.

The 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 are showing the impacts. Concentrated hunter numbers at release sites negatively impact other species such as California quail. To meet desires of various factions of the hunting public, birds should not be stocked where there is quality habitat and good wild production.

Chukar

CHUKAR STATUS AND TREND REPORT: REGION 1 Snake River Basin

PAT FOWLER, District Wildlife Biologist
PAUL WIK, Wildlife Biologist

Population objectives and guidelines

The chukar population in Region One reached an all time high in between 1979-81, but crashed in 1982. The long-term objective will be to increase chukar populations within Region One to historic levels that occurred in the late 1970's. 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 average over 66,000 birds per year in Region One. Most of this harvest occurred within the Snake River basin portion of Whitman, Garfield, and Asotin counties. The average harvest in Region One declined to 28,872 birds per year during the 1980's, and declined to only 12,020 birds per year in the 1990's.

The Region One harvest remained low in 2001 and 2002 at 7,905 and 3,849, 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

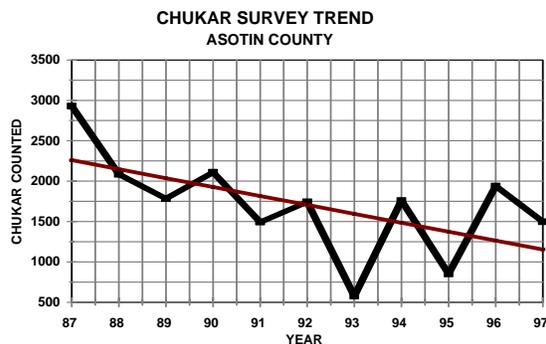


Figure 1. Aerial Chukar Survey Trend 1987-97, Asotin County.

Region One.

Surveys

Chukar populations were surveyed by helicopter between 1987 and 1997 (Figure 1), 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. However, nesting conditions in 2003 were excellent.

The annual chukar population is dependent on the current year's production. Production in 2003 appears to be excellent, and possibly the best in over 20 years.

During aerial surveys for falcons in late June 2002, 13 chukar broods were recorded, averaging 10 young per brood. Observing chukar broods in late June from a helicopter is extremely difficult, because most broods are too young to fly or be seen from the helicopter. Field personnel have also reported seeing good numbers of chukar with large broods in August.

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 infested with cheatgrass (*Bromus tectorum*, Ware and Tirhi 1999), they are not fond of areas inundated with yellow-star.

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 (Ware and Tirhi 1999). As the acreage of yellow-star thistle increases in the Snake River Basin, the availability of

cheatgrass is declining significantly. This may be one of the reasons chukar populations have failed to reach historic levels since 1981.

Augmentation and habitat enhancement

Weed control programs appear to be faltering because of the huge costs involved in the aerial application of herbicides. Aerial spraying is the most effective method if followed by good land management practices. Unfortunately, landowners tend to put livestock back out on acreage that has been sprayed, which only exacerbates the weed problem. Biological control agents are also used, but appear to be most effective in newer, smaller stands, and have little impact on large areas of yellow star thistle.

Management conclusions

Chukar populations in Region One are still below the peak levels of the 1970's and early 1980's. Habitat deterioration and land management practices that do not favor chukars will result in the loss of more habitat. Nesting conditions improved in 2003, and 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 1993-2002.

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Asotin	3,734	4,742	2,790	6,781	5,111	5,006	3,547	4,788	3687	1416
Columbia	227	439	374	695	561	273	111	155	179	140
Ferry	0	0	0	0	0	0	0	0	0	0
Garfield	470	1,387	187	864	2,057	2,648	1,337	724	769	667
Walla	64	670	0	112	155	0	0	55	429	396
Whitman	1,461	994	1,082	1,531	1,075	2,319	1,875	2,953	2644	1070
Lincoln	162	0	229	807	77	135	148	174	76	127
Spokane	178	0	145	17	405	154	55	146	111	33
Stevens	0	0	0	0	0	0	0	0	10	0
Pend Ore	0	0	0	0	0	0	0	0	0	0
Total	8,289	10,226	6,802	12,803	11,438	12,533	9,072	10,995	7905	3849

Literature Cited

Ware, D. A., and M. Tirhi. 1999. Chukar (*Alectoris chukar*). In E. M. Larsen and N. Nordstrom, editors. Management Recommendations for Washington's Priority Species, Volume IV: Birds [Online]. Available <http://www.wa.gov/wdfw/hab/phs/vol4/chukar.htm>

CHUKAR STATUS AND TREND REPORT: REGION 2 Upper Columbia River Basin

TOM McCALL, Wildlife Biologist
BEAU PATTERSON, District Wildlife Biologist

Population objectives and guidelines

Management objectives for chukar are to maintain healthy chukar populations in all suitable habitats within Region 2 and provide maximum recreational opportunities consistent with population management objectives.

Hunting seasons and harvest trends

Since 1999, Chukar season has opened October 1 and continued through the third weekend in January. Bag and possession limits for chukar are 6 and 18. These season and limit regulations allow more recreation for chukar hunters than previously available.

Approximately 40 percent of Washington’s chukar harvest comes from Region 2. Chukar harvest in the region reached a low of 4,755 in 1993, increased to 13,042 in 1997, and fluctuated between 9,373 and 14,785 from 1991 to 2002 with no apparent trend (Figure 1).

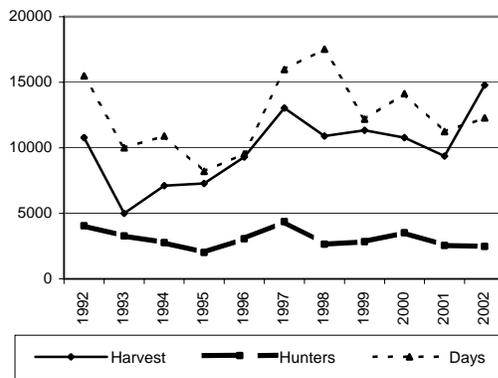


Figure 1. Hunters, Harvest and Hunter Effort from 1992-2002 in Region 2.

From 1992 to 2001, chukar harvest in Region 2 averaged 9,362 birds per year (range 4,755 to 13,042). In 2002, chukar harvest was estimated at 14,785 birds, which was 58% greater than average. There were 2,484 hunters in 2002, which is similar to the average from the previous 10 years (2,987).

Surveys

In Region 2, we drive 3 routes (Colockum-Tarpiscan, Swakane-Nahahum, and Chelan Butte) in early August to monitor chukar populations. Each route is approximately 20 miles long. Volunteers count total chukar seen while driving these routes. In 2003, the 3 survey routes were each driven 3 times. An average of 2.0 chukar were seen on each route compared to an average of 4.9 per route from 2000 to 2002. Counts of chukar were down in 2003 probably because birds were concentrated near water due to drought conditions and were missed during surveys. Incidental reports of broods and initial harvest information indicate strong chukar populations.

Population status and trend analysis

In summer 2003, incidental observations of chukar and early harvest information suggest above average production of chukar throughout Region 2.

Habitat condition and trend

Chukar habitat is relatively stable in Region 2. Because of the precipitous habitat that chukar use, few areas have been influenced by human development.

Management conclusions

Chukar habitat appears stable. Populations and harvest of chukar will continue to fluctuate as a function of annual weather conditions.

CHUKAR STATUS AND TREND REPORT: REGION 3 Mid-Columbia and Yakima 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 1990-1997 hunting season for Chukar in Region 3 began the third Saturday in October and ended the second Sunday in January. In 1997 the opener was moved to October 1. The season was extended to the third Monday in January in 2000. The bag limit has remained at 6 birds per day.

A mailed hunter questionnaire indicated number of hunters and harvest remained close to 2001 levels, while success declined 9% (Table 1). Harvest was 27% below and hunter numbers were 25% below the 10-year average. Harvest per day was the same as the 10-year average.

Population status and trend analysis

Population surveys have not been conducted for 5 years. A post-season survey of hunters is used to estimate harvest and hunter effort. Opportunistic observational information is collected during other surveys.

Harvest and opportunistic information indicate the chukar population has been below the 10-year average the past 4 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 negatively influenced brood success and overall bird numbers. Drought and poor insect production continued into 2000-01. Conditions improved slightly in spring 2002, yet harvest rates indicated that chukar numbers did not respond.

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.

Table 1. Chukar hunting statistics for Region 3.

Year	Harvest	Hunters	Harvest Per Hunter Day
86	4,554	2,947	0.65
87	13,821	4,439	0.60
88	9,040	2,958	0.60
89	10,034	3,164	0.43
91	9,498	3,302	0.47
92	8,675	3,101	0.47
93	3,976	2,731	0.55
94	7,402	2,349	0.54
95	6,433	1,905	--
96	15,421	3,152	--
97	7,572	3,316	--
98	10,050	2,135	0.99
99	5,514	2,132	0.58
00	6,162	2,168	0.84
01	5,374	1,836	0.73
02	5,080	1,745	0.66
10-year avg.	7,658	2,483	0.67

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, the Washington Department of Fish and Wildlife (WDFW) and Department of Defense (DOD) manage the majority of chukar habitat. WDFW lands have not changed significantly in the last decade. Since 1995, the DOD has excluded cattle grazing. Sections of both WDFW and DOD lands have burned in the last few years. The fires did not appear to have significantly impacted chukar habitat. A drought in recent years appears to have had a short-term negative impact.

Management conclusions

The chukar population in Region 3 apparently fluctuates with weather conditions and appears to be at its lowest level since 1993. Conditions only slightly improved in spring 2002 in Yakima, Benton, and Franklin Counties. Chukar populations need several consecutive years of mild winters and high reproductive success before they can rebound to historic levels.

Quail

QUAIL STATUS AND TREND REPORT: REGION 1 Snake River Basin

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

Hunting seasons and harvest trends

The 2002 hunting season for California and bobwhite quail (*Colinus virginianus*) extended from October 5, 2002 to January 20, 2003. In addition, a youth hunting only season occurred for two days in late September (September 21-22, 2002). As in past years, the bag limit for quail was 10/day, with 30 in possession. Mountain quail (*Oreortyx pictus*) season remained closed in Eastern Washington because of extremely low population levels.

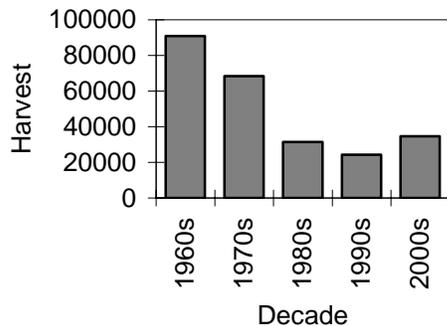


Figure 1. Mean annual quail harvest by decade, Region 1.

California quail harvest has declined dramatically compared to the 1960s and 1970s (Figure 1). Regional quail harvest averaged 90,956/year during the 1960's (1964-1969), declining 26% to 68,424/year during the 1970s. Declining harvest continued into the 1980's and 1990's when harvests averaged 31,503/year and 24,312/year respectively. The average harvest for the Region since the 2000 season is 34,717/year

Despite the long-term decline in harvest since the 1960's, quail harvest in Region 1 may have stabilized at a lower level, based on relatively consistent harvest levels over the last 20 years (Figure 2). Harvest during 2002 was slightly below the 1997 to 2001 average of 32,875

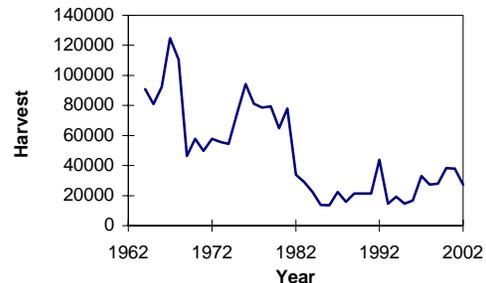


Figure 2. Region 1 quail harvest.

birds (Figure 2). The 2002 quail harvest in Region 1 was 27,270 birds, 28 percent less than the 2001 harvest of 38,000. Harvest was 38,252 in 2000, 27,861 in 1999, 27,263 in 1998 and 32,999 in 1997.

The Region 1 Hunter Access Program includes over 854,776 acres in various cooperative agreements with private landowners that help provide places to hunt. Many of these areas support California quail. These access agreements help balance the overall loss of hunting access which has occurred over the years, as human populations have increased and land use practices have changed.

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, combined with the decreased quail harvest, indicate that quail production in 2002 was below that of 2000 and 2001, and below average for the last 5 years.

Weather conditions during the 2002 nesting season were unfavorable for quail. Precipitation was high during the critical spring season, and chick survival appeared lower than past years.

Few late hatches of quail were observed during August 2002. Quail numbers were very low in marginal habitat, as well as being reduced the better quail areas of

the Region. These observations lend support to the belief that quail production was below average in 2002, a hypothesis supported by the reduced harvest documented in 2002 as compared to 2001. The number of hunters and birds harvested per day were also lower in 2002 than 2001 or an average over the past 5 years.

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.

The next new CRP enrollment is scheduled through October 2003, with the maximum CRP acreage being 25 percent of the total agricultural acreage by county. Several counties are projected to reach maximum CRP amounts during 2003. UWRP staff will be working on “continuous CRP sign-ups” for riparian buffers. Riparian buffers will enhance roosting and escape cover for quail.

Management conclusions

Acreage set aside under CRP and habitat enhancement projects implemented by the Upland Restoration Program will benefit quail and other upland wildlife populations. Especially important to California quail is protection and enhancement of riparian habitat in all areas of Region 1. The Hunter Access Program in Region 1 may help offset losses of quail hunting areas to posting and leased hunting.

QUAIL STATUS AND TREND REPORT: REGION 2 Upper Columbia River Basin

JIM TABOR, District Wildlife Biologist

Population objectives and guidelines

Objectives for California quail are to maintain healthy quail populations in all suitable habitats within the Region, and provide maximum recreational opportunities consistent with population management objectives.

Hunting seasons and harvest trends

Quail hunting seasons and bag limits have remained relatively constant in recent years. The season ran from the first Saturday after October 10 to early-mid January with a daily bag limit of 10 quail through 1998. From 1999 through 2002, the season opened on October 5-9 and remained unchanged in other respects. There has been a slight difference (up to 8 days) in the closing date of the season annually. In 2002, there was a youth hunting season Sept. 21-22.

Region 2 is one of the state's most popular quail hunting regions as 36% of all quail hunters hunted there in 2002. There were 5,533 quail hunters in Region 2 in 2002 (Table 1). This was a 4% increase from 2001 and is 9% higher than the 1992-2001 average of 5,029.

Table 1. Number of quail hunters in Region 2, Washington, 1992-2002.

Year	Adams	Douglas	Chelan	Grant	Okanogan	Total
1992	981	1,184	1,101	1,241	1,290	5,797
1993	517	893	851	1,583	986	4,830
1994	579	1,007	966	1,635	980	4,735
1995	556	838	654	1,256	761	3,391
1996	487	823	1,144	1,279	957	4,312
1997	887	1,542	1,736	2,063	1,043	7,271
1998	663	995	1,015	1,537	741	4,291
1999	665	1,092	1,152	1,568	781	4,454
2000	664	1,539	1,313	2,416	1,427	5,914
2001	675	1,028	1,320	1,869	1,099	5,295
2002	507	1,011	1,442	2,227	1,226	5,533
Ave.	653	1,087	1,154	1,698	1,026	5,075

During the 2002 season, 44% of the statewide quail harvest occurred in Region 2. Number of quail harvested in Region 2 during the last 11 years ranged from a high of 57,951 in 2002 to a low of 14,292 in 1993 (Table 2). The 2002 harvest was 15% above that of 2001 and 65% above the 1992-2001 average

of 35,265 birds. Okanogan and Chelan counties have yielded the largest harvest during most years and Adams County the smallest. Chelan County has shown the largest annual variation in harvest.

Table 2. Quail harvested in Region 2, Washington, 1992-2002.

Year	Adams	Douglas	Chelan	Grant	Okanogan	Total
1992	4,024	7,881	7,123	3,182	11,653	33,863
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	1,931	15,463	16,249	9,565	14,743	57,951
Ave.	2,300	7,689	9,607	6,094	9,093	35,265

Surveys

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

Population status and trend analysis

No long-term population trend in Region 2 is apparent from existing data. Major annual declines usually follow severe winters with persistent snow cover when combined with poor production during the previous and/or subsequent summer.

Habitat condition and trend

The winter of 2002-03 was moderate in Region 2. Mild temperature and reduced snow cover were likely conducive to good over-winter survival. The adult quail population in summer of 2003 should have been relatively large.

Most hunted populations of quail occur in shrub-steppe habitat near riparian zones. A significant percentage of the quail population in Region 2 occurs in cities and towns, however. Quail density in the irrigated farmland area of the Columbia Basin is low. In general, quail habitat in the region is relatively stable. Changes in habitat quality appear to result primarily from amount and timing of precipitation.

Augmentation and habitat enhancement

Upland Wildlife Restoration Program (UWRP) personnel often trap and transplant quail within Region 2. Quail are usually captured in urban and

suburban areas of Okanogan County and released at WDFW-managed sites throughout the region. In 2002, 75 quail were trapped and relocated in Grant and Adams Co.'s.

Habitat enhancement for quail is conducted by UWRP staff on WDFW properties and 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. In 2002, UWRP maintained 28 feeders in Grant and Adams Co.'s. to provide winter food for birds, including quail.

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. WDFW personnel (primarily UWR and Wildlife Area) provide wheat to quail in winter via feeders placed at locations throughout Region 2. WDFW also provides wheat to the public for feeding quail in winter.

QUAIL STATUS AND TREND REPORT: REGION 3 Mid Columbia and Yakima 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 and maximize recreational opportunities consistent with population management objectives.

Hunting seasons and harvest trends

In 2002, harvest and effort (total hunter days) were 9% and 11% below 2001 levels (Figure 1) and were 12% above and 4% below, respectively, compared to the 10-year average. Hunter success, as measured in birds per hunter-day, decreased 4% from 2001 (Figure 2), and was 15% above the 10-year average.

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.

Although there can be large annual fluctuations in populations, total harvest (Figure 1) and hunter success (Figure 2) suggest no trend in population numbers over the last 16 years. Total quail harvest, incidental observation, and biological opinion suggest that 2002 was an above average year for quail production 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

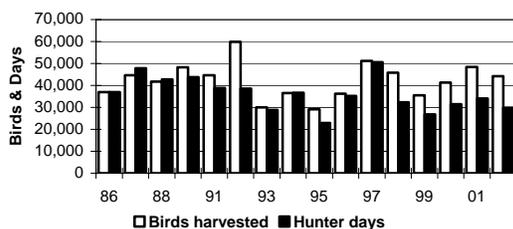


Figure 1. Quail harvest and hunter days, Region 3.

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. 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

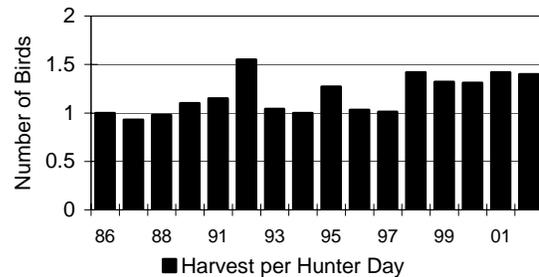


Figure 2. Quail hunter success for Region 3.

landscaped neighborhoods. Residents often enjoy feeding and watching quail year round. In some areas, urban quail populations with relatively high survival may act as population reservoirs by providing brood stock to adjacent non-urban areas where survival is lower.

Augmentation and habitat enhancement

In the past, efforts have been made to trap and translocate urban quail to augment populations in areas where numbers appeared to be reduced. With the quail's high reproductive potential, relatively few birds are needed as brood stock for localized populations to recover on their own. Region 3 did not implement any translocation activities in 2002.

Management recommendations

In certain areas an emphasis could be placed on quail management on state-managed wildlife areas. If

Russian olive trees are removed, the long-term goal should be to replace them with a diversity of native grasses, shrubs and trees such as Great Basin wild rye, rose, currant, sumac, and dogwood. Managers at the Sunnyside Wildlife Area are currently attempting to replace Russian olive with native grasses and shrubs.

In Region 3, quail management efforts should be focused on improving habitat. Given suitable habitat, species with high reproductive potential, such as quail, are usually capable of quickly rebuilding populations depressed by severe winter conditions without artificial augmentation. In areas where quail are not able to quickly rebuild populations after severe winter weather, quantity and/or quality of available habitat is probably lacking.

Forest Grouse

FOREST GROUSE STATUS AND TREND REPORT

Statewide

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Population objectives and guidelines

Forest grouse in Washington include blue (*Dendragapus obscurus*) and ruffed grouse (*Bonsa umbellus*), which occur throughout the forested lands in Washington, and spruce grouse (*Falcapennis canadensis*), which are closely tied to higher elevation spruce/fir habitats. Management objectives are to sustain well-distributed populations and provide appropriate levels recreational harvest. Harvest levels of forest grouse are generally tied to annual production and are closely dependent on weather and habitat conditions. Current population levels are considered healthy and sufficient to meet hunter demand.

Brewer (1980) stated that ruffed grouse could sustain harvest of up to 50% of the fall population without threat of decline and our objective would be to avoid a take that exceeds that number. Present harvest is thought to be well below 50% although exact population levels are not known.

Hunting seasons and harvest trends

A statewide harvest estimate (determined by using a hunter questionnaire) is the main indicator for long-term population trends. However, developing estimates of forest grouse hunter numbers and harvest are challenging because of a licensing structure that allows harvest with a big game license as well as a small game license. Forest grouse harvest survey methods were modified in 1998 and 1999 because of 1) difficulty in separating effort among the 3 grouse species, 2) inaccuracy in species identification by some hunters, and 3) changes in hunting license structure that impacted hunter sample stratification. Because of this change in survey technique, comparison of forest grouse harvest information before and after this time should be done with some caution.

The current Sep. 1 to Dec. 31 hunting season structure has been in place since 1987. The daily bag limit of 3 of any of the 3 species has not changed since 1952. Estimated hunter numbers slowly declined from the late 1980's through 1997, but then fell sharply in 1998 and 1999. Since reaching a low in 1999, hunter

numbers increased to 40,531 in 2002 (Figure 1). Forest grouse harvest over the past 10 years has fluctuated yearly and is likely dependent on annual production and hunter participation (Figure 2).

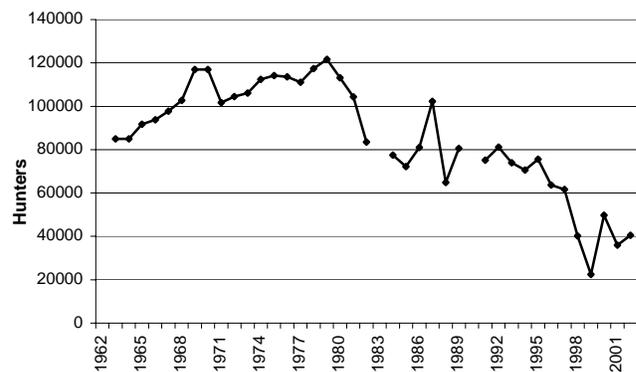


Figure 1. Long-term trend in grouse hunter numbers, 1963-2003.

Long-term harvest estimates indicate a decline from the 1960's and '70's to the 1990's (Figure 2). Some of that apparent decline may be attributed to a change in the method used to collect harvest data,

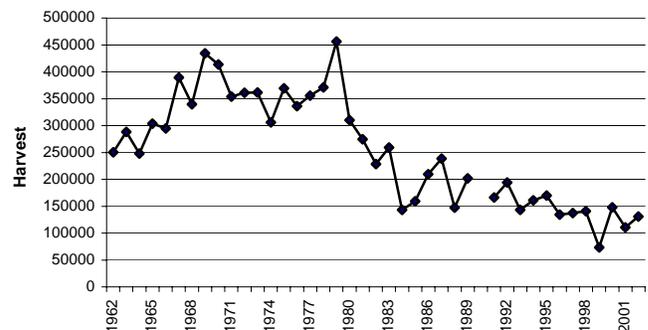


Figure 2. Long-term trend in grouse harvest, 1963-2003

beginning in 1984. Harvest estimates since 1996 have not exhibited a negative trend and harvest continues to be closely tied to hunter participation (Figures 1 and 2). Increased restrictions in motorized travel, particularly in western Washington, may reduce hunter participation as well as grouse harvest.

Future harvest monitoring should provide comparable data. In addition, improvements in data collection and analysis should provide a better understanding of harvest both regionally and statewide.

Although grouse hunter and harvest estimates have varied substantially over time, annual estimates of harvest per hunter (an indicator of hunter success) since 1984 have been relatively stable with only 1 year changing more than 1 bird per hunter (1998, Figure 3). Estimates of hunter success during recent years have actually been higher than the late 1980s and early 1990s.

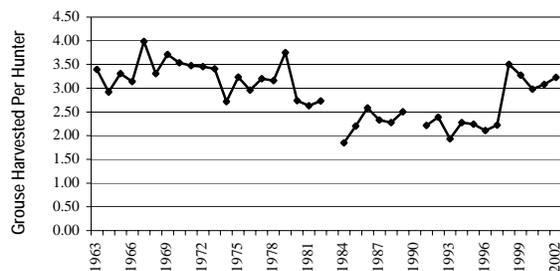


Figure 3. Grouse Harvested per hunter in WA, 1963-2002.

The estimated number of hunters annually pursuing forest grouse in Region One has ranged from approximately 9,000 to 23,000 between 1991 and 2002. Estimated harvest of forest grouse within Region One has varied between approximately 35,000 and 65,000 per year from 1991 through 2002. In 2002, the number of hunters pursuing grouse within Region One was 11,793 and a reported 43,526 forest grouse were harvested. In the past the Hunter Questionnaire reported the estimated Ruffed Grouse harvest to be roughly three to four times higher than Blue Grouse each year. Spruce Grouse harvest is consistently low as this species is the least common and range restricted forest grouse in the region.

Table 1 presents the number of hunters and reported 2002 harvest of forest grouse for each of the three Districts comprising Region One. The Colville District (Pend Oreille, Stevens, and Ferry Counties) has, by far, the highest number of forest grouse hunters and birds harvested.

Table 1. Number of forest grouse hunters and reported harvest by District within Region One in the 2002 Season.

District	Est. No. of Hunters	Estimated Harvest
Colville	10980	36656
Spokane	2338	3768
Walla Walla	1434	3102

Staff at the 40,198 acre Little Pend Oreille National Wildlife Refuge east of Colville have collected wings of forest grouse from hunters since 1997. Through the 2002 hunting season, a total of 677 grouse wings were collected including 604 identified as ruffed grouse, 26 blue grouse, and 47 spruce grouse. Ruffed Grouse have dominated the hunter harvest on the Little Pend Oreille NWR each season since 1997. Harvest of juvenile ruffed grouse harvest has most often been higher than adult birds, occasionally by as much as six fold (J. Cline, pers. comm. 2003).

Hunters harvested 26,461 grouse in Region 2 in 2002, compared to 20,154 in 2001 - a 31% increase. The average annual harvest of grouse from 1998 to 2001 was 20,861. Hunter numbers increased 33% to 9,549 in 2002. The average number of grouse harvested per day was 0.06 lower in 2002 (0.56) compared to the average during 1998-2001 (0.62).

In 2002, total grouse harvest in Region 3 (10,341 birds) was 47% above the 5-year average and 56% above the 2001 harvest estimate. The number of grouse hunters and hunter days increased 44% and 35% from last year. Hunter success, as measured in grouse harvest per day, increased 15% from last year (0.28 grouse per day to 0.32).

Few data on effects of hunting on grouse populations are available in Region 3. Harvest success for forest grouse in Region 3 is among the lowest of any of the upland bird species. While large annual population fluctuations appear to have occurred, the annual harvest per hunter trend over the last 10 years appears to be relatively stable (Averaging 1.40 and ranging between 1.1 and 1.9 grouse per hunter). The number of grouse harvested per hunter in 2002 was 1.68.

The Region 4 grouse harvest for the 2002 season was 10,022. This represents a 41% increase from the 2001 season harvest total of 7,110 birds and a 21% increase above the 1997-2001 average harvest. The Region 4 total harvest of grouse in 2002 (10,022) represents 7.6% of the statewide total of 130,854 for the same year. Region 4 had 4,353 forest grouse hunters during the 2002 season. This number represents 11% of the 40,531 hunters in Washington State.

Grouse wing collection stations were operated in GMU 418(Nooksack) during the 2002 grouse season. A total of 86 wings were turned in by local hunters. Of these, 73 were ruffed grouse(46 juveniles, 27 adults) and 13 were blue grouse(9 juveniles, 4 adults). The blue grouse wings were included in a statewide genetics study coordinated out of Region 2.

In 2002, total grouse harvest (15,463) in Region 5 decreased 1% from 2001 levels and was 10% lower than the average of the past 5 years (1997-2001). The number of hunters did not increase from 2001 and showed a decrease (17%) from the 1997-2001 period. Hunter success, as measured in grouse harvested per day increased 9% from 2001. There is currently no information that forest grouse populations in region 5 are declining. Current trends in reductions of grouse harvest are most likely attributed to general declines in hunter effort over the past few years.

Combined forest grouse harvest (ruffed and blue grouse) for Region 6 was estimated at 25,041 birds in 2002. This represents a 12% increase over the year 2001 season estimate and is 10% above the recent 5-year average (1997-2001). Estimated success rate (grouse per hunter-day) was 0.33 a 18% increase over 2001 and a 3% decline over the recent 5-year average. The three counties with the highest percentages of the Region 6 grouse harvest were: Grays Harbor (29%), Clallam (19%) and Mason (14%).

Surveys

No statewide population surveys for forest grouse were conducted in 2002-03, however, some surveys have been conducted in north-central Washington. Road transects, which were originally run from 1954-1974 were reinstated in 1996. For these routes, the average distance driven per grouse has varied between 4.8 and 47.1 kilometers (Figure 4). While there is variability between years, fewer birds were seen per kilometer in 2002 and 2003 than in previous time periods.

In addition to driving transects, forest grouse wings have been collected in the same area by placing barrels in strategic locations where hunters voluntarily deposited one wing from each grouse killed. Wings were classified as to species, sex, and age. Analysis has shown harvest to be split between the three forest grouse species: 63% blue grouse, 18% spruce grouse, and 19% ruffed grouse. Species mix was similar to that seen on driving transects (72% blue grouse, 18% spruce grouse, and 10% ruffed grouse).

Statewide wing collections from 1993-95 provided several pieces of important information, such as, more than 70% of forest grouse harvest occurs in September and early October, before modern firearm deer seasons. Therefore, current seasons that extend through

December probably have very little impact on grouse populations. In addition, there is a tendency for hunters to misidentify grouse species, which has resulted in forest grouse species being combined for current harvest estimation purposes.

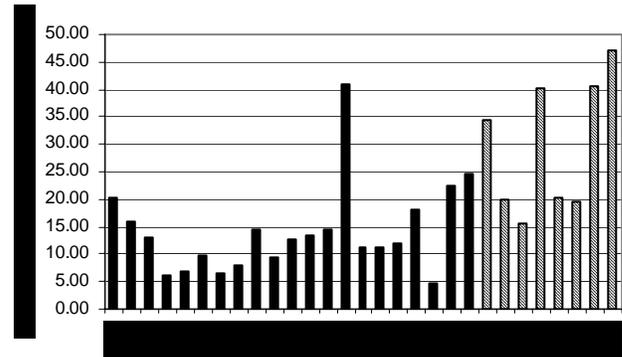


Figure 4. Kilometers driven per grouse observed during driving transects in northeast WA, 1954-2003.

Population status and trend analysis

Based on long-term harvest trends, it appears that forest grouse populations may be declining. However, it is difficult to draw concrete conclusions due to the fact that harvest estimating methods have changed over time. The fact that harvest per hunter has not varied much over time (Figure 3) may indicate that the number of grouse available to hunters has not changed dramatically. Since hunters are not able to accurately identify the species of forest grouse harvested, evaluating population trends for individual species is even more difficult.

Annual production is greatly influenced by weather conditions during the peak of hatching (late May early June). Wet and windy weather reduces chick survival due to over-exposure as well as reducing insect populations at the time when young grouse need a high protein diet. Weather patterns in the spring are often a good predictor of fall harvest and population.

Habitat condition and trend

Timber harvest is the most significant issue statewide for influencing habitat condition and forest grouse population trends. In general timber harvest activities are beneficial for most species of forest grouse. Silvicultural techniques play a significant role in the degree to which timber harvest provides benefits. Future benefits from timber harvest will depend on the manner in which regenerating forests are managed.

The pace of timber harvest in western Washington during the 1980's has had a significant impact on forest

grouse populations. Blue grouse tend to benefit in the first ten years and the greatest ruffed grouse benefits occur between 10 and 25 years after clear-cut timber harvest (Mike Schroeder, WDFW Pers. Comm.). Current conditions should result in higher blue grouse populations with a increased ruffed grouse populations over the next ten to twenty years.

The rate of timber harvest in western Washington slowed in the 1990's and forest grouse populations will likely be lower but stable over the long term. Population levels will greatly depend on forest management practices. Regeneration techniques that include extensive broad leaf tree and shrub control, reduced stocking rates and cover density through thinning and pruning, and replanting with tree species that provide fewer habitat benefits may negatively impact grouse populations.

Conditions are similar in eastern Washington, however recent timber market changes have resulted in some timber stands becoming more valuable than they were ten or twenty years ago. Specifically, lodgepole pine forests have increased in value so there is increased interest in harvesting the timber. In addition, mature lodgepole pine forests have become infested by pine beetles, killing the trees. Forest managers want to harvest those trees before they decay or burn in wild fires.

Wild fires are an important factor influencing grouse habitat in eastern Washington. Several large fires have occurred in forested areas of Region 2 since the late-1980s. These areas are currently in early successional shrub communities, which should be beneficial to grouse for several years to come.

There is significant potential to reduce spruce grouse habitat if regeneration techniques are intensive. From a habitat standpoint the better lodgepole and spruce/fir sites may be converted to more merchantable species of trees and harvested stands may end up at much lower stocking rates than are currently present. Both of these outcomes could reduce value of the habitat for spruce grouse.

Augmentation and habitat enhancement

Supplementation of forest grouse populations is generally considered unnecessary in Washington State. No large-scale efforts have been made to enhance habitat for forest grouse. WDFW Habitat Program staff, however, frequently responds to Forest Practice Applications with recommendations to mitigate forest management impacts on grouse. These recommendations commonly include the following: leaving large down logs in timber harvest areas as drumming logs for ruffed grouse; retaining large, "wolf-tree" Douglas-fir trees on ridge tops for blue grouse winter foraging and roosting, and seeding skid

roads and log landings with clover and other grouse forage plants.

Management conclusions

Past strategic plans often identified goals of increasing interest in hunting forest grouse. The rationale was that forest grouse, especially ruffed grouse were harvested at a very low rate and could withstand higher levels of harvest. Much of that rationale was based on previous ruffed grouse research in which proportions of forest grouse species harvested, as estimated by the harvest questionnaire, were assumed to be within ten percent. Recent wing collections have cast doubt on that assumption.

Management direction for forest grouse will include the following:

1. Improving harvest estimation, especially on lands managed for wildlife.
2. Development of population monitoring techniques for each species of grouse.
3. Developing forest grouse habitat guidelines for public distribution.

Until monitoring of harvest can be refined and a better determination of proportion of the population harvested can be developed, no change in recreational opportunity appears necessary.