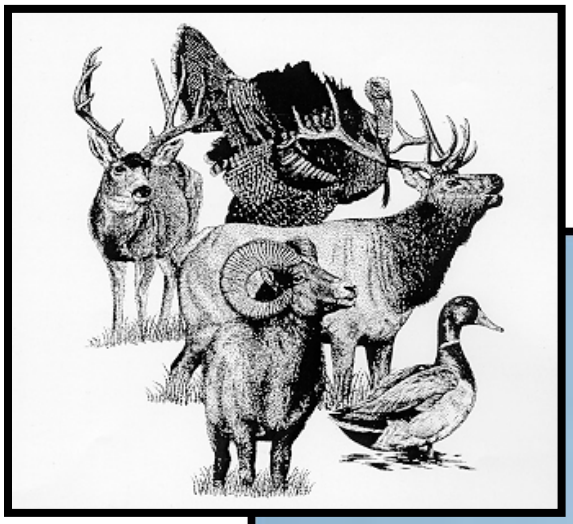
STATE OF WASHINGTON

2010 Game Status and Trend Report



Washington Department of FISH and WILDLIFE

AN OFFICIAL PUBLICATION OF THE STATE OF WASHINGTON

2010 GAME STATUS AND TREND REPORT

July 1, 2009 – June 30, 2010

Washington Department of Fish and Wildlife
600 Capitol Way North
Olympia, WA 98501-1091

STATE OF WASHINGTON
Chris Gregoire
Governor

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
Phil Anderson
Director

WILDLIFE PROGRAM
Nate Pamplin
Acting Assistant Director

GAME DIVISION
Dave Ware
Game Division Manager

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

This report should be cited as:

Washington Department of Fish and Wildlife. 2010. 2010 Game status and trend report. Wildlife Program, Washington Department of Fish and Wildlife, Olympia, Washington, USA.

TABLE OF CONTENTS

Deer

DEER STATUS AND TREND REPORT: REGION 1

PMU 11 – GMU 101

PMU 13 - GMUS 105, 108, 111, 113, 117, 121, 124

DANA L. BASE, District Wildlife Biologist

Population objectives and guidelines

In northeastern Washington white-tailed deer (*Odocoileus virginianus*) are the most abundant deer species. Mule deer (*O. hemionus*) are locally common, especially in the higher elevations and throughout Ferry County, but their overall numbers are low compared to white-tailed deer on a district scale.

The white-tailed deer harvest management objective is to provide antlered and antlerless hunting opportunity for all hunting methods whenever feasible. The buck escapement goal is to maintain a ratio of at least 15 bucks per 100 does in the post-hunting season population (Washington Department of Fish and Wildlife 2008). Antlerless hunting opportunity is managed to maintain healthy white-tailed deer populations within landowner tolerance.

Management goals for mule deer are to provide conservative hunting opportunity, maintain at least 15 bucks per 100 does in the post-hunting season population, and increase productivity and population levels (WDFW 2008).

Hunting seasons and harvest trends

Figure 1 depicts the trend in total estimated deer harvested by hunters within the Colville District from 2001 through 2009. The total harvest decreased by 34% from the recent peak in 2006. In addition all hunting methods showed a gradual decrease in participation from 2006 to 2009 (Figure 2). The

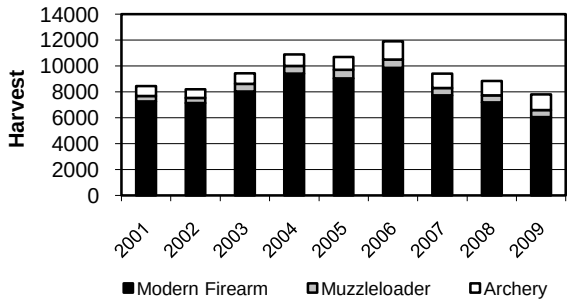


Figure 1. Trend in the total general deer harvest for GMUs 101-124 from 2001-2009.

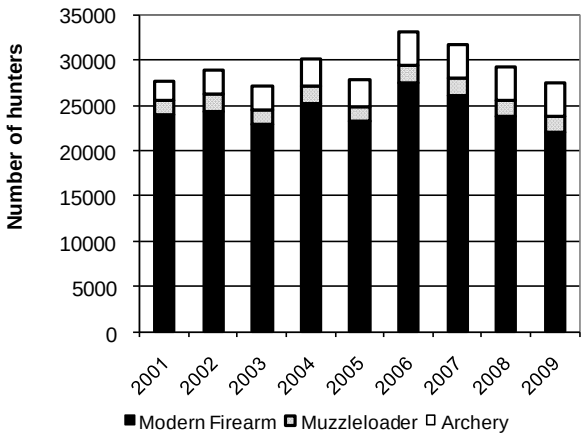


Figure 2. Trend in the number of deer hunters for GMUs 101-124 from 2001-2009.

number of days hunted per deer harvested has gone up steadily over the last five years from 15 days in 2005 to 21 days in 2009 (Figure 3).

Since 1997 mule deer bucks legal for harvest have been limited to a three-point minimum. The most prominent mule deer harvest in the Colville District occurs within GMU 101 (primarily northern Ferry County). Mule deer buck harvest increased considerably from 2001 through 2004, especially for modern firearm hunting. Since 2003 the total mule deer harvest in GMU 101 has fluctuated around 300 annually (Table 1).

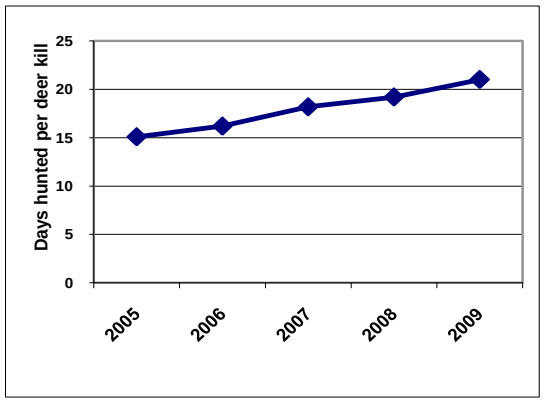


Figure 3. Five-year trend in the number of days hunted per deer harvested within the Colville District.

Table 1. Mule deer buck harvest trend from hunter reports by user group within GMU 101 from 2001-2009. (Arc = Archery; MZL = Muzzleloader; MF = Modern Firearm hunter harvest).

Year	Arc	MZL	MF	Total	%4pt+
2001	6	n/a	184	190	45%
2002	13	n/a	227	240	53%
2003	20	15	281	316	56%
2004	13	18	305	336	61%
2005	19	31	279	329	52%
2006	19	21	221	261	51%
2007	26	24	243	293	49%
2008	21	34	226	281	49%
2009	22	21	259	302	62%

The reported harvest of antlerless white-tailed deer was 1,717 and a total of 4,530 white-tail bucks were reportedly taken within PMUs 11 and 13 combined (GMUs 101-124) during the 2009 season (Table 2). Harvest of white-tail bucks dropped from 6,070 taken in 2008. Beginning in 2009 Youth, Senior, and Hunters with Disability (Y/S/D) were allowed to take any white-tail (including antlerless) within GMUs 101-124 only during the Early (October dates only) Modern Firearm Deer Hunts within GMUs 105-124. There were only 95 antlerless white-tailed deer permits allocated for deer hunters within GMUs 101-121 in 2009, a tremendous decrease from previous seasons. The 2009 antlerless white-tail permits included only conservative allocations of "Second Deer Tags" issued for GMUs 101, 105, 108, 111, 117, and 121. Overall the ratio of antlerless white-tails taken in 2009 was 38 per 100 antlered bucks taken. This is the second lowest ratio since 2001 in which the low was 36 antlerless per 100 antlered in 2002 and the high was 59 per 100 taken in 2008.

Surveys

Age, antler, and sex ratio data are collected from harvested deer for monitoring deer populations and developing season recommendations. One way that the ratio of mature white-tail bucks in the population is monitored is by sampling the proportion of adult bucks (yearlings excluded) that are 4 years or greater. Ages of hunter-harvested deer as determined by tooth samples collected in the 2009 season were not available at the time this report was written. In 2008 this proportion came up slightly to 19% from 18% observed in 2007, but still down considerably from 28% as observed in 2006 (Figure 4). White-tail buck antler data are also collected from check stations and mandatory hunter reports. This includes tallies of mature bucks that have 5 or more points on the high side of their antlers. Field checks and hunter harvest reports in 2009 yielded 30% and 21% respectively of all bucks harvested as having 5 points or more for the overall white-tail harvest within the Colville District. These data clearly substantiate an increase in the proportion of mature bucks represented in the harvest since a low of 12% from hunter reports in 2001 (Table 3 and Figure 5).

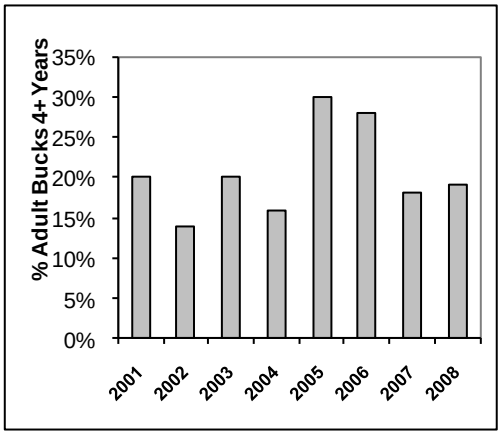


Figure 4. Percent of adult white-tail bucks 4 years and older from hunter check stations, 2001-2008.

The proportion of white-tail yearling bucks brought to hunter check stations dropped considerably from 2008 to 2009 (Table 3). All white-tailed deer checked in the field in 2009 included only 21% (n = 57) yearling

Table 2. Hunter harvest of antlered and antlerless white-tailed deer by Population Management Unit in 2009.

		Antlerless						Antlerless per
PMU	GMU	Archery	Permit	Y/S/D*	Muzzleloader	Total**	Antlered	100 Antlered
11	101	66	38	194	38	346	655	53
13	105	11	3	35	5	54	251	22
	108	8	3	38	12	61	210	29
	111	4	1	36	22	63	238	26
	113	4	2	34	37	80	231	35
	117	47	6	112	37	203	653	31
	121	44	24	173	44	297	934	32
	124	128	172	228	35	613	1358	45
Total:		**312**	**249**	**850**	**230**	**1717**	**4530**	**38**

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

** Totals include Multi-method permits.

Table 3. Whitetail yearling buck and 5+ antler point harvest trends from field checks and hunter reports for GMUs 101-124.

	October Checks		November Checks		All Field Checks		Hunter Reports
Year	Bucks	%Yrlg	Bucks	%Yrlg	%Yrlg	%5pt+	%5pt+
2001	29	48%	63	44%	45%	13%	12%
2002	40	60%	37	11%	36%	16%	14%
2003	33	55%	73	42%	47%	15%	15%
2004	45	53%	85	36%	41%	17%	17%
2005	52	77%	87	31%	46%	17%	19%
2006	30	57%	115	47%	43%	18%	19%
2007	36	33%	89	20%	25%	17%	19%
2008	19	37%	46	37%	37%	13%	18%
2009	19	32%	38	16%	21%	30%	21%

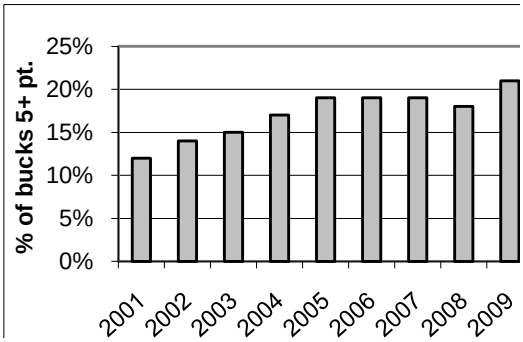


Figure 5. Percent of PMU 13 (GMUs 105-124) white-tail bucks 5 point or better from hunter reports.

white-tail bucks and 29% (n = 17) yearling white-tail does. There were no fawns in the antlerless harvest checked in 2009. The mean age of adult white-tail bucks (yearlings excluded) checked in 2008 was 2.8 years, which continues to be down from the previous 3-year average age of 3.2.

For GMUs 105-121 the proportion of white-tail bucks to does for summer 2009 came up from 2008, going from 23 to 29 bucks per 100 does (Table 4). In 2009 the fawn to doe ratio also climbed to 54 from 48 per 100 does as observed in 2008. Important to note, however, is the wide variance in buck/doe/fawn ratios amongst all survey years with overlapping confidence intervals (Skalski et al. 2005).

Population status and trend analysis

The total 2009 deer harvest declined from 2008 (Figure 1) mainly on account of the reduced number of antlerless white-tail permits as well as opportunity for Youth/Senior/Disabled hunters to take an antlerless white-tail. The Modern Firearm deer harvest decreased by about 16% from 2008 to 2009 while the Muzzleloader harvest was almost the same both years. Meanwhile the Archery harvest rose 7% from 2008 to 2009. Total deer hunter numbers decreased about 6% in 2009 from 2008 with most of this decline in the number of Modern Firearm hunters.

In the late 1990s there was unprecedented low representation of mature white-tail bucks in the harvest. This concern was addressed by maintaining conservative late buck seasons that did not extend beyond the middle of the rut. From 1999 until 2005 there was consistent improvement in the percentage of older bucks based on monitoring antlers. Improvement in the general trend toward more bucks 4 years or older was also supported by cementum analysis of deer teeth (Figure 4). Since 2005 this trend leveled out at least for 5+ antler point bucks (Figure 5). We are currently at a level that has reasonably good representation of mature bucks in the white-tail population. At least 1 in 5 white-tail bucks harvested is 5 point or better.

The total antlerless white-tailed deer harvest increased dramatically between 2001 and 2008. The ratio of antlerless white-tails taken per 100 antlered bucks went from a low of 36:100 in 2002 to 59:100 in 2008. After two severe winters beginning in 2007 the opportunity for hunting antlerless white-tails was incrementally reduced. As a result the overall ratio of antlerless to antlered white-tails in the harvest declined to 38 per 100 in 2009. The largest reductions in this ratio took place within GMUs 105-121 (Table 2).

Disease and Predators

WDFW continues to test deer for Chronic Wasting Disease (CWD) and many deer from northeastern Washington have been included in the statewide

Table 4. White-tailed deer late summer composition surveys within Population Management Unit 13.

Year	August			September		
	Sample Size	Bucks per 100 Does	90% Confidence Interval	Sample Size	Fawns per 100 Does	90% Confidence Interval
2001	1185	29	+/-10	720	57	+/-10
2002	955	22	+/-4	799	55	+/-7
2003	1064	31	+/-9	927	51	+/-10
2004	1244	31	+/-7	925	68	+/-11
2005	1245	26	+/-8	1204	64	+/-12
2006	969	28	+/-10	1055	55	+/-10
2007	966	27	+/-8	848	47	+/-9
2008	574	23	+/-9	884	48	+/-10
2009	451	29	+/-11	542	54	+/-16

sample. To date no deer from Washington State have tested positive for CWD.

Cougar populations in northeastern Washington were exceptionally high in the middle to late 1990's but hunter harvests and special hound hunting opportunity to reduce populations for protection of livestock and human safety appear to have reduced cougar numbers in recent years. Black bears and coyotes are also abundant within the Colville District. Gray wolves have recently established new packs within Washington including two packs in Pend Oreille County where there is a prey base of elk and moose as well as deer.

Habitat condition and trend

Unlike the two winters before, the winter of 2009-2010 was well below average in severity. Snow cover was especially light over the mid and late winter season. Consequently, over winter deer survival was negligibly impacted by this last winter compared to the two winters before.

More insidious than occasional bad winters in northeastern Washington is the on-going conversion of farm and forest lands into rural-residential developments along with the loss of alfalfa and cereal grain production on established agricultural ground. Between 1985 and 2008 production of cereal grains and alfalfa hay within Stevens and Pend Oreille Counties declined approximately 45% (Source: National Agricultural Statistics Service, USDA). This change in agricultural production in combination with severe winters and prolonged summer droughts has probably led to a reduction in white-tailed deer abundance but not overall distribution.

Wildlife damage

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

Management conclusions

The total deer harvest in the Colville District decreased in 2009, as did the overall deer harvest per unit effort. The proportion of 38 antlerless white-tails harvested per 100 antlered deer taken in 2009 will hopefully increase escapement of female deer for growing the white-tail population back to recent levels.

The ratio of mature white-tail bucks in the harvest appears to be maintaining a reasonable level of approximately 20%. The overall harvest of white-tail bucks has declined, however, so any substantial increase in the opportunity to take bucks such as extended seasons during the rut would impact the escapement of mature bucks. This would negate the gains made in recent years to improve the proportion of mature bucks. Maintaining adequate hunter field checks (check stations) along with similar efforts will be necessary to continue monitoring the age structure and antler classes of the deer population.

Literature Cited

Skalski, J.R., K.E. Ryding, and J.J. Millspaugh. 2005. Wildlife demography: Analysis of sex, age, and count data. Elsevier Academic Press. 636 p.

Washington Department of Fish and Wildlife. 2008. Game Management Plan. Washington Dept. of Fish and Wildlife, Olympia, WA. 136 p.

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

HOWARD FERGUSON, District Wildlife Biologist
MICHAEL ATAMIAN, Wildlife Biologist

Population objectives and guidelines

Our deer management goals are to maintain both white-tailed deer (*Odocoileus virginianus*) and mule deer (*O. hemionus*) numbers at levels compatible with landowner tolerance and urban expansion and provide as much recreational use of the resource for hunting and aesthetic appreciation as possible. Further objectives are to meet the Game Management Plan (WDFW 2009) guidelines for buck escapement (20 to 24 bucks per 100 does post-season) while minimizing agricultural damage from deer.

Hunting Seasons

Game Management Units (GMUs) 127 through 142 make up Population Management Units (PMUs) 14 and 15. PMU 14 contains a mixture of forest, shrub-steppe, and agricultural habitat, along with some areas of high urbanization. PMU 15 is relatively open shrub-steppe and agricultural habitat. Both PMUs contain populations of white-tailed deer and mule deer, with slightly more white-tailed deer harvested annually in PMU 14 and slightly more mule deer harvested annually in PMU 15.

A 3-point minimum regulation on antlered white-tailed and mule deer applies to all hunts, with an antlerless harvest option available to archery, muzzleloader, senior, youth, and disabled hunters. WDFW offered a nine-day early modern firearm season for both mule and white-tailed deer. The general late white-tailed deer season was removed in 2006 and replaced with a special permit late white-tailed buck hunt. A total of 750 permits were offered for the block hunt, which allowed permitees to hunt within any of the six GMUs. In addition, second deer tags (antlerless only) were offered in all six GMUs.

Archers were offered both early and late hunting seasons. The 3-point minimum regulation applies to all hunts with antlerless harvest allowed in some GMUs depending on species and date. A late archery white-tailed deer season is open in GMU 127 with 3-point minimum bucks or antlerless deer legal. A late season, hunt for antlerless only white-tailed and mule deer was initiated in GMUs 133 and 136 to aid with depredation issues in those units.

Table 1. Summary of harvest in PMU 14 and 15 (permit harvest not included).

	PMU 14			PMU 15		
Year	Antlered	Antlerless	Total	Antlered	Antlerless	Total
2001	1194	294	1488	1544	357	1901
2002	1391	253	1644	1639	344	1983
2003	1386	380	1766	1444	501	1945
2004	1492	387	1880	1371	468	1839
2005	1547	337	1884	1500	421	1921
2006	1092	359	1451	1074	256	1330
2007	1232	361	1593	1280	274	1554
2008	1432	439	1871	1558	333	1891
2009	1135	410	1545	1341	364	1705
AVERAGE	1322	358	1680	1417	369	1785

Early season Muzzleloader hunts are offered in GMUs 133, 136, and 142 for both white-tailed and mule deer with a 3-point minimum regulation and antlerless harvest allowed in GMU 142. A late muzzleloader white-tailed deer season is available in GMUs 130 - 139 with 3-point minimum and antlerless deer legal. An additional late muzzleloader antlerless-only mule deer season is offered in GMU 130.

Harvest trends

Total deer harvest in PMU 14 does not differ substantially from PMU 15; however harvest tends to be slightly higher in PMU 15 (Table 1). Across both PMUs there was a pronounced reduction in harvest during 2006. PMUs 14 and 15 had 15.6% and 30.3% reductions in harvest compared to the average for the previous 5-years. The reduction in harvest in 2006 was probably due in part to the replacement of the general late white-tailed deer modern firearm season with a permitted hunt. Harvest rebounded in 2008, reaching pre-2006 levels in harvest in both PMUs, but declined in 2009. Mule deer comprise a greater portion (55%) of the harvest in PMU 15, while white-tailed deer comprise a greater portion (58%) of the harvest in PMU 14.

Overall hunter participation increased from 2001 through 2004 in both PMUs, but has declined since 2005 (Fig. 1). Decline in modern firearm hunters is the main driver behind the negative trend in hunter numbers in both PMUs. In 2009, modern firearm hunters made up 67% and 86% of hunters in PMUs 14 & 15, respectively. Number of archery hunters is increasing in PMU 14 and remains stable in PMU 15 (Fig. 2). Muzzleloader numbers remain stable to increasing in both PMUs 14 and 15, averaging 681 and 333 respectively.

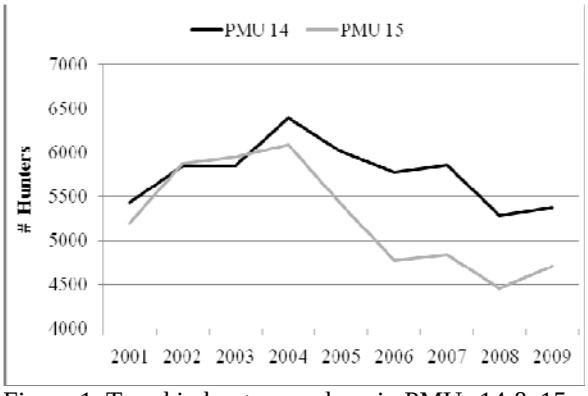


Figure 1. Trend in hunter numbers in PMUs 14 & 15.

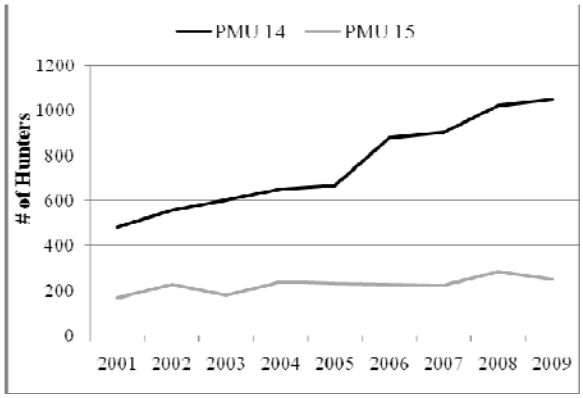


Figure 2. Trend in archery hunters in PMUs 14 & 15.

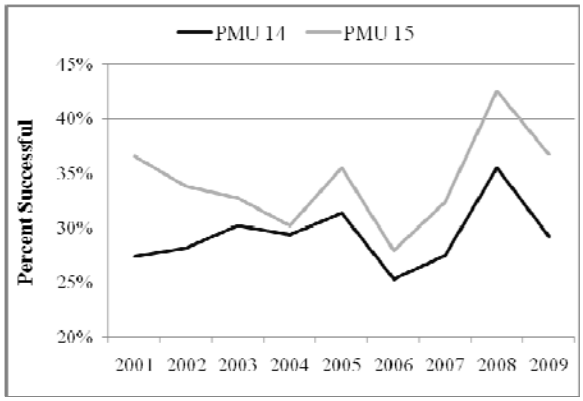


Figure 3. Hunter success rates in PMUs 14 & 15

Hunter success rates in PMU 14 and 15 have averaged 29% and 34%, respectively, over the past nine years. There is no observable trend over this time period, reflective of the complex combination of variables (deer availability, hunting conditions, access, vacation, etc) that affect hunter success each year (Fig. 3). There is a sharp decline in hunter success in 2006 in both PMUs, most likely related to the replacement of the general late white-tailed deer modern firearm season with a permitted hunt. However, both PMUs showed a modest rebound in hunter success in 2007 followed by a sharp increase in 2008. Success dropped in both PMUs in 2009, probably due to a combination of heavy snow conditions in the winter of 2008 leading to poor recruitment and very light snow in 2009 producing poor hunting conditions.

Catch per unit effort (measured as kills per day) has averaged 0.07 and 0.10 for PMU 14 and 15, respectively. Probability of making a kill each day has varied little (± 0.01 kill/day for both PMUs) from these averages over the past nine year. Catch per unit effort declined back to previous levels in 2009 after hitting a high in 2008 (Fig. 4).

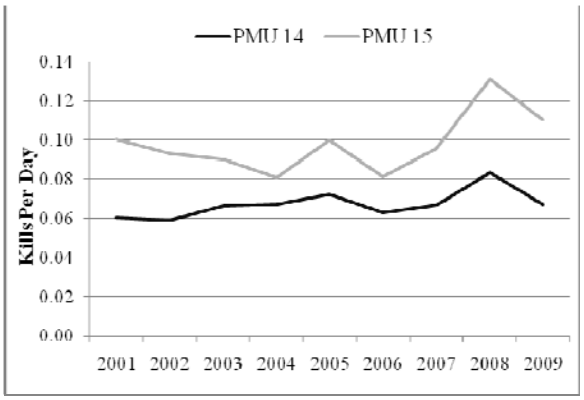


Figure 4. Catch per unit effort in PMUs 14 & 15.

Results for the first four years of the Palouse special permit hunt show higher success rates than in the general hunt (Table 2). If permit hunters that successfully harvested a buck in GMUs 127-142 during the general season are included then success increases to 65%, 51%, 66%, and 64% in 2006, 2007, 2008, and 2009, respectively. Additionally, 4+ and 5+ bucks make up a greater percentage of the harvest when compared to the general season (59% 4+ and 21% 5+ bucks, 2009).

Table 2. Palouse special permit hunt results

	2006	2007	2008	2009
Num. Of Hunters*	342	395	344	411
Hunter Success**	57%	42%	59%	57%
% 4+ bucks**	85%	88%	89%	85%
% 5+ bucks**	29%	37%	37%	35%

* Number of tag holders that hunted in one of the Palouse GMUs (127-142).

** Calculations based on kills that occurred during the permit season.

Surveys

Deer in PMU 14 and 15 have been surveyed by both ground and aerial methods. Available resources impact WDFW's ability to conduct surveys over the entire district. Pre-season ratios come from ground surveys conducted during August and September. Pre-season surveys provide an accurate reflection of fawn production for the year. Post-season ratios are calculated from helicopter surveys conducted during late November, December, or January. Post-season surveys reflect the effects of harvest on these herds, predominantly the antlered portion of the herds. However, due to the nocturnal behavior of bucks and the hunting pressure of the late buck seasons, the post-season buck:doe ratio is probably a conservative measure of composition when available.

The 2009 pre-season mule deer ratios show a decline in both buck and fawn numbers (Table 3 & 4). Pre-season ratios for white-tailed deer also show a decline in both buck and fawn numbers in 2009 (Table 5 & 6). However, none of these differences are statistically significant. Observed declines in bucks and fawns of both species may be due to the heavy snows of the 2008/2009 winter leading to poor overwinter buck survival and low fawn recruitment.

Table 3. Preseason Mule Deer Buck to 100 Doe

	Buck :	90% C. I.		#	#
Year	100Doe	Lower	Upper	Survey	Deer
2002	50	26	97	4	87
2003	57	43	77	4	148
2004	34	21	53	9	194
2005	38	29	49	16	471
2006	45	37	55	9	181
2007	32	19	51	9	125
2008	42	31	56	12	360
2009	29	20	42	26	435

Table 4. Preseason Mule Deer Fawn to 100 Doe

	Fawn :	90% C. I.		#	#
Year	100Doe	Lower	Upper	Survey	Deer
2002	74	64	85	15	320
2003	92	82	103	6	299
2004	87	70	109	7	223
2005	64	43	94	5	157
2006	71	55	93	12	372
2007	76	63	92	9	250
2008	74	53	103	9	223
2009	57	47	69	21	633

Table 5. Preseason White Tailed Buck to 100 Doe

	Buck :	90% C. I.		#	#
Year	100Doe	Lower	Upper	Survey	Deer
2002	42	30	58	12	388
2003	34	26	44	9	328
2004	33	17	64	7	159
2005	35	25	48	14	339
2006	35	20	60	9	344
2007	33	24	44	8	441
2008	29	22	38	16	400
2009	25	21	29	38	1142

Table 6. Preseason White Tailed Fawn to 100 Doe

Year	Fawn : 100Doe	90% C. I. Lower	90% C. I. Upper	# Survey	# Deer
2002	83	60	114	9	238
2003	97	72	130	5	61
2004	76	67	86	10	262
2005	45	38	54	14	365
2006	65	54	79	12	541
2007	63	49	83	10	309
2008	61	54	70	10	377
2009	47	40	56	34	1509

All post season composition data in Table 7 was collected via helicopter flights. The number of flights is limited due to available funds, which results in incomplete coverage of the district. In 2008 and 2009 the White tailed deer post season buck to doe ratio was high, while in 2006 and 2007 it was low. This is more likely reflective of the difficulty to survey white-tailed deer bucks in the post season, due to their tendency toward nocturnal activity than a real trend in the population. Post season white-tailed deer fawn numbers are lower then ideal. However, all of the post season surveys have been focused in more open GMUs (130-142) and have not been conducted in the forested GMUs of 124 and 127 which are core white tailed deer areas for District 2. Post season mule deer fawn ratios were low in 2007 and 2008, however flights and coverage were limited in both years. In 2009 mule deer fawn numbers appear to have rebounded some. Post season mule deer buck to doe ratios have been very stable the past 4 year no matter the number of or coverage of the surveys. Limiting the post season mule deer buck analysis to legal (3+) bucks results in a buck:doe ratio of 3:100, 3:100, 1:100, and 1:100 for 2006-2009, respectively. This indicates that the current mule deer harvest is sustained by recruitment of yearling and 2.5 year old bucks.

Table 7. Post season sex and age composition ratios.

Species	Year	(Buck:Doe:Fawn) Post-season	# Days	# GMU
Mule Deer	2006	22:100:73	4	5
	2007	22:100:59	1	1
	2008	22:100:52	2	2
	2009	22:100:71	4	4
White-tailed Deer	2006	8:100:65	4	5
	2007	10:100:44	1	1
	2008	36:100:48	2	2
	2009	31:100:63	4	4

Habitat and Disease

Conversion of natural habitats to agriculture occurred in past decades, but represent minor changes today in PMU 14 & 15. Gains have been made in deer habitat with enrollment of agricultural acres into the Conservation Reserve Programs (CRP). However, with current wheat and hay prices several landowners have pulled their land out of CRP or have chosen not to re-enroll after their contract was up. Additionally emergency haying and grazing of CRP acreage is often in response to a severe drought or similar natural disaster, the frequency of which are predicted to increase. Though these are temporary measures and do not remove the acreage from CRP it does reduce the quality of the land during a time of high stress, when wildlife may need it most.

Habitat loss due to development continues to occur, especially in GMU 124, 127, and 130 with the redistribution of urban populations outward into rural settings. Current habitat conditions support existing populations; however, an extended drought in these PMUs can increase stress, reduce productivity and increase mortality across sex and age classes.

Drought conditions are coincident with white-tailed deer mortality and outbreaks of Epizootic Hemorrhagic Disease (EHD) in District 2. EHD mortalities in PMUs 14 and 15 were high in 1998, 1999, 2003, 2004, but almost nonexistent in 2006, 2007, 2008, and 2009. There are some indications that mule deer increased in areas that were occupied by white-tailed deer before the outbreak of EHD.

Though Chronic Wasting Disease (CWD) has not been detected in Washington, it is a concern in District 2, due to the proximity to Idaho which has several game farms. Lymph nodes are taken from hunter kill and road kill deer through-out the district every year to test for CWD. None of the samples have come back positive to date.

Management conclusions

Currently we are meeting the Game Management Plan guidelines for mule deer buck escapement (20 to 24 bucks per 100 does post-season). However, the low legal mule deer buck to doe ratios over the past three years indicate that our harvest is being sustained by recruitment of yearlings (i.e. we are harvesting almost all of our old age classes). With accommodating weather and productive habitats these populations produce a sustained harvest. Reductions in productivity for one or more years,

however, could result in pronounced population declines due to our harvest being heavily weighted toward older age-class bucks. Discussions on long-term management of mule deer in Washington will most likely address these and similar issues. Short-term recommendations would be to continue monitoring buck escapement and to propose restrictions in hunting opportunity if declines in populations are observed.

We are not meeting the Game Management Plan guidelines for post season buck ratios for white-tailed deer every year. However, white-tailed bucks are difficult to survey because of the forested habitats they occupy and their nocturnal behavior, which hunting tends to intensify. Considering the post season buck ratios as a conservative measure, the relatively stable and robust pre season buck ratios, and the late season having been recently converted to a permit only season, we are not considering further limits to the general white-tailed deer season at this time, but are looking into methods to improve our post season surveys.

Those units near urban centers continue to receive high hunting pressure and will need to be closely watched to avoid over or under harvest. Thus far, we have not experienced excessive urban deer problems in Spokane. However, the public perceives high numbers of vehicle collisions with white-tailed deer as a problem in parts of GMUs 124 and 127. Additionally, crop damage is reported annually in some portions of all GMUs. Intensive recreational harvest with a wide range of seasons and opportunities has helped mitigate some of the damage claims and perceived urban population issues. This seems to be the most successful tool to help control damage and to provide recreational opportunity. We will continue to offer antlerless hunts by modern firearm permit, and general whitetail antlerless opportunity for archery, muzzleloader, youth, senior, and disabled hunter seasons in units near the urban area of Spokane for white-tailed deer.

DEER STATUS AND TREND REPORT: REGION 1

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

PAT FOWLER, District Wildlife Biologist
PAUL WIK, Wildlife Biologist

Population Objectives and Guidelines

The mule deer (*Odocoileus hemionus*) population has remained relatively stable along the breaks of the Snake River at a level lower than was observed during the late 1990's through 2003. Mule deer populations in the mountains are still depressed, but are slowly improving. White-tailed deer (*O. virginianus*) populations have also declined due to EHD outbreaks and antlerless harvest, but are improving in the western Blue Mountains foothills.

Hunting seasons and harvest trends

The accuracy of harvest data has improved since implementation of mandatory hunter reporting in 2001. From 2001-2009 District 3 buck harvest averaged 2,103 bucks/year, and ranged from 1789 to 2,599. In 2009, hunters harvested 1971 bucks (Table 1), 7% below the 10-year average. In 2009, the mule deer buck harvest averaged 53% four point or better, which is close to the 10-year average.

Three user groups have general seasons in the Blue Mountains: archery, muzzleloader, and modern firearm. The number of modern firearm hunters has gradually declined since 1996, from a high of 13,423 to 8,572 in 2009. Modern firearm (MF) hunters harvested 2,063 deer in 2009; 1,698 bucks and 365 antlerless deer. General season hunter success was 26%.

Table 1. Deer harvest summary, 1990-2009, Blue Mtns.

Year	Antlered	Antlerless	Total	Mule deer % ≥ 4 point*	Antlerless Hv. Per 100 Antlered
2001	2399	1127	3526	50%	47
2002	2599	1150	3749	47%	44
2003	2254	1497	3751	50%	66
2004	1994	1240	3233	48%	62
2005	1929	904	2833	53%	47
2006	1919	721	2640	55%	38
2007	1789	572	2361	51%	32
2008	2032	572	2604	53%	28
2009	1971	508	2479	53%	26

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

Muzzleloader (ML) hunter numbers increased dramatically with the introduction of a general muzzleloader season in 2000. The first year, only 117 ML hunters participated, but by 2004 that number increased to 684 hunters. ML hunters have declined since 2004, and appear to have stabilized with 464 participating in 2009. Muzzleloader hunters harvested 153 deer in 2009, 146 bucks and 7 antlerless. Muzzleloaders enjoyed a success rate of 33%, which is the highest success rate for any user group.

Archers increased again in 2009 to 1,229 hunters. Archers harvested 239 deer (103 bucks, 136 does), which is a slight increase over the long-term average (198 deer). The archery success rate is near that of modern firearm hunters at 20%.

Species composition of the general buck harvest changed slightly in 2009, with 69% mule deer and 31% white-tailed deer. The increase in mule deer may be due to slightly increasing mule deer populations in some units, and declines in white-tailed deer due to EHD. The MF antlerless harvest consisted of 9% mule deer, which is a decrease from previous years, however, most of the antlerless harvest is focused on white-tailed deer through special permits and general season hunts.

The antlerless deer harvest continues to focus on white-tailed deer, due to low numbers of mule deer in many units. A total of 255 general antlerless permits along with 440 permits for antlerless white-tailed deer were issued in 2009.

Table 2. Late White-tailed Deer Permit Hunt Summary, MF & ML, Blue Mtns., WA.

Year	Permits	Bucks	Does	Total	Success Rate	%Harvest ≥ 5 pt.*
2001	210	76	10	86	56%	18%
2002	210	82	11	93	59%	17%
2003	210	93	13	106	57%	17%
2004	210	69	16	85	52%	22%
2005	210	84	9	93	67%	37%
2006	210	83	8	91	71%	40%
2007	210	60	11	71	52%	48%
2008	210	86	18	104	65%	34%
2009	210	87	13	100	69%	37%

* Note: % 5 point in 2005-09 listed for late permit hunt, average of all seasons prior to 2005.

The 2009 permit controlled and general season antlerless harvest totaled 508 antlerless deer (general season 335, permit season 173). Species composition of the modern firearm antlerless harvest consisted of 82% white-tailed deer, and 18% mule deer. Antlerless hunting pressure on mule deer has been reduced over the last few years due to drought impacts on mule deer fawn recruitment, while pressure on antlerless white-tailed deer has increased in order to stabilize white-tailed deer populations.

Antlerless deer were harvested at a rate of 26 antlerless deer per 100 bucks; mule deer 8 does/100 bucks and white-tailed deer at 53 does/100 bucks.

Surveys

Both aerial and ground surveys are used to determine pre- and post-hunt herd composition. Pre-hunt surveys were conducted from the ground, and resulted in only 75 mule deer being classified. Future efforts need to substantially increase the number of animals being surveyed.

Post-hunt surveys were conducted from the ground and air resulting in 2,366 mule deer classified (Table 3). December fawn:doe ratios averaged 56 fawns/100 does (*90% CI* 52 – 61).

The post-hunt mule deer buck:doe ratio did not change compared to the last four years, and remained at 17 bucks/100 does (*90% CI* 15 – 19) (Table 3). Although data on post-hunt herd composition for white-tailed deer is limited, buck ratios have averaged 22 bucks/100 does since 1995 and appear to be stable.

Fall green-up improved during 2009, and winter conditions were much milder than usual with little snow in the foothills and mountains.

Population Status and Trend

The mule deer population appears to be stabilizing in the lowlands and along the Snake River breaks, but is still below the population levels that occurred from 1996-2003.

White-tailed deer populations are improving since an EHD die-off in 2008. White-tailed deer numbers in the eastern Blue Mountains have declined, while numbers on the westside of the Blues have improved.

Habitat Condition and Trend

Summer-fall drought has occurred five out of the last nine years (2001-2003, 2005, 2007), which had a negative impact on fawn production and survival. Fall green-up is extremely important for mule deer along the breaks of the Snake River and in the lowland areas. Green-up provides the nutrition necessary for deer to increase fat reserves needed for winter survival and natality. A drought during the summer-fall can result in poor physical condition for breeding and increased winter mortality, and can also result in poor fawn production/survival the following spring. The spring and summer of 2009 was normal, and fall green-up was adequate.

The Conservation Reserve Program (CRP) dramatically improved habitat conditions for deer in the lowland agricultural areas, providing approximately 250,000 acres of additional habitat. These large areas of continuous habitat provide connectivity between sub-herds, good forage, and fawning areas where little existed prior to this program. Unfortunately, large acreages of CRP are being lost as old contracts expire and are not renewed. The habitat provided by the CRP program has been a contributing factor to the increase in mule deer populations during the 1990's. If CRP acreage declines significantly, we can expect a similar decline in mule deer populations in the lowlands of southeast Washington.

Yellow star-thistle (*Centaurea solstitialis*) is a major problem in the foothills and along the breaks of the Snake River south of Asotin, the breaks of the lower Tucannon River, and throughout the rangelands of western Walla Walla County. Yellow star-thistle has inundated thousands of acres of deer habitat in GMU-181 along the Snake River breaks, and this problem surely contributes to a lack of improvement in the mule deer population in this unit.

Habitat conditions on 163,000 acres of National Forest and private land are improving due to extensive wildfires that occurred in 2005 and 2006 (School Fire-

53,000 acres, Columbia Complex Fire- 101,000 acres. The Columbia Complex Fire produced excellent conditions for habitat regeneration on over 80% of the acreage burned.

Augmentation/Habitat Enhancement

Weed control projects have been implemented on WDFW Wildlife Areas and on private lands, which should improve habitat conditions for deer. The wildfires of 2005 and 2006 will also have a positive impact on deer habitat in GMU's 154, 162, 166, and 178.

Wildlife Damage

Damage complaints attributed to deer have been minimal in southeast Washington, compared to deer densities. However, the development of vineyard acreage continues to increase in southeast Washington. Over the last year, the WDFW has received several complaints of deer damage to vineyards. This problem will continue to increase as vineyard acreage expands in southeast Washington.

Management Conclusions

Mule deer populations along the breaks of the Snake River and in the lowlands appear to be stabilizing. Mule deer populations in the mountains are considerably below management objective, but are slowly improving.

Periodic summer/fall drought along with localized winter conditions over the last six years (2001-2003, 2005, 2007) resulted in lower winter fawn survival for mule deer in the arid lowlands and along the breaks of the Snake River. Fawn production/survival in 2009 increased significantly compared to recent years (Table 3).

The post-hunt mule deer buck ratio remained the same in 2009 at 17 bucks/100 does. Low fawn production/survival in recent years and increased hunting opportunity are factors that contribute to lower post-hunt buck:doe ratios.

The quality of bucks harvested under the three-point program has improved, compared to the era when hunters could harvest any buck. Since 1992, the mule deer buck harvest has average 51% four point or larger, compared to 11% prior to the three-point regulation. The white-tailed buck harvest has averaged 20% five point or better, compared to 9% prior to the three-point regulation. Public support for the three-point regulation is excellent, due to the combination of good hunter success rates, and improved quality of the bucks harvested.

Table 3. Post-hunt mule deer surveys 2001-09, Blue Mtns., Washington

	Bucks					Ratios (90% C.I.)	
Year	Adults	Yearlings	Doe	Fawn	Total	Fawn (CI)	Bucks (CI)
2001	71	109	876	471	1,529	55 (50, 60)	21 (20, 22)
2002	77	158	1,651	581	2,465	35 (32, 38)	14 (13, 15)
2003	34	70	979	467	1,550	48 (43, 52)	11 (8, 13)
2004	85	112	1,440	719	2,363	50 (46, 54)	14 (13, 16)
2005	85	229	1,870	688	2,872	37 (34, 39)	17 (15, 18)
2006	80	147	1,350	645	2,231	48 (44, 51)	17 (14, 19)
2007	80	112	1,166	505	1,862	43 (40, 47)	16 (14, 19)
2008	113	132	1,444	697	2,386	48 (45, 52)	17 (15, 19)
2009	72	162	1,363	769	2,366	56 (52, 61)	17 (15, 19)

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
JEFF HEINLEN, Wildlife Biologist

Population objectives and guidelines

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

Hunting seasons and harvest trends

Declining post-season buck:doe ratios prompted a return to the current 9-day general modern firearm season in 2006. In 2009, we further reduced antlerless only permits for youth, disabled, and senior hunters in response to low fawn recruitment and population size. The number of b-tag antlerless permits for the private land hunt on the Methow Valley floor stayed at 100 to address ongoing damage issues. In response to escalating nuisance deer complaints additional b-tag antlerless permits for private land were also implemented in the North Okanogan, Central Okanogan, Omak, and Conconully areas in 2009.

Hunter numbers increased in PMU 21 and decreased in PMU 22 in 2009 compared to 2008. Both hunter success and harvest increased in 2009 compared to 2008 due to weather conditions favorable to hunters throughout the season (Figures 1-3).

WDFW check station personnel surveyed 796 hunters and examined 75 deer in 2009 (Table 1). Chronic wasting disease monitoring occurred in this district in 2009 but limited samples were collected.

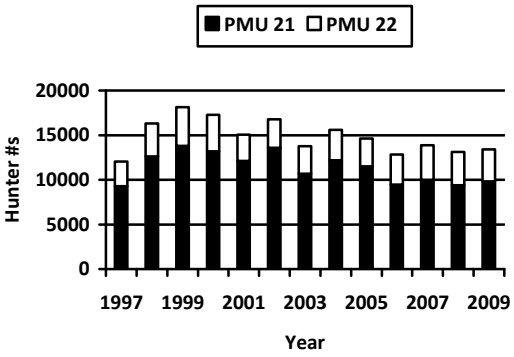


Figure 1. Trend in hunter numbers in PMUs 21 & 22.

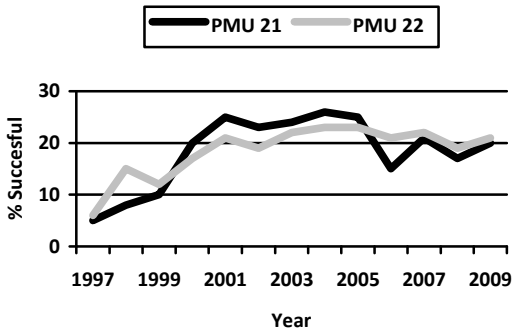


Figure 2. Trend in hunter success in PMUs 21 & 22.

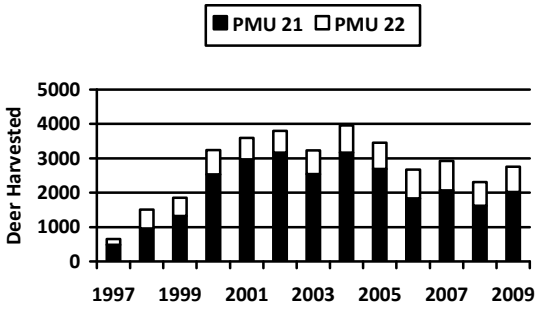


Figure 3. Trend in harvest in PMUs 21 and 22.

Table 1. Chewuch Check Station Results.

Year	Deer Type Bucks	Antlerless	Total	Hunters	%Success
1997	5	0	5	729	1
1998	33	0	33	980	3
1999	53	0	53	1,414	4
2000	72	0	72	1,250	6
2001	106	27	133	1,314	10
2002	54	45	99	1,265	8
2003	71	6	77	840	9
2004	72	5	77	1,093	7
2005	49	17	66	1,114	6
2006	24	13	37	519	7
2007	41	25	66	715	9
2008	27	13	40	795	5
2009	62	13	75	796	9

Surveys

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

Hiking surveys are conducted in early spring just as winter ranges begin to green-up, and before mule deer begin to migrate to summer range. Traditionally, these efforts have been restricted to PMU 21 due to limited resources and sample size problems; however, biologists conducted post-season surveys in PMU 22 in 2007. A new land acquisition and an associated limited entry hunt prompted this effort. The survey produced satisfactory sample sizes, particularly for white-tailed deer, but the majority of animals seen came from one 6000 acre portion of the landscape, so results are not likely representative of the PMU as a whole. Limited financial resources precluded aerial surveys of PMU 22 in 2009, and ground survey attempts yielded inadequate sample sizes. Additional aerial survey attempts of this unit will depend on funding availability.

Biologists classified 3,471 mule deer during helicopter surveys of PMU 21 in early December 2009 (Table 2).

Table 2. Post-season mule deer population composition counts in PMU 21 from 2009, by watershed. F:100:B is fawns and bucks per 100 does.

Area	Bucks ≥3 pt	Bucks <3 pt	Doe	Fawn	Total	F:100:B
Methow	82	137	1242	951	2412	77:100:18
Okanogan	46	84	520	409	1059	79:100:25
Total	128	221	1762	1360	3471	77:100:20

The counts yielded overall buck:doe and fawn:doe ratios of 20:100 and 77:100 respectively. Buck ratios continue to meet the minimum management objective of 15. Fawn production continued to improve (Table 3), likely a result of reduced competition for limited winter forage.

Table 3. Long-term post-season mule deer population composition counts for PMU 21. F:100:B is fawns and bucks per 100 does.

Year	Buck Antler Class ≥3 pt	<3 pt	Subt	Doe	Fawn	Total	F:100:B
1997	64	113	177	1464	1061	2712	72:100:12
1998	103	185	288	1735	1520	3544	87:100:17
1999	102	225	327	1301	1150	2778	88:100:25
2000	123	264	387	1425	1321	3133	93:100:27
2001	168	318	486	2067	1841	4394	89:100:24
2002	214	319	533	2059	1607	4199	78:100:26
2003	193	329	522	2854	1938	5314	68:100:18
2004	95	191	286	2086	1676	4048	80:100:14
2005	174	433	607	3367	2841	6815	84:100:18
2006	214	412	626	3343	2148	6117	64:100:19
2007	141	176	317	1935	1409	3661	73:100:16
2008	105	146	251	1499	1119	2869	75:100:17
2009	128	221	349	1762	1360	3471	77:100:20

Fawn recruitment continued to improve, likely a result of mild winter conditions, but remains below the historical average and below the level needed to create significant herd growth at the PMU level (Table 4 & 5).

Table 4. Spring mule deer population composition counts from 2010, by area for PMU 21. F:100A is fawns per 100 adults.

Area	Adult	Fawn	Total	F:100A
Methow	1366	564	1930	41:100
Oka	577	204	781	35:100
Total	1943	768	2711	40:100

Population status and trend analysis

Since record keeping began in the early 1900s, the history of the mule deer population in Okanogan County is characterized by gradual long-term trends, largely in response to changes in habitat quality. In the early twentieth century, the implementation of modern game management coincided with the advent of effective wildfire suppression at the landscape level. Fire suppression allowed for the widespread establishment and growth of shrub forage species on critical lower elevation winter ranges. Improving winter forage quantity and quality, coupled with controlled harvest, allowed for steady herd growth for several decades, as evidence by historical harvest data. Range

condition and population levels likely peaked in the 60s or 70s.

Table 5. Long-term spring mule deer population composition counts from PMU 21. F:100A is fawns per 100 adults.

Year	Adults	Fawns	Total	F:100A
1998	1279	462	1741	36:100
1999	1393	833	2226	60:100
2000	1496	838	2334	56:100
2001	1593	707	2300	44:100
2002	1661	626	2287	38:100
2003	1516	506	2022	33:100
2004	925	335	1260	36:100
2005	1643	722	2365	44:100
2006	1635	288	1923	18:100
2007	1314	269	1583	20:100
2008	1762	436	2198	25:100
2009	1564	503	2067	32:100
2010	1943	768	2711	40:100

For roughly the last 35 years, harvest data and population estimates suggest a gradually declining population. This is likely a function of the reduced productivity of aging shrubs (particularly bitterbrush and ceanothus) and the lack of recruitment of new shrubs under continued fire suppression regimes. As a result, even during periods of extended mild winter weather, the population is not rebounding to the historic highs of the mid 1900s, suggesting a reduction in landscape carrying capacity for deer.

Overlayed on the general long-term population trends are significant short-term fluctuations driven by severe winter weather events and spikes in crop damage related doe harvest. Prior to the 1968 freeze, heavy orchard depredation by deer led to periodic culling events, but the populaltion rebounded quickly as soon as harvest pressure eased. Similarly, mule deer numbers bottomed out in 1997 following a string of hard winters, yet, modelling data suggests the population had almost doubled by 2000 following several consecutive mild winters (Figure 4). Herd size had been in decline for three years as a result of poor over-winter fawn recruitment in response to harsher winter conditions, but stabilized in response to last winters improved fawn survival.

Unlike mule deer, white-tailed deer have increased in the district over the long-term. Development patterns and agricultural practices, may have promoted the expansion of white-tailed deer. Whitetails are widespread in the eastern part of the district, and now inhabit most of the major drainages and valley bottoms in the western half of the county, including many places where they had not been seen historically. Relatively flat harvest figures suggest the whitetail population may be stabilizing. Whitetail also sustained significant winter losses in the 90s, but populations rebounded with milder winters.

In contrast to population size, herd composition is tied to harvest rather than habitat. Heavy hunting pressure on antlered mule deer in the past caused the buck:doe ratio to consistently drop below the historical minimum threshold of 10:100. Implementation of more restrictive seasons and a minimum management objective of 15 bucks per 100 does, have improved post-season sex ratios for the last several years. In response, the general rifle season was lengthened to 14 days in 2003; however, ratios began declining again immediately and season length returned to nine days in 2006.

Habitat condition and trend

As mentioned above, habitat quality and quantity have likely suffered from decades of fire suppression. The resulting tree encroachment, loss of early to mid-successional forage conditions, and lack of shrub regeneration diminish forage quality and quantity in the long-term. The situation has been exacerbated by the spread of introduced noxious weeds.

In addition, loss of winter range, due to increased human population and associated development has likely reduced landscape carrying capacity to some degree. Historically this has been most true in the Methow Valley, but more recently, development pressure has accelerated district-wide. This is being mitigated somewhat by land acquisition and conservation easement purchases by WDFW and local land trusts, but this is far from a complete solution, particularly as land prices escalate. More aggressive growth management planning is needed if critical private lands are going to continue to play an important role in deer conservation.

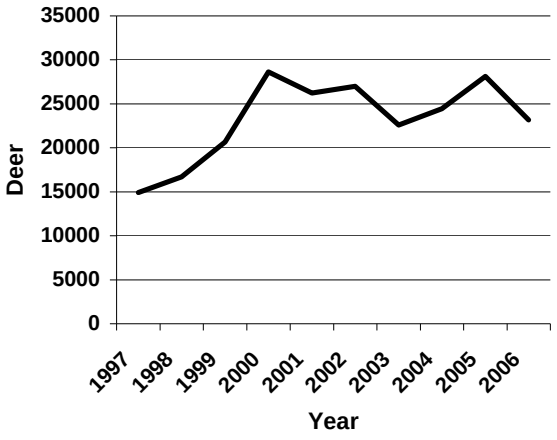


Figure 4. PMU 21 modeled deer population.

In recent years, wild fires burned over 400,000 acres of deer habitat within the district, primarily at mid to higher elevations. This should improve summer forage quality and availability. Similarly, public agencies are pursuing a more aggressive prescribed burning policy near the forest/development interface. This could potentially revitalize some winter forage if applied over a significant area.

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

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

Management conclusions

The gradual long-term decline in Mule deer numbers is expected to continue unless steps are taken to revitalize shrub growth on the winter range and manage increasing development. Fire, community planning, and habitat protection will likely be the most important tools in this effort. More recently, the population hit a short-term low about 10 years ago following a string of bad winters. Almost immediately, this reduced pressure on seasonal ranges, improved productivity and recruitment, and allowed the herd to rebound quickly during a string of mild winters. Conservative antlerless hunting seasons aided recovery. More recently, herd growth and harvest reached a plateau, with productivity and recruitment falling off as the modeled population level exceeds about 20-25,000 animals, which appears to be the approximate landscape carrying capacity for deer. We implemented more aggressive antlerless harvest to stabilize or slightly reduce herd size in an effort to improve productivity, maximize sustainable harvest yield, and reduce overuse of seasonal ranges. Most recently, three moderately tough winters have reduced recruitment and led to a significant herd decline. As a result, we reduced antlerless permits for 2008 and implemented further reductions in 2009. Mild winter conditions in 2009-2010 allowed for a slight rebound in the herd due to an increase in fawn recruitment. Even so, population recovery is likely to be less vigorous than in the past unless long-term, chronic reductions in habitat quantity and quality are not halted.

White-tailed deer numbers have also dipped during harsh winters, but also rebounded strongly in recent years. In the face of increasing human development, the long term prognosis for white-tailed deer distribution and abundance is more favorable than for mule deer. This is a function of the whitetail's ability to better handle habitat changes associated with human development, less winter range loss due to fire suppression, and the de-facto refuge effect of private lands, where white-tailed deer tend to concentrate.

For deer in the short term, minimal fawn recruitment in 2006-2008 will mean continued reduced legal buck availability that began in 2007 and will likely continue at least through 2010. Mediocre recruitment in 2009 likely stopped the decline, but is not robust enough to generate increases for 2011. The recent shortening of the general hunting season and corresponding earlier closing date may improve buck escapement and raise the post-season buck:doe ratio.

Over the last decade or two, populations of resident deer on the Methow and Okanogan Valley floor have increased significantly to problematic levels. Nuisance/damage complaints have risen sharply and population levels have surpassed social tolerance. Reduced harvest pressure associated with increasing development and housing density is the major contributing factor. A winter feeding effort in 1997 likely exacerbated the problem, as does taught succeeding generations of fawns to look for winter forage near the feeding sites, despite the discontinuation of the feeding effort in subsequent years. Mild winters allowed deer to survive with this strategy, but more recently, tougher winters have resulted in high fawn mortality in developed areas. Ironically, this mortality has generated public calls to reinitiate feeding efforts, a move that would only expand the nuisance problems.

Instead, in 2007 and 2009 we initiated an antlerless permit season on resident, valley-bottom deer on private land in the Methow and Okanogan Valleys, respectively. This was needed to alleviate the nuisance/damage issues. To date, the program is operating smoothly. Deer nuisance/damage complaints appear to be down somewhat. Ultimately, success will hinge on community acceptance and landowner cooperation.

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

DAVID P. VOLSEN, District Wildlife Biologist
JON GALLIE, Wildlife Biologist

Population objectives and guidelines

The majority of deer in the Wenatchee District are mule deer, although white-tailed deer occur at low density within certain limited habitats. Management objectives for Population Management Unit (PMU) 23, Douglas County, are a post-hunt buck ratio of 15 to 19 bucks per 100 does, and a mule deer population size within landowner social tolerances. Management objectives for PMU 26, Chelan County, are a post-hunt buck ratio of 25 or greater bucks per 100, to maintain deer populations in balance with winter forage, and to limit conflicts with agriculture. Composition surveys, harvest estimates, population modeling, and end of winter browse observations are used to monitor the population relative to objectives. Game Management Unit 243 (Manson), while managed in the Wenatchee District, is a part of the Methow PMU (21). 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

All general mule deer seasons are restricted to the harvest of 3-point minimum bucks, whereas, white-tailed deer seasons allow harvest of any buck. In addition, there were multiple deer permit harvest opportunities in several GMUs for youth, senior and disabled hunters. Deer season began with September early archery general deer season. The modern firearm and muzzleloader high buck season ran from September 15-25 in the Lake Chelan National Recreation Area, the Glacier Peak Wilderness, the Henry Jackson Wilderness and the Alpine Lakes Wilderness. This season occurs within a portion of GMUs 244, 245 and 249 in Chelan County. Early muzzleloader general deer season was open in twelve GMUs for nine days in early October. The early modern firearm general deer season was open 9 days in October in all Chelan and Douglas County GMUs. Early archery general deer season hunting was open in September for 30 days in most GMUs, and late archery general season deer hunting was open in 2 GMUs in late November and early December. No general, late, muzzleloader or modern firearms seasons offered.

Limited-entry, special permit hunting was offered for all user groups. One hundred twenty November modern firearms any deer permits were offered in six GMUs, down from the 163 permits offered in 2008. Twenty four November muzzleloader any deer permits were offered in GMUs 245, 246 and 251. November/December archery buck deer permits were offered in four GMUs. One hundred thirty antlerless and youth antlerless permits were issued in GMU 251. One hundred and sixty modern firearm, 45 muzzleloader, 10 archery, 75 youth, and 25 senior antlerless permits were offered in Douglas County in 2009.

District-wide, buck harvest reached at least a 7-year low in 1997, with 644 bucks harvested, and had increased each season until 2004, when 2,028 bucks were harvested (Fig. 1). In 2009, buck harvest was to 1,428, a 19.0% increase over 2008.

In the Chelan PMU, the 1997 harvest of 247 bucks was the lowest on record. The reduction in harvest by 1997 was primarily influenced by the following factors: severe winter of 1996-1997, 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.

Douglas PMU harvest decreased dramatically from 1996 to 1997, but increased through 2002. Total increased every year from 486 in 1997, to 1,348 in 2002, and has declined since. Total Douglas PMU harvest in 2009 was 642 deer, comprised of 503 bucks and 139 antlerless deer. Total harvest increased by 4% in 2009; buck harvest increased by less than 1%, while antlerless harvest increased by 19%. While some of the decrease in past years is likely due to reduced participation and changing from general to permit only youth, senior and disabled

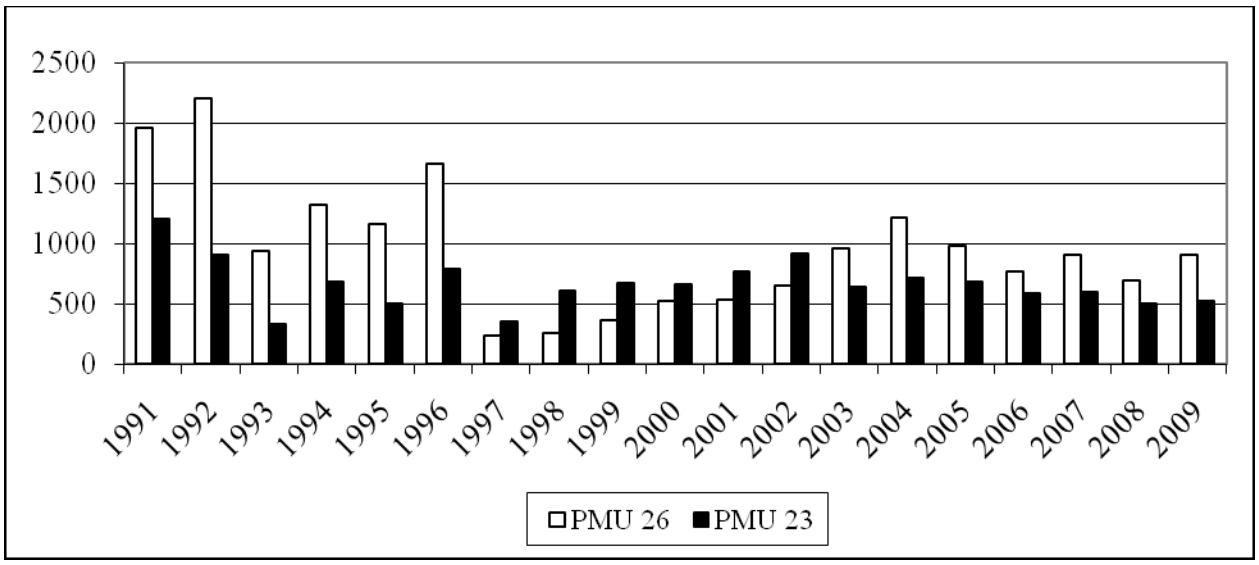


Figure 1. Antlered deer harvested from PMU 23 and PMU 26, 1991 through 2009.

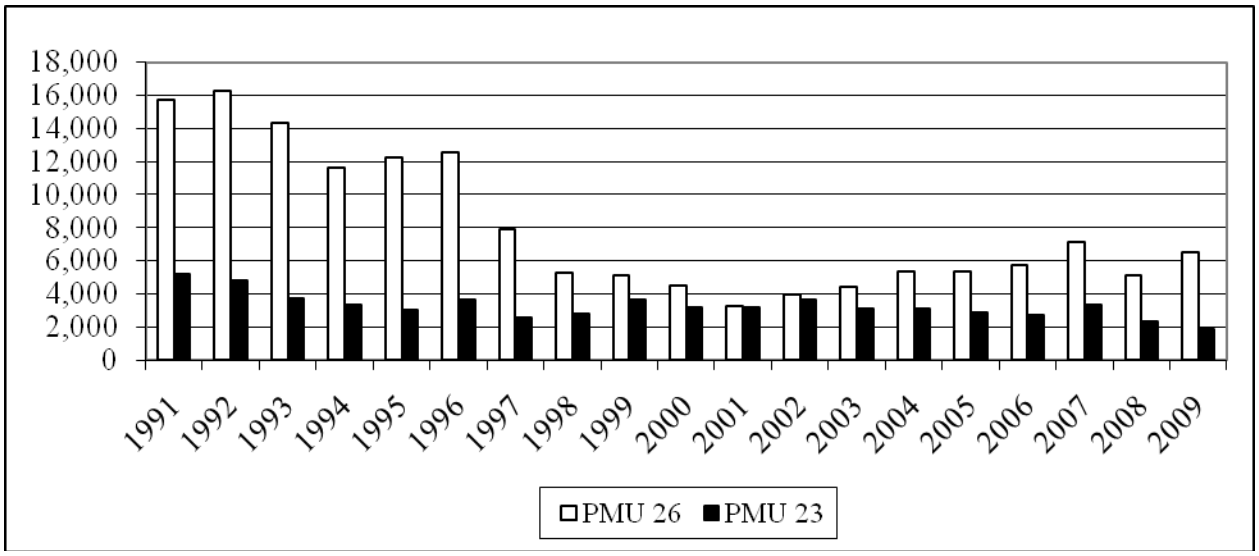


Figure 2. Numbers of hunters reported from PMU 23 and PMU 26, 1991 through 2009.

hunting opportunities in 2005, it appears deer numbers have also decreased over time, as have landowner complaints.

All Chelan PMU data support an increasing trend toward habitat carrying capacity 1997-2004, and reaching winter habitat limitations in 2005. Chelan's buck harvest in 2004 increased 26% from 2003, but is still only 55% of the 1992 harvest of 2,206 bucks (Figure 1). The 1992 buck harvest level may not be attained with the 3-point restriction for general seasons, even as winter ranges mature post-fire and populations increase. During 2009, 906 bucks and 144 antlerless deer were harvested in Chelan County, an increase of 14% overall.

The number of deer hunters in the Wenatchee District declined dramatically from 21,082 in 1992, to 6,438 in 2001. General season hunter numbers in 2009 were 8,384, a 13% increase from 2008 (Figure 2). Hunter numbers decreased in the Douglas PMU (20%), and increased in the Chelan PMU (24%).

Vehicles kill a large number of deer each year in the Wenatchee District, based on data collected by the Department of Transportation. More deer are killed in Chelan County than Douglas County because the mountainous terrain forces migratory deer to lower elevations in the winter to avoid deep snow. Deer kill peaks in winters with deep snow accumulation at lower elevations. Construction of the wildlife fence along S.R. 97A has reduced annual vehicle collisions.

Surveys

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

In the Chelan PMU, observed postseason ratios were 27 bucks and 87 fawns per 100 does in 2008. Adult (age 2+) bucks comprised 79% of Chelan bucks, while yearling (age 1+) bucks comprised 21% of observed bucks in Chelan. Due to poor flight conditions and equipment problems, post-season surveys were not conducted in 2009.

The observed winter/spring fawn:adult ratio for the Chelan PMU was 43:100, derived from a total count of 910 deer. Spring counts were not conducted in Douglas County.

Population status and trend analysis

Deer population status is quite different between the two PMUs that make up the Wenatchee District. The deer population in the Douglas PMU was reduced by the severe winter of 1996-97. However, winter conditions for these deer have been mild since this time, and the population quickly recovered. In addition, there have been significant habitat enhancements associated with the Conservation Reserve Program that have been beneficial for deer. Seasons from 2001-2003 were designed to reduce deer, and this objective was met. As a result, 2004 and 2005 seasons were more conservative, with reduced harvest opportunities for antlerless deer. Antlerless deer opportunities were increased for 2006 and 2007, and then reduced in 2008 and 2009 to slow overall declines. In the Chelan PMU, conservative seasons since 1997, and a series of mild winters, allowed this population to increase steadily through 2005.

In Douglas and Chelan PMUs, there was little harvest of antlerless animals from 1997 to 2000 (range 0-40). The average yearly antlerless harvest from 1992 to 1996 was 233 in Douglas and 441 in Chelan. The 2002 antlerless harvest in Douglas, 426, is the highest in at least 11 years. Antlerless harvest was reduced in 2004 and 2005 in the Douglas PMU, through reduction of antlerless opportunity permits. Antlerless permit holders harvested 139 antlerless deer in 2009. Antlerless permits in the Chelan PMU in 2009, resulting in 144 antlerless deer harvested.

The Chelan PMU was severely impacted by the 1994 Tyee fire, which severely burned a large portion of the winter range, greatly reducing browse. In addition, the winter of 1996-97 was severe. As a result of lost habitat and winter weather, the deer population within the Chelan PMU declined, but has now recovered, based on the increase in the number of bucks harvested, high postseason buck:doe ratios, and high mature buck representation. The deer population in Chelan County is predominantly migratory (89% based on a radio-collared sample of does), and is typically widely dispersed during the modern firearm season in mid-October. Forty-five percent of the bucks observed in Chelan County during post-hunt surveys in 2006 were legal (3 point +) bucks. This percentage dropped to 13% in 2007, increasing to 17% in 2008. Survey conditions may have played a role in producing these low results. Continuing surveys will allows us to determine if the population is trending to a lower percentage of adult bucks or if the 2007 survey was an anomaly. In 2008, total bucks per 100 doe ratios in the Chelan PMU were similar to 2007 at 27 bucks per 100 does. While it appears harvest rates on legal bucks are increasing, this is still a high rate of buck escapement. However, harvest of 4-point bucks declined from 49% in 2005 to 17% in 2006, and then increased to 41% in 2007 in the Chelan PMU. In 2008, harvest of 4-point bucks was 38%. It appears the herd reached carrying capacity of the winter forage base postseason 2005, based on elevated fawn mortality and heavy browse utilization. Informal observations of winter range shrub conditions suggest deer use of available forage rapidly increased 2001-2005, and population growth rate has slowed as winter habitat carrying capacity is approached. The drop in harvest in 2005, in combination with observed increased use of winter range browse and reduced fawn:doe ratios in 2005, suggest the herd had reached the biological carrying capacity of the winter range in the PMU. As a result, near-term future management will be directed toward maintaining a stable, to slowly increasing, mule deer population.

The Chelan PMU has a deserved reputation for producing large numbers of mature bucks, and many hunters express interest in maintaining the high quality of bucks in this PMU.

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

POP-II (Fossil Creek Software, v. 1.2.11) models have been created for both the Chelan and Douglas PMUs. The Chelan model simulation aligns well with observed data and is considered a reliable indicator of trend. Model simulations indicate this herd nearly quadrupled between spring 1998 and spring 2006. Historically, the Chelan PMU has supported much higher hunter numbers and harvest, and there is potential for some additional future herd growth without negatively impacting habitat, as winter range forage production increases. The Douglas model aligns less precisely, indicating further modeling and/or data needs, and is interpreted cautiously; however, the simulation supports harvest trends and field observations that suggest rapid recovery following 1997, a slight decrease from 2001 to 2003, and stabilization 2004 to 2009.

Habitat condition and trend

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

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

Management conclusions

Buck age structure in the Chelan PMU will require close monitoring in the future to avoid dramatically reducing buck numbers and age structure. We can probably meet buck escapement goals under the current season structure in Chelan without the 3-point regulation, because in most years many of the bucks do not migrate to lower elevations where they are vulnerable to harvest until after the general modern firearms hunting season. However, the 3-point restriction is very popular with a large segment of the public, and is often credited for the large numbers of older, mature bucks seen on winter ranges. Consistent retention of this regulation for mule deer may also improve compliance with hunting regulations. It is 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. For the 2006-2009 general season, modern firearm hunting season length was reduced from 14 to 9 days in Chelan and Okanogan counties, in response to concerns about lowered buck escapement in Okanogan County, and hunter desires to maintain older aged, large bucks in the Chelan PMU.

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

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

DEER STATUS AND TREND REPORT: REGION 2

PMU 24 – GMUS 272, 278, AND 290
PMU 25 – GMU 284

BROCK HOENES, Wildlife Biologist

Population objectives and guidelines

Both mule deer (*Odocoileus hemionus*) and white-tailed deer (*O. virginianus*) occur in Population Management Units (PMU) 24 and 25. However, mule deer dominate the harvest and white-tailed deer are only present in small groups widely distributed across the landscape. In 2009, only 3% (12 deer), 0%, and 6% (17 deer) of the estimated total deer harvest in Game Management Units (GMU) 272 (Beezley), 278 (Wahluke), and 284 (Ritzville), respectively, were white-tailed deer. Consequently, management objectives for PMUs 24 and 25 focus primarily on mule deer. The overall management goal is to increase deer herds to levels that are within the limitations of available habitat and minimize landowner conflicts. Additional management objectives include maintaining a post-hunt buck:doe ratio of $\geq$ 15:100, while maintaining or increasing hunt opportunity and hunt quality.

GMU 290 (Desert) is located within PMU 24, but overall management goals differ from those outlined above. Primary management objectives in GMU 290 include maintaining a post-hunt buck:doe ratio of $\geq$ 30:100 and ensuring that at least half of the male segment of the population is comprised of bucks $\geq$ 2.5 years old. Additional objectives are to maintain populations within the limitations of available habitat without increasing depredation complaints on agricultural lands adjacent to the Desert Wildlife Area.

Hunting seasons and harvest statistics

All GMUs, except GMU 290, were open during the general modern firearm season. GMUs 272, 278, and 284 had an early archery season, while GMUs 272 and 278 were also open during late archery general deer seasons. Opportunities during the general muzzleloader season were limited to GMUs 272 and 284.

All permit opportunities in GMU 272 were restricted to antlerless permits in Deer Area 2011 (Lakeview) and in areas managed by the BuckRun Landowner Permit Hunting (LHP) Program. Permit opportunities in GMU 284 were primarily limited to antlerless permits in Deer Area 2010 (Benge), but limited opportunities were available for modern firearm and muzzleloader hunters during late season hunts for 3-point minimum bucks or antlerless mule deer. No permit hunts were offered in GMU 278.

All GMUs, except GMU 290, were also open for white-tailed deer during the general modern firearm and early archery seasons. GMUs 272 and 278 were also open during the late archery general deer season, while GMUs 278 and 284 were open during the early muzzleloader general deer season for any white-tailed buck.

GMU 290 is restricted to permit only. Opportunities in 2009 were available for modern firearm, muzzleloader, and archery hunters. Youth permits were also available for each hunt type.

GMU 272.—With the exception of the 2004 season, harvest estimates have varied little since 2001 (Table 1). The consistent trend in harvest levels has occurred despite the fact hunter numbers have been relatively inconsistent (Table 1).

Table 1. Estimated number of mule deer harvested in GMU 272, number of hunters, overall hunter success (Suc), and days/kill (D/K), 2001–2009. Harvest estimates include mule deer harvested on BuckRun LHP (BR).

	Harvest[1]						
Year	B	D	T	BR	Hunters	Suc[2]	D/K
2001	275	63	338	UNK	1,649	0.20	18.2
2002	332	47	379	94	1,602	0.24	15.4
2003	277	57	334	72	1,254	0.27	15.5
2004	367	38	405	75	1,461	0.28	13.4
2005	257	86	343	104	1,325	0.26	14.5
2006	294	52	346	50	1,165	0.30	12.7
2007	304	35	339	45	1,210	0.28	14.7
2008	268	51	319	38	1,350	0.24	17.4
2009	263	33	296	44	1,359	0.22	18.7
Avg.	293	51	344	65	1,375	0.25	15.6

[1] B = bucks, D = does, T = total harvest.
[2]Success rates are for all weapon types and general seasons combined.

Since 2001, hunters participating during the general modern firearm season have, on average, accounted for 76% of the total harvest in GMU 272. In 2009, harvest during the modern firearm season again constituted the majority (77%) of harvest, while harvest during the archery, muzzleloader, and permit seasons constituted 13%, 5%, and 3% of the total harvest, respectively (Figure 1).

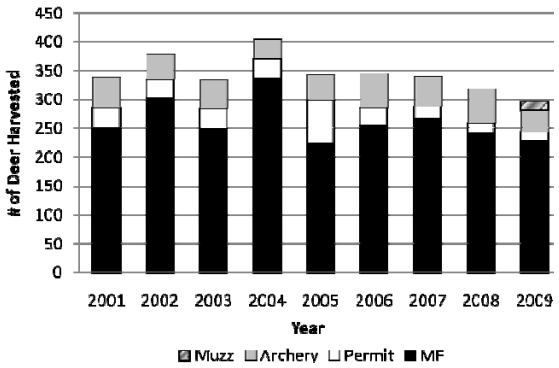


Figure 1. Estimated number of deer harvested by permit holders (permit) and during the general modern firearm (MF), muzzleloader (Muzz), and archery seasons in GMU 272, 2001–2009. Data includes deer harvested on BuckRun LHP.

The number of deer harvested on BuckRun has been steadily declining since 2005 (Table 1). Harvest in 2009 only accounted for 15% of the total harvest in GMU 272 compared to 30% in 2005. Declining trends in harvest levels on BuckRun have been a result of decreases in landowner harvest rather than decreases in local deer herds.

Table 2. Estimated number of mule deer harvested, number of hunters, hunter success rate (Suc), and days/kill (D/K) in GMU 284, 2001–2009.

	Harvest[1]					
Year	**B**	**D**	**T**	**Hunters**	**Suc[2]**	**D/K**
2001	346	70	416	1,060	0.39	8.1
2002	346	113	456	1,093	0.42	8.7
2003	276	18	294	731	0.40	8.0
2004	245	22	267	788	0.34	9.7
2005	235	17	252	671	0.38	7.8
2006	245	28	273	643	0.42	7.3
2007	185	31	216	613	0.35	9.5
2008	208	23	231	681	0.34	9.6
2009	273	25	298	802	0.37	8.8
Avg.	262	39	301	787	0.38	8.6

[1]B = bucks; D = does; and T = total harvest.
[2]Success rates are for all weapon types and general seasons combined.

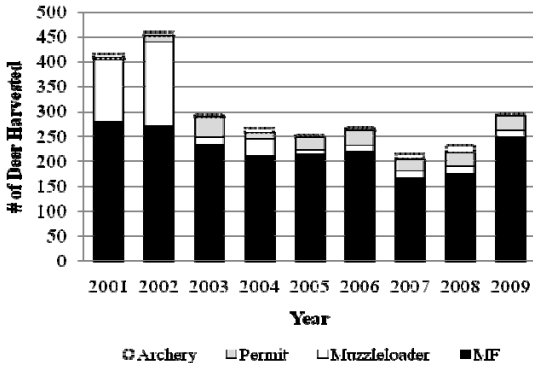


Figure 2. Estimated number of deer harvested during the general modern firearm (MF), archery, and muzzleloader seasons and by permit holders in GMU 284, 2001–2009.

GMU 278.—With only 26 mule deer and no white-tailed deer harvested in GMU 278 during the 2009 season, harvest levels remained low. Hunter numbers have steadily increased from 158 in 2001 to 285 in 2009. Overall hunter success was only 9% and well below the 9-year average of 17%.

GMU 284.—Since late season muzzleloader opportunities were removed following the 2002 season, harvest levels in GMU 284 have shown a slight downward trend, but increased in 2009 compared to 2008 and were comparable to harvest levels in 2003 (Figure 2). Hunter numbers had shown a similar downward trend until 2009 when they increased by 18% compared to the 2008 season (Table 2).

Harvest during the general modern firearm season accounted for 83% of the overall harvest in 2009, which was slightly above the 9-year average of 76%. Overall hunter success was 37% in 2009 and has remained relatively stable since 2001(Table 2).

GMU 290.—Hunters harvested 23 bucks and 20 does in 2009 (Table 3). Success rates remained high during the modern firearm any deer season where 94% of hunters reported harvesting a deer. Success rates during the modern firearm antlerless season (64%) decreased slightly in 2009, but were comparable to the 12-year average (Table 3). Only 56% of the hunters issued permits for the antlerless season chose to participate. Success rates were moderate for youth hunters in GMU 290 during the 2009 season, while success rates for archery and muzzleloader hunters continued to be variable (Table 3).

Table 3. Estimated number of mule deer harvested in GMU 290 and success rates of hunters that held modern firearm any deer permits (MF Any), modern firearm doe permits (MF doe), archery permits, muzzleloader permits, and youth permits, 1997–2009. Values in parentheses are the number of permits that were available.

	Harvest			Hunter Success[1]				
Year	Buck	Doe	Total	MF Any	MF Doe	Archery	Muzzleloader	Youth
1997	22	0	22	0.84 (26)	na	0.00 (8)	0.33 (3)	na
1998	10	0	10	0.91 (11)	na	0.00 (13)	0.00 (1)	na
1999	13	14	27	0.92 (13)	0.83 (50)	0.05 (21)	0.00 (2)	na
2000	13	16	29	1.00 (13)	0.53 (50)	0.14 (21)	0.00 (2)	na
2001	14	10	24	1.00 (15)	0.23 (50)	0.07 (35)	0.00 (3)	na
2002	18	17	35	0.85 (15)	0.70 (50)	0.26 (104)	0.00 (4)	na
2003	17	11	28	1.00 (15)	0.48 (50)	0.17 (21)	0.33 (6)	na
2004	16	11	27	0.92 (15)	0.55 (50)	0.08 (20)	0.60 (5)	na
2005	19	12	31	1.00 (15)	1.00 (50)	0.25 (21)	0.75 (4)	na
2006	32	30	62	0.93 (15)	0.88 (50)	0.60 (14)	1.00 (3)	0.65 (30)
2007	11	31	42	0.91 (15)	0.76 (50)	0.00 (12)	1.00 (2)	0.20 (6)
2008	17	28	45	0.86 (15)	0.67 (50)	0.30 (16)	0.00 (2)	1.00 (6)
2009	23	20	43	0.94 (19)	0.64 (50)	0.21 (24)	1.00 (2)	0.50 (6)
Average	17	14	33	0.93	0.66	0.16	0.39	0.59

[1] na denotes years when specific hunt types were not offered.

Surveys

Post-hunt surveys are conducted to evaluate trends in productivity rates (fawns:100 does), adult sex ratios (bucks:100 does), and age structure of mule deer herds in GMUs 272, 284, and 290. Collectively, this data allows managers to evaluate the current status of mule deer populations. Due to the extremely limited occurrence of any deer species in GMU 278 post-hunt surveys are not conducted.

GMU 272.—Since 1996, post-hunt herd composition surveys have been conducted annually in GMU 272 using a variety of techniques (e.g., fixed-wing, helicopter, ground surveys, etc.). Similarly, survey date has varied from late-October to early-January. However, surveys are typically conducted by ground during late-October. In 2009, biologists initially intended on using helicopter based surveys in early December to estimate population size and collect ratio data, but a prolonged period of inclement weather prevented this from occurring. As a direct result, post-hunt surveys were not conducted until early to mid-January using ground based road surveys. A total of 439 deer were observed with a resulting buck:doe:fawn ratio of 18:100:38.

GMU 284.—Post-hunt surveys in GMU 284 were conducted using fixed-wing aircraft from 2000 through 2007. Surveys were not conducted in 2005 or 2006 and were conducted using ground based road surveys in 2008. In 2009, surveys in GMU 284 were completed as part of a cooperative effort to monitor migratory deer herds that winter in Adams, Franklin, and Whitman counties. In total, biologists classified more than 4,500 mule deer of which 881 were located in GMU 284. For the 881 deer observed in GMU 284 the resulting buck:doe:fawn ratio was 19:100:82.

GMU 290.—Post-hunt surveys in GMU 290 have been conducted annually since 1998 using volunteer based ground surveys. Volunteers consist mostly of individuals from the general public, but also include some WDFW employees. Volunteers are asked to survey a designated area and are allowed to use differing modes of transportation (e.g., hiking, horseback, ATV, etc.) depending on what is most suitable in their assigned area and most convenient for them. Survey date ranges from mid-November to mid-December and is scheduled around ongoing hunts to avoid hunter disturbance.

In 2009, 70 volunteers surveyed more than 49,000 acres and classified 541 mule deer with a resulting buck:doe:fawn ratio of 54:100:46. However, because 18 does and 8 bucks were harvested during seasons that occurred after surveys were conducted, biologists corrected ratio estimates so they would more accurately reflect “true” post-hunt ratios. Corrected buck:doe:fawn ratios were 55:100:50.

Population status and trend analysis

GMU 272.—Both harvest and survey data suggest mule deer populations in GMU 272 have remained relatively stable since 2001. The average post-hunt

fawn:doe ratio from 2003–2008 has been 56:100 (Table 4) and showed little variability [Coefficient of Variation (CV) = 13%], which suggests herd productivity has been relatively similar for the past several years. However, fawn:doe ratios observed in 2009 were 41% below the long-term average (Table 4), which is indicative of a precipitous decline in herd productivity. Lastly, average fawn:doe ratios from 1996–2002 were 75:100 (CV = 14%) which also suggests productivity rates for this herd have steadily declined from levels observed a decade ago.

Table 4. Number of bucks, does, and fawns observed during post-hunt surveys in GMU 272, resulting number of bucks and fawns per 100 does (B:D:F), and proportion of bucks observed that were classified as being ≥ 2.5 yr old (%), 1996–2009.

Year	B	D	F	U[1]	Tot	B:D:F	%
1996	47	223	187	0	457	21:100:84	0.23
1997	29	213	133	0	375	14:100:62	0.31
1998	64	181	157	0	402	35:100:87	0.44
1999	50	213	176	0	439	23:100:83	0.48
2000	38	201	166	0	405	19:100:83	0.29
2001	85	435	282	0	802	20:100:65	0.36
2002	84	510	331	0	925	16:100:65	0.40
2003	77	517	306	0	900	15:100:59	0.25
2004	63	435	208	0	706	14:100:48	0.40
2005	62	272	146	0	480	23:100:54	0.39
2006	67	377	197	0	641	18:100:52	0.30
2007	72	415	227	0	714	17:100:55	0.38
2008	77	366	252	12	707	21:100:69	0.31
2009	49	256	97	37	439	18:100:38	0.39
Avg.	77	330	205	-	677	20:100:64	0.35

[1]U = Deer that were observed during surveys, but could not be positively classified by observers.

Average buck:doe ratios for the past 5 years have been 20:100 and have shown a stable trend (CV = 12%). Additionally, the proportion of adult bucks (≥ 2.5 years old) observed during post-hunt surveys (2005–2009 average = 35%) suggests the age-structure of the male population has also been relatively stable for the past 5 years (CV = 12%).

Trends in the total number of deer harvested in GMU 272 also suggest a stable population. Since 2001, there has been little variability in the overall number of deer harvested (CV = 9%).

GMU 278.— Because post-hunt surveys are not conducted in GMU 278, harvest trends are the only indication of relative population size. Harvest levels have historically been low (< 55 deer harvested annually since 2001), but have shown a significant degree of variation since 2001 (CV = 29%). Nonetheless, this data indicates that deer populations in GMU 278 continue to exist at low densities and rates of increase have likely been minimal in recent years.

GMU 284.—Because of the poor survey conditions present during 2007 surveys, few deer were observed and smaller bucks were not readily visible from an airplane. Consequently, data from 2007 is likely biased low for both bucks and fawns causing trends that include this data to be misleading. As such, the following analyses do not include data collected during 2007 surveys.

Both harvest and survey data suggest a relatively stable deer population. The average number of fawns:100 does from 2001–2008 was 63:100 and showed minimal amounts of annual variation (CV = 8%; Table 5). This suggests that herd productivity remained relatively constant during this time period. However, fawn:doe ratios in 2009 were 30% greater than the long-term average and indicate herd productivity increased substantially during the 2009 season. Relatively stable harvest levels (total harvest CV = 12%) and trends in hunter effort (CV = 11%) since 2003, also indicate the rate of increase for this deer herd has remained relatively stable.

Table 5. Number of bucks, does, and fawns observed during post-hunt surveys in GMU 284, resulting number of bucks and fawns per 100 does (B:D:F), and proportion of bucks observed that were classified as being ≥ 2.5 yr old (%), 2000–2009. Surveys were not conducted in 2005 and 2006 and averages exclude data from 2007 due to the bias associated with this data set.

Year	B	D	F	U[1]	Tot	B:D:F	%
2000	43	167	121	0	331	26:100:72	0.42
2001	25	69	42	0	136	36:100:61	0.64
2002	40	156	96	0	292	26:100:62	0.60
2003	90	491	300	0	927	18:100:61	0.27
2004	63	445	270	0	778	14:100:61	0.60
2007	15	241	117	0	373	6:100:49	0.47
2008	51	211	123	31	416	24:100:58	0.35
2009	83	438	360	0	881	19:100:82	0.34
Avg.	51	277	179	-	517	23:100:65	0.46

[1]U = Deer that were observed during surveys, but could not be positively classified by observers.

Adult sex ratios (buck:doe ratio; CV = 31%) and age structure of the male segment of the population (% of bucks ≥ 2.5 year old; CV = 33%) have both shown significant amounts of annual variation since 2000. Post-hunt buck:doe ratios declined to 19:100 following the 2009 season, which is most likely a direct result of the 18% increase in hunter numbers and the 31% increase in overall buck harvest (Table 2).

GMU 290.— Decreasing trends in hunter success rates during the modern firearm any deer and modern firearm doe seasons suggest this population may have decreased slightly since 2006 (Table 3). However, success rates are still exceptionally high compared to other "open" GMUs in PMU 24 and success rates during the any deer season may also be largely influenced by hunter selectivity.

Survey data also suggests a slightly decreasing population in GMU 290 (Table 6, Figure 3). However, the number and group of sectors surveyed have varied annually, which makes it increasingly difficult to rely on the raw counts observed during surveys to adequately reflect trends in population size. Nonetheless, nearly all sectors have been surveyed enough times since 1998 such that biologists were able to rank each sector into 1 of 3 density categories: low, medium, and high. For each sector that was not surveyed, the average number of deer observed in sectors within the same category during that survey year was used to estimate the number of deer that would have been observed had the sector been surveyed.

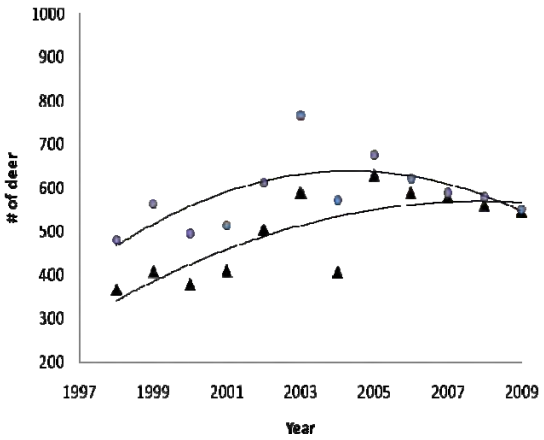


Figure 3. Long-term trends for the number of deer observed during post-hunt surveys in GMU 290 (▲) and projected number of deer that would have been observed had all sectors been surveyed (●), 1998–2009.

Using this approach to project population sizes from data collected 1998–2009 resulted in trend data that suggest the mule deer herd in GMU 290 was increasing from 1998–2002, peaked sometime between 2003 and 2005, and has been gradually declining since 2006 (Figure 3). Although this approach appears to provide informative trend data, it is still difficult to extrapolate that information to an accurate population estimate because that would assume surveyors were observing 100% of the deer located in each sector surveyed.

Fawn:doe ratios indicate productivity rates for this herd remained at moderately low levels since 2003, but have shown a slight increase during 2008 and 2009 (Table 6 and Figure 4).

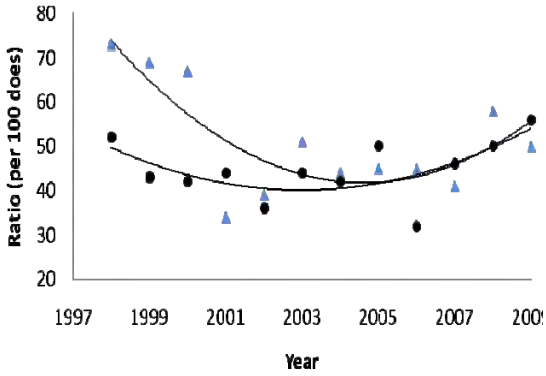


Figure 4. Long-term trends for post-hunt fawn:doe (▲) and buck:doe (●) ratios in GMU 290, 1998–2009.

Buck:doe ratios continued their increasing trend (Figure 4) and appear to be well above the management objective of 30 bucks:100 does. The proportion of bucks observed during surveys that were ≥ 2.5 years old increased to 62% in 2009 and suggests the age structure of this population is recovering from the increased level of harvest that occurred in 2006 (Table 6). However, because surveys were conducted in mid-November during the peak of the rut, it may also be likely that more mature bucks were observed during 2009 surveys simply because there is a smaller degree of sexual segregation during this time of year.

Habitat condition and trend

GMUs 272, 278, and 284.—Mule deer habitat in these GMUs is characterized by highly fragmented shrub-steppe, lands enrolled in the Conservation Reserve Program (CRP), and agricultural fields (primarily wheat, alfalfa, and orchards). Dominant native plant species include big sagebrush (*Artemisia tridentata*), rabbitbrush (*Chrysothamnus nauseosus*), greasewood (*Sarcobatus vermiculatus*), and spiny hopsage (*Grayia spinosa*).

Table 6. Number of volunteers that participated in post-hunt surveys (Vol.), number of acres that were surveyed, number of bucks, does, and fawns observed, resulting number of bucks and fawns per 100 does (B:D:F), and proportion of bucks observed that were classified as being ≥ 2.5 yr old (% Adults) in GMU 290, 1998–2009.

Year	Vol.	Acres	Bucks	Does	Fawns	U[1]	Total	B:D:F	% Adults
1998	32	42,903	76	145	106	39	366	52:100:73	0.61
1999	26	33,306	77	180	124	25	406	43:100:69	0.51
2000	43	33,037	70	165	111	32	378	42:100:67	0.46
2001	28	32,597	90	206	70	43	409	44:100:34	0.33
2002	37	32,517	97	266	105	36	504	36:100:39	0.62
2003	27	30,324	126	288	147	28	589	44:100:51	0.62
2004	35	29,174	88	210	93	14	405	42:100:44	0.63
2005	30	36,917	154	306	137	32	629	50:100:45	0.60
2006	40	40,258	102	314	140	33	589	32:100:45	0.67
2007	50	40,546	122	264	108	15	509	46:100:41	0.59
2008	50	48,676	123	246	142	49	560	50:100:58	0.50
2009	70	49,685	146	270	125	31	572	55:100:50*	0.62
Avg.	39	37,495	106	238	117	31	493	45:100:51	0.59

[1]U = Deer that were observed during surveys, but could not be positively classified by observers.

* = Ratios are corrected for bucks and does harvested after surveys were conducted.

Bitterbrush (*Purshia tridentata*), a highly important deer browse species, can be located in small and widely scattered stands. However, much of the remaining native shrub-steppe has been highly degraded and is now dominated by non-native cheatgrass (*Bromus tectorum*) and native and non-native annual forbs. Additionally, with the exception of bitterbrush, most shrub species possess little to no value as winter deer food. Consequently, deer in these regions rely heavily on winter-wheat and cool season grasses to meet their metabolic demands during winter months and most often concentrate near shrub-steppe/agricultural interfaces. The threat of losing more native shrub-steppe is always present, but significant losses are not expected in the near future.

GMU 290.—Although mule deer habitat in GMU 290 is also comprised of a mixture of shrub-steppe and agricultural lands, the vast majority of the deer herd is located on the Desert Wildlife Area adjacent to Potholes Reservoir. Most mule deer habitat is comprised of wetlands and shrub-steppe. Bitterbrush occurs in relatively large stands and is an important food source for this herd during winter months. Anecdotal observations suggest many of these stands are in older seral stages, characterized by mature decadent plants that provide minimal value as mule deer forage. Continued maturation of bitterbrush in GMU 290, without the establishment of younger stands, is likely to decrease the winter carrying capacity of this unit and could result in increased crop depredation on adjacent lands.

Wildlife damage

Deer related damage complaints in PMUs 24 and 25 have historically involved orchards, alfalfa fields and haystacks, winter-wheat fields, and ornamental trees and shrubs. Orchard tree damage and damage to alfalfa haystacks are the most commonly reported types of damage to private property. Orchard damage and the potential for it, is most prevalent in GMU 272. Depredation issues related to orchards and haystacks have been marginal in recent years and were again low in 2009.

Management conclusions

Trend data in GMUs 272, 278, and 284 indicate relatively stable populations with post-hunt buck:doe ratios that satisfy the management goal of ≥ 15 bucks:100 does. Damage complaints associated with these herds have also been relatively low in recent years, indicating they have not exceeded the social carrying capacity that exists in agricultural settings. Consequently, current harvest restrictions and season lengths appear to be appropriate for these herds and will likely change little in the near future.

As deer populations approach carrying capacity they are often characterized by suppressed levels of productivity, decreased fawn survival rates, and an adult female population that is dominated by older age classes (Fowler 1981). Trend data in GMU 290 suggests that productivity of this herd had been moderately low since 2001, which may be an indication this population was at or near the carrying capacity of this habitat. After increased levels of

harvest occurred 2006–2009, fawn:doe ratios have been gradually increasing (Figure 4), providing further evidence this deer herd was near the carrying capacity of available habitat during its peak from 2003–2005 (Figures 3).

Lastly, because surveys in GMU 290 are conducted using volunteers, estimated ratios must be interpreted with caution. Surveys are conducted in mid to late December when it can be difficult to correctly identify a large fawn from a young doe. If fawns are commonly mistaken for an adult female, there are 2 primary consequences. First, productivity rates are likely to be underestimated as the fawn:doe ratio would be biased low. Secondly, the buck:doe ratio would also be biased low because the number of does observed during surveys was overestimated. Therefore, observed trends in productivity rates and the adult sex ratio may also be viewed as highly conservative estimates.

However, survey data collected by experienced biologists does not exist for comparison and the true magnitude of this bias is unknown. Future research aimed at evaluating the differences between survey results of volunteers and experienced biologists is needed to further justify the use of volunteers to collect this important biological information.

Literature Cited

Fowler, C. W. 1981. Comparative population dynamics in large mammals. Pages 437–413 *in* C. W. Fowler and T. D. Smith, editors. Dynamics of large mammal populations. John Wiley and Sons, New York, New York, USA.

DEER STATUS AND TREND REPORT: REGION 3

PMU 31 – GMUS 379, 381

MIKE LIVINGSTON, District Wildlife Biologist

Population objectives and guidelines

This report covers the 2009 deer season harvest and winter surveys. PMU 31 is primarily a mule deer unit, but a few white-tailed deer are harvested each year. The population is managed to provide diverse recreational opportunity while maintaining socially acceptable densities. Post-hunt buck to doe ratio objectives are ≥15 bucks per 100 does.

Hunting seasons and harvest trends

Since 2000, an early archery general season for any deer has occurred in September. Muzzleloader general seasons were first established in 2001 in PMU 31. In 2009, a 9-day early season occurred with any white-tailed or 3 point or antlerless mule deer restriction in GMU 379. A 19-day late muzzleloader season with any white-tailed deer and 3 point minimum mule deer legal to harvest occurred in GMU 379. Starting in 2009, an 11-day late general muzzleloader season with any white-tailed deer and 3-point minimum or antlerless mule deer restriction occurred in GMU 381. Fifty muzzleloader special permits were issued during 3-9 October for 3–point minimum or antlerless in GMU 381.

The modern firearm general season was 9 days long (17-25 October) with a 3-point minimum restriction for mule deer and any white-tailed deer in PMU 31. Fifteen youth, 10 senior and 10 disabled special modern firearm permits were issued. In addition, 50 modern firearm antlerless permits were issued for early-December in GMU 381.

Total deer harvest has averaged 314 (range 147 - 505; SE = 29.0) since 2000. The 2009 harvest was the highest for the 10-year monitoring period and represented a 38% increase over the 10-year average (Table 1). Most of this increased harvest was due to a substantial increase in doe harvest during the new muzzleloader late general season. Modern firearm general season hunters harvested more deer overall (59% of total) and more bucks (84% of total) than all other hunters combined. Harvest contributed by muzzleloaders increased from 23% in 2008 to 31% in 2009. Archery harvest declined from 7% to 1% likely in response to elimination of the late archery season. In 2009, success was highest for special permit hunters (67%); general modern firearm success was the highest recorded during the reporting period (47%).

Table 1. Deer harvest and hunters in PMU 31 during 2000 - 2009.

	Harvest			Hunters	
Year	Buck	Doe	Total	Success	Number
2000	119	28	147	10%	579
2001	205	72	277	34%	699
2002	239	99	338	38%	808
2003	220	60	280	53%	913
2004	214	67	281	41%	1125
2005	251	62	313	45%	997
2006	190	86	276	43%	948
2007	235	100	335	41%	1158
2008	303	85	388	53%	1180
2009	335	170	505	51%	1264
Avg.	220	73	314	44%	967

Surveys

In 2009, a coordinated aerial survey effort across regions (and PMUs) was initiated to estimate deer herd size at a meaningful scale. The surveyed area included randomly selected units in Whitman, Franklin, and Adams Counties. Previous research and observations indicate this herd is highly migratory beginning in the fall. Surveys were spatially and temporally designed to account for seasonal deer movements. During the early December surveys >4,500 mule deer were classified. Of this total, 1,518 were observed in GMU 381, primarily on private land above the breaks of the Snake River. Estimated ratios were 16 bucks and 79 fawns per 100 does.

Post-hunt roadside composition surveys were initiated in 2004 to estimate buck:doe:fawn ratios. These surveys are conducted from a vehicle in the eastern portion of GMU 381 near the Snake and Palouse Rivers in winter prior to antler drop. Three replicate surveys of two driving routes in mid-December 2009 yielded estimates of 16 bucks and 43 fawns per 100 does and a high count of 242 deer. Both the buck and fawn ratios decreased from the 2008 estimates (Table 2). The buck ratio estimates from the aerial and

Table 2. Post-hunt deer surveys in GMU 381 during 2004 - 2009. Buck, doe, and fawn numbers were from the survey that yielded the highest count. Ratios were averaged across surveys.

					Per 100 Does	
Year	Bucks	Does	Fawns	Total	Bucks	Fawns
2004	23	135	80	264	17	59
2005	26	120	92	238	23	77
2006	35	142	90	283	26	62
2007	18	129	87	247	21	70
2008	64	367	165	608	17	48
2009	21	158	63	242	16	43

roadside surveys were very precise, providing confidence in the ratio estimate. However, the fawn ratio from the roadside survey was substantially lower than the aerial survey estimate (i.e., 43 vs. 79). The difference in the fawn ratios between the two methods reduces the confidence in the estimate. Since the sample size from the aerial survey was significantly higher, it could be assumed this ratio estimate is more accurate. However, accurately distinguishing fawns from yearling does while surveying from the air is difficult, especially during years when fawns have grown well due to good nutrition. For the next few years, both survey methods will be repeated until one appears superior, aerial survey funds run out or a hybrid of the two is determined to be the best approach.

Over 80% of the bucks observed during roadside surveys had less than 3-point antlers. It is expected that the majority of legal bucks would be harvested each year in open country. Roadside surveys, however, may be biased against observing older aged bucks if they are less likely to occupy areas adjacent to roads or less active in the day. Harvest trends indicate plenty of 3-point or better bucks continue to be available to hunters. Over the last 9 years greater than 3 point bucks have comprised over 40% of the buck harvest and during 5 out of the last 9 years have comprised over 50% of harvest (Figure 1).

Population status and trend analysis

The results of the coordinated aerial survey across boundaries provided a snapshot of mule deer population size. Several more years of repeated surveys will eventually yield good trend data. At the moment, it appears the mule deer herd in GMU 381 is of adequate size to sustain the level of harvest recorded in recent years. Harvest and post-hunt composition data as an index to status and trends indicate that total harvest has remained at a sustainable rate (Table 1).

No survey data is available for GMU 379. For several years the GMU was managed as deer area 3081 with

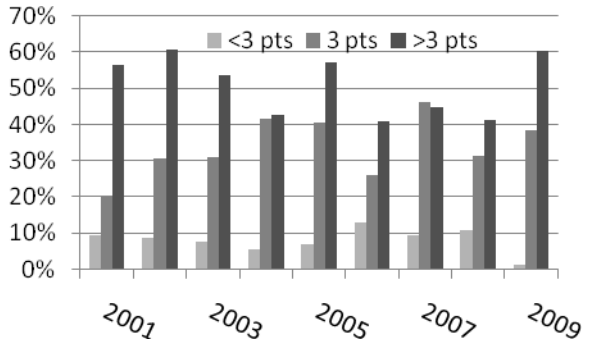


Figure 1. Antler points as a percentage of buck harvest in GMU 381.cultivation. Most of these lands receive various levels of livestock grazing. Numerous irrigation waterways traverse this landscape providing some habitat.

very liberal harvest seasons to reduce crop damage risk. Because of no recent deer damage complaints, the decision was made to reduce harvest opportunity beginning in 2009 to increase the herd, especially on the Hanford Monument. As a result, harvest in the unit declined from an average of 65 to 29 deer in 2009.

Habitat condition and trend

GMU 379 includes the south Columbia Basin Irrigation Project and the Hanford Reach National Monument. Intense agriculture in the irrigation project has significantly reduced historical deer habitat. Irregular terrain and shallow soils in the northern portion of the unit resulted in some habitat escaping Wildfires on the Hanford Reach National Monument in 2005, and again in 2007, reduced the amount of habitat for deer. Reduction of vegetation may in the short-term make deer more vulnerable to hunters and predators and cause them to move elsewhere to find forage. In the long term, successful restoration of native vegetation may improve conditions for deer. Failure to restore native vegetation will result in expansion of cheatgrass and other invasive weeds leading to degradation of deer habitat.

GMU 381 is comprised of a mixture of dryland wheat, CRP and shrub steppe. CRP acreage increased significantly with the 1998 signup, and has increased and improved habitat for deer. Recent changes with the 2008 Farm Bill may result in reduced CRP acreage in the future. If this happens deer habitat will be reduced.

Management conclusions

Continuing coordinated aerial surveys in the future will provide important trend data and facilitate more informed harvest management decisions at the appropriate landscape scale. The buck to doe ratio is on the low end of the objective and therefore requires close monitoring and possible reduction of harvest opportunity in the future. Also, the substantial increase

in doe harvest in 2009 requires monitoring to assure harvest is not reducing the population beyond desired levels.

GMU 381 deer hunting seasons are structured to provide abundant opportunity for both general season and special permit hunters. The late muzzleloader general season is a unique mule deer opportunity for eastern Washington. Maintaining this opportunity and the numerous special permit seasons requires reliable survey and harvest data. It also requires the willingness to change seasons and permit levels if the available data indicate it is necessary.

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, 373
PMU – 35 GMUS 352, 356, 360
PMU – 36 GMUS 364, 368

JEFFERY A. BERNATOWICZ, District Wildlife Biologist

Population objectives and guidelines

The population goals for mule deer (Odocoileus hemionus) in these Population Management Units (PMUs) are to maintain maximum population levels compatible with available habitat base, provide recreational opportunity, and minimize damage complaints. The buck escapement objective is ≥15 bucks per 100 does post-hunting season.

Hunting seasons and harvest trends

Game Management Units (GMUs) 329 and 371 are restricted to permit only. All other units are open during the general modern firearm season for 3-point minimum bucks. The late archery season is open in GMUs 346, 352, 364, and 368. Archers were allowed to take antlerless deer in 2003-2006. GMUs 328, 330-342, 352-360, and 368 are open for muzzleloader. The number of units open to muzzleloader increased from 3 to 10 units in 2003. Antlerless harvest for modern and muzzleloader hunters was by permit only. Most antlerless hunting by all user groups was eliminated in 2007.

Deer hunter numbers decreased slightly from 2008, were below the 10-year average, and about 55% below the average for the 1990s (Table 1).

Harvest had steadily increased over the decades (Table 2). The 2009 buck harvest was 42% and 34% below 1980's and 1990's. It is reported to have increased 71% over 2008 and 15% above the 10 year average. There has been no detected increase in the deer population. Raw harvest reports increased slightly from 2008.

Table 1. Number of deer hunters and success rate PMUs 32-36, 1991-2007.

Year	Modern Firearm	Muzzle-loader	Archery	Total	Success Rate (%)
1991-99	20,242	708	5163	26,113	8
2000	11,688	147	3,599	15,434	9
2001	9,946	132	2,648	12,726	11
2002	9,659	106	2,577	12,342	12
2003	10,314	869	3,772	14,955	15
2004	11,677	1,069	4,024	16,770	13
2005	11,542	966	3,836	16,344	14
2006	11,430	985	3,602	16,017	9
2007	9,928	891	2,799	13,618	9
2008	9,760	860	2,890	13,510	6
2009	9,164	763	2,622	12,549	9
10-yr avg	10,794	563	3,276	14,634	10

Surveys

In December of 2009, aerial surveys were conducted in GMU 371. The survey estimated 309 ± 90 deer. The estimate was over 50% below the last survey in 2000 (829 ± 144). The 2009 survey was conducted shortly after the permit season ended and some deer were probably still off the hunt area. Staff from the Army's Yakima Training Center (which encompasses all of the GMU) collected information in early 2010 that indicated the deer population was higher than surveys estimated, but is still probably down 30-40%. The buck ratio was above objective (Table 3). There was no hunting in 2008 and a 30% reduction in permits in 2009 compared to 2007. The 2009 survey in GMU 371 found only 7 yearling bucks per 100 does. The rest were adult bucks.

Table 2. Deer harvest for PMUs 32-36.

	PMU 32		PMU 33		PMU 34		PMU 35		PMU 36		Total	Total
Year	Buck	Doe	Buck	Doe	Buck	Doe	Buck	Doe	Buck	Doe	Buck	Doe
1980-89	996	54	721	82	112	8	370	72	250	21	2,449	237
1991-99	761	108	714	79	155	9	302	56	216	52	2,154	305
2000	482	0	461	0	179	17	140	0	121	0	1,383	17
2001	459	28	371	62	179	35	121	0	103	0	1,233	125
2002	531	62	446	75	194	32	100	3	168	1	1,439	173
2003	517	242	518	261	146	32	173	144	145	92	1,499	769
2004	633	157	540	200	155	40	148	59	140	69	1,616	525
2005	510	349	399	354	147	50	143	101	188	119	1,387	973
2006	361	197	265	144	135	41	65	49	96	74	922	505
2007	364	0	297	0	139	29	105	0	117	0	1,022	29
2008	318	0	188	0	125	11	70	0	124	0	825	11
2009	512	0	392	1	201	58	109	0	197	0	1,411	59
10 yr avg.	448	104	380	110	154	30	114	36	129	36	1,224	315

Population status and trend analysis

Deer populations across all PMUs have been declining. Population surveys and previous harvest estimates indicate a 40-50% decline in PMUs 32, 33, 35, and 36 since 2003. In the GMU 371 portion of PMU 34, the population decline was similar. The harvest data suggests only a moderate decline in population across the remainder of PMU 34.

There appears to be a strong relationship between the expansion of an exotic louse *Bovicola tibialis* and deer population decline. Deer with signs of hair loss (which is caused by the lice) were first seen in 2004 in PMU 33. Observations of deer with hair loss have since become common throughout the district. *Bovicola tibialis* is distinctly different from the exotic louse *Damalinia* (*Cervicola*) sp., which has caused hair loss in the black tailed deer in western Washington and Oregon.

The population declines observed in District 8 may not be due just to lice infestations. Disease and weather may also be involved. In spring 2009, all the deer (N=8) on a small island near GMU 371 appeared to have died in a short time frame. Hair-loss or starvation did not appear to be factors in the mortality.

The decline in buck harvest from 4,900 in 1991 to current levels is an indication that the population has declined. The change in harvest management from “any buck” to “3-point minimum” regulation in 1997 was likely responsible for some of the reduction in harvest. The 50% decline from 2004-2008 is not due to winter weather or regulation change. The winter of 2004-05 was one of the mildest on record. Fawns going through 2004-05 would have been expected to have been available for harvest in fall 2006. There have been droughts in the lower elevations, but no winter has been particularly severe in over 10 years.

All PMUs have typically had buck ratios at or above the goal of 15 bucks per 100 does when surveys have adequate sample sizes. Bucks tend to be somewhat isolated from doe/fawn groups in December and short term declines in PMU 32 may be due to missing a few groups of bucks. Also, the majority of deer seen on surveys are <3.5 years old. One year of high fawn mortality can greatly influence buck ratios.

Habitat condition and trend

There is little data on the historic or current condition of the deer range. Fires have probably negatively impacted woody browse in the lower elevations where cheatgrass often replaces shrubs after fire. In the mid-upper elevations, fire produces quality forage. Unfortunately, the frequency of fire has been much higher in the lower elevations. A drought the last few years has likely impacted forage production. Houses are also being built in prime winter range.

Management conclusions

It is unknown how the lice will affect mule deer long-term in this District. An increase in harvest in 2009 was somewhat expected due to a good fawn crop in 2007.

Populations have declined 40-50% over most of the range since 2004. Only the southern portion of PMU 34 does not seem to be as impacted. Antlerless harvest was eliminated from PMUs 32, 33, 35, and 36, but populations have not rebounded.

Table 3. Deer composition survey data by PMU.

Year	PMU	Total Sample	Fawns: 100 does	Bucks: 100 does
1996	32	704	49	2
1997	32	326	46	10
1998	32	325	78	16
1999	32	255	58	21
2001	32	559	47	14
2002	32	372	48	13
2004	32	1095	42	16
2006	32	194	40	18
2007	32	205	46	17
2008	32	268	57	11
1996	33	863	58	2
1997	33	427	37	8
1998	33	645	75	11
1999	33	609	44	17
2001	33	481	37	15
2002	33	1017	44	17
2003	33	666	53	11
2004	33	1050	46	20
2006	33	236	47	11
2007	33	251	60	17
2008	33	277	55	15
1996	34	67	56	17
1999	34	120	54	20
2000	34	372	54	28
2009	34	179	45	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
2002	36	352	48	22
2006	36	287	59	19
2007	36	269	66	18
2008	36	195	44	16

Table 4. April deer population estimates.

	PMU			
Year	32	33	35	36
2003	6315 ± 669	5049 ± 666	1221 ± 133	1662 ± 94
2004	5462 ± 505	5067 ±1065	NA	NA
2005	NA	NA	1191 ± 123	1482 ± 127
2006	NA	2633 ± 275	NA	NA
2007	2771 ±236	2549 ±244	NA	~880
2008	3648 ±370	NA	NA	NA
2009	NA	NA	649 ± 73	936 ± 81

DEER STATUS AND TREND REPORT: REGION 4

PMU 41- GMU 410
PMU 43- GMU 407
PMU 45- GMUS 418, 426, 437

JENNIFER BOHANNON, Wildlife Biologist

Population objectives and guidelines

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

Hunting seasons and harvest trends

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

Harvest and recreational opportunity profiles for GMUs 407-437.

Black-tailed deer harvest in GMUs 407 – 437 during the 2009 season totaled 1,543 animals (Table 1).

Table 1. Deer harvest summary for GMU's 407-437, 2009.

Harvest	Modern Firearm	Archery	MZL	Multiple Weapons	Special Permit	Total
Antlerless	145	118	49	2	19	333
Antlered	933	185	43	11	38	1210
Total	1078	303	92	13	57	1543

Antlerless harvest for the 2009 season totaled 333 animals (22% of total harvest) with antlered harvest totaling 1,210 animals (78% of total harvest). In 2009 the number of hunters in GMU 407 decreased slightly from 2008, and the number of deer harvested decreased proportionally with hunter success basically unchanged at 25% (Figure 1). The number of hunters in GMU 410 also decreased from 2008, and hunter success remained high at 43% (Figure 2). Starting in 2006, second deer tag permits for GMU 410 were allocated by island, and second deer harvest increased dramatically from 52 deer in 2005 to 152 deer in 2007. In 2009, second deer harvest decreased to the same level it was in 2005 with 52 deer harvested and hunter success slightly above 58% (Table 2). In GMUs 418,

Table 2. Second deer tag harvest results by island in GMUs 410 and 407 for 2009.

Island Name	Hunters	Antlered	Antlerless	Total	Success (%)
Shaw	7	3	1	4	57.1
Lopez	17	6	1	7	41.2
Orcas	18	12	3	15	83.3
Decatur	4	2	1	3	75
Blakely	6	2	0	2	33.3
Cypress	10	4	0	4	40
San Juan	6	3	2	5	83.3
Camano	4	0	2	2	50
Whidbey	15	1	9	10	66.7
Guemes	2	0	0	0	0
TOTAL	89	33	19	52	58.4

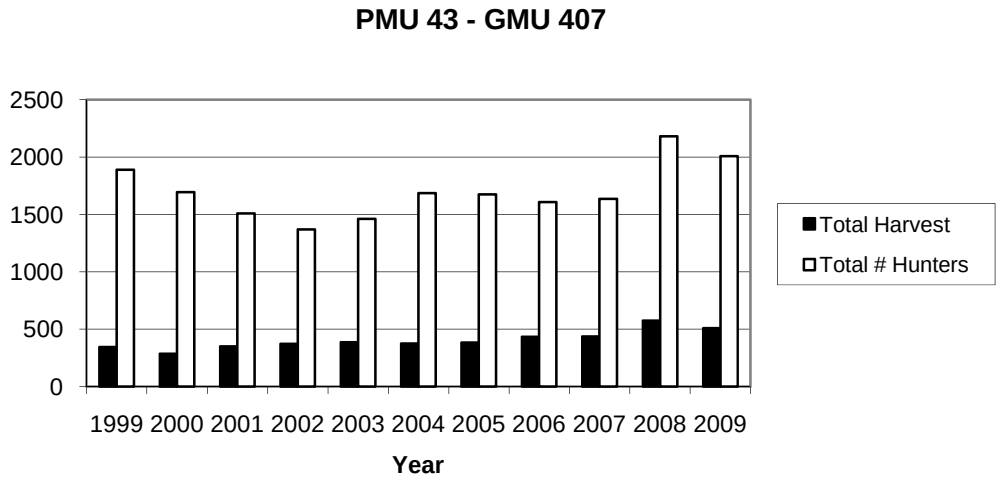


Figure 1. Deer harvest and number of hunters in PMU 43, 1999-2009.

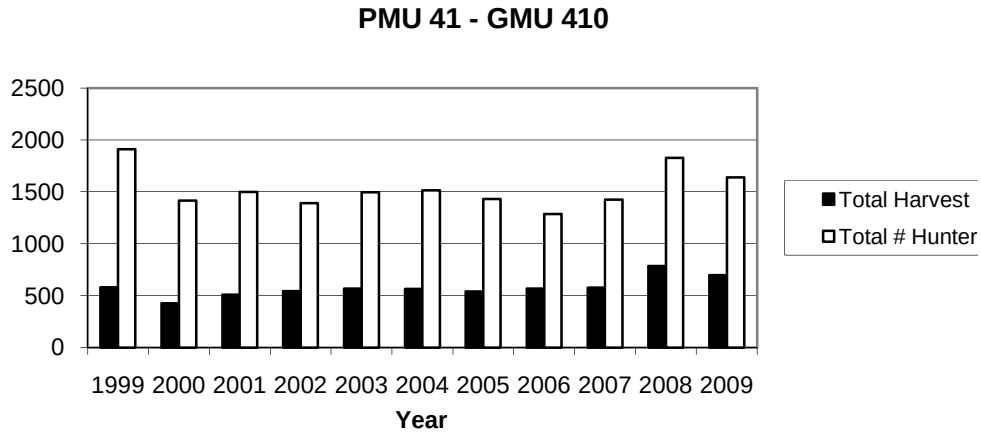


Figure 2. Deer harvest and number of hunters in PMU 41, 1999-2009.

426, and 437, the number of hunters was down from 2008, but harvest was higher and hunter success increased from 11% in 2008 to 14% in 2009 (Figure 3).

The proportion of deer harvested in 2009 within GMUs 407 – 437 (1,543 animals) as compared to the statewide harvest for the 2009 season (33,778 animals) indicates that these northern Region Four GMUs represent 4.6% of the statewide total harvest, the same proportion as in 2008. Tribal harvest in GMUs 407-437 for the 2009 season consisted of 11 bucks and 7 does harvested in GMU 407, 1 buck in GMU 410, 23 bucks and 16 does in GMU 418, and 12 bucks and 17 does in GMU 437.

Surveys

In the past, herd composition surveys were not conducted in GMUs 410-437 due to low deer population densities and equally low hunter distribution and numbers. However, islands in GMUs 410 and 407 support higher densities of deer, which can be easily viewed foraging in fields at dawn and dusk. A survey effort was conducted in 2004 and 2005 to gather data on deer densities and herd composition on vehicle-accessible islands in San Juan County and on Guemes Island in Skagit County. The survey was conducted by driving standardized routes on the islands

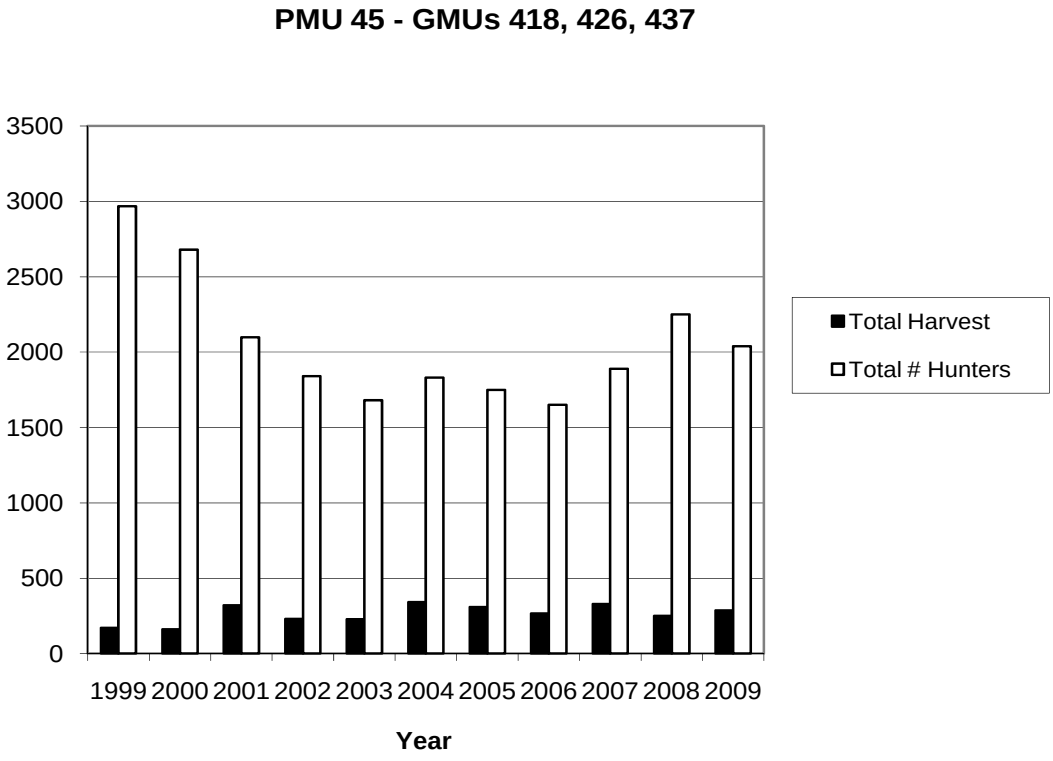


Figure 3. Deer harvest and number of hunters in PMU 45, 1999-2009.

in the mornings and evenings during mid-July. The buck:doe ratios for the 2004 and 2005 surveys on the islands were very high and ranged from 58 to 97 bucks per 100 does.

Hair loss syndrome continues to be prevalent throughout the mainland GMUs in north Region Four and in 2004, hair loss was confirmed in the island habitat of GMU 410 where it was previously thought to be absent.

There was no Chronic Wasting Disease (CWD) sampling in 2009. In 2004, 172 samples from animals harvested in GMUs 407-437 were tested and all were negative for CWD. CWD remains undocumented in GMUs 407-437.

Population status and trend analysis

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

In 2007, researchers from Seattle Pacific University initiated a study of black-tailed deer population size, home range, and movement patterns on Blakely Island in the San Juan Archipelago (GMU 410). Fifteen deer were captured in 2007 and 2008 and equipped with either VHF or Global Positioning System (GPS) collars, and an additional 19 deer received ear-tags. Density estimates indicate very high population densities of about 39 deer/km^2 and smaller home ranges than those demonstrated by mainland or large-island populations (Long et al., 2009).

Wildlife damage

Deer related damage to private property has remained a chronic problem throughout all of the mainland portions of north Region Four. No damage payments were made in this general area in 2009.

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

Habitat condition and trend

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

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

Management conclusions

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

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

Literature Cited

Long, E., K. Taylor, L. Davies, and S. Irvin. 2009. Estimating population size and movement patterns of black-tailed deer on Blakely Island, WA (*abstract*). The 8th Western States and Provinces Deer and Elk Workshop, April 27-30, 2009, Spokane, WA.

DEER STATUS AND TREND REPORT: REGION 4

PMU 44 – GMU 454
PMU 47 – GMU 460
PMU 48 – GMU 466, 485

RUSSELL LINK, District Wildlife Biologist

Population Objectives

Population objectives for Game Management Units (GMUs) 454, 466, and 485 are to maintain healthy population levels of black-tailed deer (*Odocoileus hemionus columbianus*) within habitat limitations, to provide recreational opportunity, and to ensure long-term population persistence.

Population objectives for GMU 460 are to maximize harvest opportunity and maintain the post-hunt buck composition ratio at a minimum 15:100 does.

Hunting Seasons and Harvest Trends

Management strategies are similar for GMUs 454 and 466. Both have a modern firearm season from mid-October to the end of October with annual calendar date adjustments. Each has a four-day late buck season in mid-November, also with annual calendar date adjustments. Both have an early archery season, and GMU 454 has an any-deer late archery season. GMU 454 has an early muzzleloader season for any deer.

GMU 454's more liberal seasons are designed to maintain the population at a level that helps prevent road kills and 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.

GMU 454 exhibited a substantial increase in total modern firearm buck harvest beginning in 1999 (Fig. 1). Total buck harvest post 1998 showed an approximate 75% increase in harvest compared to previous harvests. While the number of modern firearm hunters reached their peak in 1999 and 2000 at 758 and 750 hunters respectively, the following years show a decrease in modern firearm hunters by roughly 300 hunters, yet buck harvest remained high. While increased habitat modification continues with widespread new home and lot development, modern firearm hunters remain able to find accessible lands with ample opportunity to harvest a buck.

Buck harvest in GMU 466 has oscillated back and forth indicating possible extrinsic factors in harvest rather than population changes (Fig. 2). GMU 466 antlerless harvest has shown some variation with yearly fluctuations most likely affected by dry early fall weather and early winter snowfall, both influencing hunter success.

In GMU 466, the Northwest Indian Fisheries Commission Big Game Harvest Reports show tribal harvest levels that add considerably to the total deer harvest in GMU 466. This is an additional mortality source to the total deer harvest for GMU 466. Tribal harvest numbers are considered when evaluating future hunting seasons and population trends for GMU 466.

GMU 460 has been managed as “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. However, since 1998 the total deer harvest per year has remained well below the average (Fig. 4). The late buck season closure in 1998 certainly contributed to the 41% decline in total buck harvest compared to 1997.

In GMU 460, total deer harvest began to decline in 1998 with buck take declining by more than 50% (Fig. 4). While archery and modern firearm buck take declined in this time period, 2004 showed resurgence in the modern firearm harvest, but in 2005 it went back down.

Data collected from check stations in GMU 460 showed >71% and >85% of deer checked to be yearling (1.5 years) in 1997 and 1998 respectively. Similarly, during 1999 about 72% of deer checked were yearlings. This exceeds harvest guidelines and likely contributed to the low buck:doe ratios observed

during post season composition counts in 1996 and 1997 (Table 2). Hunter check station results for 2000 recorded only 46% yearling deer. The post-hunt buck:doe ratios for these years are below the recommended level of 15:100 (WDFW 2003).

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

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

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

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

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

Access fees in Hancock Forest Management lands in GMU 460 have increased over time and may contribute to lower number of hunters. In addition, many long-time hunters of this unit have expressed their belief in a precipitous decline in deer numbers.

GMU 485 has had a limited entry special permit hunt since 1984. Concerns over population declines and hunter pressure have reduced permit numbers with accompanying reduced harvest. In 2000, the special permit hunt was designated as buck only. Beginning in 2003, a limited number of state permits for persons with disabilities allowed the take of any deer. A youth hunt was added in 2006. An “Any Deer” opportunity is provided to the youth and persons with disabilities on an every other-year basis.

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

Surveys

Currently no surveys are conducted in GMUs 454, 460 and 466. The Muckleshoot Indian Tribe (MIT) has conducted mid-winter population estimate surveys in GMU 485 since 2000 based on a mark-resight/Lincoln Petersen technique using radio-collared deer.

In 2003, both pre and post season composition flights in GMU 460 resulted in classifying only 25 and 20 deer respectively. One buck was seen on the pre-season and only two bucks were seen on the post-season flight. The extremely low sample size does not allow us to calculate meaningful ratios from the data. In addition, the scarcity of deer seen on these flights carried out under the same historic count methods, raises concerns over a continued and apparent decline in deer numbers. Further restrictions on antlerless hunting were instituted for 2004, with archery season remaining buck only.

Population Status and Trends

Precise population estimates for GMUs 454, 460, and 466 are unavailable. Since 2002, only mandatory hunter reports have been used to monitor deer population trends and determine hunting regulations. Radio-marked doe survival, previous fawn ratios, and low harvest do suggest that there should be a population increase in GMU 485 (Table 3), (Vales unpubl. data 2006).

Table 3. Trend in Deer Population in GMU 485

Year	# seen	Fawn: Doe	Buck: Doe	Pop Est.
2000	118	50	19	350± 100
2001	106	34	31	440
2002	105	47	17	367
2003	106	56	18	434 ± 279
2004	127	55	34	402 ± 204
2005	144	60	12	645 ± 377
2006	97	53	17	572 ± 398
2007	83	48	18	578 ± 449
2008	120	38	31	681 ± 477
2009	88	64	31	505 ± 344

Based on Muckleshoot Indian Tribe surveys, deer in GMUs 485 and 466 appear to be on the slight increase, however, confidence intervals are wide and therefore true changes in population may be dubious.

Fluctuations in deer numbers in GMU 466 may be because of a reduction in habitat quality and/or predation. Limited empirical data beyond harvest trend assessment belies our ability to estimate population changes.

In GMU 460 and beginning in 1996, black-tailed field surveys documented a hair loss syndrome that affects deer during the late winter and early spring surveys. It appears this has negatively influenced deer survival and recruitment, particularly fawns. Over a three-year period Bender and Hall (2001) reported rates of "hair-slip syndrome" in fawns as 55, 74, and 46% from 1999-2001.

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 1-10 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 accessible to hunters in GMU 454.

The significant majority of GMU 460 is managed for timber production. Annual timber harvests create a mosaic of seral stages that can be beneficial to deer. Openings of 1 to 10 acres exist that provide a good forage base as well as riparian corridors protected by Forest and Fish rules. The forest stands in these corridors provide older age classes that diversify habitat and help intercept snow during harsh winters; this may provide deer access to forage in these sites and serve as travel corridors.

In 2003-2004 an apparent increase in timber harvesting in the Snoqualmie Forest portion of GMU 460 may provide an increased forage base for deer over time; however, the spraying of herbicides on private industrial timberlands is of concern. In addition, in 2004 King County announced the purchase of development rights on the King County portion of the Snoqualmie Forest (app. 90,000 acres). This will protect a large area of commercial forest as open space and de facto deer habitat, yet without additional research into the relationship between current conditions, herbicide application, and deer populations, habitat quality will remain in question.

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

Wildlife Damage and Nuisance Problems

In GMU 454, deer damage to ornamental shrubs and gardens can be a problem and numerous complaints are received every year. These deer are supported by many citizens and equally condemned by others because of associated property damages. There are no damage complaints for deer in GMUs 460, 466 and 485.

Hair Loss Syndrome

"Hair loss syndrome" (HLS) of black-tailed deer was first described in Washington in 1995. The condition is caused by a heavy infestation with a Eurasian louse of poorly defined taxonomic status in the genus *Damalinia (Cervicola) sp.* The normal hosts of this louse are non-native deer and antelope, which are not seriously affected by the lice.

In contrast, when black-tailed deer become infested, they tend to develop a hypersensitivity (severe allergic) reaction to the lice, which causes irritation of the skin and excessive grooming by the deer. Eventually, this excessive grooming leads to loss of the guard hairs, leaving yellow or white patches along the sides. Infestations are heaviest during late winter and early spring, and many affected deer, especially fawns, die during this time. The geographical distribution of HLS has steadily expanded since its first appearance and now affects black-tailed deer throughout their range in western Washington.

The effects of hair-loss syndrome on black-tailed deer throughout western Washington will likely never be completely understood.

Management Conclusions

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

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

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

Literature Cited

Bender, L.C. and P.B. Hall. 2001. "Hair-slip syndrome" of Black-tailed deer: a description and population impacts. Final Report. Washington Department of Fish and Wildlife.

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

Vales, D.J. 2006. Personal communication. Muckleshoot Indian Tribe Biologist.

Washington Department of Fish and Wildlife. 2003. Game Management Plan, July 2003-June 2009.

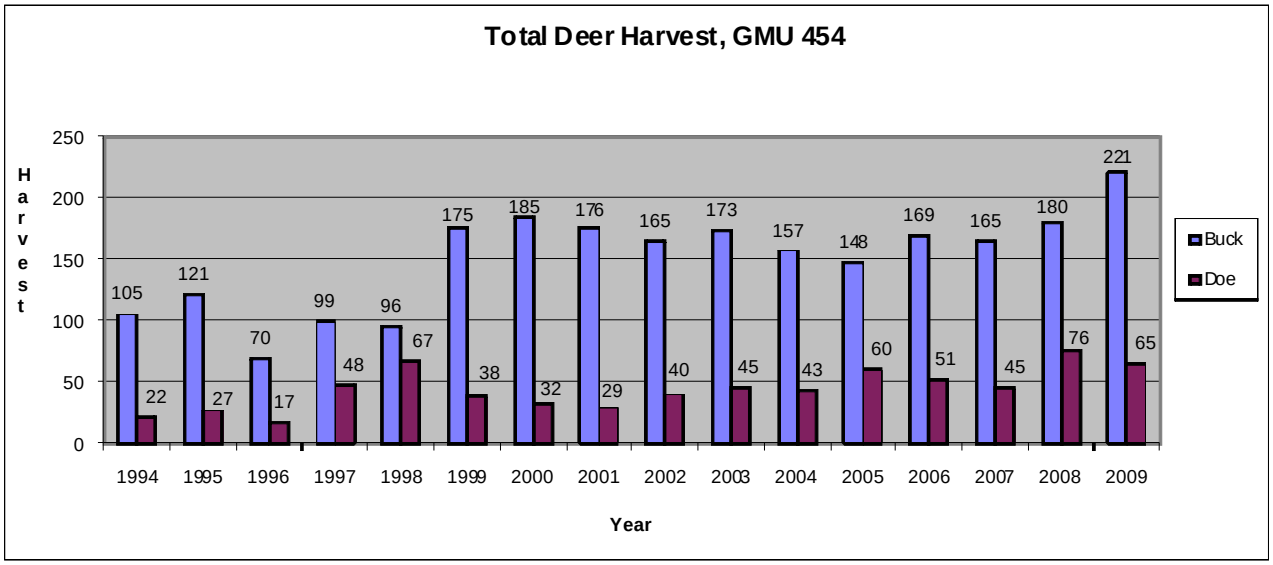


Figure 1. Annual deer harvest in GMU 454, all weapon types, 1994-2009.
*2004 harvest reflects uncorrected raw data reported from hunter report.

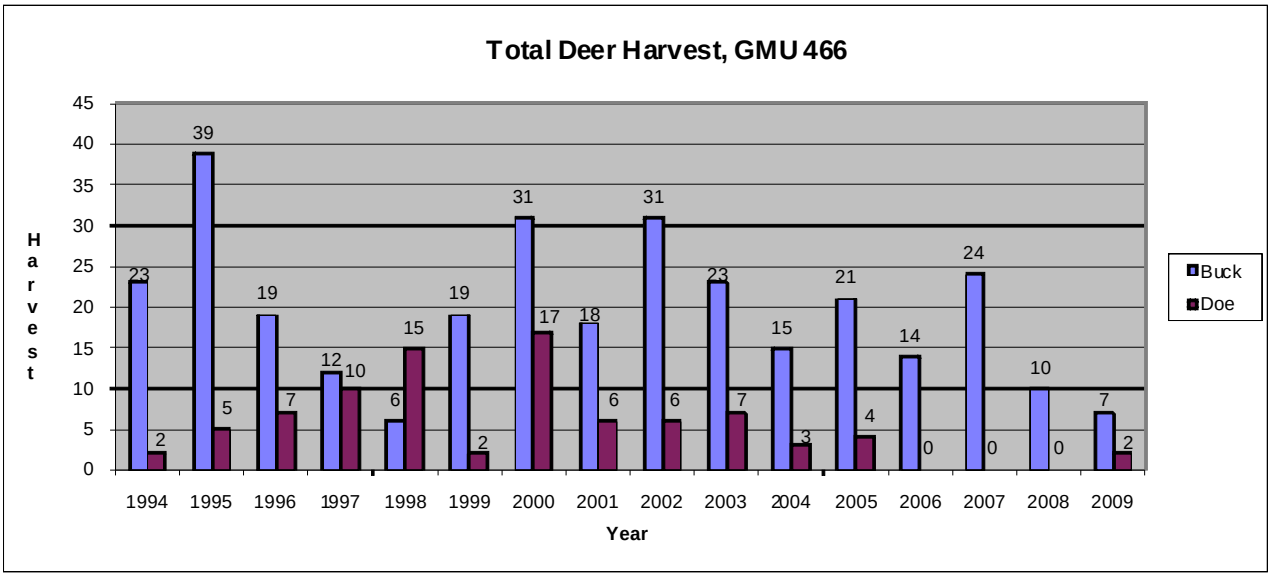


Figure 2. Annual deer harvest in GMU 466, all weapon types, 1994-2009.
*2004 harvest reflects uncorrected raw data reported from hunter reports.

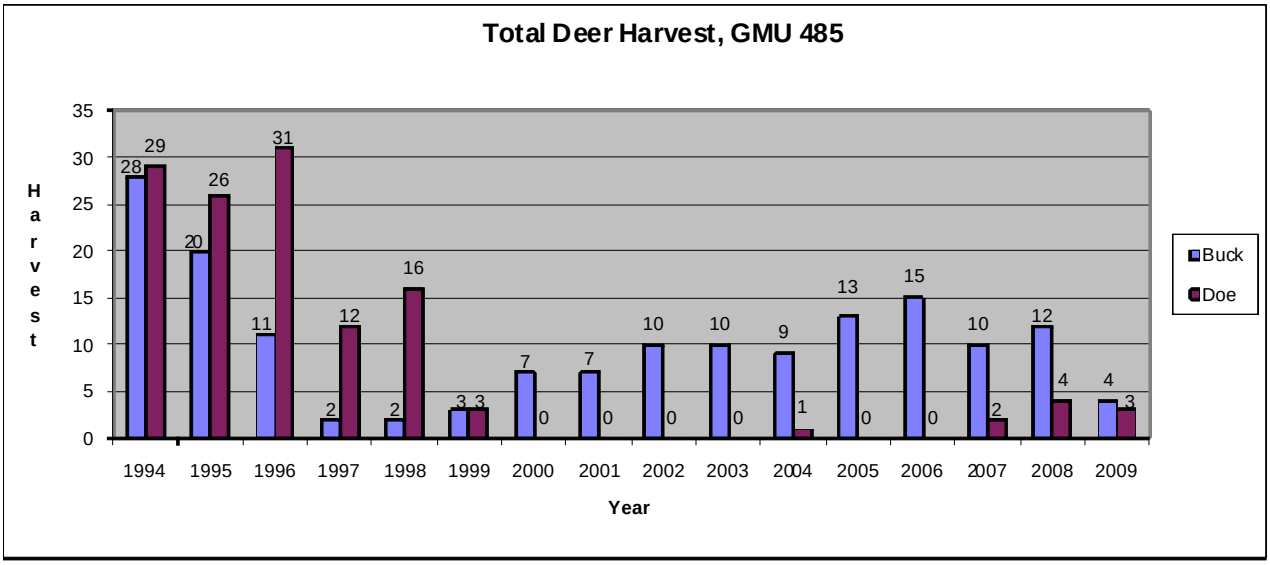


Figure 3. Annual state deer harvest in GMU 485, 1994-2009.

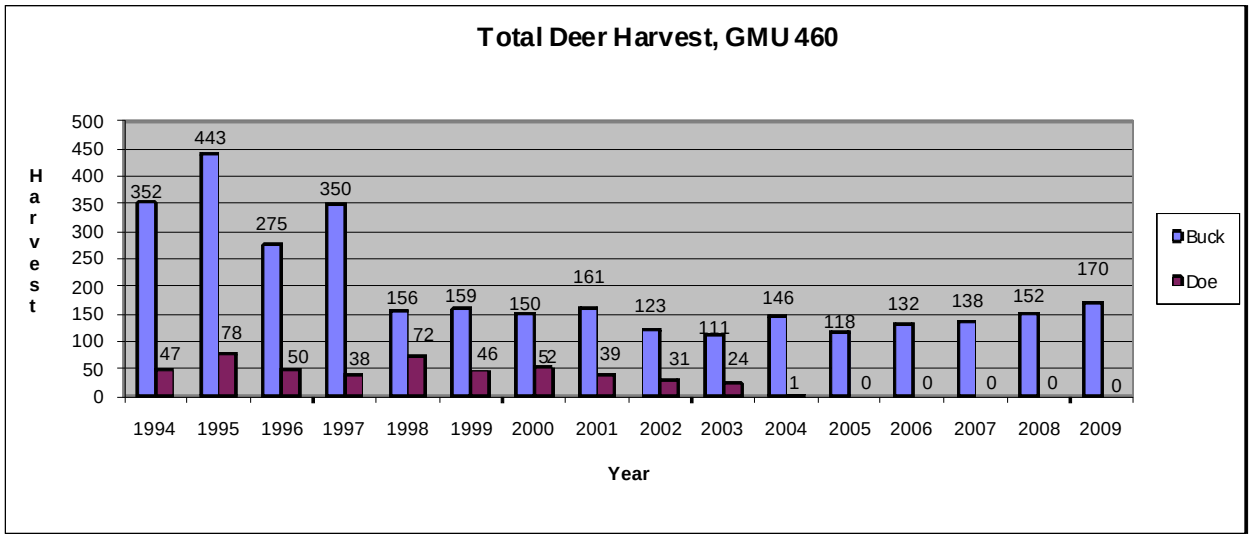


Figure 4. Annual deer harvest, GMU 460, 1994-2009, general season and special permit combined.
*1997 was last year of late buck hunt.
*2004 1st year of buck only archery hunt

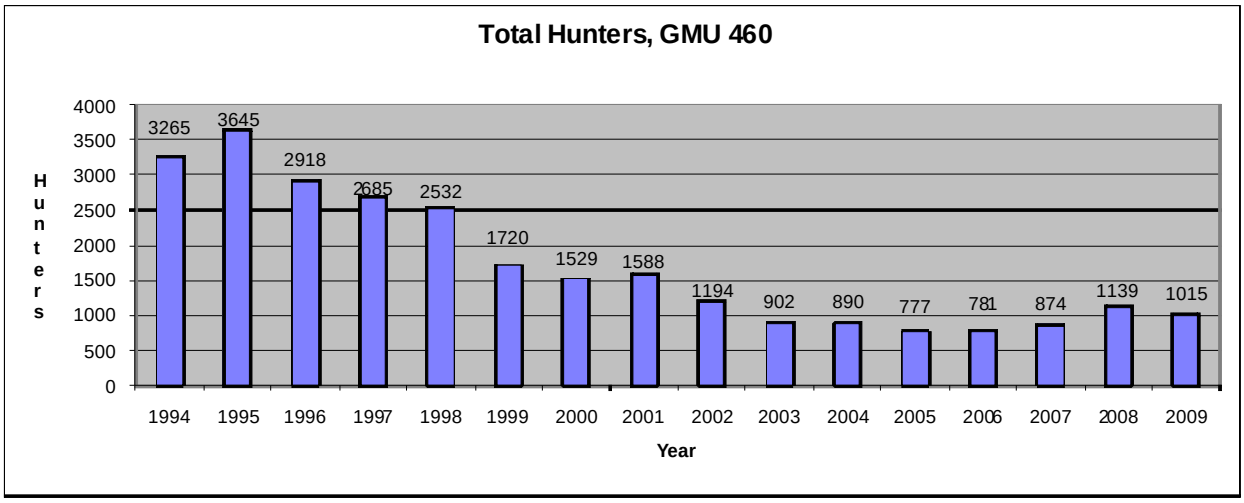


Figure 5. Number of deer hunters, GMU 460, 1994-2009, general season and special permit combined.
*1997 was last year of late buck hunt.
*2002 increase in access fee-Hancock Forest Management.

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

RUTH L. MILNER, District Wildlife Biologist

Population objectives and guidelines
Population Management Unit (PMU) 46 is composed of Game Management Units (GMU) 450 and 448. GMU 450 is a relatively small, high elevation area. Most hunting within the PMU takes place in GMU 448, which is the larger and more accessible GMU. Objectives for black-tailed deer (Odocoileus hemionous columbianus) in PMU 46 are to provide healthy and stable deer populations for the long term and to maximize harvest opportunity and hunt quality despite an increasing human population, which is impacting the availability and quality of habitat for deer.

Hunting seasons and harvest trends
The 2009 hunting season in GMU 448 began with the early archery season open for any deer from through Sept. 1- 25, the early muzzleloader season open for any buck from Sept. 26 through Oct.4, and the general modern firearm season open for any buck from Oct. 17-31. Hunter numbers decreased slightly in 2009 compared to 2008 in GMU 448. However, hunter numbers remained higher than numbers reported for the period 2002-2007 (Figure 1). Harvest increased in 2009 compared to 2008, with 129 deer harvested compared to only 81 the previous year. Hunter success rates also doubled in 2009 compared to the previous year (16% success (2009) versus 8% success (2008)) (Figure 2). Archery hunters had a slightly higher success rate of 18% (27 deer harvested) compared to modern firearm hunters (15% success rate; 102 deer harvested. Sixteen muzzleloader hunters reported hunting in GMU 448, with no deer harvested.

As in previous years, few people hunted in GMU 450. In 2009, 67 hunters harvested 8 bucks, for a 12% success rate. These numbers are consistent with the number of hunters and harvest success rate over the last several years.

Ten late buck season modern firearm permits are allotted to this PMU. For the 2009 season, 320 hunters applied for the permits and 5 deer were harvested. Of these, 2 bucks were reported as 4 point deer.

In GMU 448, 80% of hunters used modern firearms, and this group harvested 92% of the deer in 2008. Archery hunters comprised 18% of hunters and took 8% of the deer. Muzzleloader hunters accounted for 2% of hunters, with only 16 people reporting that weapon type and 0 deer harvested. 65 hunters hunting in GMU 450 used modern firearms, 2 hunters used archery equipment, and 2 hunters used primitive weapons. Only modern firearm hunters were successful in GMU 450.

PMU 46 is hunted by the Stillaguamish, Tulalip, and Sauk Suiattle Tribes. The tribes preliminarily report harvesting 3 bucks and 1 doe from GMU 448 and no deer from GMU 450 in 2009.

Surveys
Population surveys were not conducted in GMUs 448 or 450 in 2009.

Population status and trend analysis
Insufficient data exist to model the deer population in PMU 46. Total harvest and hunter success increased slightly in 2009. In general, we believe that conditions are stable in this geographic area.

Habitat condition and trend
Much of the forest habitat available on USDA Forest Service lands is in a mid-rotation age class, with relatively tightly stocked stands that provide limited under-story vegetation. These conditions provide limited forage for deer, with the nutritional quality of the forage available unknown. Access to federal lands has been hampered in recent years because roads and trails have been heavily impacted by damage caused by severe weather, including floods, slides, and wind.

Clear-cutting continues on private and State owned timberlands in GMU 448. However, herbicidal sprays applied in many clear-cuts to control brush may limit forage available to deer in parts of the area.

Increasing human developments in Snohomish County affect the amount of habitat available for deer, as well as limiting hunter access in some areas. We expect the trend of shrinking habitat available to deer to continue, as the human population of the County continues to grow, although economic trends in recent years appear to be slowing growth for now. Access to large tracts of

land continues to be a challenge in many parts of the PMU, as many public landowners are gating or decommissioning their roads and prohibiting the use of motorized vehicles.

Management conclusions

Conversations with hunters who choose to hunt in GMU 448 indicate that this GMU is hunted primarily by local residents who have access to private land or are well acquainted with access on public lands. Although the number of hunters has dropped compared to a decade ago, hunting is still a quality experience for those who know where to hunt in GMU 448. Hunters will find that crowding is not a problem in PMU 46.

Figure 1. Total Deer Harvest: GMU 448 2000-2009

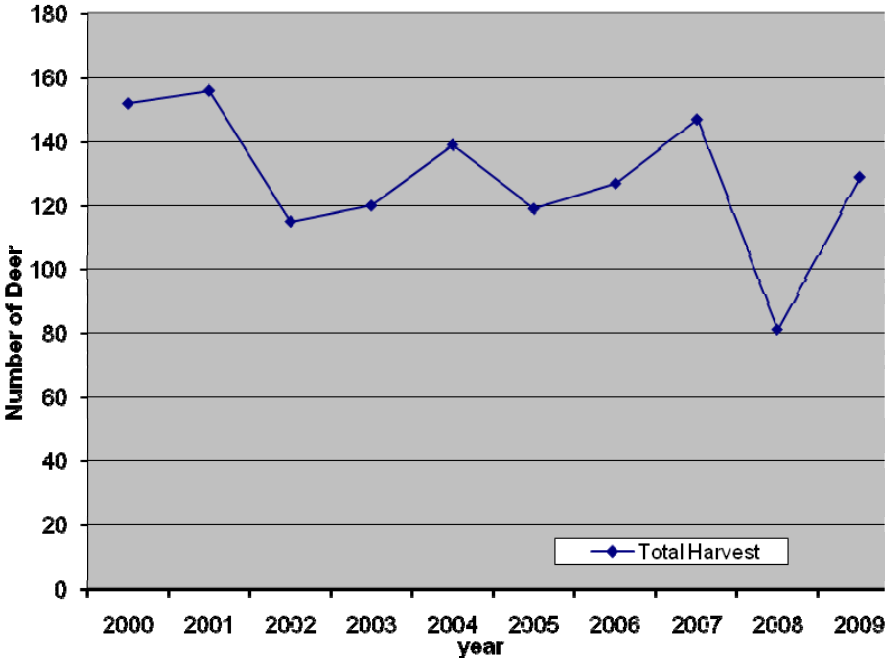
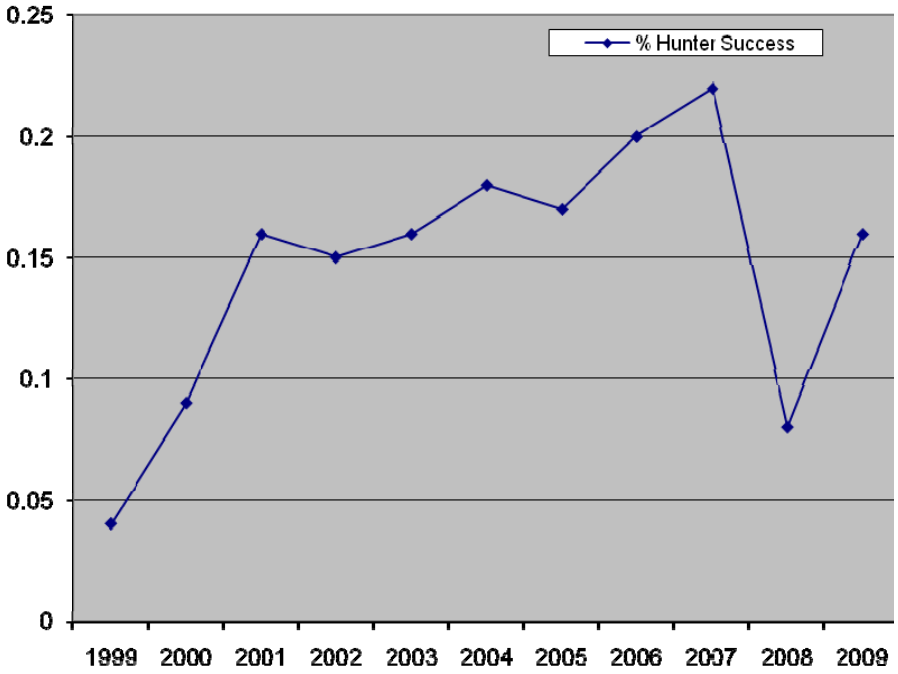


Figure 2. Percentage of Successful Hunters: 1999-2009



2010 DEER STATUS AND TREND REPORT: REGION 5

PMU 51 - GMUS 578 (WEST KLICKITAT), 388 (GRAYBACK)
PMU 52 – GMUS 564 (BATTLE GROUND), 568 (WASHOUGAL), 574 (WIND RIVER)
PMU 53 – GMUS 524 (MARGARET), 554 (YALE), 556 (TOUTLE)
PMU 54 – GMUS 516 (PACKWOOD), 560 (LEWIS RIVER), 572 (SIOUXON)
PMU 55 – GMUS 510 (STORMKING), 513 (SOUTH RAINIER)
PMU 56 – GMUS 503 (RANDLE), 505 (MOSSYROCK), 520 (WINSTON), 550 (COWEEMAN)
PMU 57 – GMUS 501 (LINCOLN), 504 (STELLA), 506 (WILLAPA HILLS), 530 (RYDERWOOD) GMU 382 (EAST KLICKITAT)

ERIC W. HOLMAN, Wildlife Biologist

Population objectives and guidelines

Black-tailed deer (*Odocoileus hemionus columbianus*) and mule deer (*Odocoileus hemionus)* 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 productive populations, manage for a variety of recreational educational and aesthetic purposes, and manage the population for a sustained yield (WDFW 2008).

Hunting seasons and harvest trends

Information on deer harvest and hunter effort during the 2009 hunting season was obtained from WDFW's mandatory reporting system. Estimates of total harvest, hunter effort, and hunter success are based on reports submitted by hunters. During the 2009 general deer season in Region 5, modern firearm hunters made up 74% of the hunters, archery accounted for 17%, and those choosing to hunt with a muzzleloader made up 8%. Finally, those utilizing "multi-season" tags accounted for roughly 1% of the Regional deer hunting effort.

Table 1. Deer Hunter Numbers and Harvest Statistics for Region 5, 2000-2009.

Year	Hunters	Days	Harvest	Success (%)
2000	34,672	226,550	6,454	18
2001	39,686	270,908	7,363	19
2002	29,231	201,360	5,219	18
2003	27,540	179,850	5,522	20
2004	35,455	188,370	6,832	19
2005	28,628	169,910	5,575	19
2006	31,966	174,738	5,222	16
2007	32,889	186,325	5,404	16
2008	31,013	204,116	4,911	16
2009	32,731	178,419	4,643	14

Two primary harvest management strategies are employed for male deer 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. New for the 2009-11 3-year-package, GMU 574 (Wind River) was changed from a 2-point antler-restriction GMU to the any-buck management strategy consistent with most Region 5 Units. Additionally, GMU 578 (West Klickitat) was changed from the 2-point strategy to a 3-point or larger management unit, thus joining the other two Klickitat County GMUs (388-Grayback and 382-East Klickitat), with the 3-point management strategy.

Harvest of antlerless deer during general archery season is legal in many GMUs. In addition to the general-season archery harvest, permits allowing for antlerless harvest are allocated based on the estimated population of deer in selected GMUs. Additionally, the damage history and record of nuisance complaints (social carrying capacity) within GMUs are considered.

In 2009, an estimated 32,731 hunters spent a total of 178,419 days deer hunting in Region 5 (Table 1). Total general-season harvest in 2009 was 4,643 with a hunter success rate of 14% (Table 1). The percentage of hunters that harvested a deer in 2009 was below the previous 10-year mean of 18%. Similarly, the total deer harvest was nearly 25% lower than the mean harvest of approximately 6,000 during the period from 1999-2008.

Hunter participation rates and deer harvest were not evenly distributed throughout the Region.

Proportionally fewer hunters elected to hunt in Cascade Mountain GMUs relative to other areas of Region 5. In turn, those PMUs (53, 54, and 55), located in the Cascade Mountains, contributed relatively less to the overall deer harvest than their lower elevation counterparts (Table 2). It is likely that this divergence in deer hunting effort and success is the result of lower deer densities in the Cascade Mountain GMUs, a lack of openings within the forested landscape, and much lower road densities in these GMUs.

Table 2. Region 5 2009 Deer Hunters, Hunters/Square Mile, Harvest, Harvest/Square Mile, and Success / PMU.

PMU	Hunters	Hunters /SQ Mile	Total Kill	Kill/SQ Mile	Success (%)
51	3965	4.2	667	.71	17
52	5324	4.5	879	.74	17
53	1238	3.5	138	.37	11
54	4169	2.4	337	.19	08
55	1043	2.3	154	.35	15
56	8625	8.7	967	.97	11
57	6548	5.3	916	.74	14
GMU 382	1819	2.2	612	.75	34

In addition to the general-season deer hunting effort and harvest discussed above, tags were offered for special hunts open only to permit holders in 2009. These tags were made available to allow controlled harvest of antlerless deer in the Region while promoting hunting by young hunters, those with disabilities, and seniors. Additionally, "late-buck" hunts in GMUs 574, 578, and 388 are offered as a quality hunting opportunity for those fortunate enough to draw these permits. Hunters selected for controlled deer hunting permits in Region 5 have typically enjoyed a pooled success rate of approximately 40%. Table 3 details the harvest of deer by special permit holders in Region 5 during 2009.

Table 3. Region 5, 2009 Special Deer Permit Harvest Summary.

Permit Type	Antlered Kill	Antlerless Kill	Total Kill
Modern Either Sex	25	87	112
Modern Late Buck	67	1	68
Archery	9	9	18
Muzzleloader	15	20	35
Senior	3	23	26
Disabled	6	14	20
Youth	25	41	66
2ND Tag	2	9	11
SUM	152	204	356

Surveys

Region 5 deer demographics have historically been collected from several types of surveys and data collection efforts. These surveys include; (1) biological sampling stations, (2) late summer productivity surveys, (3) spring counts of the Klickitat deer herd, (4) evaluation of female deer age structure from tooth analysis, and (5) post-hunting season surveys. The various data-collection efforts and their purpose are discussed below.

One voluntary deer sampling station was staffed by a combination of Regional Staff and volunteers during the opening weekend of the general firearm deer season, October 17-18, 2009. The biological sampling station was located near Yacolt, primarily sampling deer from the northern portion of GMU 568 (Washougal). Deer encountered during these efforts were examined by WDFW personnel and/or qualified volunteers. Information on age, sex, number of antler points, and GMU of harvest was taken for each deer. Age was determined by tooth irruption and deer were grouped into one of three discrete categories (fawn, yearling, adult) at the discretion of the examiner. A total of 450 hunters with 9 male deer (1 fawn, 4 yearlings, 3 adults and 1 unidentified) and two adult female deer were checked through the course of the opening weekend.

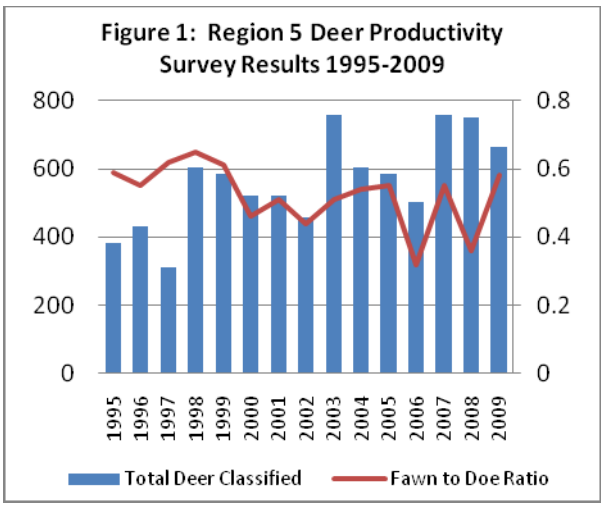
Historically, check station data were used to determine the percentage of yearling bucks in the total Regional buck harvest, i.e. Annual Yearling Buck Percentage (AYBP). In an age stable population, this percentage is assumed to be equal to the overall buck mortality rate. Essentially, yearlings are replacement animals filling voids left by the previous year's mortalities. However, small sample size and potential bias related to opening weekend deer hunting were problematic in this data set. Additionally, operation of the check stations is difficult logistically and requires far more staff than those available. For these reasons, the 2005 through 2009 AYBP used for calculation of the Sex Age Kill (SAK) model in Region 5 was generated from harvest data. Through this means, the buck mortality rate may be calculated from a sample of all reported deer harvested in the Region. Buck age is correlated to antler size in a consistent manner but varies throughout the Region. An appropriate buck mortality rate based on this correlation was applied to broad portions of the Region (Willapa, Cascades, and Klickitat). This method of calculation results in buck mortality rates of 20-45% across the Region.

The long-term estimate of annual doe mortality rates in the Region is 0.22. A large-scale effort to characterize doe mortality rates was undertaken in 2001. Tooth

envelopes and an explanatory letter were sent to all hunters possessing an antlerless permit in Region 5. Additionally, incisors were taken from any female deer checked at the check stations or recovered from meat lockers. In 2001 a sample of 96 harvested female deer from the western portions of Region 5 resulted in an annual doe mortality rate of 0.219. A sample of 68 females from PMU 51 (GMUs 578 and 588 (now 388)) resulted in an annual doe mortality rate of 0.132. Efforts to collect female deer teeth for ageing in subsequent years have relied on less expensive and less effective methods. These have included collection of doe teeth at check stations and meat lockers as well as from road-killed animals. These efforts (2002-2009) have not resulted in the collection of a useful data set for adequate evaluation of the annual female mortality rate. Updated data on the female mortality rate of deer in the Region would facilitate improved population estimation and improve the ability to appropriately establish antlerless deer seasons.

Late summer deer productivity surveys were first established in 1995. In 2009, deer observations were conducted throughout the Region from August 15th to September 30th. Personnel from WDFW's Wildlife Management Program along with a variety of volunteers from within WDFW, the U.S. Forest Service, private timber companies, and interested individuals recorded observation data for all deer encountered during field activities or recreational outings. In addition to these incidental deer observations, 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 2009 productivity surveys, a total of 663 deer were classified. The mean value of .58 fawns/doe is somewhat above the historical average of .52 per doe for the Region (Figure 1). The surveys are conducted after the peak of neo-natal mortality, so these values are likely closer representatives of recruitment than fecundity. For the purpose of calculating the SAK model, more specific productivity rates are assigned to aggregations of GMUs.



For spring counts, four permanent survey routes centered on the Klickitat Wildlife Area, near Goldendale, were censused on March 23-24, 2010 (Table 4). Transects were driven on the evening of the 23rd and morning of the 24th. Deer group sizes and composition were determined. All deer were classified as fawn, adult, or unknown and the fawn:adult ratio was determined. A total of 440 deer were classified during the March 2010 Klickitat deer survey. The resulting fawn:adult ratio of 0.72 is indicative of excellent over-winter survival among the Klickitat deer population. The long-term mean (1980-2010) ratio for this area is 0.48.

Table 4. Historic Fawn:Adult Ratios for the Klickitat Spring Deer Survey, 1996-2010.

Year	Total Deer Classified	Fawn:Adult
2010	440	0.72
2009	277	0.53
2008	238	0.48
2007	344	0.67
2006	450	0.66
2005	462	0.60
2004	619	0.52
2003	647	0.52
2002	448	0.52
2001	764	0.54
2000	843	0.46
1999	481	0.58
1998	328	0.47
1997	702	0.18
1996	637	0.42

Long-term correlations (1992-2005) between the spring fawn:adult ratio and the overall buck harvest in GMU 388 (Grayback) the following fall were historically significant (r = 0.59). These analyses indicated that spring surveys were a good predictor of hunting

success in GMU 388. The biological significance of this relationship is straightforward. Fawns are generally more vulnerable to resource shortages and other environmental stress, low fawn:adult ratios indicate tougher over-wintering conditions and likely lower overall survival of deer. High winter mortality across all age classes will result in lower fall harvests. Secondly, biological sampling station data indicate that many yearling bucks (approximately 56% in the Grayback GMU) develop two points on at least one antler and were therefore legal for harvest at age 1.5 under the 2-point antler restriction. Depressed fawn:adult ratios in the spring meant fewer yearling bucks were available in the fall; hence, a lower total buck harvest. However, due to the 2006 changing of the Grayback GMU to a more conservative season structure (3-point minimum and abbreviated modern-firearm season), this relationship is no longer observable.

Limited post-season deer herd composition surveys were initiated in Region 5 in 2003. The surveys are intended to evaluate the effectiveness of current management strategies in meeting the buck escapement goals outlined in the Game Management Plan (WDFW 2008). Secondarily, the surveys provide an additional opportunity to evaluate the annual fawn to doe ratio. The sparsely vegetated habitats of Klickitat County offer suitable survey conditions during daylight hours in winter.

Regional Wildlife Program Staff conducted the surveys during December. The timing of post-season surveys was selected to fall after the conclusion of the year's final hunting season (late archery) and prior to the initiation of antler casting (approximately January 1). Ground surveys are conducted in GMU 382 and a combination of ground and aerial surveys are conducted in GMUs 388 and 578. Due to a GMU boundary change, a portion of Unit 578 was included in the post-season survey effort for the first time in 2009. A summary of these post-season deer surveys is listed in Table 5.

The results from these survey efforts indicate that 2006 changes in management regimes had a beneficial impact on the post-season buck to doe ratios in the Grayback GMU. Specifically, the change to 3-point minimum with a reduction to 14 days of modern firearm hunting appears to have had a positive effect on the post-season buck to doe ratio. The initial year of the 3-point antler restriction appears to have had a similar effect in GMU 578 (West Klickitat). A continuation of these survey efforts will be required to adequately assess ongoing management efforts. Ideally, this would include the availability of funding for additional aerial surveys.

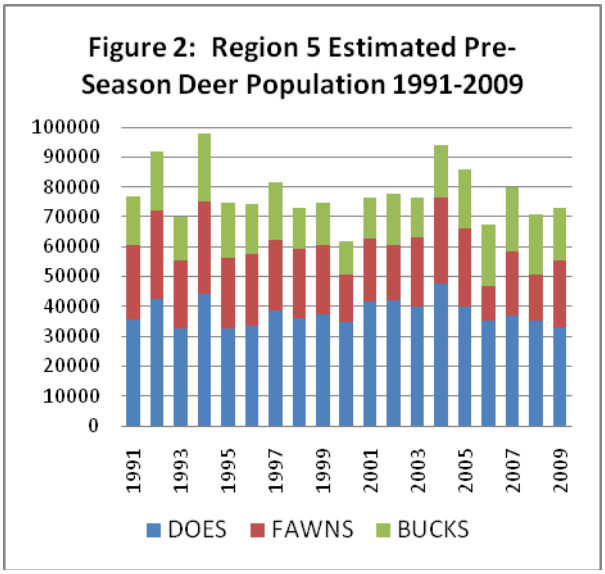
Table 5. Post-Season Deer Composition Survey Summary, GMUs 388, 382 and 578, 2003-09.

GMU	Year	Total Deer Classified	Bucks:Does:Fawns
388	2003	376	16:100:72
	2004	127	6:100:56
	2005	364	2:100:59
	2006	589	16:100:63
	2007	403	22:100:63
	2008	420	15:100:68
	2009	419	14:100:66
382	2003	270	14:100:63
	2004	170	15:100:68
	2005	165	15:100:57
	2006	428	10:100:62
	2007	418	17:100:70
	2008	301	11:100:81
	2009	211	10:100:64
578	2009	243	32:100:55
Klickitat Pooled	2003	646	15:100:68
	2004	297	11:100:63
	2005	529	6:100:58
	2006	1017	14:100:63
	2007	821	20:100:67
	2008	721	14:100:73
	2009	873	18:100:62

Population Status and Trend

Information compiled from hunting activity suggests stability of the deer population in the Region. Hunter success rates over the past 15 years have remained very consistent (R^2=.00). Similarly, hunter days per kill has not changed (R^2=-.08). In contrast, total deer harvest has steadily declined (R^2=-.74) from roughly 7000 to 5000 during the same period. However, the reduced harvest in recent years can be explained by a concurrent reduction in the number of hunters choosing to pursue deer in Region 5. During the past 15 years deer hunters in Region 5 have declined from approximately 42,000 to 32,000.

Biological data also indicate relative stability in the overall Regional deer population. However, the deer population is not evenly distributed throughout the Region. While the population in lower elevation portions of Region 5 remains relatively robust, those in the Cascade Mountain GMUs remain suppressed. An evaluation of estimated deer densities from population reconstruction (SAK Model), demonstrated this phenomenon as well. See Figure 2 for a graphic illustration of the estimated deer population in Region 5, generated from the Sex Age Kill Model.



Habitat Condition and Trend

Increasing urbanization in several GMUs (504, western portion of 550, 554, and 564) is resulting in a loss of quality deer habitat, an increase in human-deer interactions, 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 range. A portion of this habitat loss is being addressed in mitigation agreements concerning the three major hydroelectric projects (Merwin, Yale, and Swift reservoirs) on the North Fork Lewis River (Pacificorps Energy 2008).

Additional negative impacts to deer habitat are the result of certain forest management activities. While forest canopy removal (natural or otherwise) generally increases forage production, certain aspects of forestry can be detrimental to black-tailed deer. Herbicides are used by both private and public forest managers to suppress and preclude the establishment of "competing" vegetation (WADNR 2005; WADNR 1997). The broadleaf shrubs, trees, and forbs delayed by these efforts are often the plants that comprise the black-tailed deer diet (Crouch 1981; Brown 1961). In addition, the combination of herbivory and these techniques may be resulting in suppressed forage production. 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, impacting 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. Furthermore, these dense conifer stands are harvested at approximately age 40. Harvest of such monocultural stands at a time prior to differentiation among the trees within the stand or generation of forest openings, reduces significant growth of understory shrubs. 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 ungulates (Powell and Lindzey 2004; Rowland et. al. 2000). These impacts primarily include the loss of security associated with increased human access to remote areas. Additional negative impacts from roads are likely associated with weed dispersal, direct loss of habitat due to hardened surfaces, soil erosion, etc. In aggregate, these forest management activities cause delays or reductions in forage production, community complexity, and early successional vigor. These can have negative impacts on deer and are atypical of young forests following natural disturbances.

In the Cascades (GMUs 513, 516, 560, 572, and 574), suppression of the deer population is long-term and likely the result of habitat condition. Large amounts of forested habitat were clearcut in the 1980s prior to the listing of the northern spotted owl. Those forest stands harvested in the 1980s are now largely at an age (20-30 years) where forage production is minimal. In the Cascades, largely held in Federal ownership, subsequent timber harvest has been tremendously reduced. Additionally, active management (thinning) of forest plantations has not been extensively conducted. Furthermore, landscape-wide fire suppression assures that significant areas of fire-initiated early-succession habitats are not generated.

No specific habitat enhancements for black-tailed deer are planned outside of WDFW managed lands in Region 5. However, various management activities on Pacificorps' mitigation lands surrounding the North Fork Lewis River and limited thinning on USFS lands will benefit deer. Finally, both the Klickitat (Klickitat County) and Cowlitz (Lewis County) Wildlife Areas have on-going, long-term management practices designed to benefit black-tailed and mule deer habitat. Additionally, a new habitat guidelines reference is available to those managing black-tailed deer habitats (Nelson et. al. 2008). This document has been distributed among those managing forested habitats in the Region.

Hairloss Syndrome

The habitat conditions discussed in the previous section likely influence the Region 5 deer population on a

broad-scale. One potential cause of localized additive mortality on the deer population is the hairloss syndrome. Reports of the problem began in PMUs 56 and 57 during 1996. Since that time, numerous reports of affected deer have been received from throughout the Region. Hairloss syndrome was observed in Klickitat County for the first time in 2000. Hairloss was first documented in East Klickitat (GMU 382) in the spring of 2006. Approximately 17% of the deer observed during the March 2010 Klickitat deer survey had noticeable signs of the syndrome. Late 1990's 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 hairloss syndrome. Anecdotal reports from hunters, homeowners, and citizens indicate that deer are now absent from areas where they were present in high numbers during the mid 1990s. An effort to quantify some aspects of the hairloss syndrome was conducted by WDFW from 2001-03. In this study, 30-39% of fawns were found to exhibit the syndrome. However, the establishment of an association between mortality and hair loss syndrome was inconclusive (Woodin 2004).

Neither the hunter generated nor the biological data discussed earlier in this document suggest a large-scale decline in the Regional deer population. However, it is likely that the impact of the hairloss syndrome has been offset by significant restrictions on antlerless deer harvest opportunities imposed in the late 1990s. Recent efforts indicate that the species of louse (*Damalinia (Cervicola) spp.)* associated with black-tailed deer hairloss syndrome is not indigenous to North America (Bildfell et. al. 2004). Furthermore, recent collections of lice samples from Klickitat County and other portions of Central Washington indicate that the lice associated with the hairloss syndrome in these areas are those normally associated with fallow deer (*Bovicola tibialis)* (Bernatowicz, et. al. 2008).

Current Research Projects

An effort to better understand the ecology and demographics of western Washington black-tailed deer is being conducted by WDFW. Study animals are distributed in several locations. Within Regions 5, four does from the western portion of GMU 568 (Washougal) were captured via helicopter net-gun in March of 2010. The does were outfitted with collars carrying both traditional VHS and satellite transmitters. Additionally, the deer were equipped with VITs (Vaginal Internal Transmitters) designed to broadcast an alternate signal upon parturition and facilitate the capture of fawns.

Intensive monitoring was conducted during the May-June birthing period by Regional Wildlife Program Staff. Four fawns associated with the study does were captured and radio-collared (VHS only) as a result of these efforts. All 4 adult deer and 1 juvenile remained alive at the end of the time-period associated with this report (June 30, 2010). Subsequent work, conclusions, reports, and publications are anticipated in association with this research project.

Summary

The cumulative effects of increased development, certain forest management activities, reduced federal timber harvest, hairloss syndrome, and limited antlerless harvest opportunity have combined to stabilize the Region's deer population in relatively recent years. However, distribution of the deer population is not uniform, with deer much more abundant in the lower elevation portions of the Region. As recently as the 1980s, habitat conditions were more favorable throughout the Region, i.e. less of the landscape was developed, reforestation efforts were much less intensive, the federally managed lands were subject to extensive timber harvest, and hairloss syndrome was yet to arrive. Anecdotal reports consistently state that there were many more deer in Region 5 during those years. Given the changes in habitat condition in the years that have followed, it is likely that these sentiments are correct. Unfortunately, monitoring methodologies have evolved throughout this time span and therefore meaningful comparisons of current population size to those of the past are not possible.

At this time, WDFW does not have the authority to implement landscape level programs or regulations that would change the habitat conditions that fundamentally control the deer population. Very large scale changes that would benefit deer at the population level would include such things as a moratorium on the sub-division of private property, changes to the Forest Practices laws , and the establishment (through cutting or burning) of tens of thousands of acres of early-successional forest on the federally-managed lands. Favorable habitat changes of these magnitudes are not realistic in the foreseeable future of western Washington State.

Literature Cited

Bernatowicz, J. A., K. Mansfield, J. W. Mertins, and W. Moore. 2008. Hair-Loss Syndrome in Deer in South Central Washington, in Proceedings of the 8th Western States and Provinces Deer and Elk Workshop -2008.

Bildfell, R.J., L.W. Mertins, J.A. Mortenson, and D.F. Cottam. 2004. Hair-loss Syndrome in Black-tailed Deer of the Pacific Northwest. Journal of Wildlife Diseases. 40 (4): 670-681.

Brown, E.R. 1961. The Black-tailed Deer of Western Washington. Washington State Game Department, Olympia, WA.

Crouch, G.L. 1981. Coniferous Forest Habitats –Food Habits and Nutrition, in Mule and Black-tailed Deer of North America. Olof C. Wallmo, editor. Wildlife Management Institute, University of Nebraska Press, Lincoln NE, USA.

Nelson, J., D. Cottam, E. W. Holman, D. J. Lancaster, S. McCorquodale, D. K. Person. 2008. Habitat Guidelines for Black-tailed Deer: Coastal Rainforest Ecoregion. Mule Deer Working Group, Western Association of Fish and Wildlife Agencies.

Pacificorps Energy, 2008. Lewis River Wildlife Habitat Management Plan. Lewis River Hydroelectric Projects Federal Energy Regulatory Commission Project NOS. 935, 2071 and 2011.

Powell, J. H. and Lindzey, F.G. 2004. Distribution, Habitat Use Patterns, and Elk Response to Human Disturbance in the Jack Morrow Hills, Wyoming, in Proceedings of the 5th Western States Deer and Elk Workshop –2003. S. A. Tessmann, editor. Wyoming Chapter of the Wildlife Society, Wyoming, USA.

Rowland, M. M., M.J. Wisdom, B.K. Johnson, and J.K. Kie. 2000. Elk Distribution and Modeling in Relation to Roads. Journal of Wildlife Management. 64 (3): 672-684.

Washington State Department of Fish and Wildlife. 2008. Game Management Plan. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

Washington State Department of Natural Resources. 2005. Yacolt District 2005 Aerial Herbicide Applications. State Environmental Policy Act Lead Agency and Mitigated Determination of Non-Significance, file #05-051704. Olympia, Washington, USA.

Washington State Department of Natural Resources. 1997. Site Preparation, Regeneration, and Vegetation Management in Final Habitat Conservation Plan. Olympia, Washington, USA.

Woodin, R. S. 2004. Black-tailed Deer Hairloss Syndrome: Affliction Rates and Sources of Mortality, in 2004 Game Status and Trend Report. Wildlife Program, Washington Department of Fish and Wildlife, Olympia, Washington, USA.

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

BRYAN L. MURPHIE, Wildlife Biologist

Population objectives and guidelines

Black-tailed deer in Region 6 are managed to maintain productive populations, while providing for multiple uses; including recreational, educational and aesthetic (WDFW Game Management Plan 2008). Deer populations are generally managed by Population Management Unit (PMU), which is a collection of Game Management Units (GMU). Hunting seasons are set at the GMU level. Buck harvest is generally any antlered buck, although the Skokomish (636), Mashel (654) and Bear River (681) GMUs are managed as 2 point or better units. Antlerless harvest is limited to certain weapon types and/or by permit.

Hunting seasons and harvest trends

Region-wide harvest during the general season was 5,375 black-tailed deer in 2009; an increase of 3% compared to 2008. Of these, 13% were does and 87% were bucks. Total deer harvested PMU ranged from 237 – 1,283 in 2009 (Table 1).

Modern firearm hunters comprised 76% of all general season hunters and harvested 77% of all deer harvested during the 2009 general season in Region 6. This group had up to 19 days to hunt during the general season. Hunter success by PMU ranged from 12.3 – 29.5%. Modern firearm hunters reported killing 4,078 bucks and 58 does.

Seventeen percent of all hunters in Region 6 in 2009 were archery hunters. This group harvested 15% of all deer and had as many as 63 days to hunt during the general seasons (early and late), depending on the GMU hunted. Hunter success by PMU among this group ranged from 9.1 – 24.3%. Archery hunters reported killing 362 bucks and 462 does.

Table 1. Total number of bucks and antlerless deer harvested during general and permit seasons by PMU from 2007-2009, Region 6.

PMU	YEAR	BUCKS	ANTLERLESS	TOTAL
61	2007	942	125	1067
	2008	947	149	1096
	2009	1059	182	1241
62	2007	1099	169	1268
	2008	1002	247	1249
	2009	1068	215	1283
63	2007	872	93	965
	2008	748	101	849
	2009	752	160	912
64	2007	952	117	1069
	2008	830	143	973
	2009	961	231	1192
65	2007	279	18	297
	2008	238	11	249
	2009	215	22	237
66	2007	273	23	296
	2008	270	18	288
	2009	280	28	308
67	2007	539	32	571
	2008	465	45	510
	2009	415	42	457

The muzzleloader group totaled 6% of all general season hunters in the Region and they harvested 6% of all deer harvested in 2009. Muzzleloaders had up to 29 days to hunt during the general seasons (early and late), depending on the GMU hunted. Hunter success by PMU for this group ranged from 4.3 – 26.6%. Muzzleloader hunters reported killing 165 bucks and 167 does.

Multi-season permits were issued to 375 Region 6 hunters in 2009. Of these, 74 reported harvesting a total of 22 does and 52 bucks in the Region.

A total of 755 special deer permits were issued in Region 6 during 2009. Of these, 438 hunters reported using their permit to harvest 156 does and 85 bucks. This is similar to the 2008 and 2007 hunting seasons where 755 permits were issued each year; 440 hunters

harvested 222 deer and 435 hunters harvested 196 deer in 2008 and 2007, respectively.

Four GMUs- Satsop (651), Capitol Peak (663), Skookumchuck (667), and Wynoochee (648), had a limited, special permit hunt opportunity designed to allow buck hunting during the peak of the black-tailed deer rut in November. Sixteen of 30 hunters reported harvesting a deer with this permit in Region 6 during the 2009 season; 2 spikes, 3 2-points, 7 3-points, 3 4-points, and 1 5-point were harvested. Hunter success was 53% for this group combined. The black-tailed rut hunting opportunity will be expanded in 2010 to include the Mashel (654) GMU for modern firearm hunters, the Kitsap (627) and Skokomish (636) GMUs for archery hunters, and the Olympic (621) GMU for muzzleloader hunters.

Tribal hunting accounted for 5% of the overall deer harvest in Region 6 in 2009-2010. Deer harvest was estimated at 87 does and 202 bucks (NWIFC Preliminary Big Game Harvest Report 2009-2010).

Research and Monitoring

WDFW initiated a black-tailed deer study in 2009 to examine the influence of land management activities on habitat use, doe survival and productivity. This project is still in the initial phases and data have not been evaluated. Twenty-two (22) fawns were radio-collared in the Capitol Peak (663) and Satsop (651) GMUs and monitored for survival. Preliminary results indicate annual survival was 45% in 2009-2010 for this cohort of fawns, with predation accounting for 58% of all mortalities (Dr. C. Rice, pers. comm.).

The Makah Tribe continued their deer study in the Hoko (601) GMU to estimate fawn survival, cause-specific mortality, and to examine the influence of hair-loss syndrome on fawn behavior and survival (McCoy and Murphie, 2010; S. Murphie, 2010). Average-annual fawn survival over the first 3 years of their study (2006-2009) was estimated to be 0.35 with the majority of mortality attributed to predation; 80.7%.

The extent of the effects of HLS on deer populations is poorly understood. Bender and Hall (2004) concluded minimal population level response associated with HLS, while recent data from the Hoko (601) GMU suggests HLS is influencing fawn survival contributing to poor fawn recruitment and potentially limiting population growth (McCoy and Murphie, 2010; S. Murphie, 2010). Hair-loss syndrome (HLS) is the result of infestation by an exotic species of biting louse, which can lead to irritation, excessive grooming and loss of hair (Bender and Hall, 2004; Bildfell and others, 2004). HLS can occur among all age- and sex-classes, but appears to influence fawns disproportionately (S. Murphie, 2010). As the HLS condition worsens over winter, fawns feed less and scratch or groom more often (S. Murphie, 2010), which likely contributes to a decline in condition and an increase in vulnerability to predation and winter weather events. Over-winter survival among fawns with HLS was 53%, while those fawns without HLS had a winter survival probability of 75% (P = 0.058) (McCoy and Murphie, 2010; S. Murphie, 2010).

Cases of HLS have been reported across Region 6, however no comprehensive effort has been conducted to assess the annual prevalence of HLS across Region 6. Surveys conducted by helicopter in April and May from 2000-2002 showed incidence rates ranging from 5-23% among adults and 11-48% among fawns in the Skookumchuck (667) and Satsop (651) GMUs (WDFW unpublished data). Incidence rates among adult does in the Hoko (601) GMU were reported to range from 15-20%, while 23-50% of fawns showed clinical signs of HLS in 2006-2008 (McCoy and Murphie, 2010).

Annually, WDFW conducts fall composition counts in Region 6 to estimate fawn to doe ratios. Fawn ratios are used to estimate pre-season deer populations and to guide antlerless harvest season setting. In 2009, helicopter surveys were flown in Pysht, (603), Olympic (621), Wynoochee (648), White River (653), Capitol Peak (663), and Skookumchuck (667) GMUs. A total of 535 deer were classified resulting in fawn: doe ratios ranging from 61 to 94 fawns: 100 does (Table 2).

Table 2. Estimates of fawn productivity and fall buck: doe ratios (± 90% confidence interval; Czaplewski et al, 1983) from composition flights conducted in September and October 2009. The low precision in these estimates is largely due to the small number of deer observed and classified.

PMU/ GMU	Count Summary				Ratio per 100 does	
	Bucks	Does	Fawns	Total	Bucks	Fawns
61/663	6	40	28	74	15±11	70±28
62/667	27	118	72	217	23±8	61±15
63/648	6	32	30	66	19±14	94±39
64/621	4	29	25	58	14±12	86±39
66/603	1	17	14	32	6±10	82±49
67/653	4	24	17	45	17±15	71±37

A deer check station was run at the Vail Tree Farm (Skookumchuck (667) GMU) on 4 weekends in 2009 with help from Eyes in the Woods volunteers. On average 826 hunters were checked each weekend day during the general deer season. A total of 165 deer

were checked with yearlings accounting for 40% of the bucks (n=145) and 20% of the does (n=20). The percent yearlings in the harvest as measured by tooth eruption at check stations can estimate annual mortality rates if one assumes a stable deer population with a stationary age structure.

Tooth envelopes were sent to 210 antlerless permit holders in the Olympic (621), Wynoochee (648), and Capitol Peak (663) GMUS to determine age-at-harvest, to the nearest year, by examination of annuli (Hamlin et al. 2000; Matson's Laboratory, Milltown, Montana). Twenty-four samples (20 does, 4 bucks) have been returned and submitted for analysis however results are not expected until late-October 2010.

Population status and trend analysis

Deer population trends will vary by GMU/PMU largely due to variation in habitat quality. There are some general declines in deer numbers in some units while others are expanding. This follows the pattern that would be expected from timber rotations and natural habitat succession, where large magnitude changes in population occur with stand age.

Pre-season black-tailed deer populations are estimated by reconstruction from harvest data (Sex-Age-Kill (SAK) model; Table 3). Population parameters were estimated from Vail check station data, harvest reports, as well as pre-season composition surveys. Doe mortality was estimated to be .20. The recovery rate was set at .75. Estimates of total annual buck mortality rates (i.e. from all sources) vary depending on the data source. For PMUs without check stations, the analysis of harvest data looking at antler size (spike vs. branch antlered) is used to estimate buck mortality. Regional buck mortality rates ranged from 0.12 to 0.54.

Table 3. Population estimates based on SAK Model by PMU.

	Year				
PMU	2005	2006	2007	2008	2009
67	4,509	10,821	8,447	12,185	9,343
66	1,556	4,578	3,851	7,139	4,264
65	1,997	5,123	4,102	6,462	4,059
64	5,663	18,805	14,746	21,914	15,800
63	6,564	18,135	12,539	20,270	11,584
62	6,774	24,762	15,235	26,756	15,023
61	6,658	20,906	13,307	25,797	15,364

One of the weaknesses of SAK is that over time, relatively minor changes in input ratios and mortality rates can result in wide swings in population estimates from year to year; an inherent flaw in the model. The WDFW will be initiating research to explore new techniques for estimating black-tailed deer populations in the near term.

Management conclusions

Understanding population trends and harvest effects requires unbiased estimates of fawn recruitment, as well as, estimates of adult mortality partitioned to specific sources (hunting and natural, for example). Efforts to collect recruitment, cause-specific mortality, and survival rate data among fawns and other age/sex-classes across the Region were expanded in 2009, but more work is needed.

The potential for high over-winter mortality among fawns and the moderate fawn: doe ratios observed in the pre-season for some PMUs suggest antlerless harvest should remain conservative for most Region 6 units. A total of 693 any deer or antlerless only permits will be offered in the 2010 deer season; a 3% reduction from 2009 levels. Additionally, general archery seasons allowing any deer to be harvested were changed to buck only for the Hoko (601), Pysht (602), Dickey (603), Sol Duc (607), Goodman (612), Clearwater (615), and Matheny (618) GMUs to address low recruitment concerns.

Buck only permits will be increased from 40 to 75 in the 2010 season to allow additional deer hunting opportunities during November for archery and muzzleloader hunters. No changes in the general season buck hunting were proposed for the 2010 season except 1 change from any buck to 2-point or better in the Skokomish (636) GMU.

Literature Cited

Bender, L. C., and P. B. Hall. 2004. Winter Fawn Survival in Black-tailed Deer Populations Affected by Hair Loss Syndrome. Journal of Wildlife Diseases 40: 444-451.

Bildfell, R. J., J. W. Mertins, J. A. Mortenson, and D. F. Cottam. 2004. Hair-loss Syndrome in Black-tailed Deer of the Pacific Northwest. Journal of Wildlife Diseases 40: 670-681.

Czaplewski, R. L., D. M. Crowe, and L. L. McDonald. 1983. Sample Sizes and Confidence Intervals for Wildlife Population Ratios. Wildlife Society Bulletin 11:121-128.

McCoy, R. and S. Murphie, 2010. Factors Affecting the Survival of Black-tailed Deer Fawns on the Northwestern Olympic Peninsula, Washington. Progress Report. Makah Tribal Forestry Department. Neah Bay, WA, USA

Murphie, S. 2010. Effect of Hair Loss Syndrome on Survival, Behavior and Habitat Selection of Black-tailed Deer Fawns. Master's Thesis. Humboldt State University, Arcata, CA, USA.

Northwest Indian Fisheries Commission. 2009-2010. Preliminary Big Game Harvest Report for Western Washington Treaty Tribes.

Elk

ELK STATUS AND TREND REPORT: REGION 1

SELKIRK HERD
GMUS 101, 105, 108, 111, 113, 117, 121

DANA L. BASE, District Wildlife Biologist

Population objectives and guidelines

The primary objective for elk (*Cervus elaphus*) management in the Colville District is to provide for sustained annual hunter harvest of a viable and productive elk population with desirable population characteristics. The harvest objective is to maintain the annual overall bull mortality rate at less than 50% and a post hunting season bull-to-cow ratio of 12 to 20 bulls per 100 cows (Washington Department of Fish and Wildlife 2008).

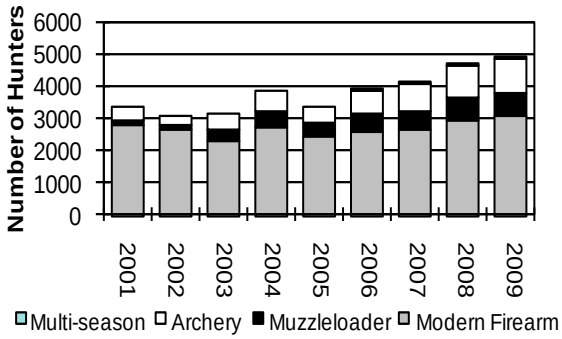


Figure 1.Trend in elk hunters by hunt method for GMUs 101-121.

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 to harvest. Population data are extremely limited due to the habitat . There are no antler point restrictions and any antlered bull is legal during the hunting season.

Season timing and increased opportunity for archers and muzzleloaders has resulted in a significant increase in harvest for those groups. Hunter numbers have increased as harvest has increased (Figures 1 & 2).

Since mandatory hunter harvest reporting began the number of elk hunters reporting hunting GMU's 101-121 increased 47% from 3,296 in 2001 to 4,833 in 2009 (Washington Department of Fish and Wildlife 2010). During that time the total elk harvest increased from a low of 57 elk in 2001 to a high of 276 elk in 2009 (Table 1).

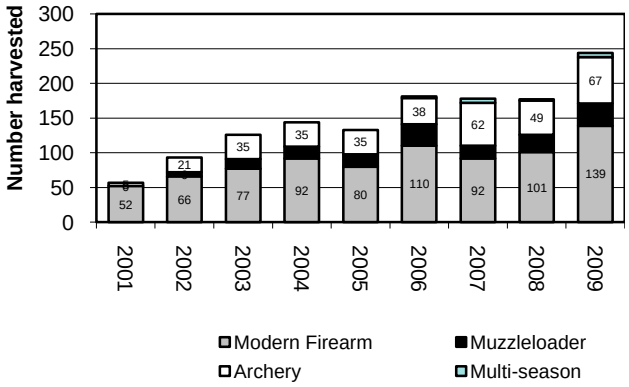


Figure 2. Trend in elk harvested by hunt method for GMUs 101-121.

New in 2006 was the "multiple season" elk tag. This tag resulted in a modest harvest of 2 elk in 2006, 6 in 2007, 2 in 2008 and 6 in 2009. Hunter success has been substantially higher for multi-season tag holders at approximately 22% in 2009 compared to general methods at just under 6%.

The "any elk" permit hunts are designed to provide added hunter opportunity for antlerless elk and address landowner conflict where it occurs. The elk permit harvest reported by hunters for 2009 was 16 antlerless elk taken for a success rate of 14% (Table 2).

Table 1. Antlered bull and antlerless elk harvest within the Colville District, GMUs 101-121 from 2001 through 2009.

Year	Bulls	Antlerless Harvest	Total Harvest
2001	46	11	57
2002	66	27	93
2003	90	36	126
2004	108	36	144
2005	102	31	133
2006	136	45	181
2007	120	58	178
2008	119	68	187
2009	187	89	276

Table 2. Special permit harvest and success rates reported for "any elk" special permits in GMUs 101-121.

Year	Permits Issued	Antlered Killed	Antlerless Killed	Success Rate
2003	54	1	6	13%
2004	65	0	4	6%
2005	75	1	5	8%
2006	95	2	6	8%
2007	120	1	10	9%
2008	120	1	20	18%
2009	116	0	16	14%

Table 3. Antler point distribution (high side) from hunter harvested elk within GMUs 101-121.

Year	1-2 points	3-5 points	6+ points	Total
2003	37 (41%)	22 (24%)	31 (34%)	90
2004	34 (37%)	30 (33%)	28 (30%)	92
2005	42 (42%)	34 (34%)	26 (26%)	100
2006	60 (44%)	31 (23%)	45 (33%)	136
2007	29 (24%)	52 (44%)	38 (32%)	119
2008	37 (31%)	44 (38%)	37 (31%)	118
2009	66 (36%)	68 (38%)	47 (26%)	181

Surveys

Harvest levels have been relatively low for the northern Selkirk Herd compared with other regions of Washington State. Consequently, devoting substantial resources to surveying bull-to-cow ratios has not been a high priority. From 2003 – 2009 the proportions of bulls harvested by antler point category has ranged fairly evenly (Table 3).

No aerial surveys focusing exclusively on elk have been accomplished for several years. Nevertheless any elk observed during winter aerial surveys targeting moose are classified and tallied. The winter of 2008-2009 was exceptional in that more elk were encountered in that winter survey than any previously. Altogether 81 elk were observed including 9 bulls, 42 cows, 17 calves, and 13 unclassified elk for a bull/cow/calf ratio of 21:100:40.

The best opportunity to observe elk from ground-based surveys is in the early spring from mid-March to early May. Qualified volunteers have been enlisted to help survey elk for many years. Observations during early mornings or early evenings before dark are made of elk that concentrate on "green-up" fields or within forest openings. Survey effort each spring has been variable, however, due to other work priorities. The calf:cow ratio and the trend in total numbers is the most reliable information gathered on early spring surveys in this area. The spring 2010 survey efforts yielded a ratio of 57 calves per 100 cows, which along with the same ratio obtained in 2003 is as high as ever observed since 2001 (Table 4). Important to note, however, is the wide variance in bull/cow/calf ratios amongst all survey years with overlapping confidence intervals (Skalski et al. 2005).

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

Year	Ratio per 100 cows (90% Confidence Interval) Bull	Calf	Classified Sample
2001	13 (+/-11)	47 (+/-17)	183
2002	14 (+/-5)	48 (+/-8)	220
2003	15 (+/-12)	57 (+/-19)	139
2004	29 (+/-38)	36 (+/-20)	46
2005	9 (+/-6)	42 (+/-8)	163
2006	6 (+/-6)	46 (+/-6)	288
2007	7 (+/-4)	45 (+/-8)	324
2008	1 (+/-1)	39 (+/-13)	291
2009	11 (+/-9)	28 (+/-7)	247
2010	1 (+/-3)	57 (+/-20)	131

Population status and trend analysis

Increasing hunter harvest, winter and spring surveys, and anecdotal information indicate that elk populations are higher than they have ever been in northeastern

Washington. High calf ratios as observed in spring composition surveys support the general observation of a growing elk population.

Habitat condition and trend

The habitat conditions for elk in the Pend Oreille sub-herd are undergoing both positive and negative changes. Road closures by federal, state, and private land managers have been aggressive in recent years and are highly beneficial for elk habitat security and escapement. Logging continues on national and state forest lands and even more intensively on private lands. The high rate of logging during the 1990s in central Pend Oreille County has produced forest successional forage vegetation that elk prefer. Recently, however, large tracts of private industrial timberlands have been treated with herbicides to control hardwood shrubs that compete with regenerating conifer trees. In the last 3 years Forest Practice Applications & Approvals were received for treating 13,663 acres mostly within south Stevens County, which includes GMUs 117 and 121.

Wildlife damage

Elk damage to standing hay, baled hay, and stored hay continues in the Cottonwood Creek drainage (GMU 117) southeast of Chewelah. Antlerless permit opportunity was increased substantially last year with a permit season that now includes December 16-31. In addition all user groups currently have general seasons within GMU 117, which puts pressure on elk that frequent agricultural land there. WDFW may issue special Landowner Access Permits when and where circumstances are appropriate as another means of addressing damage to lands open to hunting.

Habitat enhancement

The Colville National Forest, with grant money from the Rocky Mountain Elk Foundation (RMEF) has implemented many projects designed to benefit elk. As of 2009 these projects including all partners amounted to a total of 52,819 acres. Most of the projects involved controlled burning to enhance winter forage production, but there were also projects to restore aspen stands and reclaim roadbeds for improved habitat. Most of these projects have been in the prime elk areas of Pend Oreille County (J. McGowan, USFS, pers. comm. 2009)

Management conclusions

The management objective for elk in the Colville District is being met with a sustained annual harvest of a viable and productive elk population with desirable population characteristics. The harvest objective of an overall bull mortality rate at less than 50% appears to be on track as the percentage of yearling bulls in the harvest as indicated by 1-2 point bulls, was 36% in 2009. While there are unreliable post-season survey data on bull:cow ratios, the prime bull (6 point +) percentage in the 2009 bull harvest was 26% which is indicative of desirable population characteristics for elk productivity and quality bull hunting opportunities.

Elk hunter numbers in the Colville District have increased over the last several years (Figure 1). In recent years WDFW has provided increased opportunity or season timing to improve equity among the three hunting method groups. Hunter participation and harvest is now well dispersed across the Colville District through all three hunting methods. In 2001 modern firearm hunters took 91% of the elk harvest and archery hunters took the other 9%. By 2006 the participation and harvest was dispersed more equitably in proportion to hunter numbers by each method. Discounting multi-season permit holders, modern firearm hunters accounted for approximately 66% of the participation and 62% of the kill. Archers accounted for 16% of the hunters and 21% of the kill and muzzleloaders accounted for 18% of the hunters and 17% of the kill.

The number of permits isued for “any elk” has increased from 54 in 2001 to 120 beginning in 2007 for the three primary elk GMUs 111, 113, and 117. While there was considerable interest in these permits including 1,652 modern firearm and 379 muzzleloader applications for 2008, the resulting harvest was modest. Consequently, within GMU 117 where there are areas of chronic agricultural damage by elk, the permit season was extended to December 16-31 beginning in 2008. In 2009 the success rate was 14% on antlerless elk.

.

Literature Cited

Skalski, J.R., K.E. Ryding, and J.J. Millspaugh. 2005. Wildlife demography: Analysis of sex, age, and count data. Elsevier Academic Press. 636 p.

Washington Department of Fish and Wildlife. 2008. Game Management Plan. Washington Dept. of Fish and Wildlife, Olympia, WA. 136 p.

Washington Department of Fish and Wildlife. 2010. 2009 Game Harvest Report. Wildl. Prog., Washington Dept. of Fish & Wildlife, Olympia, WA.

ELK STATUS AND TREND REPORT: REGION 1

SPOKANE SUBHERD OF SELKIRK ELK HERD
GMUS 124, 127, 130, 133, 136, 139, 142

Howard L. Ferguson, District Wildlife Biologist
Michael Atamian, Wildlife Biologist

Population objectives and guidelines

The population goal for this elk (*Cervus elaphus*) herd is to manage the population for a sustained yield, at levels compatible with agriculture production and within tolerance levels of landowners occupying the rural-urban interface. Consequently "any elk" seasons are offered in these GMUs.

These harvest strategies in place are directed to control populations where agricultural damage and nuisance problems have persisted or increased. For the past few years, however, many local landowners have recognized the economic benefits of providing fee access for elk hunting, thus increasing hunter access. This has resulted in increased harvest, and subsequently fewer damage complaints.

Hunting seasons and harvest trends

The 2009 general elk hunting seasons for Game Management Unit (GMU) 124-142 did not change from the previous year and were all Any Elk with dates as follows:

- Modern Firearm – Oct. 31 – Nov. 8
- Archery – Sept. 8 - 20
- Late Archery (GMU 124) – Nov. 25 - Dec. 8
- Muzzleloader – Oct. 3 - 9
- Late Muzzleloader (GMUs 130-142) – Nov. 25 - Dec. 8
- Master Hunters only (GMUs 127-142) – Dec. 9 – 31

Hunter numbers have varied, but have shown an upward trend since 2005 (Fig. 1). This past year, the number of archery and muzzleloader hunters decreased with only modern firearm hunter numbers increasing (Fig. 1). Hunter success was effectively the same as last year, after decreasing from a high in 2005 when it nearly doubled and has now leveled off to around 9%. Modern firearm hunters were the most successful group in 2009 with 10.5%, while muzzleloader hunters were most successful last year (Table 2). This year archer success dropped over 40% to 3.97%.

Total elk harvested increased slightly from the previous year – the highest since 2005 (Table 1and Fig. 5). For both muzzleloaders and archers, total elk harvested decreased in 2009 from 2008, but increased by over 20% for modern firearm hunters (Fig. 2) The harvest of bulls has shown an increasing trend since 2001 while bulls taken dropped from a high of 138 in 2008 to 121 this year (Table 1 & Fig. 3). The majority of bulls are taken from 3 GMUs -- 124, 127 and 130, with the majority being taken in GMU 130; however, 2009 harvest in GMU 130 dropped to 2005-06 levels (Fig. 5).

Although antler point classes (1-2, 3-5, and 6+ points) reported in the harvest have varied from year to year this year's data shows a decrease of more than 50% in the harvest of 6+ bulls (Table 1 & Fig. 4). This is a change from 2006-08 data showed an increasing trend with harvests of 6+pt elk making up more than 20% of the bull harvest (Table 3) with the harvest in GMU 130 decreasing from 21 last year to 9 this year (Fig 4.).

Antlerless harvest increased this year reversing a decreasing trend from a high of 157 antlerless elk in 2005 to a low of 101 last year (Table 1).

Surveys

Composition counts have been conducted primarily in GMU 130 on and around the Turnbull National Wildlife Refuge (NWR) due to limited funds, the lack of success at earlier attempts of aerial surveys in the more forested area of GMU 124 and 127, and the fact that GMU 130 comprises almost 50% of the harvest. Surveys are conducted in this area because Turnbull NWR is able to occasionally share survey costs. Post-season composition counts are collected while

conducting our annual moose surveys in December and January.

The composition count data from GMU 130 (Table 4) show that since 2004, the bull:cow ratio has been at or above the 12 to 20 bulls:100 cows ratio guideline given in the WDFW Game Management Plan (WDFW 2009). This past year showed a decrease in the ratio for both calves and bulls. The calf ratio decreased from 83 to 54 calves per 100 cows, while the bull ratio dropped from 42 to 24. These estimates are highly variable due to the small size of the population and the small sample size of elk being classified.

Population status and trend analysis

Since mandatory reporting began in 2001, harvest reports indicate an increasing trend of elk being harvested. The majority of the harvest occurs in GMU 130 (~43%) with GMU 124 and 127 providing in combination ~40% (Table 5). A catch per unit effort analysis (measured as kills per day) shows a decrease and leveling off of effort the last four years (±.003) from a high of .028 in 2005 indicating at either a sustaining or slightly increasing population (Fig. 6). The elk population in and around Turnbull National Wildlife Refuge is estimated to be around 450 animals. Efforts will be made this coming year to analyze the last 10 years of data and produce herd estimates with confidence intervals.

Habitat condition and trend

The greatest concern for our elk herds in the past has been related to agricultural conversion of native habitat in the area. Now, elk habitat degradation due to urban expansion, increased roads, and human disturbance is the highest concern. Habitat loss due to development continues to occur, especially in GMU 124, 127, and 130 with the redistribution of urban populations outward into rural settings and will have an effect on the elk population in these GMUs. There is concern for habitat damage to aspen and other vegetation from high elk numbers on Turnbull National Wildlife Refuge.

Elk Damage

During the last few years, elk damage complaints have decreased. Hotspot and landowner antlerless permits have been effective tools for targeting offending elk. It is important that an adequate number of these permits continue to be made available to address landowner concerns.

While the core herd area is in GMUs 124, 127 and 130 there are indications of increasing elk numbers in GMUs 133, 139, and 142; consequently, we have begun receiving some complaints from these more southern GMUs. Elk in these areas are in scattered groups, occupying habitats wherever they can find relative seclusion and safety, frequently being found in Conservation Reserve Program (CRP) plots. As a result of this expansion, harvest strategy in all GMUs has been set to “any elk”.

Management conclusions

Data from the last five years indicates a small but constant increase in population levels in the District. This year there was also an increase in the number of antlerless elk taken, the first increase since 2005. Since 2001 there has been a steady increase in the harvest of bulls with a high harvest of bulls occurring in 2008. This year, however, there was a decrease in the number of bulls taken. Consequently, the number 6+pt bulls both in the harvest and on surveys will be closely monitored to ensure a proper balance between younger bulls and mature bulls exist in the population.

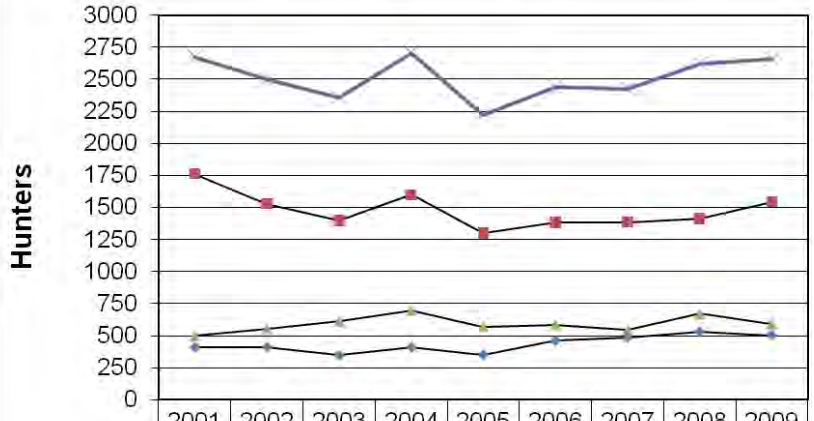
Due to the concern for habitat damage in Turnbull National Wildlife Refuge, an elk hunt is scheduled to be offered in the 2010 season.

Literature Cited

Zender, S., H. Ferguson, and J. Hickman. 2004. Draft. Selkirk Elk Herd Plan. WDFW, Olympia,

Washington Department of Fish and Wildlife. 2009. Game Management Plan. Washington Dept. of Fish and Wildlife, Olympia, WA, USA

Figure 1. Number of Elk Hunters by Weapon Type.



	2001	2002	2003	2004	2005	2006	2007	2008	2009
Modern	1764	1530	1399	1600	1300	1384	1386	1415	1545
Muzzle	500	554	614	697	572	586	545	671	593
Archery	410	413	346	410	351	460	484	532	504
Total	2674	2497	2359	2707	2223	2441	2427	2624	2659

Figure 2. Harvest of Elk by Weapon Type.

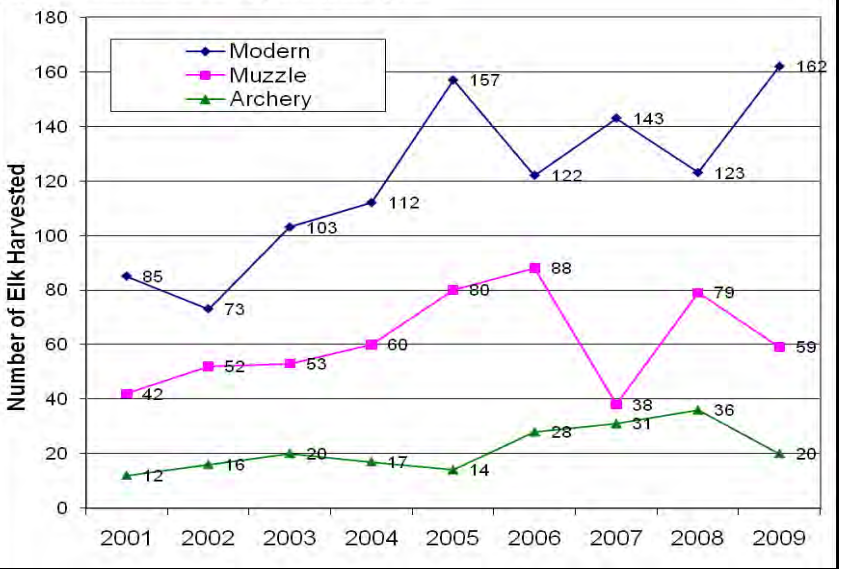


Figure 3. Bulls Harvested from 2001.

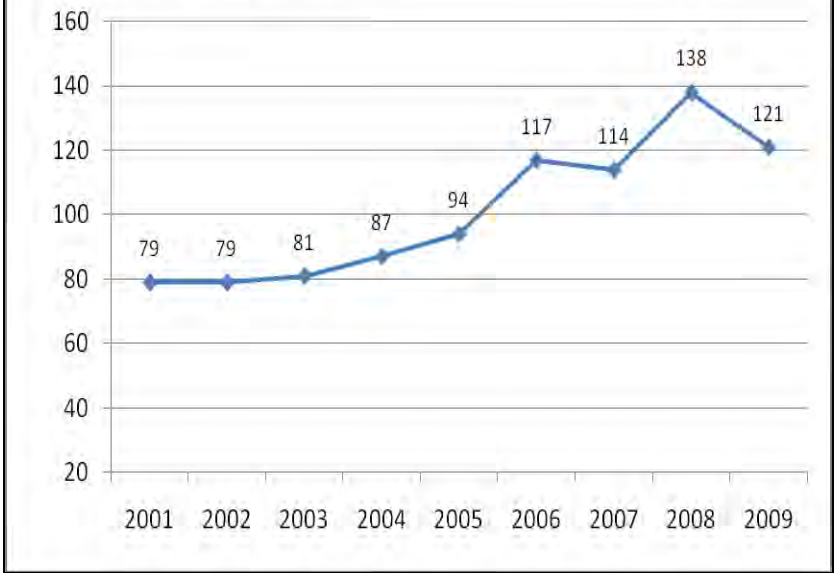


Figure 4. Number of Bulls Harvested by GMU.

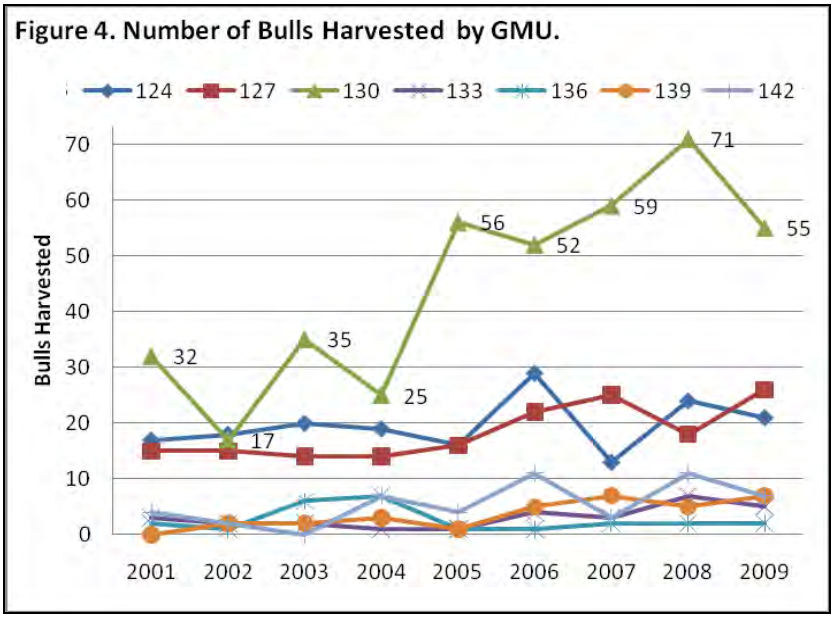


Figure 5. Elk Harvested in GMUs 124-142.

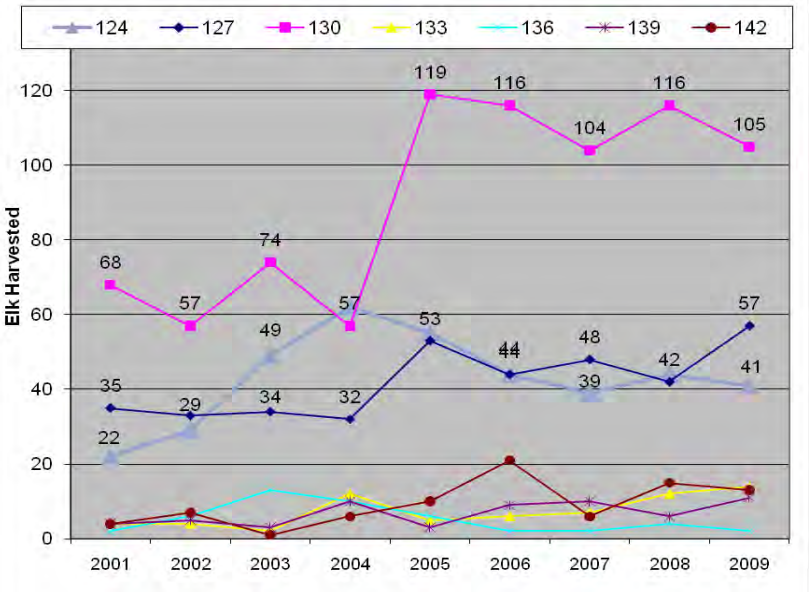


Figure 6. Catch per Unit Effort (Elk harvested/Hunter Days).

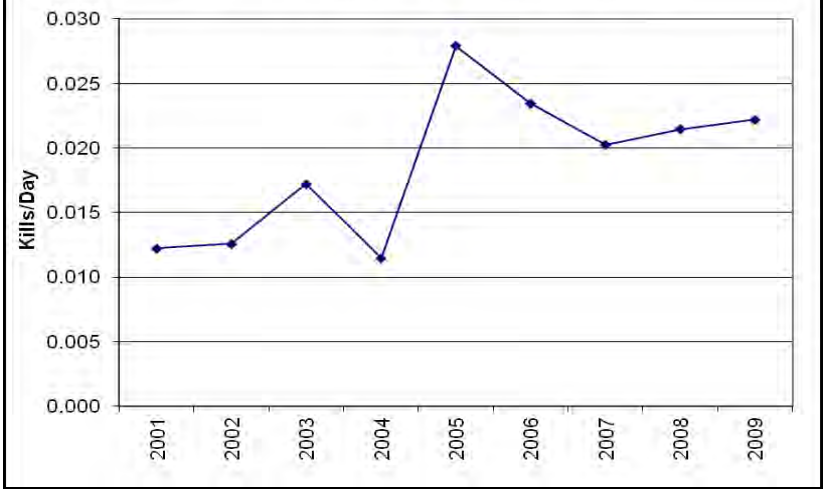


Table 1. GMU 124-142 harvest, hunters and hunter days						
Year	**Bulls**	**Antler-less**	**Total**	**Hunters**	**Hunter Days**	**Hunter Success**
2001	79	60	139	2674	11380	5.20%
2002	79	62	141	2497	11210	5.65%
2003	81	95	176	2359	10221	7.46%
2004	87	102	189	2707	16456	6.98%
2005	94	157	251	2223	8992	11.29%
2006	117	125	242	2441	10323	9.91%
2007	114	102	216	2427	10663	8.90%
2008	138	101	239	2624	11134	9.11%
2009	121	122	243	2659	10955	9.14%

Table 2. Hunter Success By Weapon				
	Archery	**Modern**	**Muzzle**	**All**
2001	2.93%	5.27%	8.40%	5.50%
2002	3.87%	4.97%	9.39%	5.77%
2003	5.78%	7.36%	8.63%	7.46%
2004	4.15%	7.00%	8.61%	6.98%
2005	3.99%	11.92%	13.99%	11.20%
2006	6.09%	9.61%	15.02%	10.36%
2007	6.40%	10.32%	6.97%	8.90%
2008	6.77%	8.69%	11.77%	9.11%
2009	3.97%	10.49%	9.95%	9.14%
Average	4.88%	8.40%	10.30%	8.27%

Table 3. Antler Point Proportion			
	1-2 Pt	**3-5 Pts**	**6+Pt**
2001	60.27%	23.29%	16.44%
2002	47.37%	36.84%	15.79%
2003	45.57%	25.32%	29.11%
2004	43.42%	42.11%	14.47%
2005	49.47%	41.05%	9.47%
2006	38.71%	38.71%	22.58%
2007	44.64%	33.93%	21.43%
2008	31.72%	40.00%	28.28%
2009	42.28%	44.72%	13.01%

Table 4. Elk Composition Count in GMU 130.

Year	Total	Cow	Calf	Spike	Rag-horn	Adult Bull	Bull:Cow :Calf Ratio
2004	354	211	106	22	11	3	15:100:50
2006	369	207	113	26	12	11	24:100:55
2007	268	140	78	26	13	11	36:100:56
2008	327	145	121	31	12	18	42:100:83
2009	260	146	79	15	3	17	24:100:54

Table 5. Harvest and proportion of Harvest for GMUs 124-130 and remainder.

	Harvest	Proportion
GMU 124	41	16.9%
GMU 127	57	23.5%
GMU 130	105	43.2%
Total GMU 124-130	203	83.5%
Total GMU 133-142	40	16.5%
TOTAL HARVEST	243	

ELK STATUS AND TREND REPORT: REGION 1

PMU 13 – GMUS 145, 149, 154, 157, 162, 163, 166, 169, 172, 175, 178, 181, 186

PAT FOWLER, District Wildlife Biologist
PAUL WIK, Wildlife Biologist

Population objectives and guidelines

Elk (*Cervus elaphus*) populations in six of eight major elk units are at or near management objective. Most elk sub-herds within the Blue Mountains are at or near population management objective, with the exception of the Wenaha and Tucannon sub-herds. The Wenaha unit held the largest sub-herd in the Blue Mountains until the late 1980's with a wintering population of over 1,800, but declined during the 1990's to less than 500 elk. The Wenaha sub-herd is still struggling, but appears to be slowly increasing. The Blue Mountains Elk Management Plan is currently being revised, which will set population objectives for each sub-herd (GMU).

Hunting seasons and harvest trends

The general season bull harvest was restricted to spike-only in 1989 in order to increase bull survival, post-hunt bull:cow ratios, and breeding efficiency. Prior to spike-only management, the bull:cow ratios historically ranged from 2-5 bulls/100 cows, and few bulls older than 2.5 years of age were observed during post-hunt surveys. After implementation of the program, bull:cow ratios increased to management objective within 3 years. Currently, an excellent and diverse age structure is observed in the post-hunt bull population.

The bull harvest in the Blue Mountains has declined due to low calf recruitment, a major decline in the Wenaha elk population, and restrictions needed to maintain bull survival. Between 2001 and 2008, the bull harvest averaged 207 bulls/year. Hunters harvested a total of 265 bulls in 2009 (Table 1), which is 31% above the previous 8-year average. The increase in the bull harvest can be attributed to an increase in elk numbers, improved calf survival, and an increase in "any bull" permits.

Table 1. Blue Mountains Elk Harvest (PMU 13), 2001-2009 .

	Bulls					Antlerless Harvest
Year	Spikes	Adult	Total	Antlerless	Total	Cows:100 Bulls
2001	184	36	220	127	347	56
2002	202	24	226	181	407	80
2003	209	16	225	149	374	66
2004	193	32	225	194	419	86
2005	146	45	191	251	442	131
2006	163	47	210	203	413	97
2007	133	47	180	151	331	85
2008	90	88	178	127	302	71
2009	177	88	265	103	368	39

Note: adult bull harvest all GMUs.

Branched antlered bulls are harvested under permit control in spike-only GMUs (Table 2.) and GMU-157 (Mill Creek Watershed). In 2009, 130 "any bull" permits were issued in nine spike-only units for rifle, muzzleloader, and archery hunters, plus auction and raffle permits. Bull permit hunters averaged 64% success with 115 hunters harvesting 74 bulls. Six point or larger bulls comprised 95% of the harvest. Large, mature bulls continue to be harvested in the Blue Mountains, and generate much public interest for both hunting and viewing.

Table 2. Special Permit Bull Elk Harvest-All Weapons, Blue Mtns. WA., 2001-2009 (Spike-only GMUs).

	Bull		Hunter	Percent
Year	Permits	Harvest	Success	6 Point+
2001	49	26	59%	90%
2002	28	15	68%	87%
2003	17	3	20%	100%
2004	33	20	65%	95%
2005	41	28	80%	78%
2006	62	36	84%	86%
2007	79	35	54%	94%
2008	134	73	66%	85%
2009	130	74	64%	95%

The Mill Creek Watershed (GMU 157) is a limited entry unit managed in cooperation with the City of Walla

Walla (City water supply), U.S. Forest Service, WDFW, and Oregon Dept. of Fish & Wildlife. Washington issued 45 Watershed permits in 2009. Weather conditions during the hunting season allowed for good access throughout the hunt period. Normally, some Watershed permit holders do not hunt because they fail to research the area before applying, and are not aware of the rugged terrain. Only 37 permit holders reported hunting, harvesting 14 bulls and 4 cows for a success rate of 49%. Bulls harvested in the Watershed consisted of 80% six point or better.

Antlerless elk hunting is by special permit for modern firearm and muzzleloader hunters in GMU's 149, 154, 162, 163, 172, 175, 178, and 181. Archery hunters are allowed to hunt antlerless elk on private lands in GMU 162 and 172, and unit wide in GMU's 149, 154, 163, 175, and 178. The antlerless elk harvest declined again in 2009. A total of 520 antlerless elk permits were issued, which doesn't include hotspot hunts or landowner damage control permits: modern firearm 325, ML 170, archery 25. Hunters harvested a total of 103 antlerless elk from eight GMUs. Modern Firearm hunters harvested 37 antlerless elk, muzzleloaders harvested 23, and archers 43.

The antlerless harvest is generally focused on sub-populations on private land in to alleviate agricultural damage. In 2009, permit levels were reduced due to hunter complaints about finding few elk on private land. The strategy of targeting antlerless elk on private land was successful in reducing agricultural damage complaints, while allowing elk populations on public land to increase and maintain the overall elk population near management objective.

Poaching of adult bulls appears to have returned to normal levels. Only a few were reported in 2009, compared to 50+ bulls between 2000-2002.

Surveys

Pre-season surveys are conducted to monitor calf:cow ratios when elk re-group after calving (July-Sept.). Surveys are conducted from the ground. A total of 859 elk were classified in 2009 with calf/cow ratios in the various sub-herds ranging from 43-60 calves/100 cows, and an overall average of 52.6 calves/100 cows (*90% CI* 46-59).

Post-season surveys are conducted to determine population estimates and herd composition in late winter. The 2010 survey was conducted between February 26-March 5 in most units, and April 14 in GMU 169. In the 2010 survey, 4,566 elk were classified.

Population status and trend analysis

Data from the 2010 survey was analyzed using the Hiller 12-E version of the sightability model (Unsworth et.al 1998). In units surveyed by air, the sightability model estimates a population of 4,921 elk (*90% CI* 4,824-5,018), compared to 4,925 elk (*90% CI* 4,570-5,280) in 2009. Two units not surveyed from the air (GMUs 145 & 149) have an estimated population of 150 elk, which puts the Blue Mountains elk population estimate at ~5,100.

Elk population status varies between sub-herds. Sub-herds in each GMU are managed according to the unique management issues associated with that unit.

Winter calf ratios in 2010 were estimated at 28.3 calves/100 cows (*90% CI* 27.8-28.8), similar to last year.

Post-hunt bull/cow ratios in 2010 were estimated at 33 bulls/100 cows (*90% CI* 28.5-37.5). The artificially high bull ratios encountered in GMUs 169 and 172 can be attributed shed antler hunting activity, which redistributes cow/calf groups outside the survey area. Large cow/calf groups will often move south of the Wenaha River or onto the Wenaha Wildlife Area (ODFW) to avoid shed antler hunting activity, while bulls stay in the area, but move to higher elevation. Redistribution of cow/calf groups from normal wintering areas inflates the bull:cow ratio in the Wenaha and Mtn. View units, and undoubtedly inflates the sightability bull/cow ratio as well.

Research

The Department concluded fieldwork on the Blue Mountains Elk Mortality and Vulnerability Study in the spring of 2007 (McCorquodale et. al. 2010). The project had several objectives; evaluate harvest vulnerability of bull and cow elk based on habitat conditions and land ownership, determine what percentage of yearling bulls are being harvested under the "spike-only" strategy, evaluate the level of tribal harvest, determine the level of poaching occurring within the project area, and ascertain the level of bull movement between habitats and ownerships.

Annual survival rates varied between age classes of bulls. The survival rate for yearling bulls was 0.41 (95% *CI* = 0.29-0.53), which provides adequate recruitment into the adult bull population. Most yearling bull mortality was human caused (hunting). Survival for branched antlered bulls ranged from 0.80-0.85. Most sub-adult bull mortality was a result of tribal hunting, while adult bull mortality was evenly split between natural causes and tribal hunting. Bull permit levels prior to and during the study were greatly reduced due to a serious poaching problem from 1999-2002. "Any bull" permits issued annually between 2003-2006 were very limited in spike-only units (17, 31, 44, 60), which is one reason adult bull survival was high. Since 2006, permits for "any bull" have increased annually in spike-only units.

Poaching mortality was minimal, indicating increased enforcement activity was successful in reducing poaching of adult bulls. Hunting accounted for 57% (8 of 14 deaths) of all cow elk mortality. Several cows were harvested during damage hunts. Most antlerless harvest is targeted at sub-populations in damage areas. Annual cow elk survival during the study ranged from .80-.84 (95% *CI* = 0.64-0.93), but cow elk survival outside damage areas is probably higher.

Habitat condition and trend

The Pomeroy Ranger District has made progress in closing old roads and reducing road densities in GMU-175. WDFW biologists worked with USFS biologist in 2009 to develop alternatives for the South George Vegetation Management project, which includes the Hogback-Triple Ridge road complex. WDFW has proposed decommissioning roads in the complex, and moving the current road closure date from October 1 to August 1 in order to improve habitat effectiveness for elk in high value summer habitat. Unfortunately the Pomeroy Ranger District will be constructing a 29-mile ATV trail within GMU-175 in 2010. Although the Pomeroy District will be constructing the trail near existing roads in order to minimize the impact on elk, the increasing number of ORV's attracted to the area by the new trail system could very well have a negative impact on elk use of existing habitat.

The road closure program on the Walla Walla Ranger District is complete.

Habitat conditions on 163,000 acres of National Forest and private land will continue to improve over the next 10 years due to extensive wildfires that occurred in 2005 and 2006 (School Fire-2005, Columbia Complex Fire-2006).

The Umatilla National Forest Access Management and Fire Management Plans should improve habitat conditions over time, and prescribed burns are being implemented throughout the forest to reduce fuel loads and improve stand conditions. The WDFW will work closely with the USFS to reduce road densities and improve habitat effectiveness in areas of high value elk habitat.

Augmentation and habitat enhancement

Projects to control weeds on WDFW Wildlife Areas and elk winter range on private land were implemented in 2009-2010. Long-term habitat improvement projects will be developed in conjunction with the Blue Mountains Elk Initiative (BMEI), Rocky Mountain Elk Foundation (RMEF), U.S. Forest Service, and county weed boards.

Elk Damage

Elk damage continues to be a problem in some units. The largest damage issues occur in the GMU-162 Dayton, where landowners in the Eckler Mtn. area normally experience some damage to crops.

The sub-population that inhabits the wind power project lands in the Marengo unit (GMU-163) is becoming more problematic. The numbers are increasing and elk are spending more time on wind power lands.

Damage issues in GMU-181 have decreased after issuing landowners preference permits for antlerless elk in lieu of damage.

Approximately 180 elk were herded out of the Peola unit and back into GMUs 166 and 175 in 2010, but over 100 elk still need to moved out of the Peola unit. Efforts will continue to herd these elk back inside the elk fence and onto public land in GMUs 166 and 175.

Management conclusions

The spike-only management program has been in place for 21 years. Management objectives of the program were to increase the number of bulls in the post hunting season population, while creating a diverse age structure within the bull population. The increased number of adult bulls in the population has improved breeding ecology and efficiency. Most cows (93%, WDFW

unpublished data) are now being bred by October 2, compared to only 55% prior to the rule change .

The increased number of adult bulls has allowed the WDFW to offer quality permit controlled hunting opportunity for branched-antlered bulls. The intense rutting activity and presence of large, adult bulls has also resulted in a tremendous increase in recreational elk-viewing .

Summer calf ratios have improved and remain near historic levels (Fig. 1); 50 ca./100 cows. Winter calf ratios have improved, but are still below historic levels (40+calves/100 cows). Low calf survival has a negative impact on hunting opportunity. Low calf survival has been the major factor that prevents the Wenaha sub-herd from increasing in numbers.

Shed antler hunting activity continues to be a serious problem for elk on the winter range. Shed antler hunting activity in GMU-154, GMU-162, GMU-166, and GMU-169 is extremely intense during March and April. Elk use patterns in GMUs 166, 169, and 172 have changed significantly over the last decade due to 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 redistributed onto agricultural lands. Large cow/calf groups normally seen along the Wenaha River breaks redistribute to areas south of the Wenaha River to avoid human activity. Shed antler hunting and other activities on winter range are putting elk under increased stress at a critical time of year.

Recommendations were developed in 2009 to reduce harassment and control human activities on elk winter range, especially shed antler hunting.

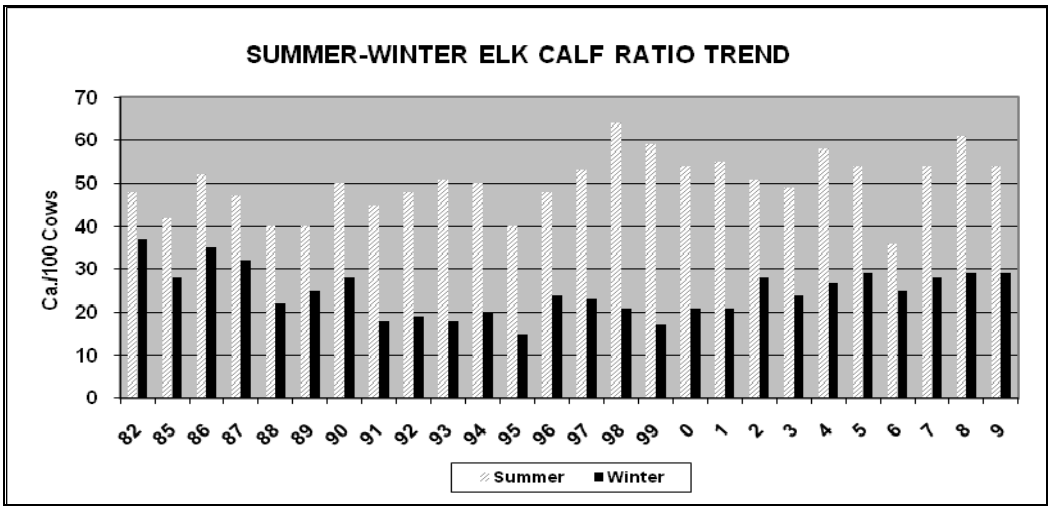
Agricultural damage continues to be a problem in specific sub-herds (GMUs 154, 162, 178) resulting in damage control hunts. The current damage control strategy to target specific groups of elk on private land for damage control has worked well and allows sub-herd populations to maintain numbers or actually increase, while minimizing damage.

Habitat values have declined in some areas due to roads and noxious weeds, but extensive wildfires in 2005 and 2006 have improved habitat conditions on 163,000 acres in GMUs 154, 162, 166, 175, and 178.

The Department should will continue in its attempt to develop a cooperative system of monitoring tribal harvest with the Nez Perce Tribe and the Confederated Tribes of the Umatilla Indian Reservation.

The Blue Mtns. elk population is approximately 400+ elk under the management objective listed in the Blue Mtns. Elk Herd Plan (2010 in progress). Most sub-herds are at or near population management objective.

Figure 1. Calf Ratio Trend 1980-2009, Blue Mtns., Washington.



ELK STATUS AND TREND REPORT: REGION 3

PMU 31 – GMUS 379, 381
PMU 32 – GMUS 328, 329, 335
PMU 33 – GMUS 336, 340, 342, 346,
PMU 34 – GMUS 372, 373
PMU 35 – GMUS 352, 356, 360
PMU 36 – GMUS 364, 368

JEFFREY A. BERNATOWICZ, District Wildlife Biologist, PMUs 32-36
MIKE LIVINGSTON, District Wildlife Biologist, PMUs 31, 34

Population objectives and guidelines

The post-season population objective for the Yakima and Colockum elk (*Cervus elaphus*) herds is 9,025-9,975 and 4,275-4,725, respectively. A goal of <350 animals has been set for the Rattlesnake Hills sub-herd (PMU 34). The postseason bull ratio goal is a range of 12 to 20 bulls per 100 cows for all herds.

Hunting seasons and harvest trends

PMUs 31 and 34 have been managed separately from the remainder of the region with an array of liberal seasons allowing the harvest of antlerless and any bull. In addition, a substantial number of damage permits have been issued to landowners to target problem elk and to reduce the sub-herd. In 2009, a modern firearm general season for antlerless elk occurred in the Blackrock Elk Area (private land west of Hanford) September 9-22. A general modern firearm season in all of GMU 372 for any elk occurred October 31-November 8. In PMU 31 and GMU 373, general seasons for modern firearm, muzzleloader and archery seasons occurred simultaneously October 31-November 15. In 2009, the reported number of elk hunters in Region 3 decreased for the fifth year in a row (Table 1). The reported hunter numbers were 18% below the 10-year average.

Reported harvest and hunter success was below average for Colockum. The Colockum elk herd was below objective and the antlerless harvest has been reduced to allow the herd to increase. The Colockum herd is now at objective for total elk, but below objective for bulls. The recent change to "true-spike" was designed to increase yearling bull escapement. The percentage of yearling bulls escaping the hunting season did increase, but low calf recruitment has hindered increasing total yearling bull recruitment. Bull harvest in Colockum was the lowest in recent history and 37% below the 10-year average. Below average harvest and success is expected to continue.

The Yakima herd had been at objective and seasons set to maintain stability. An above average harvest and below average recruitment has now pushed the total herd below objectives. Antlerless harvest and branched-bull permits have been reduced. The later than normal season in 2009 might have been partially responsible for the high bull harvest in 2009.

Harvest data for the Rattlesnake Hills sub-herd has been variable (Table 4). Harvest has typically ranged between 43 and 101 since 1999. The exceptions were 2000 (harvest =212) and 2007 (harvest = 137) when wildfires displaced elk from Hanford ALE. In 2009, field personnel documented a harvest of 50 elk (28 bulls, 22 antlerless).

No elk were harvested in GMU 373 in 2009. In GMU 381, 3 bulls and 4 antlerless elk were harvested, and in GMU 379, 1 bull 8 antlerless elk were harvested. Elk numbers are low in these units and are managed liberally to prevent crop damage risk.

Surveys

A post-hunt aerial survey was conducted over 100% of the Colockum winter range in March 2010. In the Yakima herd, ground counts were conducted on feed sites in early February. No aerial survey was conducted because a light snow pack concentrated few animals on the winter range, making aerial surveys ineffective. The population was indexed using ground survey and harvest data.

PMU 34 was surveyed as a separate area in January. All survey units on the Hanford ALE site and a random

selection of units on the Central Hanford, southeast Yakima Training Center and surrounding private land to the south and west of ALE were also surveyed.

Calf recruitment in both the Colockum and Yakima herds was up slightly from the previous year (Tables 2 and 3). Historical harvest data has not always followed trends seen on surveys. When dramatic shifts in calf ratio were observed in the 1990's, harvest often showed the opposite trend. There is some late spring mortality after surveys are completed but misclassification is also a potential problem, especially in large groups. In recent years, no attempt has been made to classify calves from large groups (>100), during aerial surveys. Ratios from ground counts and smaller groups are applied. This change appears to be a better indicator of recruitment.

The observed bull ratio in the Colockum is below objective (Table 2). The change to "true-spike" increased the percentage of yearling bulls that made it through the season. However, due to low calf recruitment, there were not many yearling bulls expected to enter the 2010 season.

The Yakima bull ratio continues to be within objective, but is declining (Table 3). In 2009, harvest took over 80% of yearling bulls from a relatively small yearling crop. Recruitment of bulls into the adult population was <50% of average.

Population status and trend analysis

In February/March 2010, the Colockum and Yakima herds were estimated at 4,594 and 8,589 respectively (Tables 2 and 3). The Colockum herd is at, and the Yakima herd is below total population objectives.

The increase in the Colockum herd is partially due to a decrease in antlerless harvest (Table 1). However, the majority of the increase is probably due to other factors. Experiments with photography indicated that elk numbers were being under-estimated in large groups. Photography is now used for all large groups of elk. Secondly, roads on the winter range have been closed for ~ 3 years. Large numbers of elk are now appearing within the closure. Those elk may have moved in from outside the survey area.

All indicators suggest the Yakima herd has been declining and is now below the objective of 9,500 $\pm$ 475. Antlerless permits have been decrease to stop the decline. Below average recruitment and above average permit success (2009) has pushed the herd downward.

There have also been observations of increased tribal hunting, including from a western Washington tribe that has claimed the Yakima herd as part of their traditional area.

The Rattlesnake Hills sub-herd grew from less than 100 elk in the early 1980's to about 840 by 1999. In 2000, a trapping effort and high harvest, due to wildfire, reduced the herd to about 520. Surveys in January 2010 yielded a herd size estimate of 677 $\pm$ 42 elk (398 cows, 78 calves, 201 bulls). Ratios per 100 cows were 50 bulls and 20 calves. No surveys were conducted in GMU 373, 382, 379 of 381.

Habitat condition and trend

The overall summer range forage for the Colockum herd is improving due to timber harvest. However, large areas now lack hiding cover. When human activity increases, a large portion of the herd concentrates in and around the Coffin Reserve.

Colockum winter range forage quality may be decreasing. Nearly all 2000 acres of WDFW land, which was previously farmed in winter wheat, has 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 digestibility.

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 shifted toward a late seral stage emphasis over 20 years ago. The lack of timber harvest reduced forage production on a portion of summer range. Insect outbreaks have recently killed timber over significant acreage. Prescribed burns and wildfires are starting to improve forage quantity and quality.

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

The major change to habitat for the Rattlesnake Hills elk was a fire that consumed most winter range in June 2000. The short-term effect of the fire was to reduce herd productivity and push elk onto private land. The

long-term effect is unknown. Repeated fires influenced the spread of weeds, including cheatgrass. In August 2007, approximately 67,000 acres burned mostly on ALE and some private land west of ALE.

Crop damage

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

Most of the Colockum herd is not fenced. Damage is being managed by hunting. The boundaries of the hunts are drawn depending on where damage is occurring. In 2004, the damage season was extended to August 1 – February 28th. The program has been successful in some areas. Additional problem elk are being managed through landowner damage hunts. The goal is to eliminate/displace the elk that have developed a preference for agricultural crops. The program would be more successful if disturbance could be further reduced on the public lands where elk presence is desired.

Historically, the Rattlesnake Hills elk caused the most significant damage in Region 3. Claims have largely been for damage to dryland wheat fields south of ALE. Typically elk enter the fields from ALE after sunset and return to ALE prior to sunrise. Starting in 2005 landowners have been issued damage prevention permits beginning in mid-May through June to target any bulls damaging wheat. In July, only spikes are permitted and after August 1st permits become antlerless or spike. The proximity of these elk to valuable perennial crops further increases the risk. Several orchard and vineyard managers west of ALE have fenced their crops or have selected to waive damage in return for damage prevention permits. These farms are relatively small and surrounded by rangeland. In contrast, the area south of ALE near Prosser and Benton City contains large acreages of orchards and vineyards. The number of elk complaints in this area has increased since the August 2007 fire. Controlling the herd size is problematic as the core use area is on ALE, where hunting is prohibited.

In 2005, WDFW worked with USFWS to draft an elk control plan that included tightly controlled hunting on ALE, but the Department of Energy (DOE), who owns the land, objected to public hunting on this site. As of 2010, DOE has not changed their position.

Management conclusions

Based on the available information, the Colockum bull ratio is below objective and the Yakima bull ratio is declining.

Hunter opportunity and harvest have been reduced in both herds. Achieving bull escapement in the Colockum is problematic. Recruitment of spike bulls through the hunting seasons has typically been low. High road density is likely contributing to elk vulnerability during damage and regular hunting seasons. A change in regulation (True-spike) is being tried in an attempt to increase bull escapement. However, without a significant increase in calf recruitment, achieving the objective of 12 to 20 bulls per 100 cows is unlikely in the short term.

Yearling bull escapement in the Yakima herd has averaged 35% over the last 10 years and has never been below 30%. In 2009, <20% of yearling bulls survived the season, despite a decrease in hunters. The season was slightly later than in previous years, but only by 3-6 days. For some reason, elk migrated out of the higher elevations, with greater security, to open winter range areas during the season. Even in years with significant snow, bull escapement had been much higher.

Extensive permit seasons may have slowed the Rattlesnake Hills sub herd growth, but not reduced it. Displacement of elk onto private land by the two recent wildfires (2000 & 2007) has proven to be effective at increasing harvest. However, wildfires are not desirable from a public property, safety, or habitat management perspective. Hazing and targeting problem elk has reduced, but not eliminated damage. Landowner tolerance and WDFW's ability to pay for damage are finite. The Rattlesnake Hills sub-herd must be reduced to <350. Landowners and hunters have not been targeting enough antlerless elk (Table 4). Bulls have averaged 50% of the total harvest the last 5-years. A controlled hunting program on ALE will ultimately be needed to reduce the sub herd and hopefully reduce the risk of crop damage .

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

	Colockum harvest		Yakima harvest		Regional hunter numbers				Regional hunter success			
Year	Bull	Cow	Bull	Cow	Modern	Muzz	Archery	Total	Modern	Muzz	Archery	Mean
1988	564	579	824	482	21,505	2,163	4,173	27,841	8	22	6	9
1989	797	735	1,492	1,152	23,054	2,530	4,473	30,057	15	17	9	14
1990	977	537	1,294	901	25,785	3,323	3,992	33,100	11	14	9	11
1991	621	761	1,595	1,016	NO	DATA			NO	DATA		
1992	611	652	1,348	1,246	26,928	4,086	5,865	36,879	11	10	7	10
1993	801	613	1,513	1,020	26,513	4,618	5,989	37,120	11	12	6	11
1994	550	433	782	770	26,328	5,503	6,114	37,945	6	9	7	7
1995	542	731	970	2,418	21,341	5,517	5,622	32,480	17	11	9	15
1996	469	660	631	892	20,288	6,190	4,819	31,297	9	6	8	8
1997	449	593	911	1,069	21,237	5,490	5,558	32,285	10	7	8	9
1998	335	255	717	426	18,253	3,918	3,701	25,872	6	9	9	7
1999	492	239	975	889	20,128	4,705	4,362	29,195	8	11	9	9
2000	392	214	1,140	1,058	25,383	4,554	5,549	35,486	7	8	10	8
2001	385	245	1,450	1,549	23,278	4,305	5,363	32,959	9	18	12	11
2002	379	358	1,184	1,442	22,204	4,791	6,177	33,172	11	10	8	10
2003	513	591	1,017	1,157	21,926	6,119	5,914	33,959	8	13	10	10
2004	424	393	1,083	1,373	20,888	3,342	6,521	30,751	11	13	9	11
2005	449	218	1,013	772	23,291	3,789	6,760	33,840	8	7	5	6.5
2006	418	302	927	1,093	20,654	3,497	5,972	30,123	10	7	6	9
2007	381	241	802	695	19,045	2,743	5,618	27,406	8	9	7.5	8
2008	327	282	799	826	18,552	2,898	5,578	27,028	8	7	7	8
2009	250	160	1,019	787	17,160	2,474	5,141	24,775	10	10	7	9
10 YR AVG	399	288	984	990	20,825	3,910	5,517	30,090	9	10	8	9

Table 2. Colockum elk winter composition 1990-2009.

	Antlerless		Bulls		Total	Ratios (per 100 cows)	
Year	Cow	Calves	Spike	Branched	Elk	Calves	Bulls
1992	559	213		23	795	38	4
1993	1,314	309	16	9	2,099	23	2
1994	1,439	607	22	6	2,074	42	2
1996	1,197	409	14	36	1,656	34	4
1997	1,597	486	88	66	2,237	30	10
1998	1,581	467	16	75	2,139	30	6
1999	2,807	854	88	60	3,809	30	5
2000	3,871	1,061	84	242	5,258 ± 2,048	27	8
2001	2,697	570	60	130	3,457 ± 940	21	7
2002	3,464	719	100	170	4,453 ± 543	21	8
2003	2,800	829	119	391	4,172[c] ± 566	30	18
2004	3,060	526	96	238	3,920 ± 445	17	11
2005	2,388	782	63	209	3,442 ± 168	33	11
2006	3,084	770	46	86	3,986 ± 391	25	4
2007	2,244	873	73	116	3,306 ± 160	39	8
2008	2,829	843	130	116	3,918	30	9
2009	3,723	732	80	85	4,,621 ± 21	20	4
2010	3,549	839	69	137	4,594	24	6

Table 3. Yakima elk winter composition 1990-2010.

	Antlerless		Bulls			Ratios (per 100 cows)	
Year	Cow	Calves	Spike	Branched	Total Elk	Calves	Bulls
1991	432	195		28	655	45	7
1992	940	266	8		1,214	28	1
1993	943	457	51	13	1,464	48	7
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	10,399	3,479	442	716	15,036 ± 4,334	33	11
2000	8,125	2,528	421	703	11,777 ± 1,242	31	14
2001	6,896	2,652	464	698	10,710 ± 830	38	17
2002	6,611	2,337	356	970	10,274 ± 609	35	20
2003	6,815	2,007	413	599	9,834 ± 983	29	15
2004	6,217	2,806	357	688	10,068 ± 457	45	17
2005	6,242	2,013	253	343	8,851 ± 843	32	10
2006	5,717	2,926	273	673	9,589 ± 270	51	17
2007	6,167	2,000	518	674	9,359	35	18
2008	6,001	2,368	290	820	9,478 ± 389	39	18
2009	6,076	1,816	267	737	9,133	30	17
2010	5,834	1,890	150	715	8,589	32	15

Table 4. Rattlesnake Hills Elk Harvest 1983-2009. Data derived through landowner and hunter interviews.

Year	Bulls	Antlerless	Unk	Total	% Bull
1985	2	1	0	3	67%
1986	10	2	1	13	77%
1987	6	8	0	14	43%
1988	4	9	0	13	31%
1989	8	3	0	11	73%
1990	3	0	0	3	100%
1991	14	0	0	14	100%
1992	8	0	0	8	100%
1993	9	5	0	14	64%
1994	18	15	0	33	55%
1995	17	3	0	20	85%
1996	17	2	0	19	89%
1997	17	3	0	20	85%
1998	18	15	0	33	55%
1999	22	41	38	101	22%
2000	95	104	13	212	45%
2001	17	58	0	75	23%
2002	45	8	0	53	85%
2003	46	33	0	79	58%
2004	17	47	0	64	27%
2005	29	27	0	56	52%
2006	36	59	0	95	38%
2007	59	78	0	137	43%
2008	24	19	0	43	56%
2009	28	22	0	50	56%
25-yr avg	22	21	2	47	61%
last 5 yrs avg	35	46	0	79	50%

ELK STATUS AND TREND REPORT: REGION 4

PMU 45 – GMUS 418, 437
PMU 46 – GMUS 448, 450

JENNIFER BOHANNON, Wildlife Biologist

Population objectives and guidelines

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

1) Manage the North Cascade elk herd using the best available science.

2) Increase elk population numbers in the North Cascade elk herd to or above the late 1980's estimated level of 1700 animals.

3) Promote expanding the North Cascade elk herd into potential ranges south of the Skagit River in the Sauk unit.

4) Re-establish tribal/state authorized hunting seasons.

5) Manage hunted elk units for spring bull ratios consistent with the statewide plan (currently 12 to 20 bulls per 100 cows) combined with overall bull mortality rates less than or equal to 50 percent.

6) Minimize elk damage to private lands.

7) Work cooperatively with Indian tribes to implement the North Cascade Elk Herd Plan.

8) Increase public awareness of elk and promote recreational uses of elk, including viewing and photographic opportunities.

9) Maintain elk habitat capability on U.S.D.A. Forest Service, WA. Department of Natural Resources, and private lands.

Hunting season and harvest trends

Conservation closures were established in both GMUs 418 and 437 in 1997 until 2007 when a bull only special permit hunt was initiated in GMU 418. In 2009 the total number of permits in 418 increased from 30 to 40 (20 spike only, 20 any bull) and were divided equally to state and tribal hunters. The 20 state permits were allocated as 4 archery (2 spike, 2 any bull), 4 muzzleloader (2 spike, 2 any bull), 10 modern firearm (6 spike, 4 any bull), 1 Westside raffle tag, and 1 auction tag. The auction tag holder hunted GMU 418 in 2009. Out of the 20 state permits in 418, 13 bulls (5 spike, 8 any bull) were harvested. Tribal hunters harvested 17 bulls using their permits.

General season state harvest during the 2009 season was 1 bull and 3 antlerless elk taken by archery in GMU 407, 10 bulls and 7 antlerless elk taken by archery hunters in Elk Area 4941 (GMU 437), and 2 bulls taken by modern firearm and 1 antlerless elk harvested by archery in GMU 448. Elk Area 4941 was closed to elk hunting effective December 28, 2009 to January 20, 2010 due to disorderly and unsportsmanlike conduct of archery hunters in the general hunt.

Because of problems with the muzzleloader general hunt in 4941 the previous year (2008), muzzleloader hunting in 4941 was by special permit only in 2009. Four elk (2 spikes, 2 cows) were harvested in the muzzleloader special permit hunt (Skagit River A) and 1 cow was harvested in February 2010 with a muzzleloader in the Master Hunter special permit hunt (Skagit River B). In addition, the Incentive Permit holder harvested a branch bull in Elk Area 4941 using a rifle.

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). In 2009, tribal harvest outside of GMU 418 consisted of 1 bull and 3 cows taken in GMU 437.

In the Acme area (GMU 418) 6 archery damage permits were issued to state and tribal hunters and 1 cow was harvested. Two cows were harvested with damage permits by state and tribal hunters in the Hwy 20 area of 418 and one cow in Elk Area 4941 in response to damage complaints.

There were 3 documented poaching/closed season violations between July 2009 and June 2010 with all three elk taken illegally in GMU 418. Other reported sources of human-related mortality include 8 elk-vehicle collisions on Hwy 20.

Surveys

A proposal for developing population estimation tools for the Nooksack elk herd was completed in April 2005 as part of a cooperative effort between WDFW and the NW Indian Fisheries Commission (McCorquodale et al 2005). Developing a sight-bias corrected model requires a known number of radio-marked elk of both sexes. Radio-marked cows in the Nooksack population came from previous research efforts and also from translocated animals moved from the Mount St. Helens herd. Nineteen resident adult bulls were darted from a helicopter and fitted with radio collars in 2005-2007 to facilitate development of the estimation model. Two additional bulls were fitted with radio collars in 2008. In 2008 and 2009, WDFW and Tribal biologists deployed 19 GPS (Global Positioning System) collars on a total of 15 elk as part of a Sauk-Suiattle project examining elk habitat use (4 animals received replacement collars). In April 2010, 10 elk (9 bulls, 1 cow) were captured and received VHF collars and 4 GPS collars were retrieved due to a malfunctioning remote release mechanism. The primary objective of the 2010 collaring effort was to increase the sample of collared bulls for mark-recapture population estimates.

Population status and trends

The North Cascade elk herd resulted from successful augmentations in 1946 and 1948 of eastern and western Washington elk stocks. The estimated peak population of 1700 elk occurred in 1984. It declined to a low of around 300 animals in 2002 (WDFW 2002). From 2003 to 2005, augmentations from the Mount St. Helens Wildlife Area added 98 cows and calves to the herd. The current population estimate for the core Nooksack herd based upon aerial surveys done in March and April 2010 is about 770 animals. Estimates of bull:cow and calf:cow ratios based on data from the aerial surveys are shown in Table 1.

Table 1. Late winter/early spring elk herd ratios per 100 cows (with 95% confidence intervals).

Year	Bulls:100 Cows	Branch:100 Cows	Calves:100 Cows
2007	25.9 (24.5, 27.2)	15.6 (15.3, 16.0)	38.0 (27.8, 48.4)
2008	31.1 (16.1, 46.1)	15.9 (3.3, 28.5)	41.8 (34.7, 48.9)
2009	30.4 (24.9, 35.9)	17.4 (13.4, 21.4)	35.8 (20.3, 51.3)
2010	23.5 (18.9, 28.1)	17.7 (13.7, 21.8)	25.8 (20.9, 30.6)

These estimates have not been corrected for sighting bias and the bull:cow ratios, particularly for the branch-antlered bulls, are likely to be biased low.

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 priority. The Sauk-Suiattle Tribe has put GPS collars on 15 Nooksack elk and will analyze their movements and habitat use over a 2-year period. 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.

The primary winter and summer range of the North Cascade herd on the south fork of the Nooksack River has gone through a series of ownership changes. In 2005, the Sierra Pacific Corporation purchased much of the core range. Sierra Pacific has closed the road system to the public with the exception of permitted elk hunters. Any increase in public access would probably have a negative effect on the herd.

Wildlife damage

Estimates of elk numbers occupying agricultural damage areas is estimated to be between 140 – 180 animals. 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. In the Acme area, efforts to trap and move problem animals, along with the issuance of damage permits, appear to have reduced the number of animals in using this area considerably. Despite these efforts, elk damage complaints in the traditional problem areas persist. Some of the translocated elk from Acme have added to a newer damage problem on the Sauk Prairie near Darrington, illustrating the difficulties in dealing with damage-oriented elk. From July 2009-June 2010 there were 20 documented elk damage complaints in the Hwy 20 corridor from Sedro-Woolley to Concrete. One damage claim of $5,690.00 for hay in GMU 418 resulted in payment of the full amount claimed. It is inevitable that there will be continuing conflict between increasing populations of humans and elk in low elevation agricultural areas.

Recreational Use

An elk public viewing area, developed in cooperation with The Skagit Land Trust and Skagit County, has been established along Highway 20 west of Concrete. The bull only special permit hunt will continue in GMU 418 in 2010 with 40 permits (20 spike, 20 any bull) divided equally between state and tribal hunters. In 2010, hunting in Elk Area 4941 will be limited to a

Master Hunter special permit hunt administered by a hunt coordinator. Permitted hunters will be contacted on an as-needed basis to address site specific elk damage. Extremely limited general hunt opportunities exist outside of the core elk herd range in GMUs 407 and 448.

Augmentation

A total of 98 elk have been transplanted from the Mount St. Helens Wildlife Area (MSHWA) since 2003. Projected population responses to augmentation of the North Cascade Elk Herd based upon multiple variables indicated that the transplanting of up to 100 animals was the most practical management option for accelerated recovery of the herd (WDFW 2002). The augmentation goal has been met and there are no plans for additional augmentations.

Management conclusions

Management recommendations for the Nooksack elk herd and associated habitat include the following:

- Complete 5-year update of the North Cascade (Nooksack) Elk Herd Plan.
- Evaluate the potential of establishing an elk damage special management corridor along the north side of Highway 20.
- Continue efforts to establish a statistically valid population estimator.
- Continue road closure agreements with DNR and Sierra Pacific Corp. in primary winter and summer range areas.
- Establish additional public viewing areas, when possible.
- Evaluate potential habitat in the Skagit River drainage.
- Maintain and/or upgrade existing habitat enhancement projects.
- Establish new habitat (forage enhancement and road closure) projects in key summer range areas.
- Maintain elk population numbers in agricultural damage areas at or below current estimated levels (140 - 180 animals).
- Complete a Habitat Landscape Evaluation for GMU 437 (Sauk).

Literature Cited

McCorquodale, S.M., M.A. Davison, and C. Madsen. 2005. Population Monitoring Tools for the North Cascades elk herd: A Proposal. Washington Department of Fish and Wildlife, Olympia. 23pp.

Washington Department of Fish and Wildlife. 2002. North Cascade (Nooksack) Elk Herd Plan. Wildlife Program, Washington Department of Fish and Wildlife, Olympia. 54pp.

ELK STATUS AND TREND REPORT: REGION 4

PMU 44 – GMU 454
PMU 47 – GMU 460
PMU 48 – GMU 485, 466

RUSSELL LINK, District 12 Wildlife Biologist

Population objectives and guidelines

Precise population estimates for elk (*Cervus elaphus*) in Game Management Units (GMUs) 454 and 460 are unavailable. Current estimates for elk numbers in these areas are based on limited surveys and knowledge of herd and sub-herd sizes. Current numbers have been reported as 200-250 elk in GMU 454 and 400-500 elk in GMU 460 (WDFW 2010). 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 of GMU 454.

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 >75 elk. The North Bend-Snoqualmie herd (Elk Area 4601) has grown to an estimated >300 animals (Erland, 2008. unpublished data). Occurrence varies on the extremes, with elk found from isolated wilderness areas and managed timberlands to suburban/urban populations.

The Green River elk herd in GMU 485 is a sub-population of the North Rainier Elk Herd that exhibited a decline during the 1990's. Elk historically occurred in the Green River watershed, 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. Elk population estimates for GMU 485 indicate a continuing increase since 2000 (Table 1) (WDFW unpubl. data 2001, Muckleshoot Indian Tribe unpubl. data 2006).

In 1984, GMU 485 became a unique management unit where access is limited by the City of Tacoma to protect water quality and eliminate unauthorized access. That same year GMU 485 became established as a quality bull area with additional high success antlerless hunts.

GMU 466, also part of the Green River watershed, consists of multiple ownerships including U.S. Forest Service lands. GMU 466 retains public access and hunting opportunities for bull elk with a 3-point minimum.

Hunting seasons and harvest trends

Management strategies vary for the different GMUs. GMU 454 has liberal seasons set for all weapon types. This is designed to keep vehicle-elk collisions to a minimum and maintain the population at a level that keeps damage complaints at an acceptable level. Harvest for years 1994-2009 in GMU 454 are presented in Fig. 1.

Hunting seasons in GMU 460 include a 3-point minimum for all weapon types. This is designed to allow the population to grow at a slow rate and for elk to expand their range. Antlerless harvest was eliminated since the 2000 season to enhance herd growth. Harvest for years 1994-2009 in GMU 460 is presented in Fig. 2.

GMU 466 continues to be included in the general season with 1998 being the last year an antlerless elk could be taken. GMU 466 elk intermix with GMU 485 elk, and collared 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, Mucleshoot Indian Tribe, pers. comm.).

In part due to the bull only hunt, total elk harvest in GMU 466 dropped substantially from a high of 30 (8 bull, 22 cow) to 5 (3 pt. minimum bulls) in 2002 with an average of 6 elk killed (range 3-8/season) between 1999 and 2007 (Fig. 3).

Tribal harvest as reported by the Northwest Indian Fisheries Commission (NWIFC) (see http://www.nwifc.org/wildlife/biggame.asp) in GMU 466, has also added to the total elk harvest for this GMU (Fig. 4). Some tribal harvest continues to include cows in this unit and cooperative efforts between the tribes and state are vital to increasing the future productivity of this sub-herd. (Note: the Muckleshoot Indian Tribe and other tribes have closed GMU 466 to antlerless hunting since 1998.) State late archery seasons have harvested relatively few elk. This is possibly due to the earlier tribal season and restricted access in this unit during the late season

because of snow combined with elk moving to lower elevations.

Beginning in 1992 the Muckleshoot Tribe began exercising treaty-hunting rights in the Green River Watershed. Subsequently, permit allocation changed to include the Tribe as follows: 1992 and 1993 - 15 elk (6 spike, 9 antlerless); 1994 - 31 elk (6 spike, 19 antlerless, 6 branch-antlered bulls); 1995 and 1996 - 43 elk (6 spike, 35 antlerless, 2 branch-antlered bulls). Permit numbers totaled 93 for both hunts combined. No permits were issued from 1997-2003 because of the continued population decline

In GMU 485 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 and Tacoma Water also contribute flight dollars for composition flights. Management decisions, permit levels, and allocation result from annual meetings between the Tribe, State, and Tacoma Water. Since 2000 herd composition surveys have shown an average bull:cow ratio of 23:100.

After 3 consecutive years of high bull:cow ratios and an increasing population trend, in consultation with the Muckleshoot Tribe, a 1 permit any bull hunt for all citizens and 1 any bull tag for the tribe was instituted for the 2004 season by special permit. This was a successful hunt with the tribe and the state each taking one bull. Subsequent survey flights indicated no change in the bull:cow ratio and the permit allocation of 1 elk each for the tribe and the state was instituted for the 2005 season. It was further agreed that the limited hunt would be biologically acceptable and not affect the future growth of the herd, while at the same time allowing hunter opportunity; the first since 1997.

During the 2005-9 seasons a limited entry 3 bull permit each for the state and the Muckleshoot Tribe has occurred.

Surveys

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

Prior to 1986 elk composition surveys for GMU 485 was primarily from the ground by foot or vehicle;

Table 1. GMU 485 Post-hunt elk herd composition, 1984-2009 (ratios per 100 cows).

Year	Total Bull	Calves	Pop Est ± 95%
1984	9	21	
1985	10	30	
1986	13	23	
1987	10	15	
1988	19	22	
1989	18	21	
1990	27	15	
1991	30	14	
1992	20	21	
1993	22	12	
1994	20	13	
1995	13.5	10	
1996	8.4	11.5	
1997 [a]	6.3	14.8	
1998 [a]	27	7	
1999 [a]	14.7	6.4	161 ± 27
2000 [a]	22.8	9.9	147 ± 14
2001 [a]	7.9	23.7	124 ± 45
2002 [a]	16.1	32.3	174 ± 55
2003 [a]	30.3 [b]	15.2	204 ± 34
2004 [a]	23	27	190 ± 25
2005 [a]	27	54	265 ± 62
2006 [a]	36	47	298 ± 62
2007 [a]	25	43	297 ± 37
2008 [a]	19	41	387 ± 103
2009 [a]	26	30	408 ± 90

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

standardized helicopter surveys are now the primary method.

Beginning in 1996, WDFW flights in June, July, and August were conducted to better assess calf production and to document and compare recruitment with traditional September composition surveys in GMU 485. Calf:cow ratios averaged 40:100 for June-August and declined to 26:100 by September.

Post-hunt (March) composition counts from 1985-2005 have shown a general increase in calf recruitment over the last four years (Table 1).

Population status and trend analysis

Based on limited, primarily anecdotal information, the elk population in GMU 454 is stable or declining slightly. A small number of elk from adjacent GMU 490 may use eastern portions of GMU 454 and southern portions of GMU 460. The elk population in GMU 460 is likely increasing slowly, with concentrated growth occurring in and around the City limits of North Bend and Snoqualmie.

In GMUs 485 and 466 there are no historic population estimates for comparison, but the long history and experience with this elk herd from field observations and

sub-herd location suggests this herd declined from about 1992 to 2001. Also, the total number of elk counted during post-hunt helicopter composition flights in March has shown a decline from 1992 thru 2003. However, the population in GMU 485 has increased since 2003.

Factors that may be affecting this herd are 1) a density dependent decline associated with changes in seral forest stages which reduces winter range carrying capacity and elk numbers exceeding carrying capacity; this can have a negative effect on recruitment and there are some data to support this hypothesis; 2) predation may be affecting recruitment; predation mortality may be additive and not compensatory. GMU 485 was closed to bear and mountain lion harvest until 2000; these predators are likely at maximum densities relative to prey availability. Analysis of mountain lion elk kills (n=28) found that selection for elk < 1 year old was statistically significant. Certainly a combination of these variables should be considered.

Calf mortality study

A calf mortality study was initiated in May of 1998 to determine the sources of elk calf mortality in GMUs 466 and 485. This was a cooperative study involving the Muckleshoot Indian Tribe, Tacoma Water, Weyerhaeuser and Plum Creek Timber Companies, the Army Corp of Engineers, and WDFW. The Muckleshoot Indian Tribe and WDFW continued with the study in 1999. The Muckleshoot Indian Tribe continued with the study through 2004.

Results suggested that predation, predominantly mountain lion, is the primary source of death to radio-equipped calves.

It has been noted that elk herds on the west side of the Cascade Mountains tend to have poor nutritional condition in general. Further research to distill differences in calf survival and both proximate and ultimate causes is necessary to understand these relationships (WDFW 2002, D.Vales, pers. comm. 2003).

Habitat condition and trend

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

The Green River Watershed (GMU 485) has interspersed ownership of private, state, and federal timberlands. Most of the timberlands are intensively managed and create a mosaic of seral stages, which means a mosaic of clearings mixed with different age stands of trees. Average rotation between successive harvests is about 60 years on private and state lands. These managed lands also contain remnant old growth forest, primarily in federal ownership, at higher elevations (> 2500 feet).

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

Habitat enhancement activities

Past and present work in GMU 485 has included cooperative projects with the U.S. Army Corp of Engineers, Tacoma Water, and the Muckleshoot Tribe to create open meadow grass habitat plots for elk. These mitigation measures were enacted to compensate for the anticipated loss of habitat from raising the Howard Hansen Dam and subsequent loss of habitat due to additional water storage.

In August 2000 a 250 acre forage enhancement project with the Rocky Mountain Elk Foundation, Tacoma Water, and the Bonneville Power Administration was completed. The project was highly successful and involved spraying and mowing of scotch broom along power line corridors to stimulate elk forage. The work and collaboration has continued with consecutive projects occurring through 2008. In summer of 2005, $30,000 from the combined sources of the Rocky Mountain Elk Foundation, the Muckleshoot Indian Tribe, BPA, and Tacoma Water was used to continue efforts on reducing scotch broom cover and improve forage quality. Over 550 acres have been treated mechanically and/or chemically to improve forage conditions on the range.

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

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 is a notable problem in some golf courses, Christmas tree farms, nurseries, and blueberry farms. Vehicle-elk collisions have increased as well. GMU 460 has good elk habitat, primarily on managed forestlands and the potential to support about 450-550 elk without damage concerns. However, damage complaints within the city limits of North Bend and Snoqualmie, and vehicle-elk collisions on I-90 are raising concerns. As a result, the Upper Snoqualmie Valley Elk Management Group was formed in 2008. The group is made up of citizens, WDFW wildlife and enforcement division personnel and city and county staff. The primary role of the group is to address the problems associated with the rapidly increasing herd.

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

Management conclusions

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

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

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. Encounters of elk and humans along the urban interface present an opportunity for building and expanding public interest in wildlife conservation.

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).

The GMU 485 permit hunt is one of Washington’s most popular because of the opportunity to harvest and view quality bulls coupled with the high success rates.

Cooperative efforts between Tacoma Water, the Muckleshoot Tribe, and WDFW will continue to assess herd composition and population numbers while enhancing habitat in order to achieve population objectives and improve forage conditions in GMU 485.

Literature cited

Erland H., 2008. Upper Snoqualmie Valley Elk Group Study Census Results For Winter Of 2008 and Plans for 2009 Census Data Collection North Bend. WA http://www.snoqualmievalleyelk.org/tiki-index.php?page=upperValleyElk

Muckleshoot Indian Tribe. 2006. Vales, D. Unpublished data.

Raedeke, K. J. 1995. Big game management plan for the Green River Watershed, Tacoma, Washington. Raedeke Associates, Inc. Seattle. 86pp.

Raedeke, K. J. and J. F. Lehmkuhl. 1984. Elk populations Mount Rainier National Park: status of range outside the park. Final Report, Cooperative Park Unit, Univ. of Wash., Seattle. 69pp.

Washington Dept. of Fish and Wildlife. 1987-2000. Spencer, R.D. Unpublished data and information, GMU 485.

Washington Dept. of Fish and Wildlife 2002. North Rainier Elk Herd Plan. Wildlife Program, WDFW, Olympia. 63 pp.

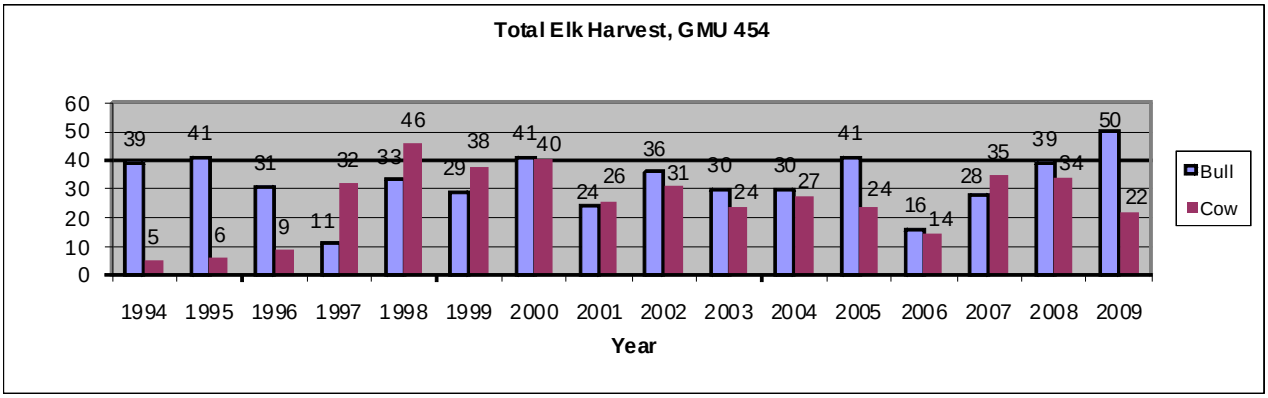


Figure 1. Annual elk harvest, GMU 454, 1994-2009 (all weapon types combined)

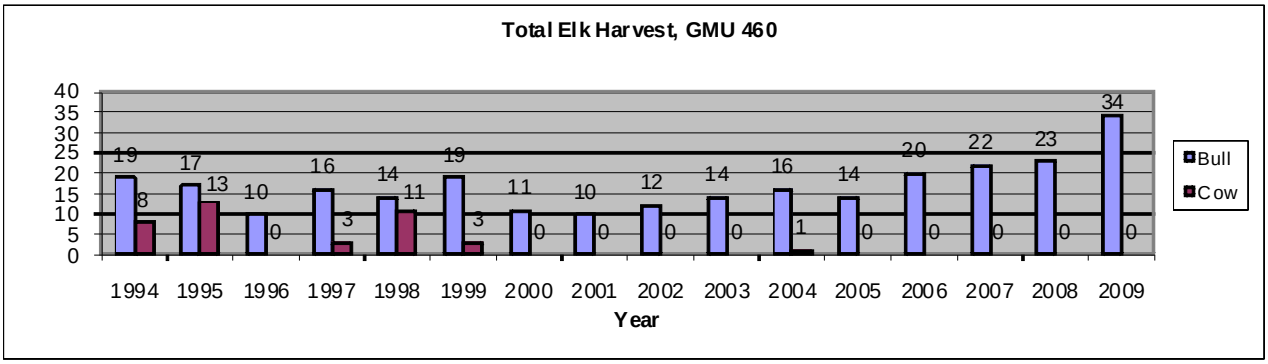


Figure 2. Annual elk harvest, GMU 460, 1994-2009 (all weapon types combined)

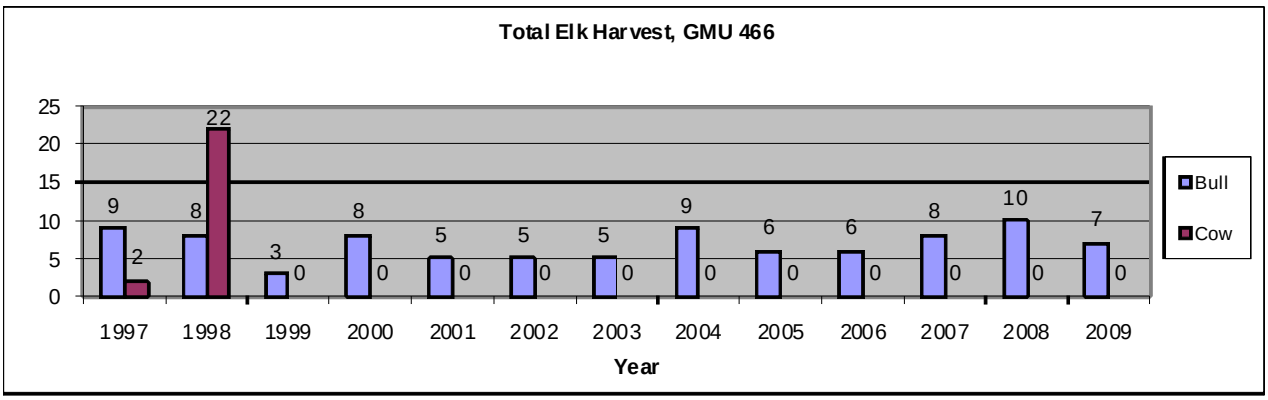


Figure 3. Annual elk harvest, GMU 466, 1997-2009 (all weapon types combined)
*2004 harvest reflects uncorrected raw data reported from hunter reports

ELK STATUS AND TREND REPORT: REGION 5

PMUS ALL, GMUS ALL

ANNEMARIE PRINCE, Wildlife Biologist
PATRICK MILLER, District Wildlife Biologist

Population Objectives/Guidelines

Region 5 contains all or part of three elk herds. The largest in the region and the state is the Mount Saint Helens (MSH) herd followed by the Willapa Hills herd and the South Rainier elk herd. Management plans for two of the herds, MSH and South Rainier have been written to date, and the Willapa Hills herd plan is in the process of being written. The Game Management Units (GMUs) comprising each herd are listed in Table 1.

Table 1. Region 5 elk herds and associated GMUs

Herd	GMUs
Mount Saint Helens	578, 388, 564, 568, 574, 522, 524, 554, 556, 560, 572, 505, 520, 550, 503
South Rainier	510, 513, 516, 667
Willapa Hills	506, 530, 501, 504, 684, 681, 673, 658, 672, 660, 663

The MSH elk herd plan was adopted in November of 2006. Before adoption it was submitted for public review and three public meetings were held to gather input from citizens. Many factors, which include increased human population, damage complaints, and declining habitat on United States Forest Service (USFS) and other timberlands, suggest a reduction of elk is needed to bring the herd into balance with the amount of available habitat (WDFW 2006). Other objectives specified in the MSH elk herd plan are to continue post-season bull ratio and mortality rate goals for open-entry, three-point, and permit-entry units that are consistent with state goals (WDFW 2008). The plan also outlines objectives to continue efforts to monitor and improve winter habitat and wintering elk populations in the Toutle River valley. In addition, plan goals address minimizing damage conflicts, increasing public appreciation of the elk resource, and using the best available science to monitor the herd.

The South Rainier elk herd plan was adopted in 2002 and is currently under revision. Specific goals of the South Rainier herd plan are to increase the estimated elk population in the eastern half of the herd's range in keeping with habitat limitations and landowner tolerances, to minimize elk damage to private property, to encourage/maintain the current habitat availability on USFS lands, and to maintain current elk winter range. Other goals include, managing the herd with the best available science and developing private/public partnerships to improve habitat and management of elk in the South Rainier herd.

The herd plan for the Willapa Hills is being developed and the management goals will follow the same general goals as the other two plans and the state-wide elk management bull ratios and bull mortality rates. Specific population objectives will be set to keep within habitat limitations and public tolerance.

General Hunting Seasons and Harvest Trends

In 2009 elk were managed under four principal harvest strategies in Region 5. From year to year, these strategies and/or what GMUs are in each of the categories can be modified to promote healthy elk populations and restrict elk numbers where they are not tolerated by the public, while offering a variety of hunting opportunities. These strategies are summarized for the modern firearm general season in the Table 2. General hunting seasons for archers and those choosing to hunt with muzzleloading firearms may differ from the listed strategies.

Table 2. Summary of modern firearm general season harvest strategies in Region 5

Antler Restriction	GMU (s)
3 pt. min.	503 , 505, 506, 510, 513, 516, 520, 530, 550, 560, 572
3 pt. min. or antlerless	501, 504
Any elk	564, 568, 574, 578, 388, 382
Permit only (limited entry, permit draw)	522, 524, 556

In Region 5, a total of 27,546 general season elk hunters spent 167,642 days afield in 2009 (Figure 1). Region 5 general season harvest was 2,517 elk and broken down by season and success as follows: 658/9% in archery, 478/11% in muzzleloader, and 1,342/9% in the modern firearm season; the other 39 elk were killed by multi-season permit holders. Overall, hunter success during the general season was

9%. The 2009 general season elk harvest of 2,517 was down 5% from the most current 10 year average (2000-2009) and is up 12% from the 2008 harvest. Table 3 lists a summary of the 2009 general season elk harvest in all Region 5 GMUs.

Table 3. Summary of general season elk harvest, all weapons combined, for 2009 in Region 5.

GMU	Bull Harvest	Cow Harvest	Total Harvest
388	7	5	12
501	18	46	64
503	29	25	54
504	36	66	102
505	61	44	105
506	174	59	229
510	11	0	11
513	77	0	77
516	123	0	123
520	223	98	321
530	175	51	226
550	243	28	271
554	8	5	13
560	239	58	297
564	34	77	111
568	32	42	74
572	91	32	123
574	34	55	89
578	76	138	214
TOTAL	**1,691**	**829**	**2,516**

Most units in Region 5 had higher harvest rates in the general season compared to 2008 with 388, 506, and 520 being the exceptions. GMU's 504 and 578 had the most notable increases as compared to 2008.

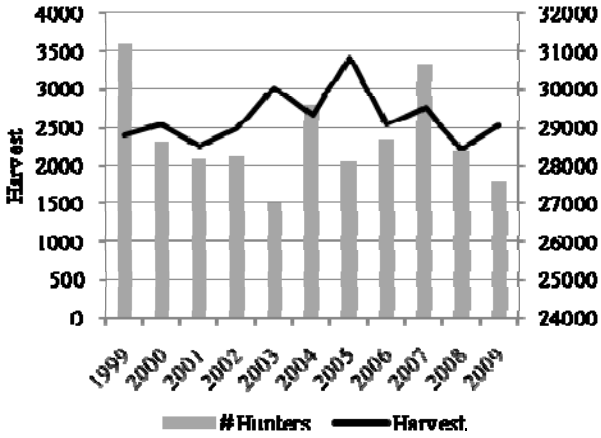


Figure 1: General season harvest and hunter numbers for all user groups from 1999-2009 in Region 5.

Permit Hunting Seasons and Harvest Trends

The harvest of antlerless elk in Region 5 is primarily allowed through the special permit system. Additionally, the opportunity to hunt elk is on a permit-only basis in GMUs 522, 524, and 556. Beginning in 2007, permit levels increased for modern firearm, muzzleloader and archery (both bull and antlerless permits) throughout the region. Starting in 2009, these permit levels started to level out and/or decrease in some parts of the region. A total of 2,406 special permits were distributed within 98 hunts in the Region for the 2009 season. Of this total number of permits, 1,853 were antlerless only permits (292 less than in 2008). The total permit harvest in 2009 for the region was 888. Some of these special permits were issued in designated elk areas and are designed to help minimize damage caused by elk.

Antlerless permits within the MSH herd GMUs have been substantially increased since 2007 for all seasons to assist with the population reduction goal. Permit hunts on the Mount St. Helens Wildlife Area within GMU 522 continued in 2009, but with opportunities extended to modern firearm, archery, and muzzleloader hunters for the first time. In addition to these new permits being offered, the boundary of the Elk Area 5099 was expanded to include more lands than just the Wildlife Area. Thirty-four antlerless and twenty-nine any elk permits were distributed among all of the user groups in Elk Area 5099.

In 2009 elk permit hunts were continued in 3 Elk Areas for the second year within the boundary of Mount St. Helens National Volcanic Monument. These hunts are aimed at reducing damage caused by elk to vegetation within the monument; the damage indicated elk numbers were too high. These hunts were all in GMU 522, and along with the additional Elk Area permits, account for the notable increase in harvest within this GMU as compared to previous years.

Table 4 lists the number of antlerless only elk permits and antlerless harvest for all user groups combined in Region 5 during 2009. Please note some of the antlerless harvest in the table below is made up of antlerless animals that were taken on a 3pt min/antlerless permit.

Table 4. Antlerless only permit levels and antlerless harvest for all user groups combined for 2009 in Region 5

GMU	Antlerless Permits	Antlerless Harvest
503	30	13
504	150	9
505	140	25
506	85	33
520	205	81
524	150	65
522	55	21
530	155	81
550	275	128
554	54	19
556	220	96
560	230	73
572	90	28
578	9	5
TOTAL	**1,848**	**677**

Three GMUs within Region 5 are permit entry only units for all elk hunting. All of these GMUs are within the MSH herd area and two of them (524 and 556) are designed to be quality hunt area, which are highly sought after by hunters. These limited entry units had a combined success rate of 45% in 2009.

Table. 5 Permit levels and associated harvest for all weapons combined in permit entry only GMUs in Region 5 in 2009

GMU	Number of Permits (Cow/Any Elk /Bull))	Elk Harvest (Cow/Bull)	Success Rate
522	90 (51/39/0)	38 (21/17)	42%
524	181 (150/0/31)	90 (65/25)	50%
556	461 (220/0/241)	199 (96/103)	43%

Surveys

A new research project has been initiated in the region, and it is anticipated that a more robust method of population estimation will be developed. Based on this new initiative, Region 5 began flying elk composition surveys in the post-season beginning in the winter/spring of 2009. The limiting factor of how much area is covered by these surveys is still semi-budget related, but has more to do with this new approach being refined within specific/ representative GMUs before it is deployed throughout the entire region.

GMUs surveyed by WDFW in the spring of 2010 include 522, 524, 556, 550, 520, 554, 560, and 572. Two separate flights were conducted within GMUs 520, 522, 524, 556, and 550 (flights 1 and 2) and a single flight was flown in GMUs 554, 560, and 572 (flight 3); all of these GMUs are within the MSH elk herd area. The number and classification of elk seen on these flights are summarized below.

Table 6. Summary of winter/spring elk flights in Region 5 for 2010

Flight	Calf	Cow	Spike	Rag	Mature Bull	Unk	Total
1	753	1881	217	129	199	166	3346
2	864	2125	216	154	208	44	3610
3	51	133	10	2	0	0	196

In addition to the composition surveys discussed above, an annual winter elk mortality survey is conducted on the Mount St. Helens Wildlife Area in the spring or post-winter. Throughout the winter, elk counts are performed from a fixed point overlooking the Wildlife Area once a month to determine elk use and winter severity. These count and winter severity data in combination with other criteria are then used to determine whether an emergency winter feeding effort for elk will be initiated on the Wildlife Area. Figure 2 shows winter elk mortality for the past ten years and the peak winter elk counts for the past five years on the mudflow portion of the Wildlife Area.

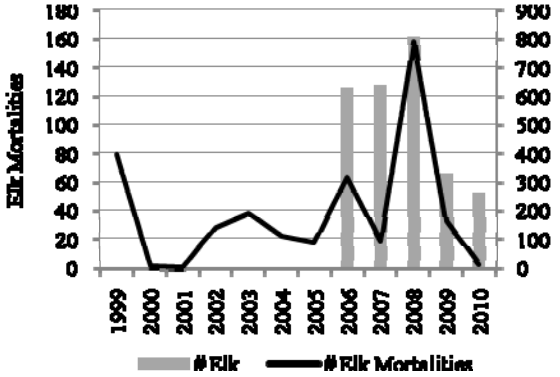


Figure 2: Elk mortality and high elk counts on the mudflow portion of the Mt. St. Helens Wildlife Area 1999-2010

Data on elk body condition has been gathered at times in the past in conjunction with elk relocation and capture efforts. In 2009 an effort began to better understand fat levels and body condition by requesting antlerless hunters in the St Helens elk herd to voluntarily provide certain organs from harvested elk to WDFW for analyses. Mailings with instructions for which organ to collect, diagrams of organs, tooth envelopes and locations of drop points were mailed to 634 permit holders (Table 7). One hundred and fifty samples were returned with all or parts of the desired organs. Although the return rate was reasonable, we intend to collect these samples again in 2010 to

compliment the data set and improve accuracy of the scores.

Table 7. Summary of elk body condition parts collection in Region 5 for 2009.

GMU	No. of Mailings to Hunters	Returned Samples
520	100	12
522	14	7
524	70	24
550	120	26
556	120	41
560	150	30
572	60	10

Population Status and Trend

In the past, several sources of information were used to assess elk herd size and composition. Most of these data come from harvest reports and annual aerial surveys. For 15 years (ending in 2007) estimates of size and composition of Region 5 elk herds were derived using a method known as the *Sex-Age-Kill* (SAK) model. The SAK model used fall aerial survey data to estimate components of the elk population (bulls, cows, and juveniles). Unfortunately, through time, this method did not perform adequately to meet Region 5's need for reliable information. This was mostly due to assumptions and limitations inherent to the method.

Mt. Saint Helens Herd

Because of the need for essential information about the size, composition, and dynamics of the MSH elk herd, Region 5 opted in 2007 to begin planning for a new population monitoring strategy. This strategy was implemented in 2008 in a cooperative venture of the Olympia Deer and Elk Section and Region 5 staff biologists. In support of the development of a new monitoring strategy and with the intent to produce more reliable estimates promptly, WDFW biologists radiomarked 55 elk in February 2009 and 35 in February 2010 across a northwestern core area of the MSH elk herd (GMUs 520, 522, 524, 550, and 556). Subsequently, in March and April 2009 and 2010 project staff conducted 2 weeks of intensive aerial surveys across the 5-GMU study area. These resighting flights are being used to generate statistically robust estimates of elk numbers in the survey area using sophisticated mark-resight models. The data collected will also be used to explore the possibility of deriving sightability-correction models for future aerial surveys of the entire MSH elk herd. The current investigative phase of this effort is expected to last 3 years. The intent is to refine a methodology over the 5-GMU focal area that can be applied at the larger herd-scale.

In the short term, the surveys conducted in the spring of 2009 and 2010 do provide an evaluation of current elk management strategy in meeting the sex ratio goals outlined in the Game Management Plan (GMP) (WDFW 2008). Specifically, the GMP calls for post-season bull to cow ratios of 12-20 bulls per 100 cows, and 2-10% mature bulls within the bull segment of the population. Table 7 lists the raw or uncorrected sex and age ratios for each of the spring flights. It should be noted that these are not "true" or corrected ratios and may not be representative of the population as a whole.

Table 8: Raw (not corrected) sex and age ratios for winter/spring elk flights in 2009-2010 for Region 5.

Flight	GMUs	Bull:Cow	Calf:Cow	% Mature Bulls
1	520, 522, 524, 556, 550	17:100	40:100	37%
2	520, 522, 524, 556, 550	17:100	41:100	36%
3	554, 560, 568, 572	2:100	38:100	0%

South Rainier Herd

The Puyallup Tribe of Indians developed sightability model for estimating elk abundance (Gilbert and Moeller 2008). Sightability models attempt to correct for visibility bias by standardizing observation factors under the control of the observers (flight speed, number of observers, etc.) and providing a measure of visibility bias for environmental factors not under the control of the observers (group size, obscuring vegetation cover, snow cover, animal behavior, etc.). To facilitate development of the model, the Tribe used radio-marked cow elk that were collared as part of research being conducted by the Tribe. Estimates of elk numbers in the areas surveyed are based on spring helicopter surveys, where the data collected are entered into the computer model. The measure of the visibility bias or correction factor is then used to adjust raw counts of animals observed to an unbiased estimate of population size and structure. Although the model was developed by the Tribe and survey funding is provided by the Tribe and Tribal wildlife grants (USFWS and BIA), WDFW staff participated and contributed to survey efforts in both 2005 and 2006. Current South Rainier herd population estimates derived by the Puyallup Tribe are in Table 8. It should be noted that WDFW did not participate in developing or reviewing this model or analyzing the data collected during

survey efforts. This information has been provided by the Puyallup tribe to supplement the South Rainier herd section of this report.

Table 9: Spring Population Estimates for the South Rainier Herd, Puyallup Tribe of Indians, 2006-2010

Year	Population Estimate
2006	938
2007	964
2008	815
2009	1084

Willapa Hills Herd

For the Willapa Hills herd, current population status is not known. Trend information can be gathered through harvest success and from past survey efforts. A desire to monitor all of the elk populations within the region using more sophisticated techniques currently requires the region to focus on the MSH herd. Hopefully, Region 5 can use this refined technique in other herd areas in the future.

Habitat Condition and Trend

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

Some mitigation for the loss of winter range along the North Fork Lewis River watershed has been addressed in the Lewis River Wildlife Habitat Management Plan (Pacificorps Energy 2008). The Plan is a cooperative management agreement between Pacificorps, the utility company managing Merwin, Swift, and Yale Reservoirs, the Rocky Mountain Elk Foundation (RMEF), the Cowlitz Tribe of Indians, the USFS, the surrounding counties, and WDFW. The plan is currently in year 2 of 50 and emphasizes elk as a primary species. These mitigation efforts benefit the southern portion of the MSH elk herd.

Many of the management issues for the northern part of the MSH elk herd stem from the natural and management-induced changes on the landscape since the 1980 eruption of Mount St. Helens. During the early post-eruption phase, the recovering landscape was dominated by early seral habitats. Such habitat provided excellent foraging opportunities for elk. However, as much of the affected landscape is industrial timberland, the forest landowners undertook a massive reforestation effort to restore the timber assets they lost in 1980. In the 3 decades since, these second-growth forests have grown up and the canopy has closed, reducing the amount of quality elk foraging habitat. Renewed logging has created a current mosaic of clearcuts, relatively open young regeneration stands, and low forage-potential closed canopy forests. Post-logging treatments on industrial timberland (*i.e.*, herbicide application) often reduce the forage values produced by logging relative to what would naturally occur (*e.g.*, what occurred on the early post-eruption landscape). In addition, the combination of herbivory and these techniques may be resulting in suppressed forage production. Limited logging on federal forests in the last two decades has led to a generally declining trend in habitat quality for elk, and a large tract of federal land within the Mount St. Helens Monument has retained its dramatically altered character near the volcano (*i.e.*, is generally poor elk habitat).

Two of the biggest factors affecting the habitat of the South Rainier herd are the extensive development of LSR's within the Gifford Pinchot National Forest and the continual residential development of the herd winter range along the Cowlitz River Valley. Elk numbers remain too high in the valley for public tolerance; however, it is the prime winter range for the herd.

Commercial forest owners in two Willapa Hills units (530 and 506) have increased timber harvest activity in the past 5 years and much more acreage is now in early successional stages.

Habitat Enhancement

Mt. St. Helens Herd

The WDFW continues to take steps to enhance forage quality on the North Toutle mudflow through plantings and fertilization. This year WDFW staff and volunteers completed several projects totaling approximately 100 acres of seeding of unproductive areas to improve forage availability. An additional 60 acres were limed and fertilized to maintain and improve existing forage sites.

Erosion by the North Toutle River has become a concern in recent years and WDFW staff secured the funding and implemented a bank stabilization project along ½ mile of the river. This action will hopefully prevent future loss of winter range and a road on the MSHWA.

An important addition of land to the WDFW Mt. St. Helens Wildlife Area took place in 2009 with the addition of 3,816 acres of land thorough a no cost transfer from Washington Department of Transportation.

Elk forage enhancements are a primary focus of the mitigation efforts relative to the North Fork Lewis River discussed earlier. Activities on the mitigation lands managed by Pacificorps include forest canopy removal, fertilization, establishment of forage plots, treatment of invasive plants, maintenance of farmlands and meadows for elk habitat and creation of meadows and openings within the forested landscape. These activities are conducted on approximately 10,000 acres surrounding the reservoirs.

Habitat improvements have also occurred on the federally managed lands within the MSH elk herd area. These projects have primarily consisted of thinning forest stands to foster development of older-age forests with a robust understory component. The projects have totaled several hundred acres in the past several years and have been completed in a cooperative arrangement between the USFS, RMEF, and WDFW.

South Rainier Herd

Past and present work in GMUs 513 and 516 has included cooperative projects with the U.S. Forest Service (Gifford Pinchot), the Puyallup Tribe of Indians, and the Rocky Mountain Elk Foundation (RMEF) to pre-commercially thin summer and winter range areas to improve forage for the South Rainier elk herd. Since 2004, more than 866 acres of wide-spaced thinning projects have been completed on both summer and winter range areas. Funding for 2009-2010 has been secured (via USFWS Tribal Wildlife Grants, the Puyallup Tribe of Indians, Rocky Mountain Elk Foundation, and the USFS) and will result in an additional 500 acres of summer range habitat improvements. These projects will continue to provide winter and summer forage for elk.

Wildlife Damage

Complaints of damage to both replanted forest areas and agricultural crops are increasing. These complaints come from all over Region 5. Agricultural crop damage complaints are concentrated in the valleys; the historical winter range areas for elk within the region. To mitigate the loss of agricultural products in these high damage areas, regional biologists along with WDFW law enforcement have created special late and early season damage hunts within specified elk areas. These hunts are designed to decrease the herd causing the damage and to haze the elk from the area.

Unfortunately, the herds causing the most damage seem to be resident herds that have lost their historical pattern of movement. As long as high quality forage exists within the valleys year-round, the elk do not move far from the agricultural lands.

Current Research Projects

In recent time winter elk mortality has been an issue of high public interest. Public attention has focused on the very visible Toutle River mudflow, particularly on the WDFW managed Mount St. Helens Wildlife Area. Periodic pulses of overwinter elk mortality have occurred here and have always generated intense media interest.

The new effort to research population monitoring protocols within the MSH herd area will yield direct estimates of annual elk mortality. The fate of radiocollared elk forms the basis for these estimates. This will allow a more formal test of whether observations made regarding overwinter elk mortality on the mudflow are actually typical of herd-wide patterns or represent a phenomenon restricted to the highly impacted mudflow. This is a key management question that will help define logical management strategies for the larger MSH elk herd.

During the captures of elk for radiocollaring, data are being collected on elk age, reproductive status, and physical condition (fat level). These data are valuable for assessing animal "*performance*", which provides a basis for inference about habitat quality these elk are exploiting. The data will be looked at to discern typical or atypical patterns of condition across the landscape. Conclusions regarding body condition and productivity of MSH elk will be evaluated given additional years of data.

Another aspect of the body condition data being collected from the MSH elk herd was initiated this year. During the 2009 modern firearm hunting season, cow elk permit holders in the MSH herd area were sent packets for submittal of their harvested cow elk heart, kidneys, and a piece of liver. Body condition in elk can be evaluated by the amount of fat surrounding the heart and kidneys and the piece of liver was used in

conjunction with a piece of kidney to establish a westside elk trace mineral dataset. WDFW mailed out 634 packets to permit holders in 2009 and received 150 samples. This type of data collection over a broad geographic area is key to understanding the condition of this herd. Additional collections are planned for subsequent years that will provide valuable information to the larger picture of understanding the MSH elk herd.

A research project that focuses on habitat use of the South Rainier elk herd is currently being completed by the Puyallup Tribal Wildlife Program. The research data will be available to supplement the South Rainier elk herd plan updates slated for 2009-2010. This habitat research will contribute to a greater understanding of the South Rainier elk herd.

Also, in the South Rainier elk herd area and specifically within Mt. Rainier National Park, a cooperative effort lead by the U.S. Geological Survey (USGS), and partnering with Mt. Rainier National Park, WDFW, Muckleshoot Tribe of Indians, and the Puyallup Tribe of Indians began in 2008 and is aimed at producing a better estimate of elk in the park in the fall months. Fall surveys are flown within the southern and northern portions of the park, with each partnering entity contributing one flight. A double-observer method is used and basic compositional data are recorded on the flights with the goal of developing a robust population estimate of elk within the park, more directly in the sub-alpine zone. This is part of a larger effort focusing on both the North and South Rainier elk herds within the park.

Management Conclusions

Recent survey coverage has been inadequate to provide representative sampling of most parts of the region. The elk harvest (success ratio) in the region continues to be fairly consistent with years past, so no drastic change in elk numbers can be detected through harvest numbers. With recent harsh winters and increased permit levels within the MSH herd, we believe we are approaching our management goals in this herd. Permit levels remain high, but are being adjusted every year to ensure we do not over achieve our reduction goal. New research efforts should give us a better estimate of population levels and condition of the MSH elk herd.

The South Rainier elk herd plan is being revised and the Willapa Hills plan is being drafted in the upcoming year and the new goals presented in those plans will guide the future management and monitoring of those herds.

Literature cited

Bender, L. C., and R. D. Spencer. 1999. Estimating elk population size by reconstruction from harvest data and herd ratios. Wildl. Soc. Bull. 27:636-645.

Gilbert, B. A. and Barbara J. Moeller. 2008. Modeling elk sightability bias of aerial surveys during winter in the central Cascades. Northwest Science, 82:3, 222-228.

Pacificorps Energy, 2008. Lewis River Wildlife Habitat Management Plan. Lewis River Hydroelectric Projects Federal Energy Regulatory Commission Project NOS. 935, 2071 and 2011.

WDFW. 2006. Mount Saint Helens Elk Herd Plan. Wildlife Management Program, WDFW, Olympia. 38pp.

WDFW. 2008. Game Management Plan. Washington Department of Fish and Wildlife. Olympia, WA. USA. 136p.

ELK STATUS AND TREND REPORT: REGION 6

PMUS 61-67, GMUS 601-699

S. M. HARRIS, Wildlife Biologist

Population Objectives and Guidelines

Each elk herd is managed under a separate elk herd management plan. Each elk herd management plan is consistent with the objectives provided in the Game Management Plan 2009-2015. Overall management goals are to increase or maintain elk populations in suitable habitat with a sustainable harvest while addressing localized elk damage complaints. Long term management strategies for Game Management Units (GMUs) are being cooperatively developed and implemented with individual treaty tribes. This includes a variety of recreational, educational, aesthetic purposes, including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing, and photography while ensuring healthy productive populations and ecosystem integrity. Region 6 contains all or part of four elk herds (Table 1).

Table 1: Region 6 elk herds and associated GMUs. Only the Olympic herd resides entirely within Region 6.

Herd	GMUs
North Rainier	667
South Rainier	652, 653
Willapa Hills	658, 663, 672, 673, 681, 684, 699
Olympic	601, 602, 603, 607,612, 615, 618, 621, 624, 636, 638, 642, 648, 651, 660

Hunting seasons and harvest trends

The three-point minimum antler restriction was retained for the 2009 hunting season. No significant changes were made for the 2009 hunting seasons. Special permits were issued to all user groups including Master Hunters, hunters with disabilities, and youth hunters. Special permits are issued for a variety of reasons: to address damage complaints; to provide an opportunity to harvest a cow in GMU's where sustainable; and to provide opportunity for quality bull hunts.

Region-wide harvest of elk was 1,260 (Bull = 916, Cow = 344). This represents an increase of 16 percent over 2008 for general and special permit seasons. From 2000 through 2009 the elk harvest for Region 6 shows a non-significant ($p > 0.05$) increasing trend (Figure 1).

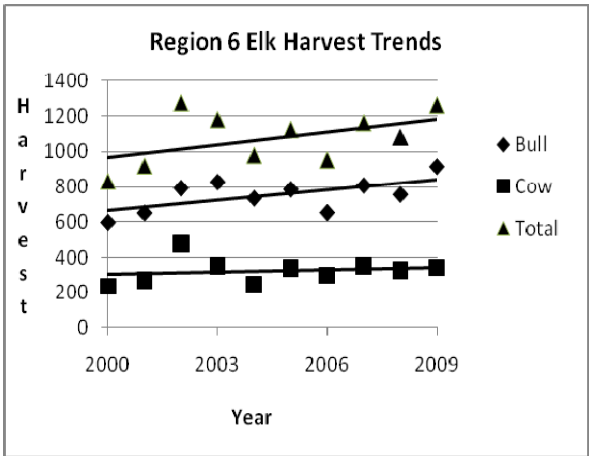


Figure 1: Elk harvest trends for Region 6 from 2000 to 2009.

Population Management Unit (PMU) 61 currently accounts for greater than fifty-percent of the total harvest in Region 6 (Table 2).

Table 2: Relative percent of total harvest for Region 6 by PMU.

Relative Percent of Harvest by PMU						
PMU	Bull	%	Cow	%	Total	%
61	455	50%	184	53%	639	51%
62	120	13%	89	26%	209	17%
63	67	7%	27	8%	94	7%
64	13	1%	5	1%	18	1%
65	139	15%	4	1%	143	11%
66	58	6%	2	1%	60	5%
67	64	7%	33	10%	97	8%
Total	916	100%	344	100%	1260	100%

Harvest trend for PMU 61 from 2000 though 2009 shows a non-significant ($p > 0.05$) increase in total

harvest and bull harvest while cow harvest shows a non-significant ($p > 0.05$) decreasing trend (Figure 2). PMU 61 consists of GMU's 658, 660, 663, 672, 673, 681, 684, 699 and lies with in the range of the Willapa hills elk herd.

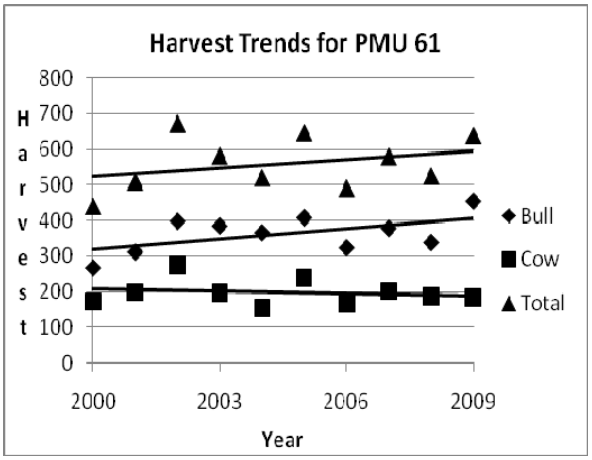


Figure 2: Chart showing elk harvest trends for PMU 61.

Harvest trends for PMU 62 show a non-significant ($p > 0.05$) increasing trend in total elk and cow harvest while bull harvest shows a significant ($p < 0.05$) increasing trend from 2000 through 2009 (Figure 3). PMU 62 consists of GMU's 652, 666, and 667. GMU 652 lies within the range of the North Rainier elk herd and GMU 667 lies within the range of the South Rainier elk herd.

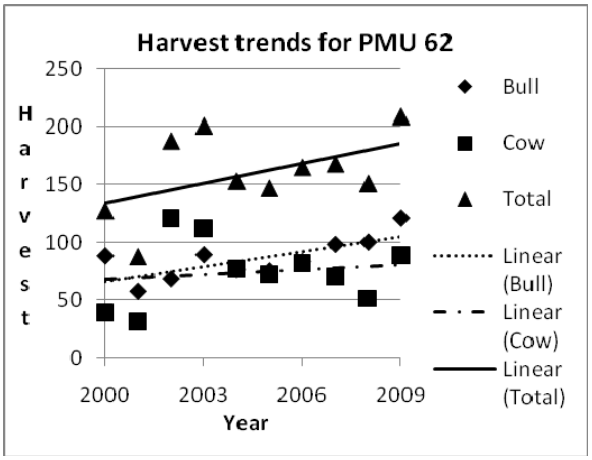


Figure 3: Chart showing elk harvest trends for PMU 62.

Harvest trends for PMU 63 shows a non-significant ($p > 0.05$) increase in total elk harvest and cow harvest while bull harvest shows a non-significant ($p > 0.05$) decreasing trend from 2000 through 2009 (Figure 4). The increase in cow harvest is partially due to special permits issued to address damage complaints in agricultural areas. PMU 63 consists of GMU's 642, 648, and 651 and lies within the range of the Olympic elk herd.

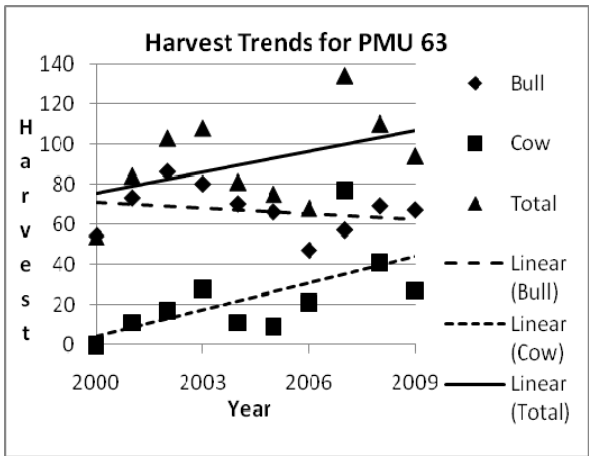


Figure 4: Chart showing harvest trend for PMU 63

Harvest trends for PMU 64 show non-significant ($p > 0.05$) declining trends in overall harvest and harvest of bulls and cows from 2000 through 2009 (Figure 5). PMU consists of GMU's 621, 624, 627, and 633 and lies within the range of the Olympic elk herd.

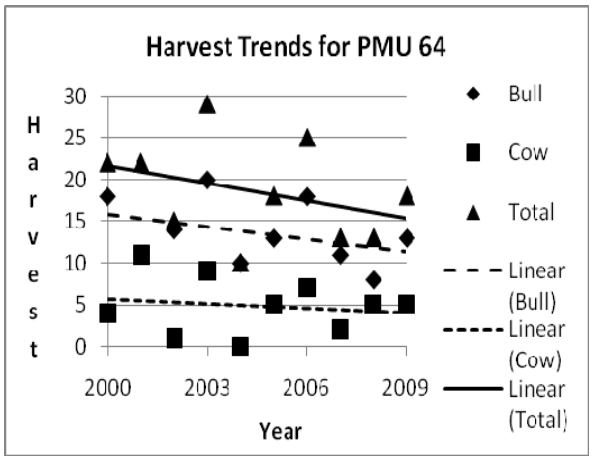


Figure 5: Chart showing harvest trends for PMU 64.

Harvest trends for PMU 65 show a significant increase ($p < 0.05$) in total harvest and harvest of bulls and cows from 2000 through 2009 (Figure 6). PMU 65 consists of GMU's 607, 615, 618, 636, and 638 and lies within the range of the Olympic elk herd.

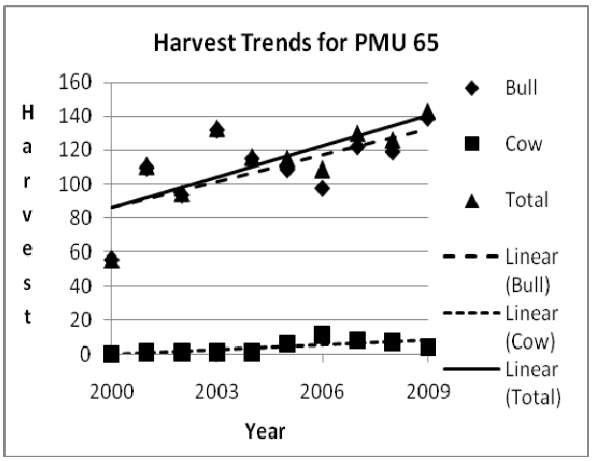


Figure 6: Chart showing elk harvest trends for PMU 65.

Harvest trends for PMU 66 show non-significant ($p > 0.05$) increases from 2000 through 2009 (Figure 7). PMU 66 consists of GMU's 601, 602, 603, and 612 and lies within the range of the Olympic elk herd.

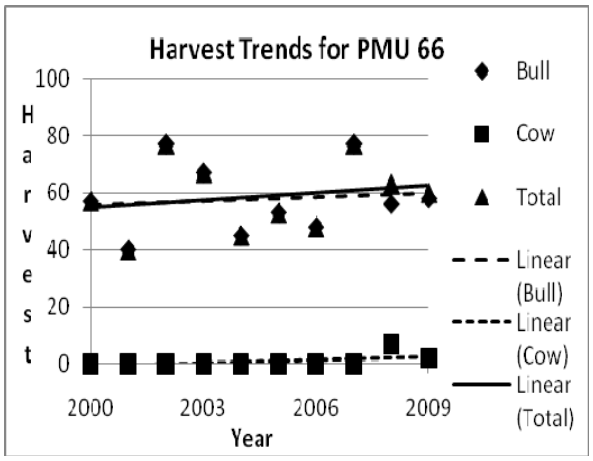


Figure 7: Chart showing harvest trends for PMU 66.

Harvest trends for PMU 67 show non-significant ($p > 0.05$) increases from 2000 through 2009 (Figure 8). PMU 67 consists of GMU's 653 and 654 and lies within the range of the North Rainier elk herd.

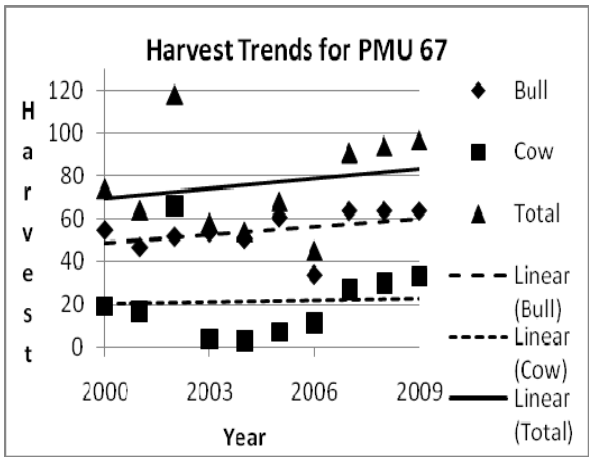


Figure 8: Chart showing harvest trends for PMU 67.

Surveys

The WDFW conducts aerial and ground surveys as budgeting and weather conditions permit. Because of this they are not able to consistently survey every GMU. In 2009 the Treaty Tribes on the Olympic Peninsula and Region 6 staff began working cooperatively to share GMU survey responsibilities and share data in a composite data base. This has greatly increased the number of GMU's surveyed and the amount of data available. This should lead to a better understanding of herd composition trends in the future.

Results of pre-season surveys conducted by the WDFW and Tribal co-managers are summarized in Table 3. Surveys are conducted from late August though September. Sometimes they are conducted after the early archery season because of scheduling and weather conflicts. Pre-season surveys can be good indicators of calf production and well as bull ratios in a population. However, because these surveys take place at a time of year when adult bulls may mix more readily and sub-adult bulls may be pushed away from the herds the bull ratios are at best a conservative estimate.

Table 3: Results of pre-season surveys conducted in Region 6. GMU's associated with an "*" indicate data provided by Tribal co-manager.

2009 Pre-Season Survey Ratios Per 100 Cows					
PMU	GMU	Calf	Spike	Branch	T. Bull
61	673	26	12	2	14
63	648*	42	12	10	22
65	607*	41	10	4	14
66	602*	43	15	15	28
66	603*	54	8	46	54
66	612*	61	6	9	15

Results of post-season surveys are summarized in Table 4: Surveys are usually conducted from mid March through April prior to spring calving.

Post-season surveys are useful in estimating over winter survival of calves but, not a good indicator of adult bull ratios since bulls older than yearlings are less likely to mix freely at this time of year.

Table 4: Results of Post-season surveys conducted in Region 6. GMU's associated with "*" indicate data provided by Tribal co-manager.

2010 Post-Season Surveys Ratios Per 100 Cows					
PMU	GMU	Calf	Spike	Branch	T. Bull
63*	648	32	6	0	6
63*	651	45	11	4	14
65*	607	29	9	4	10
65*	615	31	20	6	26
65*	638	16	20	5	25
66*	601	37	13	1	14
66*	602	29	10	3	13
66*	603	61	9	15	24
66*	612	32	13	1	14

Population status and trend analysis

Harvest trends in Region 6 continue to increase slightly but not significantly, while herd ratios appear to remain within management goals. Over winter calf survival appears to be showing a non-significant ($p > 0.05$) minor increasing trend (Table 5 & Figure 8). While current population estimates are not available these trends indicate that the population in Region 6 is likely to be stable to increasing. Several factors are likely to contribute to these trends. Road closure programs on public and private land as well as increased logging on state and private lands. Much of these managed forests were at a stage of regeneration that prohibited and or inhibited forage species growth. This increase logging has increased available forage for elk. Overall the populations appear to be stable to increasing throughout the region.

Table 5: Post-season calf ratios per 100 cows for surveyed GMU's . GMU's that were not surveyed in some years are indicated by an "n.s,".

Post-season Calf Ratios for Surveyed GMU's							
Year	601	602	607	612	648	658	673
2001	n.s.	n.s.	n.s.	n.s.	33	n.s.	40
2002	27	20	n.s.	n.s.	n.s.	n.s.	n.s.
2003	33	26	24	n.s.	40	n.s.	38
2004	44	26	29	37	28	n.s.	34
2005	40	28	33	38	21	n.s.	40
2006	n.s.	33	31	30	n.s.	30	30
2007	40	22	28	19	n.s.	n.s.	31
2008	54	30	39	33	n.s.	42	41
2009	n.s.	29	30	30	35	23	26

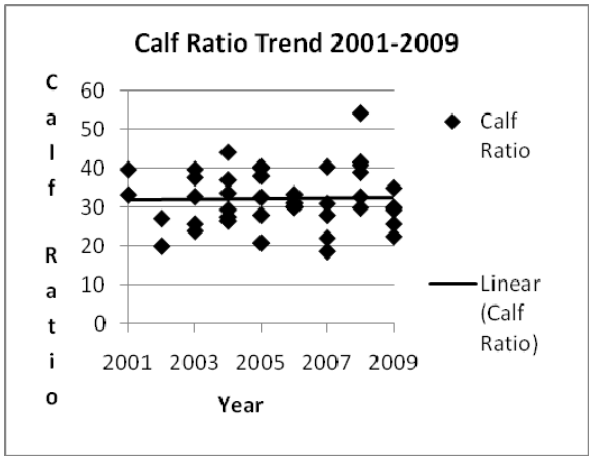


Figure 8: Post-season calf ratio trend per 100 cows for surveyed GMU's .

Research

The Williams Creek (GMU 673) bull elk mortality study, initiated in October 2005, was completed

during this reporting period. This report is currently under review and not finalized. Initial findings suggest that the preponderance of bull mortality occurs during established hunting seasons. Results of this study will be reviewed to determine if current hunting related bull mortality is meeting escapement goals and if additional actions are required to meet these goals.

Habitat condition and trend

Overall habitat conditions are improving in the region. In recent years logging has increased in GMU's resulting in improved conditions on state and private managed timber lands. This has resulted in increased acreage in an early stage of regeneration. This trend is likely to continue for the next several years. Also the U.S. forest service has began variable density thinning projects in several areas on the Olympic peninsula that should result in slightly better forage conditions in some areas of the National forests.

Augmentation and habitat enhancement

The WDFW currently manages over 500 acres of high quality elk forage in Region 6. In addition to the elk forage plantings several hundred more acres are managed for water fowl and other species that elk benefit from. WDFW continues to work with private landowners on habitat management and forage plantings for elk.

Elk damage

Elk damage continues to be an issue with damage to agricultural property and crops as well as tree damage to private timber lands. The problems areas are addressed through increase harvest opportunities via special permits and damage hunts for master hunters. In extreme circumstances land owners are reimbursed for damage or issued a permit to harvest a problem elk. In some areas were habitat conditions have improved there is a noticed reduction in the amount of complaints from landowners.

Management conclusions

Overall elk populations appear to be stable to increasing in Region 6. Without any major landscape level disturbances or severe winters this trend is likely to continue.

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 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 WDFWs Game Management Plan (2008). The harvest guidelines are to limit harvest opportunity to 4% or less of the total population, only allow harvest in goat population meeting or exceeding 100 total animals, and limit nanny harvest to 30% or less.

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). Nineteen permits (16 general permits, 2 raffle permits, 1 auction permit) were available in 7 goat management units in 2009. The 2009 mountain goat season provided 47 days of mountain goat hunting (September 15 to October 31). Hunters were able to use any legal weapon and may harvest any adult goat with horns greater than 4 inches.

Of the 19 permits available in 2009, 18 individuals actually reported that they hunted goats. A total of 15 goats were killed for a hunter success rate of 75%.

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.

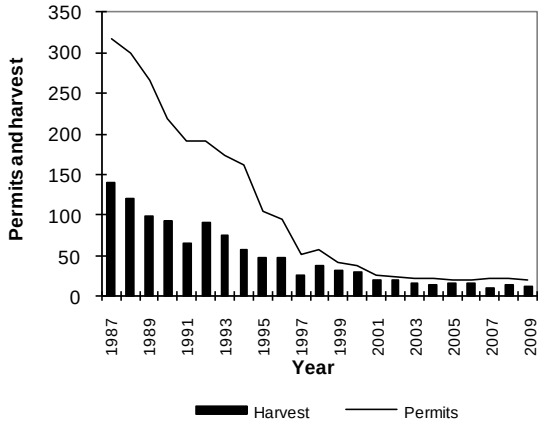


Figure 1. Mountain goat recreational hunting opportunity Washington.

Surveys
All surveys were conducted using a helicopter and generally occurred between July and September. From the survey, the total number of goats were calculated using a sightablility model recently develop in Washington. 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.

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 around 2,400. Hunting opportunity has decreased accordingly, and current permit levels are conservative and represent 4% or less of the known population in herds that are stable to increasing. Despite the overall declining trend in goat numbers and range, a few populations are doing well. Goat populations around Mt. Baker, alone the lower Cascade crest, and the north shore of Lake Chelan appear to be stable.

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 biggest obstacles are consistent funding base to assess the status of goats, estimates of demographics for individual herds, and the existence of vast areas of suitable goat habitat where goats are absent. Management activities are now being directed toward a goat translocation project to begin rebuilding goat populations in areas of vacant suitable habitat.

Table 1. Goat harvest statistics, 2009, WDFW.

Hunt Name	Total Applicants	Permits Issued	Total Harvest	Males Killed	Females Killed	Hunter Days	Days/Kill	Hunter Success
MT. BAKER WEST	1622	2	2	1	1	10	5	100%
MT. BAKER EAST	2097	3	1	1	0	1	1	100%
NORTH LAKE CHELAN	2418	2	2	2	0	8	4	100%
NACHES PASS	4657	1	1	1	0	1	1	100%
BUMPING RIVER	5097	2	2	1	1	14	7	100%
BLAZED RIDGE	4256	1	0	0	0	0	0	0%
GOAT ROCKS-TIETON RI	6355	5	5	5	0	10	2	100%
Total	26502	16	13	11	2	44		

MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 2
METHOW UNIT 2-2

SCOTT FITKIN, District Wildlife Biologist
JEFF HEINLEN, Wildlife Biologist

Population objectives/guidelines
The Methow unit (Goat Unit 2-2) is being managed for population growth and increased distribution. In addition, watchable wildlife opportunities, such as the salt lick along the Hart's Pass Road and the goats on Grandview Mountain, are encouraged.

Hunting seasons and harvest trends
Mountain Goat populations have declined dramatically in some portions of the North Cascades. Research findings suggest historical hunting levels may have been to high and unsustainable for goats. Starting in 2009 statewide mountain goat strategies recommend for Mountain Goats to be hunted, surveys must indicate a population size of at least 100 goats in a population management unit. Since the Methow unit is below the 100 goat population size, no permits have been issued since 2009.

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

Year	Permits	Hunters	Harvest	Success	Goats seen/hunter
1995	8	8	8	100%	31
1996	8	8	5	63%	8
1997	5	5	4	80%	20
1998	5	5	3	60%	22
1999	5	5	4	80%	32
2000	5	5	5	100%	23
2001	2	2	0	0%	11
2002	2	2	1	50%	26
2003	2	2	2	100%	31
2004	2	2	1	50%	26
2005	2	2	1	50%	48
2006	2	1	1	100%	23
2007	2	1	1	50%	4
2008	2	2	2	100%	38
2009	--	--	--	--	--

Surveys
Annual surveys are conducted to determine minimum population size and herd productivity. This data is used to generate hunting permit allocations in accordance with statewide management guidelines. The last survey occurred in the summer of 2009. Very poor survey conditions lead to minimal animals being detected. The survey yielded a count of 18 animals with a ratio of 38 kids per 100 adults (Table 2). The scarcity of goats in the unit is likely a survey artifact rather than a real reduction in animals.

Table 2. Population composition counts from the Methow Unit, 1995-2009

Year	Kids	Yearling	Adults	Minimum Population	Kids:100 Adults
1995	--	--	--	--	--
1996	16	--	41	57	39
1997	20	--	49	69	41
1998	--	--	--	--	44
1999	--	--	--	--	--
2000	11	--	36	47	31
2001	10	--	50	60	20
2002	19	--	61	80	31
2003	8	--	45	53	18
2004	13	17	52	82	*25
2005	18	13	65	96	*28
2006	7	5	31	43	*23
2007	18	5	38	61	*47
2008	--	--	--	--	--
2009	5	--	13	18	*38

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

In 2002, WDFW extended an ongoing goat research project to the Methow Unit with the radio marking of two mountain goats. These animals were part of a larger effort to assess population parameters and habitat relationships. The research findings suggest historical hunting levels may have been too high and unsustainable for goats. This led to the hunting closure in units with less than 100 goats to allow these populations to recover. Because funding has not been sufficient to survey all goat units in the state, hunted units have been the priority for annual surveys. It is hoped to survey the Methow at least every other year to document population status and trends. Also, a sightability model has been developed to improve survey data accuracy and consistency.

Population status and trend analysis
This unit had been monitored closely from 2000-2007 with a stable population being observed. The low

number of animals observed during the 2009 survey is attributed to poor survey conditions. With no large changes to the habitat it is believed the population continues to be stable. Continued survey effort is needed to determine any change to the population in this unit.

Based on survey data it appears that productivity may vary significantly between different portions of the unit. These differences are likely explained at least in part by differing fire histories and corresponding differences in vegetation successional stages.

Incidental observations outside of traditional hunting units suggest small numbers of goats are persisting in pockets scattered throughout suitable habitat in the Okanogan District. Little survey work has been done in these areas due to lack of resources. Population size or trend is unknown for these animals.

Habitat condition and trend

Goats in the Okanogan District had a mild winter with a lower snow pack this past year. Excessive winter mortality was unlikely.

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, regenerating burns in the Handcock Ridge area are improving forage conditions and contributing to observed robust kid production in this portion of the Methow Unit. Conversely, the fire in the Mt Gardner area is now over 20 years old and forage conditions may have passed the peak post-fire conditions. Overall, the unit is currently characterized by a mosaic of successional stages and moderate productivity for the herd as a whole is expected.

Much of the district's goat habitat is in wilderness areas. Thus, changes in habitat quality will occur primarily through natural stochastic events such as wildfires and avalanches, rather than human intervention. Wildfires burned over 20,000 acres of goat habitat in the Methow Unit in 2003, resulting in habitat and herd health improvements noted above.

Management conclusions

With the recently completed mountain goat research finding the Methow unit population too low to provide recreational hunting opportunities, management continues to focus on population growth and distribution. As a result, emphasis should remain on providing the resources necessary for a consistent survey effort to monitor population status. Utilizing the newly developed sightability model will also provide improved survey accuracy and consistency leading to improved population estimates.

Goat populations in the Methow Unit are the most robust in the district, and past fires have improved overall productivity. Still, significant differences in productivity between the north and south portions of the unit may be developing. Limited telemetry data and survey flights suggest minimal interchange between the two herd segments. In addition, the Handcock Ridge band spends significant time west of the Cascade Crest. As a result, the feasibility of managing the areas as sub-herds should be examined. Also the Unit boundary for the northwest portion of the area should be redrawn to better incorporate occupied goat range.

Suitable goat habitat adjacent to this unit is sparsely populated and could likely support many more animals than exist currently. Hopefully, habitat enhancement from past fires will continue to boost productivity and promote dispersal. If in practice, the Methow herd grows but exhibits little dispersal, animals could be actively relocated to other suitable areas in the county.

MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 2
CHELAN COUNTY

DAVID P. VOLSEN, District Wildlife Biologist
JON GALLIE, 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. Statewide mountain goat strategies recommend that prior to a population being hunted, that it be surveyed a minimum of three years to determine size and trend and have a minimum 100 goats within the management unit. For stable or increasing goat populations meeting these guidelines, harvest is limited to no more than 4% of the observed adult population with nannies consisting <30% of the harvest (WDFW 2008).

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). Only one permit has been authorized each year since 2002, with the permits increased to 2 in 2009. Only 1 goat was harvested from 2002-2007, however, hunter success has increased with 3 goats taken in the last two years. Rugged terrain, remote wilderness areas, and very limited access limits hunting success. The overall success rate of 55% satisfies the success threshold required to maintain a permit. Of the 6 goats harvested, only one has been a nanny (17%).

The increase in permits for the North Lake Chelan unit was based on the increasing population and a limit of 2 still being <4% of the adult population. Based on the above criteria, the South Shore population may also qualify for a permit. This population will continue to be surveyed annually to determine when population objectives are met.

Populations within the east Central Cascades (Chiwawa, Nason Ridge, and Wenatchee Mtn) cannot be surveyed intensively enough with current resources to evaluate population size or trend, thus are not be hunted.

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 license agreement, the Chelan Public Utility District (PUD) annually completes 12 winter wildlife surveys by boat on Lake Chelan, both north and south shore (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 (Pope and Cordell-Stine, 2010). However, sightability of goats and ability to classify age is difficult and contributes to the high variability in observation data. Kid numbers and ratios might also be biased high from the large number of unclassified goats (25 unclassified this year).

In other areas of Chelan County, helicopter surveys have been used in the past in selected mountain goat ranges. There have been no helicopter surveys since 2001. However, incidental sightings suggest these goat populations may be increasing. To gain some insight into the population's trend, we resumed historic driven routes to count goats in their winter range along Nason Ridge, and Wenatchee Mountains. (Icicle and Tumwater Canyons) (Table 2). Given the Chelan PUD monitors Lake Chelan populations, priority could be given to aquiring data on other goat populations within the East Central Cascades zone.

Population Status and Trend Analysis

Mountain goat populations in Chelan County are well below historic levels of the 1960s. Except for the Lake Chelan population, mountain goats are not monitored closely enough in Chelan County to document population trends. The Lake Chelan populations have been closely monitored by the Chelan PUD for the past 20 years. Overall, their numbers are increasing (Table 3). Kid:adult ratios appear adequate for population growth, averaging 29 kids:100 adults for 2007-2009.

The North Shore population was estimated at 91 goats (range: 81-104), with 22 kids:100 adults (range: 19-26) over the last three years. Future harvest (assuming harvest biases toward males) is unlikely to be detrimental to this slowly growing population.

The south shore population was estimated over the last three years to average 90 goats (range: 66-128), with 28 kids:100 adults (range: 27-31). This population has consistently had higher production than the north shore over the last ten years. This year's high count of 128 goats on the South Shore is the highest count in the last 30. It is not apparent why the count increased in 2009, as 100 goats on the South Shore has only been documented one other time. While herd productivity and habitat conditions are good, it is unknown if there are additional bands of goats occasionally visiting the South Shore from other areas, or whether it is the result of survey methodology. Either way, the presence of 128 goats warrants increasing survey effort to document a potential population increase.

Research

A statewide mountain goat research project was initiated to determine habitat use, seasonal range, population status, methods of survey, and population limiting factors in 2002. There were 3 adult nannies fitted with GPS collars during 2004 in District 7. One was collared on Nason Ridge, one on the south shore of Lake Chelan, and one along on the north shore. In 2005-2006 all goats were found to concentrate their activity in 4-5 mi^2 areas near their capture locations.

Insight was also gained on the gene flow and dispersal between populations. This was highlighted by two nannies that were collared on Gamma Ridge on Glacier Peak traveled 10-12 miles east to the south shore of Lake Chelan. Any potential hunting opportunity offered on the south shore of Lake Chelan would have to take into account the potential harvest of goats from Region 4 as well. In addition, in fall 2006, 3 goats collared on Gamma Ridge were found in the Chiwawa region of Chelan County.

Habitat Condition and Trend

Fire suppression during the last 50 years has 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 alteration, with changes in habitat condition occurring from forest fires. Fires are anticipated to reduce habitat initially, but increases forage after that and will be beneficial to goats. However, forest cover will be reduced for decades.

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 range. The Domke Lake fire occurred in the summer of 2007 on the south shore of Lake Chelan. A total of 11,900 acres were burned and much of it was occupied goat habitat. Domke Lake has had several more small fires in 2008 and 2009. This will increase available forage over time and may aid survey sightability.

Management Conclusions

Mountain goat populations in Chelan County are below historic levels, thus the most of their populations are not hunted. Population trends in areas outside the Lake Chelan area cannot be effectively monitored without additional survey resources. Based on Chelan PUD survey data, average kid production is gradually increasing in both the north and south shore populations. Resources should be directed to surveys of the south shore population to document its size and correlation with boat survey data. Additional emphasis should be placed on more surveys in District 7, particularly those in the East Central Cascades to better understand trends in mountain goat populations and their distribution.

Literature Cited

Pope, V. R. and Cordell-Stine, K. A. 2010. Lake Chelan Winter Wildlife Status Report: Winter of 2009-2010. Chelan Public Utility District, Wenatchee WA.

Washington Department of Wildlife. 2008. 2009-2015 Game Management Plan. Wildlife Program, WDFW, Olympia, Washington, USA.

Table 1: Summary of Mountain Goat Harvest for North Lake Chelan, 2001-2008

Year	Permits	Hunters	Harvest	Success	Goats Seen/Hunter	Days Hunted
2001	2	2	2	100	24	6
2002	1	1	0	0	0	20
2003	1	1	0	0	12	8
2004	1	1	1	100	3	3
2005	1	1	0	0	25	15
2006	1	1	0	0	0	1
2007	1	1	0	0	27	12
2008	1	1	1	100	25	8
2009	2	2	2	100	17	8

Table 2. Mountain goat counts in Chelan County, 1996-2009.

Area[a]	N. Lake Chelan	S. Lake Chelan	Stehiekin	Chiwawa	North Wenatchee Mtns	East Stevens Pass	Total
1996-97	42	13	4	14	42	33	123
1997-98	80	44		15	6	14	163
1998-99	64	41	5		27	13	150
1999-00	58	40					98
2000-01	68	31	6		35		140
2001-02	44	28	2	12		1	87
2002-03	71	39		19		18	147
2003-04	72	56					128
2004-05	118	49					167
2005-06	91	57	4				152
2006-07	75	102					177
2007-08	104	76					180
2008-09	95	66		15	23	20	219
2009-10	81	128		9	69	22	309

Table 3. Chelan PUD's mountain goat population composition for Lake Chelan, Chelan County, 1994-2009.

Year	Adults	Kids	Total Count	Kids:100 adults
1994	98	25	123	26
1995	109	12	121	11
1996	47	7	54	15
1997	105	18	123	17
1998	93	17	110	18
1999	79	19	98	24
2000	76	24	100	32
2001	60	14	74	23
2002	89	21	110	24
2003	103	25	128	24
2004	138	29	167	21
2005	120	29	149	24
2006	129	48	177	37
2007	113	26	139	23
2008	92	24	116	26
2009	133	39	172	29
Average	99	24	123	23

MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 3
GOAT UNITS: BLAZED RIDGE, BUMPING RIVER, NACHES PASS

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 100 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 2009, there were only four permits spread over three units (Tables 1-3). Three goats were taken. The Blazed Ridge hunter only hunted a few days and did not harvest a goat.

Surveys

Tables 1-4 show annual survey results for mountain goat units. Kachess is not open to hunting and has not been surveyed since 2005. 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 those with June surveys. In 2009, surveys were conducted during August.

Population status and trend analysis

The status of mountain goat populations is assessed using aerial surveys and, as an ancillary data source, interviews with hunters, guides, and others people knowledgeable on goats.

All goat populations in the Region probably declined from historic levels due to over harvest. Research suggests harvesting no more than 4% of the adult population. Goats were historically managed like deer with harvest rates often over 10%. Since 1996, harvest has been more conservative and populations should be increasing.

One problem is that aerial surveys results are often highly variable. In the Bumping River unit, the number of goats seen on surveys has varied between 39 and 98 over the last 10 years, with no obvious pattern. The unit is large, with extensive habitat and cover. It is easy to miss entire groups of animals on a survey.

Historically, the Naches and Corral Pass areas were managed as different units even though large numbers of goats were observed near the boundary. Corral Pass was rarely surveyed as a unit and Naches Pass surveys frequently included goats on the Corral Pass side. The population was very likely overharvested, especially since there was also tribal harvest. In recent years the permits have been reduced and the unit surveyed in cooperation with the Muckleshoot Indian Tribe. The number of goats seen has increased from a low of 21 in 2001 to 147 in 2009. Reduced harvest has probably helped the population rebound, but better survey efforts likely helped.

Blazed Ridge was historically included as part of the Naches Pass unit. In 1996, permits were issued for the new Blazed Ridge unit. Historic records indicate it was not unusual to issue 40 permits for the area. Survey counts in the unit have been highly variable with no obvious pattern (Table 3). In recent years, 70-80 animals are typically seen during the survey. The actual population is probably ~100. Blazed Ridge and Naches/Corral Pass are close enough to potentially be the same population.

Kachess Ridge was historically surveyed with Davis and Goat Peak units. Thirty-two goats were taken from the area from 1975-81, which is more adults than have been seen in the last 10 years. The current population for the entire area is probably less than 50 animals. This unit is the smallest unit in the region. If expanded, the "population" may exceed 100 goats.

Habitat condition and trend

The majority of goats in the Bumping, Tieton and Naches Pass spent summer in wilderness areas where short- term habitat is mostly influenced by weather cycles. However, fire suppression has reduced open meadow habitat in wilderness areas. Recent insect outbreaks have killed timber, making the area prime for a large fire. Recreational use could also be influencing use of available habitat. There is no comprehensive documentation of where the goats winter. Outside the wilderness, timber harvest and road building could impact habitat.

The Blazed Ridge and Kachess Units are mostly outside 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. Road and trail densities have also increased. There are often roads at the top and bottom of every ridge. ORV and general recreation is heavy in the Blazed Ridge unit.

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

Management conclusions

Goat populations in Region 3 have probably declined over historical levels. Over-harvest appears to have been a factor. Harvest has been reduced and populations appear to be slowly recovering. Future harvest should be conservative with no permits unless the unit is surveyed.

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

Table 1. Harvest and surveys for goat Unit 3-7 Bumping River

Harvest Information				Survey Data			
Year	Permits	Hunters	Harvest	Kids	Adults	Total	K:100
1990	15	14	11				
1991	10	9	7	5	12	17	42
1992	10	10	9	12	66	78	18
1993	6	6	5	7	43	50	16
1994	6	5	4	5	35	40	14
1995	2	2	2	3	30	35	17
1996	6	5	5	20	39	59	51
1997	1	1	1	12	49	61	25
1998	2	2	2				
1999	2	2	2				
2000	2	1	1	7	22	39	32
2001	2	2	2	14	46	60	30
2002	2	2	2	25	52	77	48
2003	2	2	2	24	59	83	41
2004	2	1	1	16	39	55	41
2005	2	2	2	32	66	98	48
2006	2	2	2	15	39	54	38
2007	2	2	1	9	40	*71	22
2008	2	*3	*3	15	53	68	28
2009	2	2	2	17	46	63	27

*Includes raffle/auction

*Includes 21 unclassifed

Table 2. Harvest and surveysfor goat Unit 3-6,4-38 Naches/Corral Pass

Harvest Information				Survey Data			
Year	Permits	Hunters	Harvest	Kids	Adults	Total	K:100
1989	9	7	4	24	94	118	26
1990	12	>7	>7				
1991	12	8	6	10	42	52	24
1992	12	10	9	11	86	97	13
1993	14	12	11	5	18	23	28
1994	14	11	9	13	27	40	48
1995	5	3	2	9	78	87	12
1996	14	11	9	23	58	81	40
1997	5	5	5	10	55	65	18
1998	7	7	7				
1999	5	5	5				
2000	5	5	5	21	48	69	44
2001	5	4	4	3	18	21	17
2002	4	3	4	18	41	59	44
2003	3	3	3	18	62	80	29
2004	2	2	1	21	61	82	34
2005	2	2	2	40	55	95	73
2006	2	2	2	18	73	91	25
2007	2	1	1	25	67	107	37
2008	2	*3	*3	37	79	116	47
2009	1	1	1	41	106	147	39

* Includes auction/raffle permit hunter

Table 3. Harvest and surveys for goat Unit 3-10 Blazed Ridge

Harvest Information				Survey Data			
Year	Permits	Hunters	Harvest	Kids	Adults	Total	K:100
1991				9	22	31	41
1996	3	2	1	27	57	79	47
1997	1	1	1	40	99	139	40
1998	6	6	6				
1999	6	6	6				
2000	6	6	5	18	43	61	42
2001	2	*3	*2	13	40	53	32
2002	1	1	1	15	40	55	37
2003	1	*2	*2	27	66	93	29
2004	2	*3	*3	17	63	80	27
2005	2	2	2				
2006	2	2	2	[a]30	[a]83	[a]113	36
2007	2	1	1	22	56	78	39
2008	2	*3	*3	22	50	72	44
2009	1	1	0	15	52	67	22

* Includes auction/raffle

[a] Probable double count of ~15 animals

Table 4. Harvest and surveys for goat Unit 3-11 Kachess Ridge

Harvest Information				Survey Data			
Year	Permits	Hunters	Harvest	Kids	Adults	Total	K:100
1991				21	39	60	54
1992				7	18	25	39
1993				14	44	58	32
1994-5		NO DATA					
1996	1	1	1	11	25	36	44
1997	1	1	1	1	5	6	20
1998	1	1	1				
1999	1	1	1				
2000	1	1	1	5	32	37	16
2001	1	1	1	6	22	28	27
2002	1	1	1	6	18	24	33
2003	0			No	Survey		
2004	0			8	18	26	44
2005	0			13	23	36	57
2006-09	0			No	Survey		

MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 4
GOAT UNITS 4-1 – 4-14

JENNIFER BOHANNON, Wildlife Biologist

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

Hunting Seasons and Harvest Trends
The history of mountain goat hunting seasons and associated harvest trends demonstrates a severe decline in both areas throughout north Region 4 (Whatcom and Skagit counties). Hunting seasons have dramatically declined since the earliest mountain goat season format in 1897 when Washington State hunters were allowed two goats per person in a three-month season. The typical season format for mountain goats in north Region 4 during the 1980's was 47 days (late September through October). In Whatcom and Skagit counties, the mountain goat range was divided into six geographic areas (Goat Management Units) with a total of 72 harvest permits issued (70 rifle, 2 archery). In 1986 mountain goat units were re-designated to more adequately reflect the geographical distribution of discrete sub-herds and to allow WDFW better management control over harvest distribution. Goat management units increased from 6 to 14 in north Region 4. Permit numbers in 1986 were 63 for the 14 new units. Harvest in these units totaled 16 goats in 1986. By 1996, all but two of the GMUs were closed to hunting (GMUs 4-8 –East Ross Lake, 4-9 – Jack Mountain). A total of 12 permits resulted in the harvest of 5 mountain goats within the two units during the 1996 season. All of the original 14 goat management units were closed to hunting in 2002. In 2007, Mt. Baker units 4-3 –Chowder Ridge and 4-7 – Avalanche Gorge were reopened with one permit issued per unit. In 2009, the number of goat permits for Mount Baker increased from 2 to 5, 3 in Mt. Baker East and 2 in Mt. Baker West. The District Wildlife Biologist assigned each permit holder a different goat unit to avoid overharvest of a particular subpopulation. The permit holders were instructed to contact Olympia to receive a map of their hunt area boundary. In addition to the 5 permits, one raffle tag holder and the auction tag holder also hunted on Mount Baker in 2009. Four mountain goats, 3 billies and 1 nanny, were harvested, including 1 billy taken by the raffle tag holder in the Lincoln Peak unit (Table 1).

Surveys
In August 2009, an aerial mountain goat survey was flown in the Mt. Baker/Loomis Mountain areas of Whatcom and Skagit counties. This was a cooperative survey effort involving WDFW, Sauk-Suiattle Indian Tribe, Upper Skagit Indian Tribe, and the Northwest Indian Tribal Commission. A Bell JetRanger helicopter was used to fly the survey area. The survey route(s) were similar to previous years' surveys but do vary slightly in response to weather and habitat changes. A total of 362 goats were observed on Mt. Baker, Mt. Shuksan (Lake Ann), and Loomis Mountain (Table 2). For the Mt. Baker survey blocks, the total count and age composition was higher than the previous three years' surveys and similar to 2005 (Table 3). When adjusted for sightability bias due to group size, terrain obstruction, and vegetation obstruction, the number of goats on Mt. Baker in 2009 is estimated at approximately 356 animals (Table 4).

Table 2. 2009 mountain goat survey results for the Mt. Baker/Loomis Mountain area.

Block	Total	Adults	Yearlings	Kids	Unknown
Black Buttes	39	18	4	17	0
Heliotrope	33	27	2	4	0
Chowder Ridge	58	44	4	10	0
Sholes Glacier	80	44	14	22	0
Coleman Pinnacle	84	53	5	26	0
Lava Divide	37	23	4	10	0
Lake Ann	25	14	5	6	0
Loomis Mountain	6	5	0	1	0
Total	362	228	38	96	0

Table 3. Mt. Baker* mountain goat surveys 2003-2009.

Year	Kids	Yearling	Adult	Unk.	Total	Kids:100 adults**
2003	33	-----	84	0	117	39
2004	56	26	136	3	222	41
2005	78	64	178	11	331	44
2006	79	53	189	3	324	42
2007	77	32	219	0	328	35
2008	72	32	196	8	308	37
2009	89	33	209	0	331	43

*Mt. Baker includes the following survey blocks: Black Buttes, Heliotrope, Chowder Ridge, Sholes Glacier, Coleman Pinnacle, and Lava Divide.
**Starting in 2004 adults and yearlings were classified separately. Prior to 2004 yearlings were classified as adults. Therefore, the ratio K:100 has changed to exclude yearlings starting in 2004.

Table 4. Mt. Baker sightability estimates 2009

	Observed	Estimates	90%CI
Groups	49		
Total	331	356.1	335.7-376.5
Adults	209	228.7	215.9-241.5
Yearlings	33	33.7	31.7-35.7
Kids	89	93.7	87.3-100.2
Unknown	0	0.0	0.0-0.0
Adults & Yearlings	242	262.4	246.5-278.2
Juveniles	122	127.4	119.9-135.0
Kids/Ad+Yl	0.37	0.36	0.34-0.38
Juv/Adult	0.58	0.56	0.53-0.58

Dates: 08/04/2009, 08/05/2009
Blocks: Black Buttes, Chowder Ridge, Coleman Pinnacle, Heliotrope, Lava Divide, Sholes Glacier

The Department of Fish and Wildlife initiated a mountain goat research project in 2002 that included cooperators such as the U.S. Forest Service, the National Parks Service, the Sauk-Suiattle Tribe, the Stilliguamish Tribe and Western Washington University. The long-term objective of this project is to assess the magnitude, extent, and causes for the reported declines in mountain goat populations in Washington. As part of this study, GPS collars were placed on a total of 13 goats in the Mt. Baker/Mt. Shuksan areas of Whatcom County. The locations from these collars were used to evaluate movements and habitat use. Collared animals also provided information to assess sightability bias (i.e. whether or not an animal or group is seen) during population surveys and a sightability bias model was developed to calculate population estimates from survey data.

Population Status and Trend Analysis

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

An aerial survey of the Mt. Baker GMUs was conducted in 1996. That survey documented 61 animals (an average of 8.7 goats per unit). A similar survey completed in 2000 covering 80% of the range documented 88 animals (an average of 17.6 goats per unit). An October 2001 survey that covered 100% of the Mt. Baker range 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. Although survey coverage has differed slightly between years, the population counts from more recent surveys in the Mt. Baker range continue to be stable or increasing.

Habitat Condition and Trend

A graduate student at Western Washington University has recently developed a mountain goat habitat map for the west side of the Cascade Range, including Mt. Baker. Road and hiking trail development continues to encroach upon existing habitat and is projected to further expand the influences of increased human disturbance throughout mountain goat ranges in Whatcom and Skagit counties.

Management Conclusions/ Recommendations

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

The Mt. Baker/Mt. Shuksan mountain goat population has grown large enough to allow a limited harvest in certain goat units. However, the level of tribal harvest is uncertain. Discussions on goat management between WDFW and the Tribes are ongoing and remain a high priority.

Literature Cited

Hebert, D.M. and Turnbull, W.G. 1977. A description of southern interior and coastal mountain ecotypes in British Columbia, 1st Annual Symposium Mt. Goats. 21pp.

Table 1. Summary of harvest information for mountain goats in north Puget Sound, 2007-2009.

Hunt Name	Unit	Year	Permits	Hunters	Harvest	Success (%)	Goats seen	Kids seen	Days hunted
Mt. Baker West	Chowder Ridge	2009	1	1	1	100	65	15	2
		2008	1	1	1	100	1	0	1
		2007	1	1	1	100	150	12	7
	Lincoln Peak	2009	1	1	1	100	47	14	8
		2008	0	-	-	-	-	-	-
		2007	0	-	-	-	-	-	-
Mt. Baker East	Avalanche Gorge	2009	1	1	1	100	9	1	1
		2008	1	1	0	0	40	2	0
		2007	1	1	1	100	57	17	5
	Lake Ann	2009	1	0	0	-	-	-	0
		2008	0	-	-	-	-	-	-
		2007	0	-	-	-	-	-	-
	Dillard Creek	2009	1	0	0	-	-	-	0
		2008	0	-	-	-	-	-	-
		2007	0	-	-	-	-	-	-

MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 5
GOAT ROCKS, SMITH CREEK, TATOOSH

PATRICK J. MILLER, District Wildlife Biologist
ANNEMARIE PRINCE, Wildlife Biologist

Population objectives and guidelines

Mountain goats (Oreamnos americanus) are prized in Washington as both a game animal and for viewing purposes. Region 5 of the Washington Department of Fish and Wildlife (WDFW) has three mountain goat population management units; Tatoosh (Goat Unit 5-2), Smith Creek (Goat Unit 5-3), and Goat Rocks (Goat Unit 5-4). In 2003, the management of the Goat Unit *Tieton River* 3-9 was combined with the *Goat Rocks* unit. Goat Rocks-Tieton River unit probably has the highest goat population in the state of Washington. Hunting in all three units is allowed by permit only. Current population goals for these three areas are to maintain or expand current population levels. A productivity goal of 20-25 kids per 100 adults is applied to these populations. Legal harvest levels are designed to remove 4% or less of the population.

Hunting seasons and harvest trends

Since 1997, all three units in Region 5 have been open to any legal weapon. Prior to 1997, Smith Creek Unit was an archery-only unit. Harvest quotas were conservative in 2009 Smith Creek= 1; Tatoosh= 1; and Goat Rocks-Tieton River= 5.

Hunting seasons in all three units have traditionally been in the last two weeks of September and the entire month of October. Beginning in 2005, the season has opened on 1 September for archery-only hunting. Firearm hunting was allowed from 15 September-31 October. The bag limit was one goat of either sex, with horns longer than 4 inches per permit. 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 to declining mountain goat populations in the three units. Aerial surveys conducted by WDFW indicate that mountain goat populations in the Tatoosh and Smith units are declining. Most of the goats observed in the Tatoosh unit are actually in the nearby Mt Rainier National Park. Visibility of goats in the Smith creek unit has long been a concern as the habitat is narrow strips of alpine vegetation with heavy forest nearby.

Mt Goat studies recently completed by WDFW have led to a new population guideline to direct harvest management. A goat unit needs to have an estimated population of 100 or more to allow harvest. The Smith Creek and Tatoosh units both have populations under this goal and no permits were issued for these units in 2009. These populations will be monitored periodically to determine if populations have improved to the point of allowing hunting again. Once again in 2009 5 Mt Goats permits were authorized. All five permits holders reported killing a goat, all males (Table 1).

Surveys

In 2009 only the Goat Rocks unit was surveyed due to lack of funding. The Goat Rocks/Tieton survey yielded 276 animals (Table 2). During this year, we surveyed only units open for permit hunting.

Population Status and Trend Analysis

Survey data from 2004 through 2009 in the Goat Rocks unit indicate a variable trend with an overall slight decline in number of goats, even when the Tieton River unit influence is incorporated (Table 2). Knowledge of the movement between the Goat Rocks and Tieton units still needs to be examined

A Mt. Goat study that was conducted by WDFW provided new methods for estimating goat numbers via a mark/resight sightablity technique. The population estimates for Region 5 units are outlined in Table 3.

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). A small herd of goats was observed in the caldera of Mt St Helens in the summer of 2007. These goats are likely migrants from the nearby McCoy Peak and surrounding area. Historic sightings of ear-tagged Smith Creek transplants in the

Mt. Adams Wilderness indicate that goats are likely expanding their range. Informal surveys are also observing goats in areas to the south and west of Smith Creek. Long-term changes in habitat (see Habitat Condition below), particularly in the Smith Creek Unit, may limit certain goat populations in the future.

Habitat Condition and Trend

High elevation openings characteristic of goat habitat are being lost in the Smith Creek Unit due to conifer encroachment. Alpine meadows are critical mountain goat foraging areas. Given the limited extent of suitable goat habitat in the Smith Creek Unit, their decline represents a serious threat to the sustained viability of this goat population. Results of the cooperative Cispus AMA project indicate that in the four study areas (Stonewall ridge, South Point ridge, Smith ridge, and Castle Butte) a total of 404 acres of alpine meadow have been lost in the period 1959- 1990 (Kogut 1996).

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. Management direction dictates that the Smith Creek and Tatoosh units remain closed until populations increase

The continuation of annual aerial surveys is needed to document trends in population and productivity. Aerial surveys provide the least biased data and the most efficient method of census, particularly considering the large expanse of area involved.

Raffle and auction permit holders often select the Goat Rocks unit as it has one of the highest numbers of goats and has a long history of successful goat hunting. As such, harvest by raffle and auction permit holders must be factored into and considered when setting the permit level for Goat Rocks.

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. Fire management in potential goat habitat will also play an important role in the expansion of goat populations outside of the Goat Rocks.

Literature Cited

Hemstrom, M. A. 1979. A recent disturbance history of the forest ecosystems of Mount Rainier National Park. Ph. D. Thesis, Oregon State University, Corvallis, OR. 67 pp.

Kogut, T. 1996. Trends in Natural Meadows within Mountain Goat Habitat, Cispus Adaptive Management Area. USFS Gifford Pinchot Nat. For. Unpublished Report. 9pp.

Olmsted, J. 1979. Mountain goat winter habitat study. Job completion report, W_88 R_3. Wash. Dept. Of Game, Olympia WA. 50 pp.

McCullough, D. R., and D. H. Hirth. 1988. Evaluation of the Petersen-Lincoln estimator for a white-tailed deer population. Journal of Wildlife Management 52:534-544.

Table 1. Hunter survey summary statistics for Region 5 mountain goat harvests (1993-2009).

Unit	Year	Permits Issued	Harvest*	Success (%)	Avg. goats seen	Kid:Adult seen	Avg days to harvest
Smith Creek	2009	0					
	2008	1	0	0	13	1	N/A
	2007	1	1	100	75	25	10
	2006	1	1	100	30	16	7
	2005	1	1	100	40	20	16
	2004	1	1	100	21	5	4
	2003	1	1	100	19	6	12
	2002	1	1	100	30	23	5.0
	2001	1	1	100	17	70	12
	2000	3	2	67	16	60	14.5
	1999	3	2(2)	100	4	25	1.0
	1998	3	2	67	21	36	7.7
	1997	3	1(2)	50	25	67	9.5
	1996	5	2	40	42	26	12.5
	1995	5	2(4)	50	24	14	22.5
	1994	3	2	67	17	28	6.0
	1993	3	2	67	53	59	11.0
Goat Rocks	2009	5	5	100	40	30	2
	2008	5	5	100	46	9	4
	2007	5	3	60	56	4	9
	2006	5	5	100	65	27	3
	2005	6	6	100	24.7	5	18
	2004	6	4	66.7	87	26	12.7
	2003	6**	6**	100	55	19	3.2
	2002	3	2	66.7	77	28	5.0
	2001	3	3	100	44	26	4.3
	2000	7	6(6)	100	55	28	3.2
	1999	7	7	100	52	20	2.7
	1998	7	7	100	32	43	3.2
	1997	10	9(9)	100	19	30	2.8
	1996	10	6(9)	67	55	36	5.8
	1995	10	10	100	40	42	2.2
	1994	10	10	100	46	39	2.3
	1993	10	10	100	37	39	1.9
Tatoosh	2009	0					
	2008	1	1	100	12	3	18
	2007	1	0	0	7	5	0
	2006	1	1	100	55	25	4
	2005	1	0	0	32	8	0
	2004	3	2(2)	100	6	2	4.5
	2003	3	3	100	27	11	21
	2002	3	2	66.7	21	23	12.5
	2001	3	1(2)	50	4	29	4.0
	2000	5	2	40	14	40	10.0
	1999	5	2(3)	67	22	35	18.0
	1998	5	2(4)	50	15	54	7.5
	1997	5	1	20	9	16	8.0
	1996	5	1(3)	33	9	37	35.0
	1995	5	3(4)	75	7	28	6.0
	1994	5	2	40	3	33	15.0
	1993	5	2	40	3	15	12.5

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

** Permits for both Goat Rocks and Tieton River were combined.

Table 2. Survey results of Mountain Goat flights Region 5 (1998 – 2009).

Goat Unit	Year	Adult	Yearling	Kid	Unknown	Total	Kid:Adult
5-2 Tatoosh	2009	****					
	2008	0	0	0	0	0	N/A
	2007	1		1	0	2	N/a
	2006***	16		4	0	20	25:100
	2005	12	4	6	0	22	37:100
	2004	5	0	2	0	7	40:100
	2003	2	3	1	0	8	14:100
	2002	5	3	1	1	10	11:100
	2001	6	1	2		9	33:100
	2000	9	0	2		14	22:100
5-3 Smith Creek	2009	****					
	2008	9	2	4	2	17	44:100
	2007	28	0	6		34	46:100
	2006	16	6	5		27	31:100
	2005	15	6	11		34	52:100
	2004	16	3	11		30	42:100
	2003	9		6		15	67:100
	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	2009	170	33	73	0	276	36:100
	2008	178	23	60	7	268	34:100
	2007	****					
	2006	203	14	71		290	35:100
	2005**	188	47	66		303	28:100
	2004**	183	31	43		261	20:100
	2003**	130		36		166	28:100
	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
*** Survey conducted by Mt Rainier National Park Staff
**** No survey due to lack of funding

Table 3. Mt. Goat Population Estimates Region 5 (2008-2009).

Area	Year	Unit	Mt. Goat Unit	Population Estimate
Goat Rocks	2008	Goat Rocks/Tieton R.	5-4	282
	2009			285
Smith Creek	2008	Smith Creek	5-3	32
	2009			N/A
Tatoosh	2008	Tatoosh	5-2	10
	2009			N/A

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 2008). The harvest objective for bighorn sheep is to maintain a harvest success that averages >85% over a 3-year period, while at the same time bighorn population size remains stable or increasing. Strategies and harvest thresholds to obtain these objectives are described in the WDFW's Game Management Plan (2008).

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	90-100
Lake Chelan	100-150
Tieton River	75-150
Total	1,750-2,130

[a] Rocky Mountain bighorn sheep
[b] Based on biologists estimates of habitat capacity, including forage, escape cover, and water sources

Hunting seasons and harvest trends

Bighorn sheep hunting opportunity in Washington was limited by permit-only hunting. Permit availability, and therefore hunter opportunity, has been high over the last 3 years as bighorn numbers increase (Figure 1). In 2009, 40 general season permits, 1 auction permit, and 2 raffle permit were available in 14 different sheep management units. The 2009 bighorn sheep season was September 15 to October 10, (except 5 areas; either October 1-10 or November 3-30). Hunters had the choice of any legal weapon to harvest any bighorn ram (no curl restrictions). Of the 43 permits available in 2009, 35 sheep were killed for a hunter success rate of 81%.

Surveys

All bighorn sheep units open to hunting in 2009 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 continue to struggle as they recover from the 1995 *pasteurella* outbreak. Lamb mortality has remained high and ewe survival has declined in several herds;

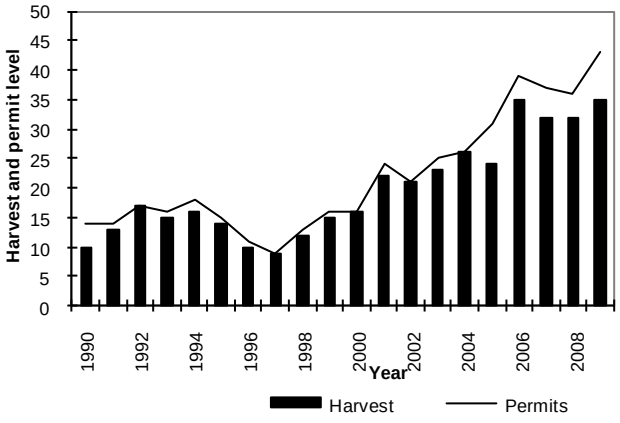


Figure 1. Trend in bighorn sheep recreational hunting opportunity in Washington.

however, the total sheep population has remained fairly stable, with a sizable mature ram component. California bighorn populations remained stable in most herds (see individual herd reports).

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 and Tucannon due to recent fire activity. Noxious weed invasion, primarily yellow-star thistle, continued to be a major concern for most bighorn sheep ranges (particularly in the Blue Mountains). Grazing also is a concern is several areas of the Blue Mountains and Yakima River basin.

Management conclusions

Bighorn sheep management in Washington centers on three main issues at this time: minimizing disease outbreaks, increasing forage conditions, and establishing new self-sustaining herds.

Disease outbreaks associated with domestic-bighorn interactions is the primary concern for several herds. Disease 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 a top priority. A new herd was established at Chelan butte in 2004 and a new translocation project is scheduled in the Tucannon herd for 2009-10 winter.

Table 1. Bighorn sheep harvest statistics, 2009, WDFW.

Hunt Number	Hunt Name	Total Applicants	Permits Issued	Total Harvest	Sheep Seen	Lambs Seen	Days/Kill	Hunter Success
5000	VULCAN MOUNTAIN A	1,540	1	1	16	1	2	100%
5001	VULCAN MOUNTAIN B	55	2	2	38	0	1	100%
5002	VULCAN MOUNTAIN C	77	1	1	15	0	2	100%
5003	SELAH BUTTE A	5,691	5	5	348	155	4	100%
5004	SELAH BUTTE B	951	4	4	277	36	2	100%
5005	UMTANUM	6,886	5	4	124	34	2	100%
5006	CLEMAN MOUNTAIN A	5,226	3	3	82	41	1	100%
5007	CLEMAN MOUNTAIN B	4,326	3	3	202	51	2	100%
5008	MT. HULL A	1,363	1	1	48	11	1	100%
5009	MT. HULL B	280	2	1	100	4	1	100%
5010	WENAHA	1,444	1	1	6	6	1	100%
5011	LINCOLN CLIFFS	1,608	1	1	58	16	5	100%
5012	QUILOMENE	4,515	4	4	73	28	1	100%
5013	TIETON	3,052	3	3	280	19	8	100%
5014	MANSON	2,576	2	1	60	40	4	100%
5015	ASOTIN	1,643	1	0	0	0	0	0%
		41,233	39	35	1,727	442		94%

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 1

HALL MOUNTAIN

JAY SHEPHERD, ASSISTANT DISTRICT WILDLIFE BIOLOGIST
DANA L. BASE, DISTRICT WILDLIFE BIOLOGIST

Population objectives and guidelines

Rocky Mountain bighorn sheep were introduced to Hall Mountain in Pend Oreille County, Washington from Alberta, Canada in 1972 (Johnson 1983). The founder herd included 5 rams and 13 ewes. Two additional ewes were trans-located to Hall Mountain in 1981 from Thompson Falls, Montana. The traditional objective has been to maintain a population of 40–70 Rocky Mountain bighorn sheep within the Hall Mountain herd (WDFW 2008). The Hall Mountain herd has not been hunted, however, beginning in 2009 this population of bighorn sheep was made available for harvest to the Rocky Mountain bighorn sheep state raffle permit winner. In the past this population was used primarily as a source for Rocky Mountain bighorn sheep transplants into other areas of Washington State.

Surveys, population status, and trend analysis

From the early 1970s through the year 2002, ground surveys at the Noisy Creek winter feeding station were carried out to estimate the total number of sheep, sex ratio, and lamb production (Table 1). In 2003 the winter feeding station was dismantled and feeding no longer occurred. Observations in the vicinity of the feeding site were made during the first post-feeding winter (2003-2004) to assess response of the sheep to the loss of the food source; few sheep were observed. A survey conducted the following winter (2004-2005) documented 27 bighorn sheep at the feeding site. As these sheep are replaced by their progeny, they are losing fidelity to the winter-feeding site.

Two ground-based surveys of the Hall Mountain bighorn sheep were accomplished in the winter of 2008-2009 along with incidental observations. The total count was 23 sheep and included 4 rams, 14 ewes, and 5 lambs (Table 1). Two incomplete ground-based surveys of the Hall Mountain bighorn sheep were also accomplished in the winter of 2009-2010. The composite count was 24 sheep which included 0 rams, 11 ewes, 9 lambs, and 4 unclassified sheep (Table 1).

A population of bighorn sheep pioneered by the Hall Mountain population has existed in British Columbia since about 1982. In summer, these sheep occasionally mix with the Hall Mountain herd. These bighorn sheep have been surveyed each year since at least 1998 at a winter feeding station near Highway 3 in Canada. In 2006-2007, the total count at this winter feeding site was 43 bighorn sheep including 12 rams, 24 ewes, and 7 lambs (Mowat, pers. comm. 2007).

From 1995 – 1999, the U.S. Forest Service (USFS: Sullivan Lake Ranger District, Colville National Forest) regularly monitored survival and movements of the Hall Mountain bighorn sheep using radio telemetry (Baldwin 1999, Aluzas 1997, and Bertram 1996). The last radio-tracking was conducted from the Sullivan Lake Road at the south end of Sullivan Lake on March 20, 2006. The radio collars had been deployed for over 6 years and the batteries gradually became depleted until they no longer transmitted signals.

Habitat condition and trend

Northeastern Washington is densely forested and the Hall Mountain bighorn sheep depend upon the steep terrain, open grasslands, and other scattered sub-alpine openings for forage and predator avoidance. Non-forested escape terrain is limited and fragmented within the range of the Hall Mountain herd including Sullivan Mountain, Crowell Ridge, Gypsy Ridge, and Hall Mountain. Sheep migrating between these and other peaks and ridges have to go through valley bottoms and dense forest where vulnerability to predation may increase by cougars, bears, and most recently gray wolves.

The U.S. Forest Service owns the vast majority of the habitat within the range of the Hall Mountain herd. Consequently, there are no immediate threats to habitat quality and quantity. The U.S. Forest Service plans to actively manage winter range habitat with controlled burns subject to funding (Suarez 2001). There are no domestic livestock grazing within the portion of national forest used by the bighorn sheep.

Augmentation and trans-location

Between 1972 and 2000 bighorn sheep at Hall Mountain were captured 18 times. The feeding site at Noisy Creek presented the ability to easily capture

Table 1. Population composition counts of Hall Mountain bighorn sheep, 2001 - 2010. (Note that the last year of winter feeding was in 2003.)

YEAR	Lambs	Ewes	Rams	Count Total	Ratio *Lambs : 100 Ewes : Rams*
2001	4	11	8	23	*36 : 100 : 73*
2002	7	13	4	24	*54 : 100 : 31*
2003	-	-	-	No Data	*No Data*
2004	-	-	-	No Data	*No Data*
2005	7	14	6	27	*50 : 100 : 43*
2006	5	7	7	19	*71 : 100 : 100*
2007	4	11	7	22	*36 : 100 : 64*
2008	9	16	4	29	*56 : 100 :25*
2009	5	14	4	23	*36 : 100 : 29*
2010	9	11	0	24 (includes 4 unclassified)	*82 : 100 : 0*

sheep for research or trans-location. With the closure of the winter feeding site in 2003, annual trapping activities ceased. The last year bighorn sheep were trans-located from Hall Mountain was in 1994 with 9 sheep that were taken to the Asotin Creek area in the Blue Mountains. The WDFW has no further plans to trap sheep at Hall Mountain.

Management conclusions

Last winter was the seventh season since winter feeding operations were terminated. The bighorn sheep continue to winter at the south end of Sullivan Lake on the lower slopes of Hall Mountain, and generally spend less time within the immediate vicinity of the old Noisy Creek feeding site.

With the loss of the ability to reliably survey sheep at the feeding site each winter, other survey techniques and protocol have been used. Ground-based surveys are time-intensive and generally require more than one visit to obtain a reliable count. As the sheep disperse over a larger range for forage, they are less likely to be surveyed with precision. Helicopter surveys, which are expensive, may occasionally be necessary. If the population increases to a level that would facilitate area-specific permit hunting, more intensive monitoring of the Hall Mountain herd would be required.

References

Aluzas, K. 1997. Bighorn Sheep radio-telemetry monitoring progress report # 2. Sullivan Lake Ranger District, Colville National Forest. Unpublished report. 10 p.

Baldwin, T. 1999. Bighorn Sheep radio-telemetry monitoring progress report # 4. Sullivan Lake Ranger District, Colville National Forest. Unpublished report. 5 p.

Bertram, T.M. 1996. Bighorn Sheep radio-telemetry Monitoring progress report # 1. Sullivan Lake Ranger District, Colville National Forest. Unpublished report. 4 p.

Johnson, R.L. 1983. Mountain Goats and Mountain Sheep of Washington. Biol. Bull. No. 18. Wash. State Game Dept., Olympia. 196 p.

Mowat, G. 2007. BC Environment, Fish and Wildlife Section. British Columbia, Canada. Personal communication.

Suarez, R.V. 2001. Lake Basin Prescribed Burn. Sullivan Lake Ranger District, Colville National Forest. Rocky Mountain Elk Foundation Project Completion Report - Unpublished. 2 p.

Washington Department of Fish and Wildlife. 2008. Game Management Plan. Wash. Dept. Fish and Wildlife, Olympia, Wash. 136 p.

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 1

VULCAN MOUNTAIN

DANA L. BASE, District 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 including 2 rams and 6 ewes were trans-located from the Colockum State Wildlife Area to U.S. Bureau of Land Management land near Little Vulcan Mountain. The population goal for the Vulcan Mountain Bighorn Sheep Herd is to maintain 80-110 animals on the available range. This herd makes considerable use of private rangeland, which has been a contentious issue with cattle ranchers in the past when the population was higher. The population declined dramatically from peak numbers in the early 1990's to about 20 bighorn sheep in 2001.

Sport hunting has been a traditional consumptive use for this herd and an activity that is co-managed with the Colville Confederated Tribes (CCT). Due to the population drop, however, no permits were issued from 2000 through 2004. By 2003 the population was recovering and hunting resumed in 2005 when objectives for managing bighorn sheep harvest as described in the Washington Department of Fish and Wildlife (WDFW) Game Management Plan (WDFW 2003) were attained.

Surveys

Since the introduction of the Vulcan Mountain Bighorn Sheep Herd in 1971 the population has been surveyed almost every year to determine composition and trend (Table 1). Beginning in 1990 this survey effort was largely 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. We attempt to classify every bighorn sheep on the range, but recognize that this effort likely never results in a complete population census.

A total of 81 bighorn sheep were observed on November 4, 2009 including 23 rams, 15 lambs, and 43 ewes. This is the highest count of classified sheep since 2001 (Table 1).

Population status and trend analysis

Originating with a founder herd of only 8 bighorn sheep in 1971, the Vulcan Mountain Herd peaked to 107 observed animals in 1990. Subsequent to 1990 the herd declined dramatically to a low of only 17 animals observed in 2001 (Table 1). In the late 1990s 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.

By the year 2000, there were encouraging signs that the population was beginning to recover as observed animals appeared to be healthy again and at least 2 lambs were recruited that year. Fall surveys in 2003 and 2004 documented at least 9 lambs recruited into the population for each year. In 2005, there were 21 lambs observed in the fall survey. Not all of the sheep comprising the herd in 2004 were observed as the increase from 46 to 75 animals in 2005 was certainly not by lamb recruitment alone. Nevertheless with the healthy recruitment of lambs since 2001, the population objective for this herd is now met and there is a need to actively manage its level so that numbers do not exceed biological and social carrying capacity.

Hunting seasons and harvest trends

Both general public hunters (State) and members of the Colville Confederated Tribes (CCT) have hunted bighorn sheep within the Vulcan Mountain Unit. Biologists annually confer prior to developing their respective permit recommendations. Recreational permit-only hunting began in 1981. From 1981 through 1999 there were 49 bighorn sheep legally harvested from the Vulcan Unit including 48 rams and 1 ewe. Due to low herd population and recruitment levels hunting was suspended by both the State and CCT from 2000 through 2004. In 2005 hunting was resumed with 1 permit each issued by the State and the CCT. Only one animal was harvested, a 4.5 year old ram by the State permittee. In 2006 a 2.5 year old ram was harvested by the State permittee. In 2007 two rams, aged at 5.5. and 6.5 were harvested by State permittees and 1 young ram by a CCT permit holder (Krausz 2008). One ram and two ewes were harvested by State permitees and one ram by a CCT permit holder in the 2008 season. In the 2009 season State permitees harvested one ram and three ewes (Table 2).

Table 1. Annual fall population composite counts of the Vulcan Mountain Bighorn Sheep Herd from 2001 through 2009.

			Rams					Ratio
Year	Lambs	Ewes	Yearling	<3/4 curl	>3/4 curl	Total Rams	Total Sheep	Lambs : 100 Ewes : Rams
2001	5	8	0	2	2	4	17	63 : 100 : 50
2002	5	8	3	2	4	9	22	63 : 100 : 113
2003*	9	17	3	4	3	10	36	53 : 100 : 59
2004	9	20	5	7	5	17	46	45 : 100 : 85
2005	21	32	4	11	7	22	75	66 : 100 : 69
2006	10	24	3	6	4	13	47	42 : 100 : 54
2007	21	39	5	4	6	15	75	54 : 100 : 38
2008	19	42	5	8	5	18	79	45 : 100 : 43
2009	15	43	2	14	7	23	81	35 : 100 : 53

* Introduction of 1 ram and 4 ewes trans-located from Nevada in January 2003.

Table 2. Summary of State and Colville Confederated Tribes (CCT) hunter harvest of bighorn sheep from the Vulcan Mountain Unit from 2005 through 2009.

Year	Org.	# Tags	Harvest
2005	State	1	1 ram
2005	CCT	1	None
2006	State	1	1 ram
2006	CCT	1	Unknown
2007	State	2	2 rams
2007	CCT	2	1 ram
2008	State	3	1 ram, 2 ewes
2008	CCT	2	1 ram
2009	State	4	1 ram, 3 ewes
2009	CCT	no data	no data

Herd health and productivity

We believe that this bighorn sheep population declined subsequent to about 1995 mainly as a result of complications from exceptionally high internal parasite loads. Mortalities appear to have been highest from 1996 through 1998. Surviving animals observed in 1998 and 1999 were generally in poor physical condition (thin, gaunt body mass, signs of chronic scours, and unusually poor horn growth). No lambs were observed at any time in 1998 or 1999 and only 2 lambs appear to have been produced in 2000.

Efforts to determine the primary cause of the herd decline began in 1999. Numerous samples of fecal pellets were collected in all seasons and sent for analysis of parasites to both the Washington State University Veterinary Sciences Laboratory as well as the Canadian Food Inspection Agency Laboratory in Saskatoon, Saskatchewan. In November of 2000 an adult ram was euthanized and necropsied by the Washington State University Diagnostic Laboratory (Foreyt 2000). While this ram was in good health, it also carried a high density of nematode larvae judged to either be, or similar in appearance to *Parelaphostrongylus*, a muscle worm (Murphy 2000). Additional fecal samples were collected. Further analyses completed by Dr. Alvin Gajadhar identified *Muellarius capillaris*, the lungworm of domestic goats rather than *Parelaphostrongylus* (Gajadhar 2002). Domestic goats were known to share part of the Vulcan Bighorn Sheep range. The parasite *Muellarius capillaris* using slugs and snails as intermediate hosts, was able to "jump" from domestic goats to the bighorn sheep. Native bighorn sheep, having less natural resistance than domestic goats to *Muellaris capillaris*, likely succumbed to pneumonia that this parasite causes (Hall 2002).

Parasite levels in the Vulcan Mountain Herd were monitored almost annually from 1999-2007 by fecal samples collected and submitted to the Washington State University Veterinary Sciences Laboratory for analysis. Levels of dorsal-spined nematode larvae declined after 2001 subsequent to the "outbreak period" of 1999-2000. Except for *Coccidea*, recent parasitological monitoring has yielded reasonably low parasite levels in the Vulcan Bighorn Sheep (Mansfield 2007). That these bighorn sheep now appear healthy and are producing lambs annually suggests that the overall health of the herd is acceptable.

Range use and habitat enhancement

Between April of 2002 and March of 2004, six of the Vulcan Bighorn Sheep including 3 rams and 3 ewes were captured by helicopter net-gun and fitted with radio collars. Five bighorn sheep from Nevada including 1 ram and 4 ewes were radio-collared and released at Vulcan in January of 2003. The purpose of this radio telemetry application was to document range use, especially use of timbered versus open habitats for the U. S. Bureau of Land Management (BLM) and U. S. Forest Service (USFS) habitat managers. Subsequent monitoring revealed little movement outside of the traditionally known bighorn sheep range (Doloughan 2004).

In the past seven years several projects to enhance habitat for the Vulcan Mountain Bighorn Sheep have been completed. These include broad range weed control, selective logging, forage plant seeding, water source development, and temporary fencing at Moran Meadow to enhance controlled cattle grazing. Partners accomplishing these projects include several local private landowners, the Foundation for North America Wild Sheep (FNAWS), the Safari Club International (SCI), the Inland Northwest Wildlife Council (INWC), the USFS, the BLM, and the WDFW. As an example, one of the private property forage range seeding projects accomplished in 2002 was followed up in 2004 with weed treatment. The most recent large-scale project was the completion of a BLM timber sale within the core sheep range in 2004. This helicopter-logging project was partially designed to improve predator avoidance for bighorn sheep by enhancing sight distances within the most densely forested portions of their range, as well as to increase forage production (Doloughan 2004).

Management conclusions

The Vulcan Mountain Herd of bighorn sheep has recovered in health and in population. Lamb ratios since 2001 average over 50 lambs per 100 ewes. With healthy lamb recruitment, the Vulcan Mountain Herd has returned to the population goal of 80–110 animals.

The 2004 fall census results indicated that the Vulcan Herd could once again sustain limited-entry hunting. The population parameters for establishing a permit were met as the population was stable or increasing; had more than 30 adult sheep; and had 8 or more ½ + curl rams of which 2 or more were greater than ¾ curl (Table 1) (WDFW 2003). One permit for any ram was authorized and filled in each of the 2005 and 2006 fall seasons. With a recovered population the WDFW issued two ram permits in 2007. In 2008 the WDFW issued one general ram permit and two ewe permits for senior (age 65 +) hunters only. An additional ewe permit was added for the 2009 hunt for youth hunters only (under age 16) making a total of 4 permits, 1 ram and 3 ewes. All 4 of these permits resulted in hunter-harvested bighorn sheep in 2009. The same categories and allocation of state permits have been offered again for the 2010 fall hunting season.

References

Doloughan, K. U.S. Dept. of Interior: Bureau of Land Management. Personal communication in 2004.

Foreyt, W. J. Washington State University. Personal communications, 1999-2005.

Gajadhar, A. A. Canadian Food Inspection Agency – Saskatoon, Saskatchewan Laboratory. Personal communication in 2002.

Hall, P. B. Washington Department of Fish and Wildlife. Personal communications, 1999-2002.

Krausz, E. Colville Confederated Tribes. Personal communications, 2006-2009.

Mansfield, K. Washington Department of Fish and Wildlife. Personal communication in 2007.

Murphy, B. 2000. Washington Animal Disease Diagnostic Laboratory, Report No. 2000-12482.

Washington Department of Fish and Wildlife. 2003. Game Management Plan. Wash. Dept. Fish and Wildlife, Olympia, Wash. 136 p.

BIGHORN SHEEP STATUS AND TREND REPORT 2010: REGION 1

LINCOLN CLIFFS

HOWARD L. FERGUSON, District Wildlife Biologist
MICHAEL T. ATAMIAN, Wildlife Biologist

Population objectives and guidelines

The management objective for the Lincoln Cliffs (Sheep Unit 12) herd is to manage bighorn sheep numbers to a self-sustaining population capable of supporting both consumptive and non-consumptive recreation and within the local landowners' tolerance. The population objective for the Lincoln Cliffs herd is to reach a self-sustaining population size of 90-100 animals (WDFW 2009).

The bighorn distribution was historically centered on the original release site on the Lincoln Cliffs area just south of the town of Lincoln. Observations of bighorn sheep have been reported as far east as Porcupine Bay on the Spokane Arm of Lake Roosevelt and to the east side of Banks Lake in Grant County. The sheep now regularly occupy two main areas throughout the year – the original Lincoln Cliffs area and the cliffs around Whitestone Rock, about 7 miles downriver from Lincoln. Sheep have also been observed semi-regularly using the cliffs above Sterling Valley, the area just west of Lincoln Cliffs. Bighorns were released in spring of 2008 into the Hellgate area of the Colville Indian Reservation, north side of Lake Roosevelt.

Hunting seasons and harvest trends

The first hunting permit for this herd was issued for the 1997-hunting season. Since then, one permit has been issued each year and harvest success has remained at 100%.

The number of applicants for the Lincoln Cliffs hunt has been fairly stable for the past five years, averaging around 1300 a year (Table 1). In addition to the annual permit the statewide 2003 and 2004 auction winners and the 2005 raffle winner all selected Lincoln Cliffs to harvest their rams. Auction and raffle winners are no longer allowed to hunt in Sheep Unit 12.

From 1997 to 2009, hunters have spent on average 4.5 days hunting per kill (Table 2). However, days hunter per kill ranges widely from 1 to 14 days over the past

Table 1. Bighorn Sheep Harvest Data

Year	Applications Received	Seen by Permitee		
		Sheep	Lambs	3/4+Curls
1997	527	38	15	3
1998	451	60	23	8
1999	732	42	5	7
2000	1,078	55	0	7
2001	1,100	13	0	3
2002	1,352	38	4	17
2003	1,219	1	0	1
2004	1,311	50	10	9
2005	1375	40	12	4
2006	1218	8	3	0
2007	1326	7	1	2
2008	1290	42	8	8
2009	1608	58	16	9

Table 2. Days per kill.

Year	Days/Kill	Last 3 yrs Running Avg.
1997	6	
1998	14	
1999	4	8
2000	1	6
2001	3	3
2002	3	2
2003	1	2
2004	7	4
2005	11	6
2006	1	6
2007	1	4
2008	3	2
2009	5	3
Avg.	**4.6**	

13 years. The area is primarily composed of private property and days/kill often reflects how much time was spent prior to the hunt gathering permission to access the local properties.

Since 1997, 16 mature rams have been removed by hunting by either the regular permittees or the auction and raffle winners. The number of mature rams seen by hunters has been variable over the years, but shows a decline since 2002. However, lower number of mature rams observed by hunters may also reflect the amount of time the individual spent hunting (Table 2).

Surveys

Aerial surveys are the preferred method for surveying this herd due to the habitat (cliffs) and lack of road access. Ground surveys have been used, however, these are often very limited due to the terrain of Lincoln Cliffs and the access to private property. Despite the problems, ground counts are conducted, whenever possible, to supplement the aerial surveys.

Table 3. Lincoln Cliffs Herd May Lamb Surveys

Year	Ewes	Lambs	Lambs: 100 Ewe	±90%CI
2002	8	4	50	50
2003	27	13	48	27
2004	35	10	29	17
2005	21	10	48	30
2006	24	8	33	22
2007	18	9	50	34
2008	34	14	41	22
2009	33	11	33	19
2010	37	16	43	21

Over the years aerial surveys have been inconsistent due to funding and personnel. However, since 2002 a concerted effort has been made to conduct two aerial surveys per year. One in the spring to assess lamb production and one in late fall to assess ram numbers. The lamb to 100 ewe ratio has remained relatively stable over the past nine years (averaging 42 lambs per 100 ewes), but yearly 90% confidence intervals are large (Table 3). The ram to 100 ewe ratio has been variable over the past nine years (average 78, range 44-178; Table 4). Survey results were greatly improved by radio collaring thirteen of the 15 sheep translocated in 2003, leading to a more stable lamb and ram to 100 ewe ratio and smaller 90% CI. However, as of 2008 no collars remain active.

Table 4. Lincoln Cliffs Herd Nov. Ram Surveys

Year	Ewes	Rams	Rams: 100 Ewe	±90%CI
2002	18	32	178	86
2003	32	18	56	27
2004	36	16	44	22
2005	21	22	105	53
2006	16	9	56	39
2007	25	20	80	39
2008	30	15	50	26
2009	31	18	58	28

Population status and trend analysis

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

Following this release, the population showed a steady increase and eventually tripled in numbers after 4 years. By 1996 the population objective level of 60 to 70 bighorns was reached with 65 animals observed during the fall ground survey. The population reportedly peaked at around 100 animals in June 1998 (ground survey, pers. comm. J.Hickman). This peak in population was further evidenced by hunter reports of animals seen (Table 1). Hunter observed animals peaked at 60 in 1998 with high numbers continuing to be reported through 1999 and 2000. Since 2001, numbers reported, appear to be decreasing with a high of 50 being reported in 2004 and dropping to a low of 7 reported in 2007. Lower number of sheep observed by hunters may also reflect the amount of time the individual spent hunting (Table 2).

In March 1999, 10 ewes and 1 ram lamb from the Lincoln Cliffs herd 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 Cleman Mountain area. From 1999 to 2001, a total of 27 ewes and 1 ram were removed from this population.

Following the last capture and translocation the number of sheep observed by the permit hunter in 2001 dropped significantly. Additionally the aerial and ground surveys in 2002 found on average only 40 sheep in the area. The population appeared to have not recovered from the removal of ewes for translocation to other areas. As a result, 15 sheep were translocated

from Nevada to the Lincoln Cliffs and Whitestone areas in January 2003 – 12 ewes, 1 ram, and 2 lambs. All were given numbered yellow ear tags and the adults were all equipped with VHF radio collars. Mortality rates for the radio collared sheep were approximately 10% each year, with a total of 7 mortalities post release – 1 ram and 6 ewes. Cougar predation has been the source of at least three of those deaths. The lambs were not found again after release, 2 ewes were never heard again after the November 2003 flight, the remaining 4 ewes appear to have outlived their radio collars. No radio signals have been picked up since May of 2008.

Since November of 2002, 31 known sheep mortalities have occurred -- 16 from hunting, 2 from vehicle collisions, 5 from cougar, and 7 unknowns -- a total of 23 rams and 8 ewes.

Minimum population estimates, based on maximum count of rams, and ewes from all helicopter surveys in a given year, show the Lincoln Cliff population to be relatively stable (Fig. 1). There was a decline in ewes in 2005 followed by a decline of rams in 2006. The population appears to have mostly recovered from this in the past three years. Estimates are only shown from 2002 on because this is the year regular helicopter surveys were initiated.

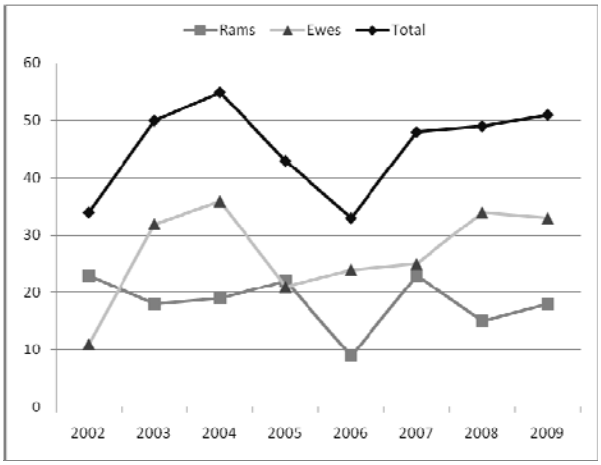


Figure 1. Lincoln Cliffs minimum population estimate by sex for 2002 – 2009. Estimated as the maximum count from all helicopter surveys conducted each year.

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. In the past few years development 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, but limited and decreasing. There is no known competition with domestic livestock at the present time. However, it is important to remain vigilant, since three domestic sheep were discovered to have escaped in the area of Sterling Valley, but follow up observations indicate they did not survive. In the future, big horn sheep information pamphlets should be made available 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.

Disease and parasites

During capture operations in 2000 and 2001 it was noted that these animals were in excellent physical condition. All of the animals captured were robust with excellent pelage and overall appearance. Disease testing showed low numbers of parasites and no harmful disease, however, the presence of domestic sheep and goat herds within the unit represent an ongoing disease threat.

Wildlife damage

We have received only a few damage complaints related to bighorns in the Lincoln Cliffs area. However, the local human population and associated construction of new housing and splitting of parcels all increase the future potential for sheep-human conflicts.

Management conclusions

The herd is now roughly estimated to be around 60-80 adult animals. This sets the Lincoln Cliff herd just below the stated goal of 90-100 animals for this population (Game Management Plan, WDFW 2009). This very rough estimate would be improved through the radio collaring of 10-15 sheep for use in creating a sightability model for this herd. Given the apparent permanent expansion of this herd to Whitestone Rock, and sporadic use of Sterling Valley, population goals for this herd should be reviewed.

With the increase in human population density in and around Lincoln Cliffs, extra effort will be taken to monitor herd numbers and sex ratios in the next few years. Permit controlled hunting for rams will be continued in the 2010 & 2011 season. However,

because of the rough population estimate and the number of mature rams being removed during the past years, the number of permits offered will remain at 1 and no raffle or auction hunts will occur at Lincoln Cliffs.

Literature Cited

Washington Department of Fish and Wildlife. 2009. Game Management Plan July 2009 – June 2015. Wildlife Program, Washington Department of Fish and Wildlife, Olympia, Washington, USA.

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 1

BLUE MOUNTAINS

Pat E. Fowler, District Wildlife Biologist
Paul A. Wik, Wildlife Biologist

Population objectives and guidelines

The first bighorn sheep (*Ovis canadensis*) population in the Blue Mountains was established on the W.T. Wooten Wildlife Area (Tucannon River) during the early 1960's, and consisted of California (*O. c. californiana)* bighorns transplanted from the Sinlahekin Wildlife Area. Since that re-introduction, four additional herds of bighorn sheep have been established in the Blue Mountains; Asotin Creek, Black Butte, Mountain View (formerly known as the Cottonwood herd), and Wenaha. The first two herds consisted of California bighorn sheep (Tucannon and Mountain View), but subsequent transplants have consisted of Rocky Mountain (*O. c. canadensis*) bighorn sheep from Hall Mountain Washington, Montana, Wyoming, and from the Wallowa Mountains in Oregon. Minimal California bighorn subspecies genetics likely remain in the Blue Mountains due to diseases introduced from inter-herd movement. Scabies (*Psoroptes ovis*) spread into the Mountain View and Tucannon herds during the late 1980's and 1990's, resulting in a massive die-off of California bighorns. The Mountain View herd has frequent interchange of radio-marked individuals with the Wenaha herd, likely further shifting the genetics towards the Rocky subspecies. Also, the School Fire killed 7 - 9 (~50%) of the remaining sheep (thought to have been about 17) in the Tucannon drainage in 2005. Currently, it is thought that herds in the Blue Mtns consist primarily of the Rocky Mountain subspecies.

Population management objectives for each herd are based on habitat conditions and minimizing herd expansion into new habitats that may increase the risk of contact with domestic sheep or goats. The adult population management objective for the Blue Mountains is 500-550 bighorn sheep; Tucannon herd-60, Mountain View herd-60-70, Asotin Creek herd-75-100, Black Butte herd-150-200, and Wenaha herd >90.

The Hells Canyon Initiative (HCI) was established in 1996, with representatives from Washington Department of Fish & Wildlife, Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, U.S. Forest Service, Bureau of Land Management, and the Wild Sheep Foundation {formerly known as Foundation for North American Wild Sheep (FNAWS). HCI conducts disease research, develops population survey methodology, conducts transplants, coordinates intergovernmental management activities, and implements projects designed to improve bighorn sheep habitat. Four of Washington's bighorn sheep populations are included in HCI; Black Butte, Mountain View, Wenaha, and Asotin Creek.

Hunting seasons and harvest trends

Permit controlled hunting was terminated in most the Blue Mountains after the *Pasturella* die-off of 1995-1996. Permits were terminated in the Tucannon in 1999, after this herd suffered a major population decline.

One raffle permit per year has been authorized by the Fish & Wildlife Commission since 2005 to fund bighorn sheep programs and research in southeast Washington. Biologists decide each year which units will be open for hunting by the permit holder. In 2009, the Black Butte and Tucannon herds were available. In 2010, only the Black Butte herd was available. In 2011, the Asotin and Black Butte herds will be available

Raffle permit holders have been successful in harvesting rams in all years; 2005 – Tucannon, 2006 – Wenaha, and 2007 – Mountain View, 2008 – Wenaha, and in 2009 – Black Butte. In 2006, WDFW issued the first permit to a licensed hunter for the Wenaha herd since 1996. This permit was good for 1 ram in the Crooked Creek drainage of the Wenaha GMU (169). In 2007, a draw permit was issued for the Wenaha unit as well as the raffle permit, which resulted in 2 rams being harvested. In 2008, draw permits were issued for the Wenaha and Asotin herds, with 3 rams being harvested (including the raffle). The Asotin permit resulted in the first legal harvest of a bighorn sheep by a Washington licensed hunter in that herd, an unknown number of tribal harvests have occurred during the past decade within this herd. In 2009, 1 ram was harvested in each of the following herds: Asotin, Black Butte (raffle), and Wenaha.

General hunt permits will not be implemented in

other herds until populations meet criteria established in the Game Management Plan. Treaty hunting by the Nez Perce tribe (NPT) occurs annually but information on harvest is limited. WDFW has documented some tribal hunting, with 8 rams over the last 7 years being documented.

Since the NPT does not regulate or monitor harvest, these losses should be considered the minimum number taken by tribal members. In 2003, the NPT Wildlife Committee recommended closing the Washington portion of their treaty area to bighorn sheep hunting by tribal members, which was a major step forward in tribal cooperation. The current status of this closure is unknown.

Twelve bighorn sheep, 10 ewes and 2 young rams, were captured and removed from the Asotin herd in February 2009. The sheep were donated to Washington State University Veterinary Center for disease related research. The population reduction was implemented to reduce habitat use expansion by the Asotin herd. This effort was likely inadequate in reducing the range of this herd. In 2010, bighorns from the Asotin herd have consistently moved further downstream than previously observed. Plans have been made to improve habitat upstream and haze animals that continue the downstream range expansion.

In 2010, 5 ewes, 3 rams, and 2 lambs were captured from the Tucannon herd. All adult sheep were fitted with VHF collars and biological samples were obtained to determine herd health. The objective of the capture was to determine herd health prior to transplanting additional sheep into this area and increase the ability of monitoring movements within the Tucannon drainage. All captured sheep were treated with a topical insecticide, a topical ear mite treatment, and injectable ivermectin in an attempt to reduce the scabies load.

Surveys

Aerial surveys are conducted in March or April using a sightability model developed through the Hells Canyon Initiative. These surveys are conducted to determine population estimates, trend, and herd composition at the low point of the annual population cycle. Radio telemetry locations are obtained frequently throughout the year by foot and/or aircraft, supplementing the March helicopter surveys.

Aerial surveys were only conducted for the Black Butte herd in 2010. Ground counts were used to estimate the population sizes of the other 4 herds. The population estimate for 2010 was 253 bighorn sheep, 136 ewes, 32 lambs, 85 rams for a ratio of 63 (90% CI: 48-77) rams and 24 (90% CI: 16-31) lambs per 100 ewes (Table 1.). A population estimate from modeling has not been developed for 2010 at this time, but biologists estimate that there are approximately 253 - 270 bighorns in the 5 herds. The population appears to be relatively stable over the past 5 years, despite low lamb recruitment 3 of the past 5 years.

Population status and trend analysis

Lamb survival has been limiting population growth since the *Pasturella* die-off in 1996, with lamb survival varying greatly between years. Only one lamb was recruited within the Black Butte herd in the Washington portion of the range and Mountain View only produced 2 lambs during 2010. The Wenaha herd had 8 lambs survive to one year of age. The Asotin herds had 17 lambs survive the first year, while the Tucannon herd had 2 lambs survive the first year. The Asotin and Tucannon herds are the only herds that have not had lambs die from pneumonia during the past 15 years of intensive monitoring. Lamb mortality has already been high in the Black Butte, Mountain View, and Wenaha herds by July 2010, with few lambs expected to survive into the yearling class. It is expected that the Asotin herd will continue to grow in the absence of disease, and has 30 lambs entering August 2010.

Individual herds should be able to increase in numbers if lamb production and survival returns to 30 lambs:100 ewes or greater for several years. Unfortunately the Black Butte herd has not reached this level since 2005 (Table 3). This trend has continued through 2010 with the Black Butte, Mountain View, and Wenaha herds all suffering from high lamb mortality. It is expected that population numbers will decline until lamb survival improves significantly on a long-term basis.

The ram population suffered high mortality during the *Pasturella* die-off in 1995-96, which resulted in few adult rams in the population for several years. Low lamb survival following the all age class die-off resulted in poor recruitment of rams into the population. The number of Class-III and IV rams in the population is currently declining or stable at a very low level in all herds except Asotin, and still remains substantially below the number that existed prior to the die-off (Table 1). Poor lamb recruitment, predation, pneumonia, and harvest are all contributing to the low performance of bighorn herds in the Blue Mountains.

The Tucannon herd is at an all time low since 1975 (beginning of data). This population will not rebound in the near future without a supplemental transplant. In

August 2005, the School Fire consumed 49,515 acres in the Tucannon drainage, including the entire range of this herd. With the loss of at least 7 adult sheep, a supplemental transplant will be scheduled to occur as soon as feasible. The rebuilding of the elk fence along the northern boundary of the W.T. Wooten Wildlife Area was completed in May 2009. It is hoped that the elk fence prevents sheep from moving north onto private land where they may come in contact with domestic sheep or goats. Although a yearling ram was observed in close proximity to a domestic goat approximately 6 miles north of the elk fence in July 2010. The origin and disposition of that ram is not known. The completion of the fence has allowed WDFW to go forward with plans to transplant additional sheep into the Tucannon during the winter of 2010 - 2011 if available.

Habitat condition and trend

Habitat conditions are moderate to good in most areas. However, the spread of noxious weeds, mostly yellow star-thistle (*Centaurea solstitialis*), thistle (*Cirsium* spp.), and rush skeleton weed (*Chondrilla juncea*) are threatening herds in the Blue Mountains. It is too early to determine the impact of the School Fire on the Tucannon range, but it is expected to exacerbate the noxious weed problem over the next 5 - 10 years. An aggressive weed control program on the Wooten W.A. is currently in effect on WDFW and USFS lands to minimize this impact.

Disease and parasites

Pneumonia continues to plague three bighorn populations; Black Butte, Wenaha, and Mountain View. The Asotin and Tucannon herds have not experienced pneumonia caused mortality, but do carry scabies (*Psoroptes ovis*). Bighorn populations in the Blue Mountains have not recovered from the *Pasturella* induced pneumonia die-off as quickly as some herds, possibly from re-infection from domestic sheep and goats that exist within the range of multiple herds. The presence of domestic sheep and goats within and adjacent to bighorn sheep range presents a constant and substantial risk of another major *Pasturella* epizootic. Fortunately, in July 2006, WAFNAWS reached an agreement with one landowner and 200+ domestic sheep were removed from lower Joseph Creek and in March 2009, another landowner with 5 domestic sheep within the Black Butte range removed his stock. WDFW actively works with landowners near bighorn sheep herds to make sure accurate information is available and options to minimize contact are made available.

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

Scabies continues to be present in all five herds, with unknown affects on the populations. The Tucannon herd suffered a major die-off caused by scabies when it was infected in 1999.

Lamb mortality continues to be high in the Black Butte, Mountain View, and Wenaha herds (Tables 3, 4, & 6). Lambs collected from these herds that recently died, or were on the verge of dying all indicate that pneumonia was the proximate cause of death. WDFW continues to support Washington State University research into the factors related to pneumonia in Hells Canyon.

In June 2010, a yearling ram was observed in close proximity to domestic goats near the town of Asotin. Biologists captured the animal and fitted him with a VHF and GPS store on board collar. The animal was hazed away from the domestic goats, unfortunately 2 weeks later the yearling ram was found in contact with 5 domestic sheep in the Cloverland area. The ram was lethally removed at that time. These domestic sheep were later sampled by biologists to determine bacterial fauna present.

Management conclusions

Three of the five bighorn sheep herds in the Blue Mountains are struggling with *Pasturella* induced pneumonia. The Black Butte, Wenaha, andMountain View herds are still plagued by periodic pneumonia outbreaks, which result in high lamb mortality and sporadic adult mortalities. The Tucannon herd escaped the *Pasturella* out-break, but suffered a major die-off after being infected with scabies in 1999. This herd is unlikely to recover without a supplemental transplant. Each herd suffers from various problems that result in mortality of adults and/or lambs. These mortality factors limit the ability of individual herds to reach the population management objectives; although recent rapid growth of the Asotin herd is creating new challenges associated with herd distribution on private lands.

Domestic sheep and goats continue to be a major problem for bighorn sheep populations in the Blue Mountains. Rural landowners continue to use domestic sheep and goats to control weeds, which poses a severe threat to all herds in Hells Canyon. HCI research has shown that a large amount of inter-herd movement

occurs (Cassirer, IDFG, pers. comm.). Two young rams were lethally removed from the Black Butte herd during the summer of 2005 because they came in contact with domestic goats at a rural residence. In 2006, a single ewe was captured above the town of Asotin, as was a single 3-year old ram in 2007. Two bighorn ewes were observed within 500m of domestic goats above Asotin in 2009 and the previously mentioned yearling ram was originally captured in this same location. The two ewes were not removed at that time because contact had not been documented. Once wandering bighorns have come in contact with domestic sheep/goats, they cannot be allowed to return to the main herd, because the risk of a major *Pasturella* outbreak is high. In early 2008, District 3 wildlife management staff authored response guidelines to be implemented when bighorn sheep are located in "high risk" areas, or domestic sheep or goats are located within bighorn range. These guidelines were submitted in February 2008, but have not yet been officially adopted.

The Hells Canyon Initiative updated an informational pamphlet for landowners in 2006, which spells out the risks of contact between domestic sheep/goats and bighorn sheep. Unless rural residents can be discouraged from acquiring domestic sheep and goats, or provide pens that prevent contact between domestics and bighorn sheep, the risk of another *Pasturella* outbreak in the bighorn population is very high.

Planning is currently occurring to transplant additional Rocky Mtn bighorn sheep into the Tucannon herd during the winter of 2010 – 2011. An attempted transplant from Montana in March of 2010 failed due to logistical problems. This transplant will be implemented to return the Tucannon population to its management objective.

Table 1. Bighorn Sheep Population Trend and Herd Composition, Blue Mountains 1994-2010

			Rams					Count	Population	Ratio (90% CI)	
Year	Lambs	Ewes	C I	C II	C III	CIIIB	C IV	Total	Total	Lambs (CI)	Rams (CI)
1994	89	202	3	35	57(14))			95	386	44 (35, 53)	47 (38, 56)
1995	20	138	10	11	20		8	49	208	14 (9, 20)	36 (26, 45)
1996	16	115	8	6	10		3	27	158	14 (8, 20)	23 (15, 32)
1997	26	135	11	16	12		7	46	207	19 (12, 26)	34 (25, 44)
1998	31	105	17	15	16		7	55	191	30 (20, 39)	52 (38, 67)
1999	42	104	13	15	10		5	43	189	40 (28, 53)	41 (29, 54)
2000	32	100	15	22	13		5	55	187	32 (21, 43)	55 (40, 70)
2001	33	99	5	17	25		5	52	184	33 (22, 44)	53 (38, 67)
2002	29	83	7	15	28		7	57	169	35 (23, 47)	69 (49, 88)
2003	38	96	9	14	24		7	54	189	40 (27, 52)	56 (41, 72)
2004	50	103	17	10	30		6	63	216	49 (35, 62)	61 (45, 77)
2005	28	121	10	26	28		17	81	230	23 (15, 31)	67 (51, 83)
2006	41	104	7	13	6		3	53*	198	39 (27, 51)	51 (38, 64)
2007	50	106	13	16	31		7	66	223	47 (34, 60)	63 (47, 79)
2008	28	125	21	26	22	1	4	74	227	22 (15, 30)	59 (45, 73)
2009	29	131	2	34	23	2	6	67	229	22 (15, 30)	51 (39, 64)
2010	32	136	17	29	33	1	5	85	253	24 (16, 31)	63 (48, 77)

*Rams were not classifed within the Wenaha herd, only total number seen is given. Survey was conducted by ODFW staff.

Table 2. Population Trend and Herd Composition, Asotin Creek Herd, Blue Mtns. Washington.

			Rams					Ram	Population	Ratio (90% CI)	
Year	Lambs	Ewes	CI	CII	CIII	CIIIB*	CIV	Total	Total	Lambs	Rams
1994	3	6	3	2	1			6	15	50 (0, 108)	100 (5, 195)
1995	1	4	1	3	1			5	10	25 (0, 71)	125 (0, 263)
1996	1	5	0	1	3		1	5	11	20 (0, 56)	100 (0, 204)
1997	2	14	1	1	3		0	5	21	14 (0, 32)	36 (5, 66)
1998	7	13	3	2	1		1	7	27	54 (12, 95)	54 (12, 95)
1999	8	16	2	2	3		2	9	26	50 (14, 86)	56 (18, 95)
2000	7	18	4	2	2		1	9	34	39 (10, 67)	50 (16, 84)
2001	3	23	1	2	3		2	8	34	13 (0, 26)	35 (11, 58)
2002	7	17	0	4	4		1	9	33	41 (11, 72)	53 (17, 89)
2003	11	23	1	5	1		1	8	42	48 (19, 77)	35 (11, 58)
2004	12	22	6	1	5		0	12	46	55 (22, 87)	55 (22, 87)
2005	8	26	3	1	6		0	10	44	31 (10, 51)	38 (15, 62)
2006	13	34	6	6	3		1	16	63	38 (18, 59)	47 (24, 71)
2007	10	30	2	8	6		3	19	59	33 (13, 53)	63 (33, 94)
2008	13	40	11	9	6	0	1	27	80	33 (15, 50)	68 (40, 95)
2009	18	48	1	9	6	0	1	17	84	38 (20, 55)	35 (19, 52)
2010	17	46	12	10	12		3	37	100	37 (20, 54)	80 (51, 110)

* Class IIIB rams are Class IV rams broomed off to a point they no longer are considered full curl.

Table 3. Population Trend and Herd Composition, Black Butte Herd, Blue Mtns. Washington

			Rams					Count	Population	Ratios (90% CI)	
Year	Lambs	Ewes	CI	CII	CIII	CIIIB	CIV	Total	Total	Lambs	Rams
1977	3	7		2				2	12	43 (0, 92)	29 (0, 66)
1978	3	9		3				3	15	33 (0, 70)	33 (0, 70)
1979	6	12		6	2			8	26	50 (9, 91)	67 (17, 117)
1980	4	13		5	1			6	23	31 (2, 60)	46 (9, 84)
1981	9	17		10	3			13	39	53 (17, 89)	76 (30, 123)
1982	7	10		7	2			9	26	70 (13, 127)	90 (22, 158)
1983	11	17		9	4			13	41	65 (24, 106)	76 (30, 123)
1984	7	31		6	10			16	54	23 (7, 38)	52 (25, 78)
1985	18	34		8	10			18	80	53 (28, 78)	53 (28, 78)
1986	25	33		14	10			24	82	76 (43, 109)	73 (41, 105)
1987	28	46		13	13			26	100	61 (37, 85)	57 (34, 79)
1988	19	56		23	13			36	111	34 (19, 49)	64 (42, 87)
1989	33	64	—	28	8		8	44	141	52 (33, 70)	69 (47, 91)
1990	16	46	—	14	12		9	35	97	35 (18, 51)	76 (48, 104)
1991	23	45	—	13	3		2	18	86	51 (30, 73)	40 (22, 58)
1992	31	55	—	10	5		7	22	108	56 (36, 77)	40 (23, 57)
1993	39	75	—	7	8		7	22	136	52 (35, 69)	29 (18, 41)
1994	51	93	—	13	18		8	39	183	55 (39, 71)	42 (29, 55)
1995	2	34	3	1	1		1	6	42	6 (0, 13)	18 (5, 31)
1996	2	29	2	1	2			5	36	7 (0, 15)	17 (4, 31)
1997	7	30	4	4	2		2	12	49	23 (7, 39)	40 (18, 62)
1998	11	31	4	5	3		2	14	56	35 (15, 56)	45 (21, 69)
1999	10	30	4	6	5		1	16	56	33 (13, 53)	53 (26, 80)
2000	7	25	3	7	4		2	16	48	28 (8, 48)	64 (30, 98)
2001	7	25	3	9	8		2	22	54	28 (8, 48)	88 (46, 130)
2002	2	18	3	6	14		1	25	51	11 (0, 25)	139 (68, 210)
2003	13	24	2	3	10		1	16	53	54 (23, 85)	67 (31, 102)
2004	9	26	6	4	6		1	17	52	35 (13, 57)	65 (32, 99)
2005	5	45	3	12	7		2	24	74	11 (2, 20)	53 (31, 76)
2006	3	19	1	2	5		1	9	31	16 (0, 32)	47 (16, 79)
2007	4	24	5	2	9		1	17	45	17 (2, 31)	71 (34, 108)
2008	1	27	2	3	2	0	0	7	35	4 (0, 10)	26 (8, 44)
2009	0	25	1	10	7	2	1	21	47	0 (0,0)	84 (43, 125)
2010	3	35	2	4	9		1	16	54	9 (0, 17)	46 (23, 68)

Table 1. Black Butte Herd Composition Data 1977-07, Blue Mtns. Washington. Pre-1989 rams were broken into legal and sublegal categories.

Table 4. Mountain View herd population trend and composition counts, 1974-2010, Blue Mtns., Washington.

			Rams						Population	Ratios (90% CI)	
Year	Lambs	Ewes	CI	CII	CIII	CIIIB	CIV	Total	Total	Lambs	Rams
1974	5	6		3	0			3	14	83 (0, 166)	50 (0, 108)
1975	3	6		2	1			3	12	50 (0, 108)	50 (0, 108)
1976	5	7		3	2			5	17	71 (3, 140)	71 (3, 140)
1977	6	7		4	2			6	19	86 (7, 164)	86 (7, 164)
1978	6	12		6	2			8	26	50 (9, 91)	67 (17, 117)
1979	9	16		4	6			10	35	56 (18, 95)	63 (21, 104)
1980	12	17		7	8			15	44	71 (27, 114)	88 (37, 140)
1981	11	21		7	7			14	46	52 (20, 84)	67 (29, 105)
1982	7	17		8	2			10	34	41 (11, 72)	59 (20, 97)
1983	10	29		11	8			19	58	34 (14, 55)	66 (34, 97)
1984	13	28		10	5			15	56	46 (21, 72)	54 (25, 82)
1985	15	35		13	7			20	70	43 (21, 65)	57 (31, 83)
1986	20	38		10	4			14	72	53 (29, 77)	37 (18, 56)
1987	6	15		5	2			7	28	40 (8, 72)	47 (12, 82)
1988	6	16		5	4			9	31	38 (8, 67)	56 (18, 95)
1989	6	16		5	2		2	9	31	38 (8, 67)	56 (18, 95)
1990	7	18		5	1		1	7	32	29 (10, 67)	39 (10, 67)
1991	8	15		8	2		4	14	37	53 (15, 92)	93 (36, 150)
1992	5	16		6	4		4	14	35	31 (5, 58)	88 (35, 140)
1993	18	23		10	4		4	18	59	78 (38, 119)	78 (38, 119)
1994	10	24		10	3		4	17	51	42 (16, 67)	71 (34, 108)
1995	6	28	1	1	3		2	7	41	21 (6, 37)	25 (8, 42)
1996	1	14	2	0	1		0	3	16	7 (0, 19)	21 (0, 44)
1997	3	14	1	1	1		1	4	21	21 (0, 44)	29 (2, 55)
1998	5	12	3	2	1		1	7	21	42 (5, 78)	58 (13, 104)
1999	10	14	3	1	1		0	5	29	71 (23, 120)	36 (5, 66)
2000	4	14	4	1	1		0	6	24	29 (2, 55)	43 (8, 77)
2001	3	11	1	2	1		0	4	21	27 (0, 56)	36 (1, 71)
2002	8	10	0	1	0		0	1	19	80 (18, 142)	10 (0, 27)
2003	0	11	1	1	4		1	7	18	0	64 (13, 114)
2004	10	14	2	2	2		1	7	31	71 (23, 120)	50 (12, 88)
2005	4	13	2	5	1		1	9	26	31 (2, 60)	69 (20, 119)
2006	10	16	0	5	1		1	7	33	63 (21, 104)	44 (11, 76)
2007	12	19	4	0	3		0	7	38	63 (25, 101)	37 (10, 64)
2008	0	22	2	0	0		0	2	24	0	9 (0, 20)
2009	0	7	0	4	2	0	0	6	13	0	86 (7, 164)
2010	2	18	2	6	6	0	0	14	34	11 (0, 25)	66 (32, 123)

Table 5. Tucannon herd population trend and composition counts, 1975-2010, Blue Mtns., Washington.

			Rams						Population	Ratios (90% CI)	
Year	Lambs	Ewes	CI	CII	CIII	CIIIB	CIV	Total	Total	Lambs	Rams
1975	4	7		1	3			4	15	57 (0, 116)	57 (0, 116)
1976	4	9		2	2			4	17	44 (1, 88)	44 (1, 88)
1977	2	10		3	2			5	17	20 (0, 45)	50 (5, 95)
1978	.	.		.	.			.			
1979	4	10		6	3			9	23	40 (1, 79)	90 (22, 158)
1980	3	13		7	4			11	27	23 (0, 47)	85 (28, 142)]
1981	9	14		4	7			11	34	64 (19, 109)	79 (26, 131)
1982	5	17		6	6			12	34	29 (5, 54)	71 (27, 114)
1983	4	20		6	5			11	35	20 (2, 38)	55 (21, 89)
1984	4	23		5	7			12	39	17 (2, 33)	52 (22, 83)
1985	4	20		6	7			13	37	20 (2, 38)	65 (27, 103)
1986	7	18		6	10			16	41	39 (10, 67)	89 (39, 139)
1987	8	20		7	11			18	46	40 (12, 68)	90 (42, 138)
1988	8	21		10	10			20	49	38 (12, 64)	95 (46, 144)
1989	9	23		10	8			18	50	39 (14, 64)	78 (38, 119)
1990	11	22		11	8		5	24	57	50 (20, 80)	109 (56, 162)
1991	12	23		10	8		5	23	58	52 (22, 83)	100 (51, 149)
1992	15	28		12	8		4	24	67	54 (25, 82)	86 (46, 125)
1993	12	24		13	6		2	21	57	50 (21, 79)	88 (44, 131)
1994	4	24		4	12		2	18	46	17 (2, 31)	75 (37, 113)
1995	2	24	1	4	6		1	12	39	8 (0, 18)	50 (21, 79)
1996	10	24	1	4	5		2	12	46	42 (16, 67)	50 (21, 79)
1997	10	27	1	3	3		3	10	47	37 (14, 60)	37 (14, 60)
1998	4	22	4	2	4		2	12	38	18 (2, 34)	55 (22, 87)
1999	2	17	2	2	1		2	7	26	12 (0, 26)	41 (11, 72)
2000	7	13	1	4	1		1	7	27	54 (12, 95)	54 (12, 95)
2001	2	12	0	0	3		1	4	18	17 (0, 38)	33 (2, 65)
2002	0	7	0	0	4		2	6	11	0	86 (7, 164)
2003	2	9	1	1	3		1	6	17	22 (0, 51)	67 (9, 124)
2004	2	9	1	1	2		2	6	17	22 (0, 51)	67 (9, 124)
2005*	2	5	2	1	2		2	7	14	40 (0, 95)	140 (5, 275)
2006									7 - 9		
2007	2	2	1						5	100 (0, 265)	0
2008	3	3	1		1		1	3	9	100 (0, 234)	100 (0, 234)
2009	0	7	0	1	0	0	1	2	9	0	29 (0, 66)
2010	2	5	0	1	2	0	0	3	10	40 (0, 95)	60 (0, 132)

* School Fire burned the entire Tucannon Sheep range. Unknown number of sheep were directly killed and displaced during this event.

Table 6. Wenaha Herd Population Trend and Composition Counts, Blue Mtns. Washington. Pre 1989 rams were broken into legal and sublegal.

			Rams						Population	Ratios (90% CI)	
Year	Lambs	Ewes	CI	CII	CIII	CIIIB	CIV	Total	Total	Lambs	Rams
1983	5	10		5	.			5	20	50 (5, 95)	50 (5, 95)
1984	3	12		.	.			.	15	25 (0, 52)	0
1985	10	13		3	.			3	26	77 (24, 130)	23 (0, 47)
1986	10	14		4	1			5	29	71 (23, 120)	36 (5, 66)
1987	13	23		15	6			21	57	57 (24, 89)	91 (46, 137)
1988	17	28		8	7			15	60	61 (30, 91)	54 (25, 82)
1989	12	36		15	12			27	75	33 (15, 52)	75 (44, 106)
1990	33	59		14	9		7	30	122	56 (36, 76)	51 (32, 70)
1991	19	45		11	13			24	88	42 (23, 61)	53 (31, 76)
1992	19	51		4	20			24	94	37 (21, 54)	47 (28, 66)
1993	25	48		14	15			29	102	52 (31, 73)	60 (37, 84)
1994	21	55		6	9			15	91	38 (22, 54)	27 (14, 40)
1995	9	48	4	2	9		4	19	76	19 (8, 30)	40 (22, 57)
1996	2	43	4	0	0			4	49	5 (0, 10)	9 (1, 17)
1997	4	50	1	7	4			12	62	8 (1, 15)	24 (11, 37)
1998	4	27	3	4	7		1	15	46	15 (2, 28)	56 (26, 85)
1999	12	27	2	4	0			6	45	44 (19, 70)	22 (6, 39)
2000	7	30	3	8	5		1	17	54	23 (7, 39)	57 (28, 85)
2001	8	28	0	4	10			14	50	29 (10, 47)	50 (23, 77)
2002	6	35	4	4	8		3	19	60	17 (5, 30)	54 (29, 80)
2003	12	29	4	4	7		3	18	59	41 (18, 65)	62 (31, 93)
2004	17	32	2	2	15		2	21	70	53 (27, 79)	66 (35, 96)
2005	9	32	0	7	12		12	31	72	28 (11, 46)	97 (57, 137)
2006	15	35						21	71	43 (21, 65)	60 (33, 87)
2007	22	31	1	6	13		3	23	76	71 (38, 104)	74 (41, 108)
2008	11	33	5	14	13	1	2	35	79	33 (14, 52)	106 (64, 148)
2009	11	44	0	10	8	0	3	21	76	25 (11, 39)	48 (27, 69)
2010	8	32	3	8	4	1	1	17	57	25 (9, 41)	53 (27, 79)

( ) indicates number of Class-4 rams in > 3\4 class

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 2

MT. HULL UNIT 10

SCOTT FITKIN, District Wildlife Biologist
JEFF HEINLEN, Wildlife Biologist

Population objectives and guidelines

Mt Hull Herd. The population objective for the Mt. Hull herd is 55-80 animals. Currently herd size exceeds this level with an estimated 100+ animals. As a result, a herd reduction of 25% is the current management focus. This population supports a conservative, any ram permit harvest to the extent it is compatible with herd demographics. Starting in 2009 two ewe permits where offered to help achieve herd reduction goals.

Sinlahekin herd. The population objective for the Sinlahekin herd is 50 animals. Currently herd size exceeds this level with an estimated 90-95 animals. Over the last decade seasonal ranges for this herd have changed significantly, thus a reevaluation of the population objective may be warranted. The Sinlahekin herd is being managed for a stable population.

Hunting seasons and harvest trends

Mt Hull Herd. Due to a slightly lower ram cohort in the survey data ram permits were reduced from two to one in 2009. In addition two adult only ewe permits were issued for herd reduction goals. This is the first time ewe permits have been issued for this herd. WDFW permit holders harvested one mature ram and one adult ewe in 2009. In addition the harvest of one mature ram and one ewe occurred under the Colville Confederated Tribe any sheep and two ewe permits in 2009 (Table 1). WDFW issued one any ram permit and two ewe only permits for 2010.

Sinlahekin herd. Due to an increased number of animals observed during the 2009 survey this herd met the statewide management guideline to issue one any ram permit for the 2010 season.

Table 1. Summary of harvest information for bighorn sheep in the Mt. Hull Unit.

Year	Permits	Harvest	CCT[a] Permits	CCT Harvest
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
2003	1 ram	1 ram	1 any	1 ram
2004	1 ram	1 ram	1 any	0
2005	1 ram	1 ram	1 any	0
2006	2 rams	2 rams	2 any	1 ram
2007	2 rams	2 rams	1 any	1 ram
2008	2 rams	2 rams	1 any	1 ram
2009	1 ram	1 ram	1 any	1 ram
2009	2 ewe	1 ewe	2 ewe	1 ewe

[a] CCT=Colville Confederated Tribes

Surveys

Population surveys are conducted almost every year on both the Mt Hull and Sinlahekin herds to determine composition and trend (Tables 2 & 3). The surveys are conducted in late fall or early winter and consist of helicopter or ground count surveys. An attempt is made to classify every bighorn sheep in each herd but that effort likely never results in a complete population census.

Mt Hull Herd. Washington Department of Fish and Wildlife and Colville Confederated Tribes Biologists conducted a ground survey of the Mt. Hull Unit in early November 2009 and classified 88 sheep, including 27 rams, 10 of which were $\geq$ ¾ curl (Table 2). Observed lamb production remained the same from that in 2008.

Sinlahekin herd. Washington Department of Fish and Wildlife Biologists also conducted a helicopter survey of the Sinlahekin Unit in early December 2009 and classified 86 sheep, including 23 rams, 9 of which were $\geq$ ¾ curl (Table 3).

Population status and trend analysis

Mt Hull Herd. Observational data suggests that the Mt. Hull herd grew fairly steadily following reintroduction in 1970. Numbers peaked at 80-90 animals around 1990 following several mild winters. The population declined noticeably in the 1990s, particularly following the severe winter of 1992-93. Herd numbers have climbed gradually over the last 10 years and are now at

Table 2. Population composition counts from the Mt Hull area. <3/4 = less than 3/4 curl rams, ≥3/4 = greater than or equal to 3/4 curl rams, and L:100:R is lambs (L) and rams (R) per 100 ewes (100).

			Rams			Count	Population	
Year	Lambs	Ewes	<3/4	≥3/4	Total	Total	Estimate	L:100:R
1992	0	26	1	7	8	34	40-60	0-100-31
1993	0	17	2	7	9	26	40-50	0-100-53
1994	5	28	2	8	10	53	50-60	18-100-36
1995	11	16	6	11	17	44	55	69:100:106
1996	0	5	10	6	16	21	40-60	0:100:320
1997	8	25	--	--	8	41	55-65	32:100:32
1998	--	--	--	--	--	--	--	--
1999	19	24	15	8	23	66	70	80:100:96
2000	21	30	9	0	9	60	60-65	70:100:30
2001	10	30	15	4	19	59	60-70	33:100:63
2002	11	40	6	4	10	61	65-70	28:100:25
2003	20	39	9	12	21	80	80-90	51:100:54
2004	9	32	7	10	17	58	70-90	28:100:53
2005	16	48	16	10	16	90	90-100	60:100:33
2006	8	40	25	5	30	77	100+	20:100:75
2007	13	54	17	6	23	90	100+	24:100:43
2008	18	52	20	13	33	103	110-120	35:100:63
2009	16	45	17	10	27	88	100+	35:100:60

Table 3. 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).

			Rams				Count	Population	
Year	Lambs	Ewes	<3/4	>3/4	Total	Unknown	Total	Estimate	L:100:R
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	--	38:100:46
1996	2	20	7	0	7	0	29	30-45	10:100:35
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	6	0	34	35-40	40:100:30
2003	0	0	0	0	0	0	0		
2004									
2005	2	13	3	2	5	0	20	30-40	15:100:38
2006	3	24	2	3	5	0	32	35-40	12:100:21
2007	2	37	5	7	12	0	51	50-60	15:100:32
2008	7	21	2	3	5	0	33	35-40	33:100:24
2009	15	48	14	9	23	0	86	90-95	31:100:48

an all time estimated high of 100+ animals. The ram cohort fluxuated significantly in the early 2000s in response to fire activity in the US and Canada, but is now quite robust.

In 2001 WDFW augmented the herd with 8 ewes and 3 rams from the Cleman Mountain area. This herd was again augmented in 2003 with 5 animals from Oregon. Augmentation efforts are primarily designed to maintain genetic diversity. Population growth is

achieved largely through natural production. Given the limited range and insular characteristic of the sheep range on Mt. Hull, current herd size is likely exceeding carrying capacity.

The number of bighorn sheep crossing west of Highway 97 and being struck by vehicles has decreased in the last two years. Four bighorn sheep perished each year in vehicle collisions during 2006 and 2007. However, only one bighorn sheep was known to perish in vehicle collisions in 2008, two in 2009 and none to date in 2010. Complaints from landowners due to large numbers of sheep foraging in irrigated agricultural fields adjacent to Mt Hull have also decreased in the past two years. This reduction in road kills and complaints may be due to herd reduction actions and the previous mild winter and wet summer providing adequate natural forage away from the highway and agriculture fields. Changes in private land use have also lead to reduced complaints. However, bighorn sheep continue to come down to Highway 97 and forage in the agriculture fields to some degree. These behaviors may still be indicative of forage competition and declining range quality.

An attempt to reduce the Mt Hull population occurred in early January 2009. A corral trap was set up with the goal of removing 20-24 bighorn sheep from the population. However, only six bighorn sheep (4 males and 2 females) were successfully captured. These sheep were transported to the Hellsgate Reserve on the Colville Confederated Tribes reservation to start a new herd of California Bighorn sheep. If surveys indicate the Mt Hull population remains high another trapping attempt may occur in winter 2010/2011.

Sinlahekin herd. The long-term outlook for the Sinlahekin herd is improving. 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. In 2003 WDFW augmented the Sinlahekin herd with 10 animals from Oregon to improve genetic diversity and bolster production. Herd demographics have improved in the last few years with the 2009 survey documenting the most bighorn sheep in the last 20 years. This is likely a function of the herd expanding its range into previously unused habitat to the north, genetic mixing through augmentation and improved survey accuracy.

In 2010 twelve bighorn sheep (10 ewes and two rams) were captured and fitted with radio collars to better determine range expansion, animal home range, and document the effectiveness of the prescribed fire projects in the Sinlahekin Wildlife Area to the herd. These collared sheep are being monitored by a graduate student enrolled at Washington State University.

Habitat condition and trend

Mt Hull Herd. The Mt. Hull range has generally remained in good shape, but this may be changing. The Rocky Hull fire in 2000 appeared to initially reinvigorate natural forage production, and sheep use became more concentrated in the portion of the range that burned. Since then, increased population, recent droughts, and noxious weed invasions may have reduced range quality.

Cheat grass has flourished in portions of the burn and other new invasives, including white-top and dalmation toadflax are on the increase. In the past programs such as the Forest Service's aggressive weed control effort, funded by FNAWS have been helpful, and similar efforts will likely be needed into the future.

Sinlahekin herd. Since the early 2000s the majority of the Sinlahekin herd has moved north out of its traditional use area on Aeneas Mountain with the exception of a small group continuing to use Aeneas Mountain and the Sinlahekin Wildlife Area. The amount of available sheep habitat on Aeneas Mountain and in the Sinlahekin Wildlife Area has likely declined due to tree encroachment and successional progression.

Much of the sheep forage habitat for the Sinlahekin herd is not under WDFW control. The WADNR and USBLM maintain cattle grazing on their permits in sheep range, and most of the adjacent private land is intensively grazed. These pressures are likely to continue.

An extensive fuels treatment and prescribed fire program within the Sinlahekin Wildlife Area has all ready reduced tree encroachment and increased forage on 400 acres. An additional 4,000 acres is scheduled for fuels treatment within the Sinlahekin Wildlife Area starting in 2010. This effort, combined with an aggressive weed control program should also improve habitat conditions within the Sinlahekin Wildlife Area.

An additional threat to the Sinlahekin herd is the presence of domestic sheep and goats within and adjacent to their range. Wild sheep are often in close proximity to these domestic herds. Past research

indicates a high endemic level of parasitism and disease in the Sinlahekin herd.

Road mortality has been a minor issue in the Sinlahekin herd with four mature bighorn sheep rams and one lamb known to be killed in the last few years.

Management conclusions

Mt Hull Herd. Generally, the Mt. Hull herd has thrived in recent years, aided by improved post-fire forage conditions, genetic mixing through augmentation, and probable immigration from British Columbia. Changes in sheep behavior over the last few years suggest that the habitat is being strained by the increase in herd size. This herd is currently exceeding the population management objectives of 55-80 animals. Efforts by WDFW to reduce the Mt Hull population, changes in land use, and favorable weather over the last year have helped increase range quality, at least in the short term. These factors have also reduced road mortalities and landowner conflicts. Capture efforts to relocate additional sheep may occur in winter 2010/2011. WDFW is continuing to work on improving habitat, reducing the factors associated with vehicle collisions, and landowner conflicts.

S*inlahekin 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. An extensive fuels treatment and prescribed fire program in the Sinlahekin Wildlife Area and weed control strategies are producing improving habitat in the Sinlahekin Wildlife Area. In addition management should focus on continued habitat enhancement projects, separation of bighorn sheep from domestic sheep and goats, reducing competition with livestock and reducing the impacts of noxious weeds to insure the long-term health of the herd and the range. Also, the incidence of disease in the herd should be closely monitored due to proximity of a domestic sheep and goats.

As sheep move north onto Chopaka Mountain, competition with mountain goats may also be a concern.

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 2

SWAKANE CANYON, CHELAN BUTTE AND LAKE CHELAN

DAVID P. VOLSEN, District Wildlife Biologist
JON GALLIE, Wildlife Biologist

Population objectives and guidelines

Three herds of California bighorn sheep are found in Chelan County, having been reintroduced into the Swakane Canyon, the north shore of Lake Chelan and Chelan Butte. Bighorn sheep from the Quilomene herd use areas along the Chelan-Kittitas County border in Tarpiscan Creek, and along Jumpoff Ridge.

Management objectives for the Wenatchee District are: (1) increase the size and range of existing populations; (2) ensure genetic health by augmenting existing populations with bighorns from other areas; (3) minimize risk of disease by eliminating overlap with domestic sheep grazing allotments on public land, and provide information to the public about the importance of separating wild and domestics sheep; (4) reintroduce bighorn sheep into suitable unoccupied historic habitat within the District; and (5) provide recreational opportunities.

There are an estimated 87-95 bighorns in the Swakane herd as of June 2010. The population objective for Swakane is 50-60 adult sheep (WDFW 2008). The north shore of Lake Chelan population was estimated at 113-130 as of June 2009, and the current population objective for the herd is 101-122 adult sheep (WDFW 2008). The Chelan Butte herd has expanded from an original release of 35 in 2004, to an estimate of 101-120 bighorns. Habitat analysis (Musser and Dauer 2003) suggests sufficient habitat exists for a population of 195-390 sheep.

Hunting seasons and harvest trends

In 1999, the first ram permit was offered for the Swakane herd, followed by one permit per year from 2000-2008. The only other Swakane harvest was by the 2002 auction tag winner. Currently, the bighorn season in the Swakane runs September 15-October 10. All of the hunters have been successful at killing a mature ram ($\geq$3/4 curl). No bighorn permit was offered in the Swakane in 2009 due to the high number of vehicle collision mortalities along SR 97A in 2008. Highway mortalities were effectively stopped with the construction of a wildlife fence along SR 97A in 2009. A drawing permit for the harvest of one bighorn ram was reinstated for the 2010 hunting season.

On the north shore of Lake Chelan, 2 permits have been offered since the permit began in 2005, all being successful. The 2007 auction permit holder also harvested a ram from the Lake Chelan herd. There will be two permits on the north shore of Lake Chelan for 2010.

The Chelan Butte herd has not been hunted yet, however, the first drawing permit will be held for hunters in 2010 based on minimum criteria for offering a permit (WDFW 2008): waiting 5 years post-introduction, population minimum of 50 adults, minimum number of 2 mature rams and ram:ewe ratio of 25:100 (Table 3). Aerial and ground surveys of the herd have confirmation of herd size and composition.

Surveys

In the past 10 years, all herd population data was collected primarily from incidental reports from WDFW personnel, permit hunters, public sightings, and occasionally aerial and ground surveys during the spring and rut periods (Table 1, 2, 3). In March of 2009, 12 sheep were outfitted with telemetry collars in both the Swakane and Lake Chelan herds (18 ewes and 6 rams). VHF collars were placed on 12 ewes and 4 rams, while GPS collars were place on 6 ewes and 2 rams. Collars have improved our ability to locate sheep during ground and aerial surveys, improving survey data, population estimates, and knowledge of home range and habitat use.

Additionally, Chelan PUD has been recording bighorn sheep observations during their Lake Chelan big game surveys since 2007. Bighorns are still opportunistically observed on Chelan Butte, both on organized ground surveys and by volunteers working in the area. All three herds were surveyed by

helicopter in June 2009 to document production and update herd estimates.

Population status and trend analysis

From 1996 to 2000, the Swakane bighorn population increased slowly (Table 1). In 2001 the population was estimated at 51 sheep, representing a 46 percent increase compared to the 1992-2000 average. The increased count in 2001 resulted after Swakane bands began using the cliffs/breaks along the Columbia River and SR 97A, allowing for better monitoring. The proliferation of residential developments, and their associated ornamental plantings, along the west shore of the Rocky Reach pool may have enticed bighorns to cross Highway 97A with increasing frequency and annual duration. For over 30 years, no bighorn mortalities were attributed to vehicle collisions. Twenty-five Swakane bighorns were killed by vehicles on SR 97A (11 rams, 9 ewes, 5 lambs) since 2002. In response to these events, multiple agencies and conservation groups including Washington Department of Transportation, State Patrol, WDFW and the Wenatchee Sportsmen's Association convened a working group to address deer and bighorn sheep vehicle collisions on SR 97A, and developed plans for a wildlife fence to reduce wildlife-vehicle collisions. Phase one of the fence is 4 miles long and extends from mile marker 212 on the north end to mile marker 208 on the south, the section where most collisions have occurred. Construction of this first section was completed 2009. Completion of the remaining sections is planned for 2010 and 2011. Only one vehicle collision mortality has occurred since completion of Phase 1 of the fence.

Telemetry data from collared sheep has improved our ability to estimate population trends. In 2009 we documented the greatest number of sheep observed in the Swakane herd (Table 1), supporting previous population estimates and suggesting that the herd is increasing.

The Lake Chelan herd exhibited rapid population growth typical of a founder population in excellent quality, unoccupied habitat. Disease and wildfire concerns have to date resulted in no observed impacts to the population. In 2004, June survey data were used to calculate 2002-2004 population trends, indicating a 3-year average annual population growth rate of 38%. This rate of increase seems to have plateaued as lamb production has decreased. Evident from recent telemetry data, several bands have moved farther uplake into steeper, rockier, unoccupied habitat. Lamb production amongst these groups (17 ewes produced 8 lambs) was much better than the lower lake (42 ewes produced only 3 lambs). Due to the remote nature of the habitat of this herd, and the difficulty in finding them, the population estimate of 101-122 is used for 2009, as a conservative estimate. The collars allowed for a productive aerial survey, where we documented the herd's highest observed count (Table 2).

The Chelan Butte herd has also shown rapid growth and is now expanding their range north of Chelan Butte into Deer Mtn. and Howard Flats. We conducted an aerial survey of this herd to assess production and estimate numbers in 2009. A total of 84 sheep were observed in 2009, and the population is estimated at 84-98. In 2010 a ground survey resulted in a minimum count of 101 sheep (Table 3). The Chelan Butte heard is easily viewed from the road system and counts occur regularly.

We estimate that less than 20 bighorns seasonally use the Colockum and Jumpoff Ridge areas in Chelan County. These sheep are part of the Quilomene herd. A group of 10-15 rams are regularly seen south of Jumpoff Ridge. Residents report a small group of 5-9 ewes and lambs on Jumpoff Ridge and that these animals reside there from spring to fall. If these are in fact resident, these observations suggest the Quilomene sheep are expanding their range.

Habitat condition and trend

Habitat conditions for Swakane, Lake Chelan and Chelan Butte bighorns are excellent, in part due to the high frequency of fires. Fires reduce tree and shrub cover and increase the abundance of grasses and forbs, which in turn benefit bighorns. During summer 2001, the Rex Creek fire on the north shore of Lake Chelan burned over 53,000 acres. However, only a small portion of this burn was known occupied bighorn habitat. During summer 2002, the Deer Point fire on the north shore of Lake Chelan, and down-lake from the Rex Creek fire, burned over 43,000 acres, including most of the occupied bighorn habitat of grass, bitterbrush, mixed shrubs, and ponderosa and lodgepole pine. In October 2002, at least 25 bighorns moved northerly to the Point-No-Point area of the Rex Creek burn, apparently to take advantage of the new forage; they continue to utilize this area. Forage quantity and quality appear to be excellent, following the release of nutrients from both the fires.

The Dinkelman fire in the Swakane area, which burned in 1988, proved beneficial to the Swakane bighorns. The Chelan Butte herd continues to utilize many of the fallow agriculture fields and adjacent shrub-steppe habitat. There are further opportunities to enhance bighorn, mule deer and other wildlife

habitats in Swakane and on Chelan Butte, but these have been limited due to funding constraints.

Several springs were developed or improved for bighorn sheep within the range of the Swakane herd along the breaks of the Columbia River. Prior to fence construction, ewe bands regularly moved to the river to access native riparian and ornamental forage. Completion of the SR 97A fence excluded sheep from a very small amount of habitat, as they have always spent most of their time in habitats west of the highway.

Telemetry data will be used to determine how the Swakane herd reacts to the newly constructed wildlife fence. Due to the observed preference of California bighorns for low elevation habitats, those susceptible to human encroachment, there is long-term impact occurring from conversion and development of native habitat. Maintenance of habitat connectivity at low elevations in Chelan County is vital to the long-term health of all 3 herds.

Wildlife damage

No official reports of agricultural damage attributed to bighorns were received in 2004-2010; however, we did receive calls this year from three orchardists (two in Swakane, one on Chelan Butte) about the presence of bighorns in their orchards. They have expressed concerns of damage to young trees; however no claims for damage have been filed. Observations indicate that the sheep are feeding mainly on grass within the irrigated orchards.

Augmentation

The Lake Chelan herd is likely continuing to grow, and presumably has good genetic diversity due to the variety of founder sources. In the Swakane, augmentation is desirable for the long-term health of this population, given the historic isolated nature of the population and its small founder population. Chelan Butte was selected as an introduction site for bighorns due to its close proximity to the Lake Chelan population. If the recently observed movements of sheep northward from Chelan Butte continue, it is likely that interchange between the Lake Chelan herd and sheep on the butte will occur.

The Moses Coulee area in Douglas County offers potential habitat for a bighorn reintroduction. Much of the area is privately owned, but the proportion in public ownership has increased in recent years. In 2005, several landowners were contacted regarding the possibility of introducing bighorns. Response was negative; however, as it appears concerns may have arisen from issues surrounding endangered species in Douglas County, rather than opposition to bighorns. The Foundation for North American Wild Sheep may be able to secure agreements for bighorn reintroduction, if landowner concerns can be addressed. A long-term agreement with landowners to eliminate potential for contact with domestic sheep would be required before reintroducing bighorns in Douglas County.

Management conclusions

The threat of disease from domestic sheep is significant for the Swakane herd. Domestic sheep were documented 6 times within the core habitat of Swakane bighorns from 2000-2007. Domestic sheep were euthanized by WDFW (with permission from owners) in 2003 and 2007.

Bighorn rams were documented in domestic sheep grazing allotments twice during 2000. WDFW and the Wenatchee National Forest have reduced the risk to bighorns from domestic sheep on Forest Service lands, however, no final solutions have been developed. Bighorns in Swakane are still at risk for disease transmission from domestics

The Swakane bighorn population is somewhat unique in that it is highly accessible for viewing during the winter months. Viewing opportunities, in particular large adult rams, are highly valued by the public. Harvest management should be conservative to maintain this viewing opportunity.

The population objective of 200 sheep for the Lake Chelan herd is conservative, based on the low potential for conflicts, US Forest Service management emphasis for bighorn sheep habitat, and the increase in habitat resulting from wildfires. Estimates of available habitat, based solely on the extent of the 2001 and 2002 fires, have suggested there may be habitat to support more than 800 bighorns. As resources become available, these estimates will be re-addressed based on habitat condition.

Aerial surveys of sheep groups outfitted with telemetry collars present the best opportunity to monitor the status of Swakane, Chelan Butte and Lake Chelan herds. Optimum monitoring would involve 2 helicopter surveys per year, during May, following lambing to monitor production, and during the rut to monitor rams and total numbers. Routine monitoring of the active collars will be done to keep

track of herd movements, range, general habitat use and trends, and contribute additional population data.

Literature Cited

Musser, J., and P. Dauer. 2003. Bighorn reintroduction site evaluation. USDI-BLM Wenatchee Resource Area. 14p.

Washington Department of Wildlife. 2008. 2009-2015 Game Management Plan. Wildlife Program, WDFW, Olympia, Washington, USA.

Table 1. Observed population composition of the Swakane bighorn sheep herd, 1996-2009

			Rams							
Year	Lambs	Ewes	Yearling	<3/4curl	≥3/4 curl	Total rams	Total sheep	Population estimate	Lambs:100 ewes	Rams:100 ewes
1996	3	19	2	8	6	16	38	38	16	84
1997	2	4			2	2	8	25	50	50
1998	3	9		7	4	11	23	30	33	122
1999	4	20		5	7	12	36	36	20	60
2000	5	14	1	1	8	10	29	35	36	71
2001	9	23	3	6	10	19	51	51	39	83
2002	10	25	2	9	8	19	54	54	40	76
2003	13	26	3*	5*	8*	20*	59	58	50	77
2004	10	15	1	6	6	13	38	50-60	67	77
2005	7	27	1	6	6	13	47	50-60	26	48
2006	11	43	2	6	7	15	69	70-75	26	35
2007							No survey			
2008	13	24	5	4	12	21	58	70-75	54	88
2009	17	34	5	5	20	30	81	81-90	50	88
2010	17	44		13	13	26	87	87-95	39	59

*12 rams classified from the observed 20.

Table 2. Observed population composition of the Lake Chelan bighorn sheep herd, 1999-2009.

			Rams							
Year	Lambs	Ewes	Yearling	<3/4 curl	≥3/4 curl	Total rams	Total sheep	Lambs: 100 ewes	Rams: 100 ewes	Population estimate
1999	2	10	1	2		3	15	20	30	15
2000	6	33	5	6		11	50	18	33	50
2001	12	24	8	4		12	48	50	50	50
2002	17	36	8	6		14	67	47	39	70-75
2003	20	54	0	4	1	5	79	37	9	83-113
2004	16	62	0	11	5	16	94	26	26	98-129
2005	10	28	0	12	5	17	59*	36	61	98-129
2006	5	28	0	1	14	15	79*	18	54	98-129
2007	10	55	3	9	16	28	93	18	51	98-129
2008	6	31	7	4	5	16	98*	19	52	98-129
2009	11	59	5	7	26	43	113	19	73	113-130
2010	11	58		15	17	32	101	19	55	101-122

*High count of sheep observed by Chelan PUD during their 12 boat surveys per year.

Table 3. Observed population composition of the Chelan Butte Bighorn sheep herd, 2004-2009.

			Rams					Lambs:100	Rams:100	Population
Year	Lambs	Ewes	Yearling	<3/4 curl	≥3/4 curl	Total rams	Total sheep	ewes	ewes	estimate
2004	10	22		3		3	35	45	13	36-47
2005	5	27	1	1		2	34	19	7	34-53
2006	5	32	2	3	3	8	45	16	25	45-50
2007							No Survey			
2008	10	32				21	63	31	66	60-70
2009	12	48	7	3	14	24	84	25	50	84-98
2010	16	50		17	18	35	101	32	70	101-120

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 3

QUILOMENE, CLEMAN MOUNTAIN, UMTANUM/SELAH BUTTE, AND TIETON

JEFFREY BERNATOWICZ, District Wildlife Biologist

Population objectives/guidelines

The statewide goals for bighorn sheep are:

1. Preserve, protect, perpetuate, and manage bighorn sheep and their habitats to ensure healthy, productive populations.

2. Manage bighorn sheep for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing and photography.

3. Manage for sustained yield.

4. Numerical goals for each herd are provided in Tables 2-5.

Hunting seasons and harvest trends

Region 3 supports four populations of California Bighorn Sheep: Tieton, Cleman Mountain, Umtanum/Selah Butte, and Quilomene. Hunting is by permit, for rams only (except Selah Butte, where five ewe permits were also issued in 2009) and occurs in all units, The number of permits and harvest are given in Table 1. The Yakama Nation also issues permits, including ewe permits in the Yakima Canyon (Umtanum and Selah Butte).

Surveys

Quilomene, and Umtanum/ Selah Butte are typically surveyed via helicopter in June. Cleman Mountain is surveyed at the feeding station in December/January. Aerial surveys in the Tieton have not been productive due to extensive cover, so the Tieton herd is mostly monitored via ground surveys and through interviews with permit holders. Umtanum and Selah Butte were aerial and ground surveyed numerous times from late 2009 through early 2010 due to a disease outbreak. 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 Region 3, but had been eliminated by over hunting and disease by the early 1900s. All existing populations are the result of reintroductions.

The Quilomene reintroduction was the first in the region (early 1960's) and the population was estimated at over 100 animals by the late 1960's. The population then crashed in the early 1970's. The cause of the decline was unknown. The population had reportedly died out by 1990. Reintroductions were initiated again in 1993. By 1996, 41 bighorns had been released in the area. The Quilomene population quickly grew to over 160 sheep (Table 2).

The Cleman Mountain population was established in 1967 with the release of eight animals. The herd grew rapidly to over 100 animals and then crashed and stagnated in the late 1980s. A portion of the population was captured, tested, and treated with antibiotics in 1990. Augmentation included 27 animals from 1989-96. Production increased after 1996 and the population exceed the goal of 150 animals by 2000 (Table 2). Over 120 sheep have been captured and translocated or used for research since 2001. Another 70 have been harvested, during that period, but the population is still above objective and translocations should continue.

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 some 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 and it is now considered one herd. In 2001, 11 sheep were released at the far south end of the canyon, near Roza Dam.

Population estimates for Umtanum/Selah Butte varied between 170 and 200 animals until 2002 (Table 4). Dispersal, winter mortality, and the removal of 52 sheep for augmenting other populations probably kept the herd stable. The increase after 2002 was largely due to the release of 11 animals and subsequent

increase in lamb production. Harvest was being increased to prevent population growth.

In December 2009, an outbreak of pneumonia was discovered at the north end of Umtanum. *Mycoplasma ovipnuemonia* was documented in the Umtanum herd. Forty-four sheep are known to have died from December 2009-May 2010. Forty-two were discovered in the north portion of Umtanum and only 2 at the south end. No natural mortalities were found east of the river (Selah Butte). Sixty-nine sheep were culled from the herd in an attempt to slow the spread, increase subsequent lamb recruitment, and better understand the disease distribution. All animals west of the river tested positive for some degree of pneumonia or *Mycoplasma ovipnuemonia.* East of the river, there did not appear to be significant signs of disease, but *Mycoplasma ovipnuemonia* could not be ruled out in a few individuals. Surveys in early July found only a few surviving lambs in Umtanum, but good production in Selah Butte.

The Tieton herd was established with the release of 54 sheep from 1998-2002. Radio telemetry indicates relatively low mortality. The rams in the herd have been difficult to survey, due to heavy cover. However, very reliable hunters drew tags in recent years and have provided excellent data that supported population estimates. Lamb production has been very high. An aerial survey in 2008 confirmed the population was over objective. Sixty animals have been removed for translocation since 2009. During the capture, crews confirmed population estimates. The area has a lot of suitable habitat. The production of 54 lambs from 81 ewes (67 lambs per 100 ewes) in 2008 was the highest ever recorded within the district. Since ewes do not typically breed until 2.5 year old and twinning is rare, nearly every ewe >2.5 was productive in 2008. Such high productivity indicates the herd is below carrying capacity and initial population goals were low.

Habitat condition and trend

Forage resources vary annually with moisture. Summers drought conditions temporarily ended in 2006. Small fires in the Cleman Mountain and Tieton areas have regenerated new growth that benefit sheep, in the last 5 years.

Augmentation/habitat enhancement

Augmentation efforts ended in 2002. Cleman Mountain and Tieton are healthy herds and are being used as sources for translocation efforts. Consideration should be given to augmenting the Quilomene herd. Sheep at Cleman Mountain are fed during the winter and salt blocks are occasionally placed in the Tieton and Cleman Mountain ranges. In 2006, a large private ranch in Quilomene was purchased by WDFW and the possibility of domestic sheep grazing was eliminated. Similar efforts are under way in the Tieton and Cleman Mountain areas.

Management conclusions

The history of bighorn sheep in Region 3 has been one of boom and bust. The declines have likely been associated with disease, similar to that document in the Yakima River Canyon in 2009-210. While there was not catastrophic mortality in the Yakima Canyon, lamb survival was poor on the west side of the river. If the Selah Butte side of the river has not been infected, there will likely be mixing of the sub-herds in late summer or fall, possibly leading to future mortality events and low recruitment.

A disease outbreak was not unexpected as domestic sheep and/or goats have been documented in close proximity to bighorns in every herd in the Region. In 2009 and 2010, a small group of bighorns were seen within a USFS domestic sheep allotment a few miles west of the Cleman Mountain core herd. Domestic goat ranching has increased dramatically within the region in the last 10 years and contact with bighorns is likely. Radioing sheep in herds near USFS grazing allotments is currently underway and should continue, to document disease risk.

A concern the last 3-4 years has been Cleman Mountain and Tieton bighorn sheep licking highways. It is not uncommon for 40-60 animals to be on the pavement. The content of the new de-icing materials is very attractive to bighorns. Center lines have had pits ground into the pavement in recent years. Those pits seem to concentrate the minerals and bighorns are often observed on the centerline. The highways also have many blind corners making accidents likely. Mineral blocks have been placed up away from the highways in attempts to attract bighorns away from traffic. One idea that should be explored is to wash the highways in late spring to remove the minerals.

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

Area	Year	Permits	Harvest	Comments
Cleman Mtn.	1996	1	1	
	1997	2	2	
	1998	4	6	Harvest includes raffle and auction hunters
	1999	3	2	One hunter became ill and could not hunt
	2000	5	6	Harvest includes auction hunter
	2001	6	8	Harvest includes raffle and auction hunters
	2002	3	3	
	2003	6	7	Harvest includes raffle hunter
	2004	7	8	Harvest includes auction hunter
	2005	9	5	4 no report
	2006	10	11	Harvest includes raffle hunter
	2007	10	10	Harvest includes raffle hunter, 1 no report
	2008	10	11	Harvest includes raffle, auction, tribal
	2009	6	9	Harvest includes tribal
Umtanum	1990	5	3	
	1991	3	3	
	1992	3	3	
	1993	3	3	
	1994	3	3	
	1995	3	3	
	1996	3	3	
Umtanum/Selah Butte	1997	3	3	
	1998	4	4	
	1999	4	4	
	2000	3	4	Mt. Hull hunter allowed to hunt area
	2001	8	7	
	2002	7	7	
	2003	7	6	
	2004	7	7	
	2005	7	6	1 no report
	2006	10	10	
	2007	10	9	1 no report
	2008	10	14	Harvest includes Tribal (2 ewes, 2 rams)
	2009	15	18	Harvest includes auction, tribal
Quilomene	1998	1	0	
	1999	3	6	Harvest includes auction, raffle, and 1 accidental
	2000	3	4	Harvest includes raffle hunter
	2001	6	5	
	2002	8	9	Harvest includes raffle hunter
	2003	7	6	
	2004	5	5	
	2005	5	5	
	2006	5	4	1 no report
	2007	6	6	
	2008	4	5	Harvest includes Tribal
	2009	4	5	Harvest includes Tribal
Tieton	2004	2	2	
	2005	2	2	
	2006	3	4	Harvest includes auction hunter
	2007	3	2	1 no report
	2008	3	4	Harvest includes Tribal
	2009	3	3	

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	
2004	13	99	32	32	144	Unknown	
2005	16	77	24	21	117	Unknown	250-300
2006	14	89	30	22	133	135	250-300
2007	44	75	32	26	151	160	250-300
2008	33	77	14	11	124	160	250-300
2009	27	86	32	23	145	160	250-300
2010	25	57	20	14	102	160	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	
2004	17	83	85		185	185	
2005	28	82	67		177	188	150-160
*2006	33	93	67	45		193	150-160
*2007	20	100	68	50		198	150-160
***2008**	40	85	64	40		174	150-160
*2009	30	98	70	45		198	150-160

*Estimate based winter counts and modeling

Table 4. Umtanum/Selah Butte June Population Compostion

Year	Lambs	Ewes	Total Rams	Adult Rams	Total Count	Estimated Population	Desired Population
1990						180	
1991						190	
1992						190	
1993	32	66	31		129	200	
1994	20	102	29		151	200	
1995	41	83	53		147	175	
1996	34	72	52	0	158	175	
1997	13	61	36	11	110	175	
1998	30	41	37	4	108	175	
1999	26	68	44	0	138	175	
2000	30	60	56	46	146	180	
2001	42	82	40	31	174	190	
2002	27	97	43	23	167	200	
2003	26	94	52	38	172	220	
2004	33	87	28		148	240	
2005	61	159	69	54	289	290	250-300
2006	27	106	24	21	157	300	250-300
2007	54	120	68	55	242	300	250-300
2008	63	156	60	51	*279	300	250-300
2009	47	149	62	52	257	300	250-300
2010	23	90	63	60	176	210	250-300

* Probable double count of 24 ewes and lambs

Table 5. Tieton Maximum June Population

Year	Lambs	Ewes	Total Rams	Adult Rams	Total Count	Estimated Population	Desired Population
1998	4	6	1	1	11	11	
1999	4	14	7		25	25	
2000	11	24	11		46	46	
2001	13	35	19		67	67	
2002	10	30	8	8	48	70	
2003	10	40	20	11	70	80	
2004	19	33	5		57	90	
2005	20	88	4	3	112	110	75-150
2006	35	55	40	37	130	135	75-150
2007	23	63	7	0	93	160	75-150
2008	54	81	32	16	167	200	75-150
2009						200	75-150
2010						200	75-150

Moose

MOOSE STATUS AND TREND REPORT: REGION 1
GMUS 101, 105, 108, 111, 113, 117, 121, 124 W.

JAY SHEPHERD, Assistant District Wildlife Biologist
DANA L. BASE, District Wildlife Biologist

Population objectives and guidelines
Statewide goals for managing moose include the following: 1) to preserve, protect, perpetuate, and manage moose and their habitats to ensure healthy, productive populations; 2) to manage moose for a variety of recreational, educational, and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing, and photography; and 3) to manage statewide moose populations for a sustainable hunting quota (Washington Department of Fish and Wildlife 2008).

Hunting seasons and harvest trends
Moose hunting in Washington is regulated through a permit system. Return of a hunter report is required to the Washington Department of Fish and Wildlife (WDFW).

Permit availability and therefore moose hunting opportunity has increased in Washington in the last 10 years (Fig. 1) In 2009, there were 68 permits available in 5 moose management units within the Colville District including the Kettle Range, Threeforks, Selkirk Mountains, 49 Degrees North, and Huckleberry Range Permit Hunts (Game Management Units 101/105/204, 108/111, 113, 117, and 121/124 West respectively). In 2009, drawings were offered in GMU 117 and 121/124 West for 9 “antlerless only” permits for youth, senior, or disabled hunters.

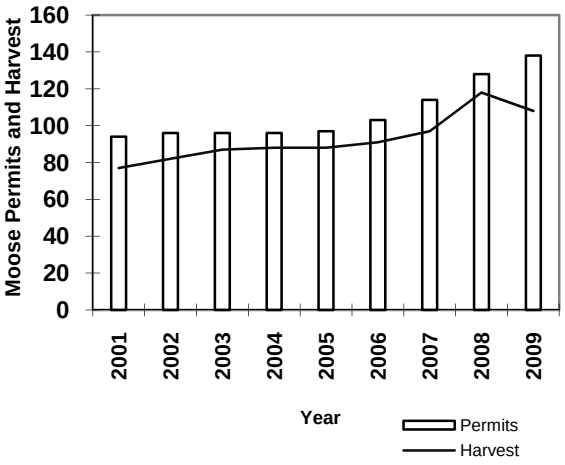


Figure 1. Statewide moose permit levels and harvest, 2001-2009.

General permit season dates remained October 1st through November 30th. All moose units were open for the use of any legal hunting method (archery, muzzleloader, or modern firearm) to maintain options for hunting. Except for the 9 antlerless moose tags in the 49 Degrees North B, C, and Youth Only Permit Hunts and the Huckleberry Range B Permit Hunt, moose hunters in the Colville District units were allowed to take 1 moose of either sex.

A total of 64 moose, including 51 bulls and 13 cows, were harvested within the Colville District units in 2009 (Table 1). The hunter success rate was 94 % and hunters averaged 6-7 days of hunting per moose harvested. Permit hunts for Youth, Senior, and Hunters with Disabilities including the 49 Degrees North B, C, and Youth Only, and the Huckleberry Range B Permits had 8 antlerless moose harvested out of the 9 permits issued for an 89 % success rate. Hunters averaged 4.0 days of hunting per moose harvested in those permit hunts.

Table 1. Colville District (GMUs # 101/105/204, 108/111, 113, 117, and 121/124 West) moose harvest and hunter effort, 2001 – 2009.

Year	Permits	Success	Bull	Cow	Total	Total Days	Days / kill
2001	47	83%	36	3	39	318	7.6
2002	49	84 %	37	4	41	443	10.8
2003	56	91 %	46	5	51	390	7.6
2004	56	91 %	45	6	51	291	5.7
2005	57	89 %	47	4	51	271	5.3
2006	60	96 %	48	8	56	338	6.0
2007	74	82 %	50	11	61	325	5.3
2008	78	95 %	63	11	74	457	6.2
2009	68	94 %	51	13	64	415	6.5

Surveys
The 2009-2010 winter helicopter survey focused on the Selkirk Mountains (GMU 113), 49 Degrees North (GMU 117), and the Huckleberry Range areas (GMUs 121/124 West). Surveys were conducted in portions of sub-watersheds referred to as “quadrats”. This survey method allowed for a complete census and repeatable coverage of targeted survey areas using GPS and real time tracking of the helicopter (Figure 2). The overall sighting rate was 27.5 moose per flight hour. In 2009-2010, the overall bull and calf to cow ratio was 52 bulls and 33 calves per 100 cows, respectively (Table 2).

Moose hunters provide incidental moose observations in the mandatory report. Hunters reported observing

723 moose within the Colville District during the 2009 season for a mean sighting rate of 11 moose per hunter (Table 3).

Population status and trend analysis

Early winter composition survey flights have been accomplished every year for the last 16 years (Table 4 and Figure 2). The December 2009 survey yielded an overall ratio of 52 ± 14 bulls observed per 100 cows (90% C.I., Skalski et. al 2005), which may represent a decrease in the ratio from 72 ± 24 bulls per 100 cows obtained in 2008. The calf to cow ratio was 33 ± 10 calves per 100 cows in 2009, similar to 38 ± 16 calves per 100 cows observed in 2008. For both bulls and calves, the 9 year trend indicates a decline relative to cows observed (Figure 3).

Age and antler spread of harvested bull moose are monitored to detect trends in age structure of the bull population, which in turn indicates the mortality rate on the bull population (Figure 4 and Table 5). For the Colville District in 2009, the mean antler spread of harvested bull moose was 39.2 inches. Ages of harvested moose from teeth collected in the 2009 hunting season were not available at the time of this report. The average age of bull moose taken in 2008 was 5.0 years. In 2008 more adult bulls (age 5+ years) than sub-adults (age 2-4) were harvested, which also occurred in 4 of the 8 years from 2001 through 2008 (Table 5).

The limited hunter harvest has likely had a low impact on the overall population of moose within the Colville District. The hunter success rate in 2009 remained at a high level of 94%, similar to 95% success that occurred in 2008.

Habitat condition and trend

Moose prefer 15-25 year old clear cuts or pre-commercially thinned areas on moist sites. Forest regeneration in these areas tends to produce dense stands of willow and other shrubs which are preferred browse. Logging in northeast Washington has been significant since 1980, especially on private industrial forests. In the past, forest successional stages have been excellent for moose browse production. Recently, however, large tracts of private industrial forests have been treated with herbicides to control shrubs to reduce competition for regenerating coniferous trees. In the last 3 years Forest Practice Applications & Approvals were received for treating 13,663 acres, primarily within southern Stevens County, which includes GMUs 117 and 121. The broad scale application of herbicides may cause a reduction in carrying capacity for the moose population in northeastern Washington.

Human safety and nuisance problems

Moose occasionally create potential safety concerns in small towns or other areas of human occupation within the Colville District. These conflicts are usually handled by either herding the moose away or by stopping traffic long enough for the animals to move away on their own accord. A more serious issue in rural areas of the Colville District are the increasing rate of motor vehicle collisions with moose. Moose have also been known to attack snowmobilers, hikers, and other humans as a defensive reaction, especially cows with calves.

Management conclusions

The primary emphasis of the 2009-2010 winter moose survey was to obtain data in a systematic manner using quadrat surveys within the major traditional moose hunting units, where a majority of moose permits are allocated. Until recently, moose survey and harvest data indicated a robust moose population, with excellent quality hunting opportunity and reasonable numbers of mature bulls. In 2007, however, harvest success dropped (possibly due to weather), but rebounded to over 90% in 2008 and 2009. At the same time habitat conditions are becoming less favorable to moose with widespread herbicide treatment within shrub fields. In some hunt areas, WDFW has likely reached a threshold in permit levels. As a consequence permit levels may have to be adjusted to maintain the traditionally high harvest success rate.

References

Skalski, J.R., K.E. Ryding, and J.J. Millspaugh. 2005. Wildlife demography: Analysis of sex, age, and count data. Elsevier Academic Press. 636 p.

Washington Department of Fish and Wildlife. 2008. Game Management Plan. Washington Dept. of Fish and Wildlife, Olympia, WA. 136 p.

Table 2. Composition counts of moose for helicopter-surveyed areas in the 2009-2010 winter.

Area	GMU	Bull	Cow	Calf	Unclassed	Total	Bulls :100 Cows : Calves	Hours	Moose/hour
Selkirk Mountains	113	27	30	9	0	66	90 : 100 : 30	3.0	21.9
49 degrees North	117	24	64	23	0	111	38 : 100 : 36	2.1	52.4
Huckleberry	121/124	4	11	3	0	18	36 : 100 : 27	2.0	9.2
Overall :		55	105	35		195	52 bulls : 100 cows : 33 calves	7.1	27.5

Table 3. Moose hunter observations and days per kill in the Colville District for the 2009 season.

Area	Permit quota	Number of hunters	Total moose harvested	Total moose observed	Average number of moose seen per hunter	Average number of days per kill
Kettle Range	3	3	2	12	4.0	14.0
Three forks	6	6	6	69	11.5	3.5
Selkirk Mtns.	22	21	21	239	11.4	8.1
49 Degrees N	29	28	27	338	12.1	5.3
Huckleberry Mtns.	8	8	8	65	8.1	4.1
Overall :	68	66	64	723	Mean = 11.0	mean = 6.3

Table 4. Summary of early winter survey effort by helicopter on moose within the Colville District from 2001 through 2009.

Year	GMUs Surveyed	Hours Flown	Total Moose Classified	Moose Observed per Hour	Bulls : 100 Cows : Calves
2001	113, 117, 109, 121	11.0	97	8.8	63 : 100 : 35
2002	117, 121/124-W	7.3	139	19.0	128 : 100 : 74
2003	117, 111, 121	5.4	160	29.6	98 : 100 : 56
2004	113 , 117	7.7	107	13.9	83 : 100 : 45
2005	108, 111, 117, 121/124-W	7.5	102	13.6	71 : 100 : 42
2006	113 , 117	7.4	297	40.1	93 : 100 : 45
2007	113, 117, 121/124-W	9.6	197	20.5	90 : 100 : 37
2008	113, 117, 108/111	7.3	125	17.1	72 : 100 : 38
2009	113, 117, 121/124-W	7.1	195	27.5	52: 100 : 33

Table 5. Antler spread and tooth age for harvested bull moose in the Colville District from 2001 through 2009.

Year	Mean Spread (inches)	Sample Size for Antler Spread	Mean Age (years)	Sample Size for Aging	Yearling	2-4 years old	$\geq$ 5 years old
2001	39	36	6.9	32	0%	31%	69%
2002	36	37	5.1	37	3%	61%	36%
2003	39	45	5.3	46	0%	46%	54%
2004	38	44	5.4	39	5%	41%	54%
2005	39	46	4.5	43	5%	56%	39%
2006	38	48	4.8	40	2%	65%	33%
2007	38	50	5.0	26	0 %	46 %	54 %
2008	39	58	5.0	46	0 %	39 %	61 %
2009	39	51	na	na	na	na	na

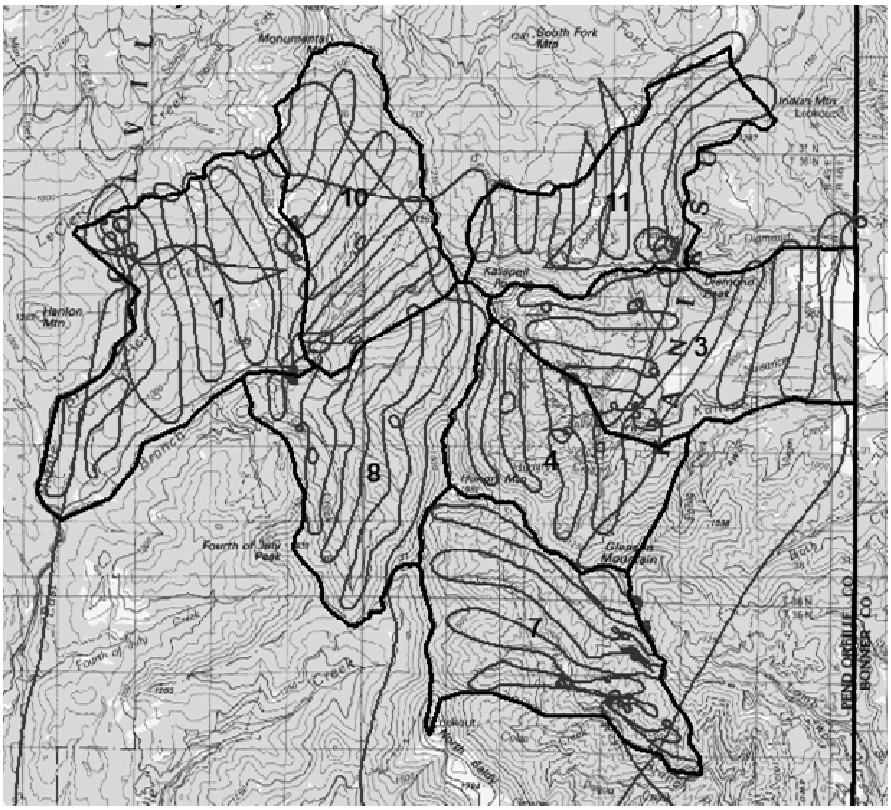


Figure 2. Flight paths (grey lines) within the survey quadrats (numbered black polygons) for the LeClerc Creek survey area in December 2009.

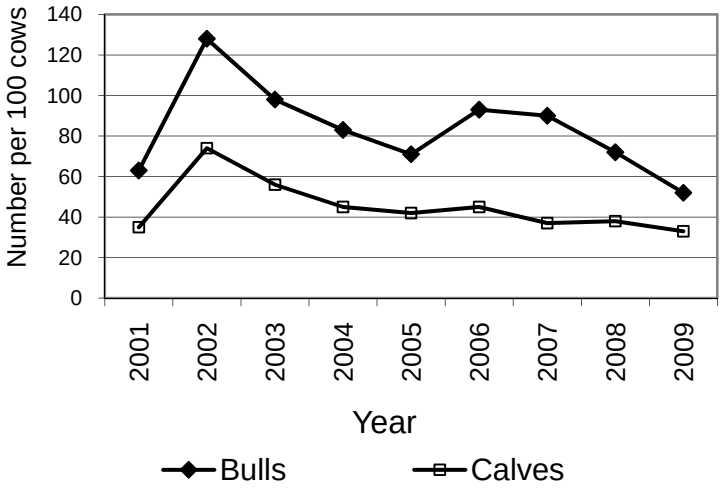


Figure 3. Age and sex ratios of moose observed during early winter helicopter surveys 2001-2009. Areas surveyed vary annually.

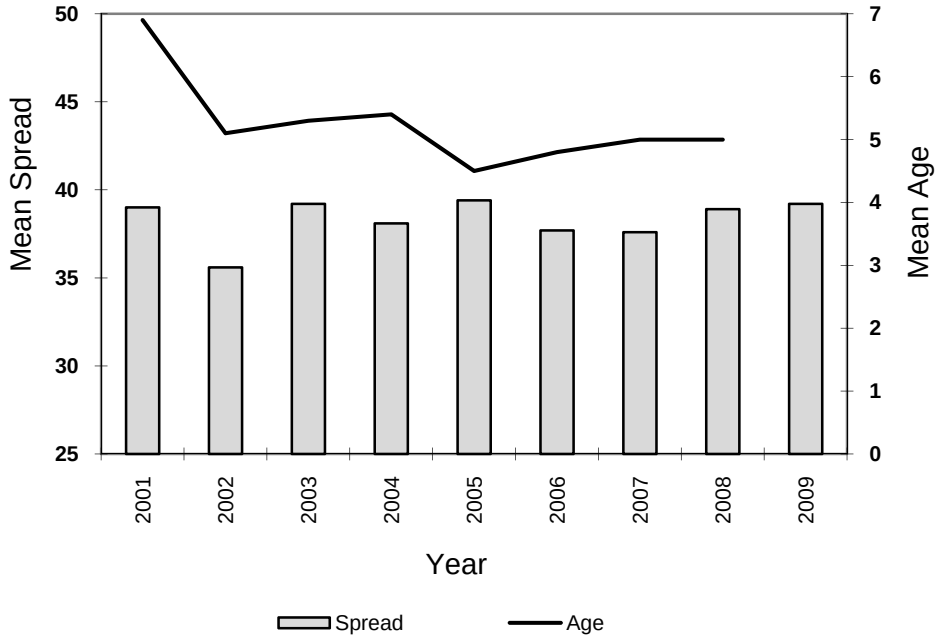


Figure 4. Mean age (years) and antler spread (inches) of bull moose harvested in the Colville District, 2001 - 2009.

MOOSE STATUS AND TREND REPORT: REGION 1
GMUS 124, 127, AND 130

HOWARD FERGUSON, District Wildlife Biologist
MICHAEL ATAMIAN, Wildlife Biologist

Population objectives and guidelines
Statewide moose management goals are to: 1. Preserve, protect, perpetuate and manage moose and their habitats to ensure healthy productive populations 2. Manage for a variety of recreational, educational and aesthetic purposes and 3. Manage statewide moose populations for a sustained yield. Harvest management emphasizes quality-hunting opportunities through a limited entry permit process. The proximity of an expanding moose population near the Spokane metropolitan area adds the challenge of balancing population objectives with community's tolerance of moose.

Hunting seasons and harvest trends
Moose hunting opportunities in Washington are by permit only. This is a once in a lifetime permit with the exception of antlerless, raffle and auction hunts. Permit season dates remained October 1 - November 30. Moose hunts are open to the use of any legal weapon in order to provide eligibility to all hunters for all units and to maintain hunter weapon choice.

Permits were maintained at 50 this year -- 36 in Mt. Spokane and 14 in Hangman. There were 18,799 applications in 2009 up from 16,777 in 2008, 15,763 in 2007, 14,811 in 2006, and 14,638 in 2005. Both the Hangman and Mt. Spokane units had an either-sex moose hunt and an antlerless-only hunt. In addition, the Mt. Spokane unit also had a youth-only antlerless hunt with 10 permits.

Forty-nine permittees reported having hunted moose in 2009, with 100% participation and reporting for all hunts, except the Mt. Spokane B hunt where all permits were issued, but one hunter failed to report. A total of 44 moose were killed this year which is the same as last year (Table 1). The mean number of days hunted per kill decreased to 3.1 compared to 4.2 days in 2008 (Table 1). The success rate for all hunts combined this year was 90%, but the any moose hunts (i.e. once in a lifetime bull hunts) had a success rate of 95%. The cumulative success rate since 2001 is 96% for all hunts and 99% for the any moose hunts.

The mean antler spread for bulls harvested in the Mt. Spokane unit in 2009 was 35.8 inches down from a high of 39.2 inches in 2007. The mean antler spread for the Hangman unit in 2009 was 36.7 setting a new high for this unit (Table 2).

Surveys
During the winter of 1999-2000, the first standardized aerial surveys were flown to survey for moose numbers in the Mt. Spokane Unit and adjacent management units of Idaho. These surveys were conducted by WDFW's Wildlife Science Division, in cooperation with Idaho Fish and Game.

Since 2002, aerial surveys have been flown every winter (December/January) by district biologists covering some of the same survey quadrats as those flown in 1999, with the exception of those units straddling the Idaho border. Additional survey quadrats have been established in the Hangman unit around Tekoa Mtn. and will be surveyed when funds allow. See Table 3 for a comparison of moose observed and Table 4 for a comparison of moose density by unit as derived from aerial survey data.

Population status and trend analysis
The number of moose observed during aerial surveys varies somewhat from year to year depending on survey conditions; however, the trend suggests stable populations in both units (Table 4). 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 continue to increase.

Results from aerial surveys indicate that the Hangman unit generally supports higher densities of moose than the Mt. Spokane unit (Table 4). In 2007, observed moose density within Mt. Spokane was the highest density ever recorded for this unit and only decreased slightly this year (Table 4). For 2008, in the Mica Peak area of the Hangman unit, the observed density was 0.52 moose/km^2 – a decline from last year.

As seen in Table 5, survey results vary from year to year. This is attributed more to weather and limited flight time then to actually variation in the herds. Snow depths appear to have a strong influence not only on the ability of the surveyors to detect moose, but also on the distribution of moose across survey quadrats. Heavy snowfalls tend to push moose down into the lowlands, while in low snow years they remain at higher elevations. With a mild winter this year moose were found, generally, at high elevation, and detection was made more difficult without the snow for contrast.

While moose are apparently expanding their distribution in the district, and the number of nuisance complaints is on the rise, the greatest increases appear to be occurring on private lands and lower elevations where hunter access is limited. Management in this district is complicated by the fact that the moose regularly move from Washington to Idaho and back. Numbers vary throughout the season depending on hunting pressure, weather and snow conditions.

Habitat condition and trend

Moose prefer 15-25 year old clear-cuts or thinned stands on mesic sites. Generally, in both the Mt. Spokane and Hangman units, it appears conditions for moose production will be optimal for the next few decades. Private timberlands provide a large portion of moose range in these units, and management practices on these lands over the past 15 years are providing excellent forage areas for moose. The Mt. Spokane unit is largely composed of large landowner private timberlands in some stage of succession that is of benefit to moose, especially winter range. Lands owned by Washington State Parks provide ample security habitats but little forage in the Mt Spokane unit. The clearcut logged habitats with abundant high quality forage and good hiding cover are thought to be important to moose in all seasons. Forested cover is important during summer heat and deep winter snow (Costain 1989).

The Hangman Unit is mostly agricultural land with moose range largely limited to the north end of the area. The limited forage areas for moose in the Hangman Unit tend to restrict the opportunity for moose to expand greatly in that unit. However, where moose do occur in the Hangman unit, habitat quality appears to be high allowing moose to occur at observed high densities; many of these moose may spend part of the year in Idaho where moose habitat appears to be less limited.

Human safety and nuisance problems

Individual moose can create human safety or nuisance concerns within the metropolitan area of Spokane. The procedure for addressing moose within the urban/suburban area is outlined in the WDFW Dangerous Wildlife Policy. WDFW's Enforcement Program takes the lead on moose incident reports in and near the city. Incidents range from single moose sightings with no associated WDFW response, to moose in dangerous situations requiring immobilization and translocation. The number of moose incidents per year has been as high as 87 and 83 in 2001 and 2005 respectively, and as low as 46 in 2006. In 2008, there were 87 reported moose incidents. More revealing is the number of winter incident reports – ranging from November of one year through April of the following year. For the winter of 2004-2005 12 complaints were filed, for 2005-2006 23, for 2006-2007 27, for 2007-2008 68 complaints, and for 2008-09 42 were filed. The high number of moose complaints in the winters of 07-08 and 08-09 are attributed to the record snowfall which pushed moose to lower elevations and into the city. A moose damage/nuisance hunt was initiated in 2009. This hunt was a limited entry hunt (20 master hunters only) and ran from Dec 1 through Mar 31. Only two hunters were called and only one nuisance moose harvested in 2009. This was due primarily to the mild winter allowing moose to remain at higher elevations, thus reducing moose nuisance complaints (16 in 2009). Dealing with urban/suburban moose will continue to be a priority for WDFW in the Spokane area.

Management conclusions

While there is tremendous interest in moose hunting in Washington, coincidentally moose populations appear to be expanding their distribution. The results of recent surveys indicate that numbers of moose in the Mt. Spokane and Hangman Units are stable (Table 3). Both units are prone to fluctuation because of proximity to the Idaho border – allowing more movement in and out of our aerial survey boundaries, variable winter weather conditions, and flight time year to year.

Permittee satisfaction with the quality of the hunt will continue to be monitored in both units, particularly for the "once in a lifetime" hunts, to ensure a high quality and successful hunt with permits being adjusted accordingly with population data.

Large 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 in other areas

and other GMUs, the population, although increasing, does not seem to be increasing as quickly as the herd in GMU 124 did during the 1990s. Information gathered by the Washington Department of Transportation has revealed a large number of moose being killed on Interstate 90 west of Spokane, indicating a resident population in the area. The only moose data we have from this area comes from moose being observed while performing elk surveys in and around Turnbull National Wildlife Refuge. These sightings have shown low moose numbers that have been slowly increasing since 2005.

Literature cited

Costain, B. 1989. Habitat Use Patterns and Population Trends Among Shiras Moose, MS degree, U. of Montana. 1989

Myers, W. 2000. Personal communication.

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

Year	Permits	Success	Bulls	Cows	Total	Days/Kill
1993	3	100%	3	0	3	5.3
1994	4	100%	3	1	4	11.0
1995	5	100%	5	0	5	3.8
1996	8	100%	6	2	8	5.3
1997	11	91%	10	0	10	4.4
1998	15	87%	8	5	13	3.4
1999	17	100%	9	8	17	2.6
2000	27	96%	6	18	24	3.8
2001	45	82%	18	19	37	9.6
2002	45	96%	15	25	40	9.0
2003	38	97%	13	24	37	4.1
2004	38	92%	13	22	35	6.6
2005	37	95%	17	18	35	4.5
2006	40	100%	14	19	33	5.4
2007	40	100%	14	21	35	3.2
2008	50	90%	17	27	44	4.2
2009	50	90%	18	26	44	3.1

Table 2. Antler spread for District 2 moose units.

Year	Mt. Spokane	Hangman
2000	34.4	36.5
2001	29.5	40.3
2002	31.5	37.2
2003	31.9	40.3
2004	35.4	32.7
2005	36.5	35.1
2006	29.2	34.1
2007	39.2	32.3
2008	32.4	33.5
2009	35.8	36.7
Average	**33.6**	**35.9**

Table 3. Observed moose for each unit for years 1999-2009.

Unit	Number of Moose Observed								
	1999	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Mt. Spokane	88	45	43	150	22	66	77	78	80
Hangman	--	46	17	57	53	28	35	41	44

Table 4. Observed densities (moose/km^2) for each unit for years 1999-2009.

Unit	Density of Moose Observed (moose/km^2)								
	1999	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Mt. Spokane	0.15	0.15	0.13	0.47	0.30	0.39	0.50	0.40	0.43
Hangman	--	0.66	0.24	1.18	1.09	0.58	0.49	0.77	0.52

Table 5. Moose observations and herd composition during aerial surveys from 1999 to 2009

Survey Area	Year	Bull	Cow	Calf	Total	Bull:Cows:Calf
Mt. Spokane Unit	1999	8	22	11	41	36:100:50
Idaho-Unit*	1999	6	27	14	47	22:100:52
Mt. Spokane Unit	2002	11	23	8	42	48:100:35
Hangman Unit	2002	5	33	16	54	15:100:48
Mt. Spokane Unit	2003	9	22	12	43	40:100:55
Hangman Unit	2003	4	9	4	17	44:100:44
Idaho-Unit*	2004	31	46	21	98	67:100:46
Mt. Spokane Unit	2004	14	22	16	52	64:100:73
Hangman Unit	2004	18	19	20	57	95:100:95
Mt. Spokane Unit	2005	4	12	6	22	33:100:50
Hangman Unit	2005	13	30	11	54	43:100:37
Mt. Spokane Unit	2006	22	30	13	65	73:100:43
Hangman Unit	2006	7	14	6	27	50:100:43
Mt. Spokane Unit	2007	26	33	18	77	79:100:54
Hangman Unit	2007	8	19	8	35	42:100:42
Mt. Spokane Unit	2008	20	43	14	77	47:100:33
Hangman Unit	2008	2	24	15	41	8:100:63
Mt. Spokane Unit	2009	18	41	21	80	44:100:51
Hangman Unit	2009	6	27	11	44	22:100:41
* Survey unit primarily in Idaho						

Cougar

COUGAR STATUS AND TREND REPORT
STATEWIDE

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

Distribution and abundance

Cougar *(Puma concolor)* occur throughout most of the forested regions of Washington State, encompassing approximately 88,497 km^2 or 51% of the State (Figure 1). No reliable estimate of statewide cougar abundance is available for Washington. However, cougar population size has been estimated in three project areas in Washington. Currently, the best available estimate of statewide abundance is from an extrapolation from those projects, corresponding to about 1,900 to 2,100 animals (excluding kittens).

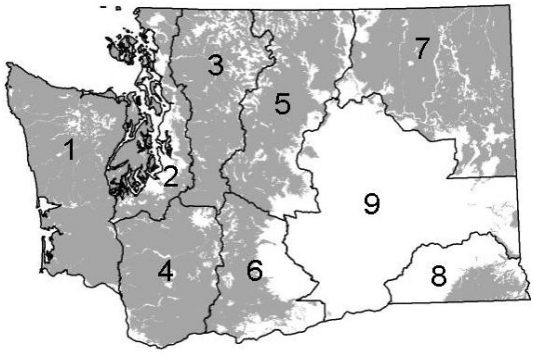


Figure 1. Distribution of cougars (gray) and cougar management units in Washington.

Population objectives and status

The statewide cougar management goal is to maintain healthy, self-sustaining cougar populations within each cougar management unit (CMU; except CMUs 2 & 9), while minimizing the number of negative human-cougar interactions. Within the context, the population objective CMU 2 is to manage cougar populations at a level that increases public and protection of private property (Table 1; see Game Management Plan 2009-2015).

The methods for assessing cougar populations are in transition in Washington, largely due to better scientific data becoming available and relatively recent changes in hunting methodologies in portions of the State. The status of regional cougar populations in western and southeastern Washington are assessed using hunter effort and success data, median age data from harvested cougar, and percentage of females in the harvest. These are not ideal methods for assessing cougar populations because harvest information can be misleading and generally are not sensitive to small-to-moderate changes in population levels, particularly over a short period of time (<3 years). Nevertheless, these parameters suggest cougar populations are relatively stable in western and southeastern Washington. In 2008, a cougar research project was initiated in the southeastern Washington to provide better scientific information on population size and status.

In comparison, the status of cougar populations in northeastern and central Washington are assessed using cougar demographic data from living cougar populations, as well as the parameters from harvest data. The department invests most of our monitoring efforts on adult female cougar survival (because of its importance to population growth) and population size. Ancillary data on litter size, cub survival, and adult

Table 1. Cougar population objectives for each cougar management unit in Washington, 2008.

CMU	Geographic Area	Population Objective
1	Coastal	Maintain a stable cougar population
2	Puget Sound	Manage cougar population at a level that increases public safety and protection of property
3	North Cascades	Maintain a stable cougar population
4	South Cascades	Maintain a stable cougar population
5	East Cascades North	Maintain a stable cougar population at 2007 level
6	East Cascades South	Maintain a stable cougar population
7	Northeastern	Maintain a stable cougar population at 2007 level
8	Blue Mountains	Maintain a stable cougar population
9	Columbia Basin	Unsustainable; not considered suitable cougar habitat

* Implement cougar population reductions over a 3-year period and monitor annually.

male survival are collected on an opportunistic basis. Washington State University also has provided valuable data on population growth rates from cougar research projects in northeastern and central Washington. These data suggest that cougar populations in northeastern Washington have declined whereas populations in central Washington appear to be stable. The decline in northeastern Washington has largely been due to hunter harvest (following population objectives in the 2003 Game Management Plan).

Hunting seasons and harvest trends

Since the mid-1980s, the most significant change to cougar seasons has been the passage of three legislative bills. During the November 1996 general election, Washington voters passed Initiative 655 (I-655) that banned the use of hounds for hunting cougar and bobcat, and the use of bait and hounds for hunting black bear. 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, which they did from $24 to $5 in 1996 (cougar tags can also be purchased as part of a big game package). The outcome of these strategies was the number of hunters purchasing a cougar tag in Washington increased from 1,000 to ~59,000. As a result, annual cougar harvest during post I-655 years increased slightly; however, the composition of the harvest has changed dramatically (Table 2). The majority of cougar harvested pre-I 655 was done so with the aid of dogs, thus mostly males and older animals were taken. From 1996 to 2000, the majority of cougars were harvested either as opportunistic encounters by deer/elk and cougar hunters, or by using tracking and calling techniques. These harvest methods are not as selective as using dogs. Therefore, hunters harvested more females and younger cougars (Martorello and Beausoleil 2003).

During the 2000 legislative session, the Legislature and Governor passed Engrossed Substitute Senate Bill 5001, which allowed the use of dogs to hunt cougar, but only to address a demonstrated public safety threat and only in portions of GMUs. Following the bill, the Fish and Wildlife Commission adopted what's called public safety cougar removals. By Commission rule, permits to use dogs to hunt cougar are allocated to GMUs with 11 of more confirmed human-cougar incidents (including sightings), of which at least 4 must be threats to public safety or pets/livestock. Kills levels associated with public safety cougar removal permits have ranged from 64 cougar in 2001 to 4 cougar in 2005.

During the 2004 legislative session, the Legislature and Governor passed Substitute Senate Bill 6118, creating a pilot cougar hound-hunting program. Under the program, Commission rule establishes seasons to allow licensed hunters to hunt cougar with the aid of dogs, but only for three years and only in Chelan, Okanogan, Ferry, Stevens, and Pend O'reille counties. Under this legislation, the Fish and Wildlife Commission established four hunt zones across the five county area, each with a total kill quota and a female subquota; the kill season remains open for a zone until either the total kill quota or female subquota is reached, at which point the season becomes a pursuit-only season (unlawful to kill cougar).

During the 2008 legislative session, the Legislature and Governor passed ESHB 2438, which extended the pilot

Table 2. Cougar harvest statistics by CMU, WDFW.

CMU	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
1	18	34	15	24	14	18	26	7	18	17
2	10	17	8	2	13	11	11	12	12	11
3	19	11	15	3	4	3	7	9	7	6
4	15	20	12	19	28	25	23	11	16	12
5	42	64	42	46	52	45	42	64	49	21
6	14	16	14	20	13	10	13	14	21	16
7	111	115	90	86	65	75	54	65	41	41
8	18	19	13	18	14	11	14	9	14	7
9	5	4	1	4	5	4	10	10	10	11
	252	300	210	222	208	202	200	201	188	142

cougar hunt 3 additional years. The bill also provided a mechanism for other counties to request inclusion into the pilot program. In 2008, only Klickitat County opted into the pilot hound hunt program.

Also in 2008 and the Department adopted the 2009-2015 Game Management Plan, which includes cougar as a species chapter. The cougar plan identifies the female harvest guidelines to achieve the population objective in each CMU (Table 3).

Human conflict

The trend in confirmed human safety incidents, and pet and livestock depredations has decreased since the recorded high of 936 in 2000 and is now at the lowest documented level (Figure 2). However, the levels of interactions continue to be problematic in some areas (Table 4). It's important to point out that the management actions the Department takes to manage human-cougar conflict don't necessarily equate to the observed trends in confirmed interactions. Several factors likely impact the rate of human-cougar interactions, such as changing public attitudes, significant media events, cougar population size, etc.

Management conclusions

Washington has experienced wide fluctuations in cougar harvest methods, cougar population size, and even cougar management objectives. With such a dynamic management arena, the importance of scientific data for guiding management decisions cannot be overstated. There continues to be a critical need for better information of cougar behaviors related to human-cougar interactions, impacts of population manipulations to conflict levels, and predator-prey interactions.

Literature cited

Martorello, D. A., and R. A. Beausoleil. 2003. Characteristics of cougar harvest with and without the use of dogs. Pages 129-135 *in* S.A. Becker, D.D. Bjornlie, F.G. Lindzey, and D.S. Moody, eds. Proceedings of the Seventh Mountain Lion Workshop. Lander, Wyoming, USA

Table 3. Cougar harvest statistics, 2009, WDFW.

	General Season			Special Permit Hunts			Depredation/Kill Permit			Other		
CMU	M	F	Unk	M	F	Unk	M	F	Unk	M	F	Unk
1	3	10	0	0	0	0	3	1	0	0	0	0
2	4	5	0	0	0	0	0	1	0	1	0	0
3	5	1	0	0	0	0	0	0	0	0	0	0
4	7	3	1	0	0	0	0	0	0	0	1	0
5	1	6	0	6	5	0	2	1	0	0	0	0
6	5	6	0	4	0	0	0	1	0	0	0	0
7	6	11	0	10	7	0	1	2	0	1	3	0
8	2	2	1	2	0	0	0	0	0	0	0	0
9	5	5	0	0	0	0	0	0	0	0	1	0
Total	38	49	2	22	12	0	6	6	0	2	5	0

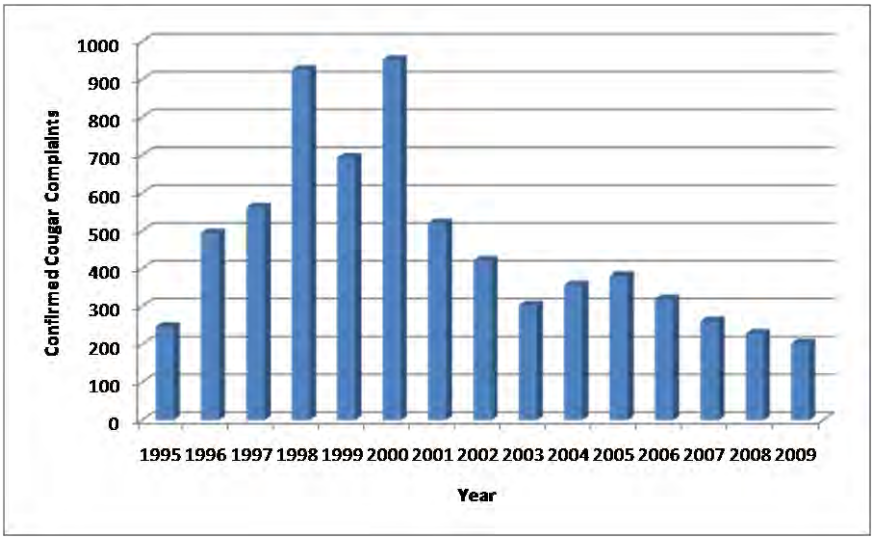


Figure 2. Number of confirmed human-cougar complaints, 1995-2009, WDFW.

Table 4. Confirmed human-cougar complaints by county, 2003-2009, WDFW.

County	2003	2004	2005	2006	2007	2008	2009
Adams	0	0	0	0	0	1	0
Asotin	0	0	2	4	0	0	0
Benton	0	0	3	0	0	0	0
Chelan	8	11	7	9	13	5	8
Clallam	9	23	19	9	7	6	5
Clark	5	10	25	18	21	12	5
Columbia	1	2	2	2	0	8	3
Cowlitz	2	3	10	7	3	3	4
Douglas	3	6	6	5	2	2	1
Ferry	23	21	23	3	6	13	3
Franklin	0	0	2	0	0	1	0
Garfield	0	0	7	5	0	0	1
Grant	0	0	4	6	2	5	7
Grays	0	13	7	9	3	9	3
Jefferson	8	9	1	1	2	13	24
King	29	37	31	23	25	6	9
Kitsap	7	11	7	1	2	5	3
Kittitas	4	2	6	5	2	1	11
Klickitat	8	6	20	19	38	18	6
Lewis	5	12	9	20	5	9	9
Lincoln	4	6	7	7	1	2	6
Mason	0	1	1	1	4	7	6
Okanogan	92	50	64	46	19	15	21
Pacific	0	2	1	1	1	1	1
Pend Oreille	2	4	0	6	7	10	3
Pierce	39	27	13	13	25	12	4
Skagit	16	11	18	16	10	9	6
Skamania	0	7	2	1	4	3	2
Snohomish	9	26	17	9	8	5	6
Spokane	29	28	24	29	10	14	15
Stevens	20	34	20	25	20	17	24
Thurston	5	2	2	0	3	6	4
Wahkiakum	3	1	1	1	0	1	0
Walla Walla	3	0	6	10	9	5	0
Whatcom	10	16	26	6	3	13	1
Whitman	3	2	1	2	1	0	0
Yakima	3	0	6	3	6	2	2
Unknown cty	0	3	0	0	1	3	0
TOTAL	350	386	400	322	263	242	203

Black Bear

BLACK BEAR STATUS AND TREND REPORT
STATEWIDE

RICH A. BEAUSOLEIL, Bear-Cougar Specialist
DONALD A. MARTORELLO, Carnivore, Furbearer, and Special Species Section Manager

Distribution and abundance

In Washington, black bears (*Ursus americanus*) inhabit 31 of 37 counties, occupying all forested habitats within western Washington, the Cascade Mountain Range, the Okanogan Region, the Selkirk and Blue Mountains ranges. Only two island counties within the North Puget Sound area and the shrub-steppe habitat of the Columbia Basin do not support resident black bear populations.

Although population surveys are not being conducted on a statewide basis, all indications are that Washington State has an abundant and healthy black bear population. Rough population estimates based on population reconstruction and computer modeling suggest the statewide black bear population is around 25,000-30,000 animals.

Management guidelines and objectives

The goals for black bear management in Washington are to: 1) preserve, protect, perpetuate, and manage black bear and their habitats to ensure healthy, productive populations; 2) minimize threats to public safety from black bears, while at the same time maintaining a sustainable and viable bear population; 3) manage black bear for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing and photography; and 4) manage populations statewide for a sustained yield (Washington Department of Fish and Wildlife, 2002).

For management purposes, the state is divided into 9 black bear management units (BBMU's)(Figure 1). Harvest levels vary between BBMU depending on local population dynamics and environmental conditions. To maintain stable bear populations, modifications to harvest levels are made on a three-year rotation through the Fish and Wildlife Commission process. The Department uses the percentage of females in the total harvest and median ages of males and females as indicators of exploitation (Beecham and Rohlman 1994) (Table 1). However, sex and age structure data of harvested bears may provide misleading interpretations (Caughley 1974, Bunnell and Tait 1981, Garshelis 1991, Clark 1999). For example, the age structure of a declining bear population can be the same as the age structure in an increasing population. In addition to this shortcoming, there is often a time lag between when a population begins to decline and when that decline is evident in sex and age structure data (Harris 1984). In some cases, by the time a decline is detected, bear numbers may have been reduced to a point where it could take longer than a decade to recover the population. However, detecting a decline early can enable managers to make a quicker recovery or retain stability.

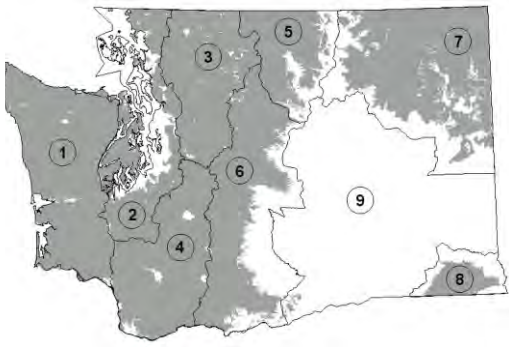


Figure 1. Black bear distribution and black bear management units.

Table 1. General black bear harvest guidelines used in Washington (Game Management Plan 2002).

Parameter	Liberalize	Harvest Acceptable	Restrict
% Females in harvest	< 35%	35-39%	> 39%
Median age of harvested females	> 6 years	5-6 years	< 5 years
Median age of harvested males	> 4 years	2-4 years	< 2 years

Sensitivity analyses of bear populations indicate that adult female and cub survival are the most influential parameters to population growth rates (Clark 1999). As

such, WDFW began monitoring female and cub survival in western Washington (Capitol Forest) in 2004 and is currently initiating a project in northeastern Washington.

Hunting seasons and harvest trends

The use of bait and hounds for hunting black bear has been illegal in Washington since the 1996 season. Since that time, bear seasons were lengthened, bag limits increased from 1 to 2 in some areas, and spring seasons have been expanded to 19 of Washington's 136 Game Management Units (GMUs). Legislation also passed that provided authority to the Fish and Wildlife Commission to reduce costs for black bear transport tags. In the following years, 1998-2000, the result was an increased number of bear hunters, and therefore, bear harvest. In 2009, 1,396 bears were harvested during recreational seasons, which is on par with the long-term average of about 1,446 bears per year (Table 2).

Depending on location, black bear hunting season begin between August 1st and September 2nd and continue through November 15th. In GMUs where a spring hunt occurs, the dates are April 15 through May 31, except 3 areas extended to June 15. While there is no physical mandatory sealing requirement for bear, successful hunters must report harvest statistics and the first upper premolar of their kill for aging via a tooth envelope provided by WDFW.

Research

Since bear populations appear to be healthy throughout Washington, formal population estimation studies have not been a high priority. However, the Department has conducted some important scientific research with regards to black bears. From 1963 to 1969, the Department studied black bear damage to coniferous forests and gathered basic demographic information that was used to establish management guidelines (Poelker and Hartwell 1973). The next study occurred from 1994-1999 and documented habitat use, home range size, and survival in three ecoregions in Washington (Koehler and Pierce 2003). Finally, from 1996-1997, WDFW conducted bait station surveys as a measure of relative bear abundance. However, an analysis of statistical power indicated that at the level of survey intensity, the Department would not be able to detect a change in bear abundance using bait stations (Rice et al. 2001). For that reason, the survey technique was discontinued.

Beginning in 2004, capture efforts have been initiated in eastern Washington to monitor adult female and cub survival in selected areas to better assess bear population status and impacts of hunting (see Coastal Black Bear Management Unit report).

Human-black bear conflict

The total number of black bear-human interactions over the past decade decreased from a high in 1998 of 786 complaints to a low in 2009 with 294 complaints (Figure 2). Complaints in 2009 where below the average of 474 per year. In Washington, negative black bear/ human conflict overwhelmingly involves garbage issues (i.e. poor storage), but tree peeling, livestock, orchard and apiary depredations are also experienced. Human population growth and development has only compounded these issues. The Department completed a statewide policy on the handling of black bear/human conflicts by field personnel. The policy specifies circumstances in which animals will be monitored, captured and relocated, or captured and destroyed. The

Table 2. Statewide black bear harvest, hunter effort, and median age information, 1996 - 2009, Washington Department of Fish and Wildlife.

								Median Age		
Year	Male	Female	Total Harvest	# of Hunters	% Success	# Hunter Days	# Days per kill	Males	Females	% Females
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	3.5	5.5	32%
2001	919	512	1,431	25,141	6%	230,431	161	3.5	4.5	36%
2002	800	427	1,227	24,844	7%	219,428	127	3.5	5.5	35%
2003	989	583	1,556	22,510	7%	192,544	123	3.5	4.5	37%
2004	1,093	561	1,654	21,573	8%	186,626	113	3.5	5.5	34%
2005	940	333	1,333	20,724	6%	172,527	129	3.0	5.0	25%
2006	1,061	581	1,642	21,801	8%	168,237	103	3.0	4.0	35%
2007	1,096	489	1,585	23,667	7%	168,237	106	3.0	5.0	31%
2008	1,450	758	2,208	26,347	8%	215,032	102	3.0	5.0	34%
2009	931	465	1,396	23,767	6%	192,347	147	3.0	6.0	33%

Department has also worked proactively to prevent these conflicts by conducting "Living with Wildlife" workshops annually to schools and local communities, distributing educational materials to stakeholders and in key locations, purchasing and installing bear-proof containers, and supplying regional WDFW offices with bear education materials.

Literature Cited

Bunnell, F. L., and D. E. N. Tait. 1980. Bears in models and in reality–implications to management. International Conference Bear Research and Management 4:15-23

Caughley, G. 1974. Interpretation of age ratios. Journal of Wildlife Management 38:557-562

Clark, J. D. 1999. Black bear population dynamics in the Southeast: some new perspectives on some old problems. Eastern Black Bear Workshop Proceedings 15:97-115.

Garshelis, D. L. 1991. Monitoring effects of harvest on black bear populations in North America: A review and evaluation of techniques. Eastern Workshop of Black Bear Research and Management 10:120-144.

Koehler, G. M. and D. John Pierce. 2003. Black bear home-range sizes in Washington: Climatic, vegetative, and social influences. Journal of Mammalogy 84 (1):81-91

Pelton, M. R. 2000. Black Bear. Pages 389-408 *in* Demarais, S. and P. R. Krausman, Eds. Ecology and management of large mammals in North America. Prentice Hall, Upper Saddle River, New Jersey, USA.

Poelker, R. J. and H. D. Hartwell. 1973. Black bear of Washington. Biological Bulletin Number 14. Washington Department of Game.

Washington Department of Fish and Wildlife. 2002. Final environmental impact statement for the game management plan: July 2003-June 2009. Washington Department of Fish and Wildlife, Olympia, Washington 98501.

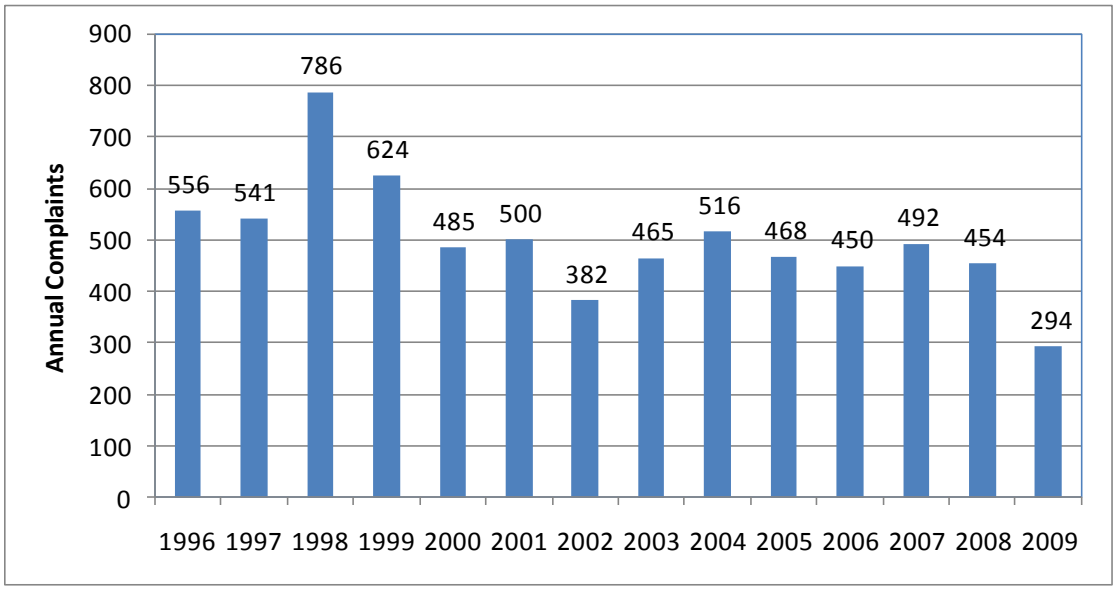


Figure 2. Trend in confirmed human-black bear interactions in Washington.

BLACK BEAR STATUS AND TREND REPORT: REGION 1
NORTHEASTERN BLACK BEAR MANAGEMENT UNIT (BBMU 7)
GMUS 101, 105, 108, 111, 113, 117, 121

DANA L. BASE, District Wildlife Biologist

Population objectives and guidelines
The objective for the Northeastern Black Bear Management Unit (BBMU) 7 is to maintain a healthy bear population and to minimize threats to public safety and property damage from black bears. Hunting opportunity is maximized consistent with statewide bear harvest guidelines and trends in depredation and nuisance complaints. Harvest guidelines are based on median ages of males and females, and percentage of females in the bear harvest. The acceptable median age parameters for harvested males and females are 2-4 years and 5-6 years respectfully. The acceptable percentage of females in the harvest is 35-39%.

Hunting seasons and harvest trends
Beginning in 2009 the general fall black bear season within GMUs 101-121 of the Northeastern BBMU was changed to open on September 1. The closing date remained the same, however, on November 15. An estimated total of 3,786 hunters hunted these units in 2009, which was about a 15% decrease from 2008, and the lowest number since 2001. The 2009 spring permit and fall general combined harvest of 305 black bears was similar to the 2008 harvest of 297, but well below the 2007 harvest of 468. The 2009 harvest was about 23% below the seven-year (2001-2007) annual average harvest of 398 black bears. Hunter success in 2009 was 8%, moderately up from 2008, but down from 2007 (Table 1, Figure 1).

Population status and trend analysis
Ages of hunter-harvested black bears as determined by tooth samples collected in the 2009 season were not available at the time this report was written. Within GMUs 101-121 of the Northeastern BBMU, the median age of harvested female black bears in 2008 was only 3 years (Table 1, Figure 2). The median male age in 2008 was also 3 years, which was up a year from only 2 in 2007. The percentage of female black bears in the harvest declined in 2008, dropping to 32% from 36% in 2007. In 2009 the percentage of females harvested went up slightly to 33%. Except for the median age of harvested females these parameters are within the acceptable harvest limits for black bears.

Nuisance and damage activity
Black bear incidents (including sightings, nuisance complaints, and depredations) are common in the Northeastern BBMU. WDFW Officers continue to stress management of food, garbage, and other attractants to avoid bear/human conflicts. High-risk bear incidents involving depredation on livestock, pets, or dangerous behavior toward humans are seriously addressed and usually result in the black bear being euthanized.

Habitat condition and trend
Huckleberry and other soft mast production were reported to be good in 2009; however, the long-term bear habitat condition and trend is uncertain. Recently large tracts of private industrial timberlands have been treated with herbicides to control broadleaf plants, including berry-producing shrubs that compete with regenerating conifer trees. In the last three years Forest Practice Applications & Approvals were received for treating 13,663 acres mostly within GMUs 117 and 121.

While humans are increasingly moving into bear habitat, people today tend to make more of an effort to avoid conflicts rather than to just eliminate the bear. Conflicts with bears escalate during specific years when huckleberry production fails; otherwise bears and humans generally co-exist in the same habitats with information and education from the WDFW providing intervention when necessary. Eliminating food attractants around residences and campsites greatly reduces the conflicts that humans have with black bears.

In years of low natural berry production the bears typically move to the lower elevations and forage extensively on residential fruit trees and gardens, consuming the fruit and extensively damaging trees and protective fencing. These bears are exceptionally difficult to manage for the homeowner and WDFW.

The bear mortality rate is high when these conditions prevail.

Management conclusions

The percentage of female black bears in the harvest remained at a desirable level for management guidelines in 2009. The median age of harvested females in 2008, however, was not within the minimum management guideline.

Spring 2009 was the third year for a spring permit season on black bears. Once again the WDFW made 70 permits available within 6 GMUs for spring black bear hunts to run from April 15 through May 31, 2009. The spring harvest was 36 black bears taken for a success rate of 52%.

Hunters have unlawfully killed 3 grizzly bears by mistaken bear identity within the last 12 years. A bear identification and certification program is under discussion to reduce the possibility of incidental take while black bear hunting. In the meantime the WDFW and U.S. Forest Service will continue to provide a proactive approach to maintaining black bear hunting within the Selkirk Grizzly Bear Recovery Zone (northern portion of GMU 113) through information and education in the form of contact with hunters in the field, presentations at hunter education classes, and other community gatherings. Signs that provide information on species identification, bear awareness, and do's & don'ts in "bear country" are posted liberally throughout much of northeastern Washington to remind hunters and campers that grizzly bears are known to occur in the area.

Table 1. Black bear harvest, hunter effort, and median age, Northeastern Black Bear Management Unit, GMUs 101-121, 2001-2009.

						General Season		Median Age		
Year	Male	Female	Total	# of Hunters	Success	Hunter Days	Days per kill	Males	Females	% Females
2001	158	108	266	4,967	5%	33,667	127	2.5	3.5	41%
2002	308	151	459	5,000	9%	34,739	76	2.5	6.5	33%
2003	310	193	503	4,943	10%	32,961	66	3.5	5.5	38%
2004	181	113	294	4,405	7%	28,414	97	3.5	4.5	38%
2005	247	100	347	4,090	9%	26,541	77	3.0	5.0	29%
2006	279	171	450	4,750	9%	27,756	62	3.0	3.5	38%
2007	301	167	468	5,268	%	30,569	67	2.0	5.0	36%
2008	202	95	297	4,467	7%	27,520	99	3.0	3.0	32%
2009	190	95	305	3,786	8%	23,133	86	na*	na*	33%

*na = not available

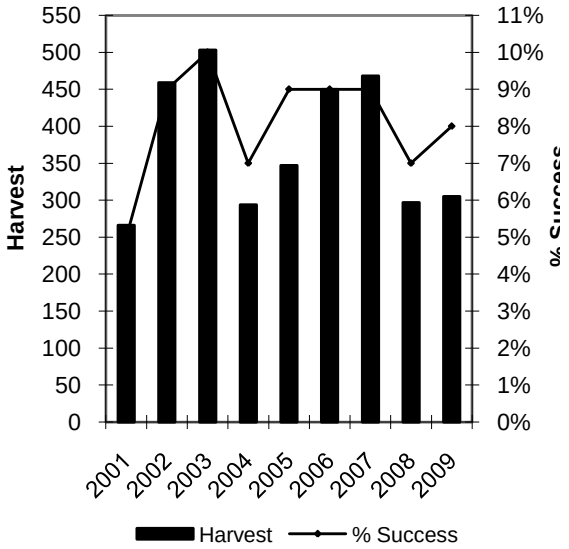


Figure 1. Total harvest and % hunter success within GMUs 101-121, BBMU 7, 2001-2009.

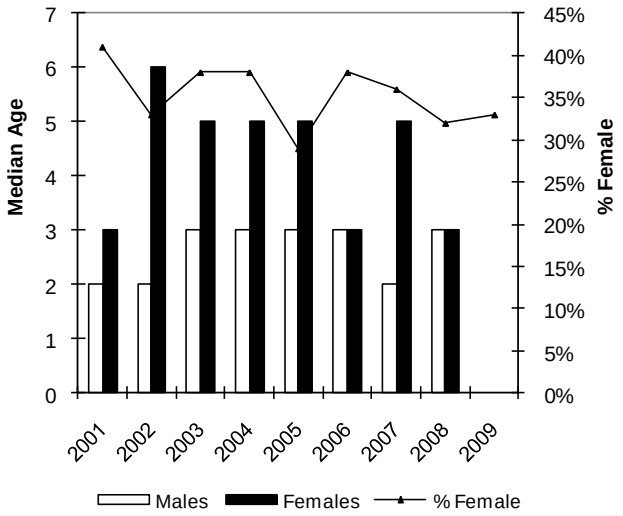


Figure 2. Median ages of harvested bears and % females in the harvest, BBMU 7, 2001-2009.

BLACK BEAR STATUS AND TREND REPORT: REGION 1
BLUE MOUNTAINS BLACK BEAR MANAGEMENT UNIT (BBMU 8)

PAT FOWLER, District Wildlife Biologist
PAUL WIK, Wildlife Biologist

Population objectives and guidelines
The black bear population in the Blue Mtns. BBMU is managed to provide optimal recreational opportunity, while maintaining a healthy bear population and minimizing conflicts with the public and other resource management objectives. Currently, the black bear population in the Blue Mountains is strong, and offers excellent hunting opportunity during the spring permit hunt, and the fall general season.

Hunting seasons and harvest trends
Two bear hunting opportunities are offered in Black Bear Management Unit 8 (BBMU-8). The general season ran for 76 days in 2009 (Sept. 1 - Nov. 15). A permit controlled spring bear season runs from April 15 to May 31 in most units, and April 15-June 15 in GMU-169 Wenaha, with 155 permits distributed between 7 game management units

The permit controlled, spring hunting season was added in 1999 in order to improve the distribution and composition of the bear harvest. From 2001-2009, 1269 permits have been issued with 569 hunters participating in the hunt. Hunters averaged 32% success, harvesting 182 bears; 117 males, and 64 females. Hunters during the spring of 2009 had a success rate of 35%, harvesting of 28 bears; 17 males, 11 females (Table 2).

Hunter success during the fall general season was 5.6%, with a harvest of 80 bears (51 males, 29 females). The 2009 general season bear harvest increased slightly over the 2008 harvest, but is still very close to the 2001-2008 average harvest of 84 bears/year. The combined harvest for the 2009 spring/fall seasons was 108 bears; 68 males, 40 females.

The bear harvest in the Blue Mountains has remained fairly stable over the last 7 years, ranging from 74-113 bears during this period, with an annual average of 100 bears/year (Table 3.). The percentage of females in the harvest varies from year to year, averaging 33% over the 7 year period.

The percentage of male bears in the general season harvest averaged 65% from 2001-2009. Over the last 3 years, the percentage of males in the harvest has increased, averaging 68%, which is slightly higher than the long-term average.

No data on the age of bears harvested in 2009 is available.

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

Habitat condition and trend
The U.S. Forest Service continues to implement their prescribed fire program on the Pomeroy Ranger District. This program will help improve habitat conditions on the Forest, which will eventually benefit the bear population by increasing the forage base (i.e., huckleberry fields).

Extensive wildfires in 2005 and 2006 burned 163,000 acres of habitat in GMU's 154, 162, 166, 175, and 178: School Fire (2005), Columbia Complex Fire-(2006). The fires have created excellent habitat conditions for bears, as shrubs and new vegetation in the burned areas regenerate.

Management conclusions
The black bear population in the Blue Mountains appears to be stable. The Wenaha-Tucannon Wilderness and Mill Creek Watershed are remote areas that contain healthy bear populations, but receive very little hunting pressure. These areas supplement bear populations in adjacent units through emigration.

Combining the general bear season with a permit controlled spring bear season has provided expanded recreational opportunity, and a well-balanced harvest by game management unit.

Table 1. Black Bear General Season Harvest Summary 1992-2009, Blue Mtns., Washington.

	Bear Harvest			# of hunters	% Success	Hunter Days	Days per kill	Median Age	
Year	Male	Female	Total					Male	Female
2001	31	25	56	1323	4%	7855	140	3.0	2.5
2002	86	49	135	1478	9%	9026	67	5.0	5.5
2003	57	41	98	1312	7.5%	8582	88	5.5	4.5
2004	49	29	78	1292	6%	7989	102	5.5	8.5
2005	43	18	61	1186	5%	7157	117	3.5	4.5
2006	65	26	91	1175	8%	6793	58	4.0	3.5
2007	53	20	73	1386	5%	8066	80	4.0	6.0
2008	52	24	76	1502	5%	9017	119	na	na
2009	51	29	80	1419	6%	8828	110	na	na
Total	**488**	**261**	**748**	**1341 av**	**5.6% av**	**8146 av**	**98 av**	**Na**	**na**

Table 2. Spring Bear Hunt Statistics. 1999-2009

		Bear Harvest						
Year	Permits	Hunters	Males	Females	Hunter	Total Success	Spring Season % Male in Hv.	General Season % Males in Hv.
2001	108	47	5	3	8	17%	63%	55%
2002	106	72	18	12	30	42%	60%	64%
2003	105	57	13	2	15	26%	87%	58%
2004	105	72	9	5	14	19%	64%	63%
2005	105	57	10	3	13	23%	77%	70%
2006	105	33	13	4	17	52%	76%	71%
2007	155	69	17	12	29	42%	59%	73%
2008	155	81	16	12	28	35%	57%	68%
2009	155	81	17	11	28	35%	61%	64%
Total	**1099**	**569**	**118**	**64**	**182**	**32%**	**65%**	**67%**

Table 3. Bear Harvest Summary, Blue Mtns., Wash.

Year	Males	Females	Total	%Females
2001	36	28	64	44%
2002	104	61	165	37%
2003	70	43	113	38%
2004	58	34	92	37%
2005	53	21	74	28%
2006	78	30	108	28%
2007	70	32	102	31%
2008	68	36	104	35%
2009	68	40	108	37%

BLACK BEAR STATUS AND TREND REPORT: REGION 2
EAST CASCADES BLACK BEAR MANAGEMENT UNIT (BBMU 6)

DAVID P. VOLSEN, District Wildlife Biologist
JON GALLIE, 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 and minimize human-bear conflicts 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. Management guidelines for black bear harvest in Washington State.

Criteria	Over-harvest	Acceptable harvest	Desirable harvest
% females in harvest	≥40%	≤36%-40%	≤35%
Median harvest age	≤3 years	≥4 years	≥5 years
Median male harvest age	≤2 years	>2 years	≥4 years
Median female harvest age	≤4 years	≥5 years	≥6 years

Hunting seasons and harvest trends

Beginning in 1999, big game license packages included a black bear tag (lowering the cost). As a result of this change, the number of bear hunters more than tripled in 1999 (11,050) compared to the average between 1989-1998 (3,394) (Table 2). Since the increase in 1999, bear hunter numbers declined to around 5,300 in 2001 and have stabilized at that level for the last decade, averaging around 4,900. Hunter success has been stable during the last decade, ranging from 3.3 to 5.3%, averaging 4%.

The harvest of black bears in BBMU 6 ranged between 120 and 339, from 1995 to 2009, averaging 188 (Table 2). In 2009, 160 black bears were harvested, below the average of 188. Over the same time period, median female age was 7 years and male age was 4. The percent of females in the harvest was 36% in 2009. The average female harvest over the last decade has been 31%, remaining within the desirable harvest guidelines. Both sex and age composition of the harvest was within the acceptable and desirable categories (Table 1).

Population status and trend analysis

Harvest statistics indicate the bear population in BBMU 6 is within management objectives. The percentage of females in the harvest has averaged 31% over the last decade, while the median age of male and female bears harvested have remained stable. These data suggest a stable population and harvest.

Nuisance and damage activity

In recent years, bear nuisance and damage complaints increased over historical levels. Most of the bear nuisance complaints involve garbage at residences in the Leavenworth and Lake Wenatchee areas. Much of the new development is of summer or weekend residences where garbage from a weekend is left out for pickup mid-week. Complaints have resulted in some bears being relocated and euthanized, however, the cause lies with inadequate garbage disposal methods, not problem black bears. Efforts to increase the public's awareness of garbage, pet food and bird feeders as attractants to bears are ongoing.

Habitat condition and trend

In 1994, fires in Chelan County reduced the amount of forage and cover for black bear. Since then, the amount of forbs and shrubs with soft mast appears to have increased, which should benefit bears. Forage production is not surveyed in BBMU 6, but casual observations and reports indicate that 2009 was an average year for huckleberries and other mast.

Large sections of BBMU 6 are in remote or wilderness areas where no habitat alterations occur. Forest management has not changed significantly in recent years. Localized fringe areas have seen an increase in recreational development and orchards. The orchards provide abundant fruit crops, but create damage situations where bears ultimately suffer higher rates of mortality.

Management conclusions

The black bear population in BBMU 6 appears to be stable. High amounts of secure, relatively inaccessible habitat suggest the population will remain so under current management. Trend in age and sex composition of harvested bears will continue to be monitored.

Table 2. Black bear harvest statistics and hunter information for BBMU 6, 1995-2008.

Year	No. males	No. females	Total	No. hunters	% success	Hunter days	Median Age		% females in harvest
							Males	Females	
1995	86	35	121	2,724	4.3	12,291	3.5	4.5	29
1996	130	16	146	3,429	4.3	15,317	4.5	7.5	11
1997	102	44	146	4,229	3.5	20,271	4.5	4.5	30
1998	230	109	339	5,661	6.0	38,557	4.5	5.0	32
1999	108	34	142	11,050	1.0	106,157	5.5	4.5	24
2000	87	33	120	9,379	1.0	54,846	4.0	8.5	28
2001	138	73	211	5,283	4.0	42,408	2.5	6.5	35
2002	142	67	209	5,356	3.9	41,302	5.5	8.5	32
2003	129	58	187	4,768	3.9	36,686	3.5	6.5	31
2004	125	73	198	4,664	4.2	34,460	4.5	7	37
2005	114	52	166	4,326	3.8	33,293	4.5	7	31
2006	148	101	249	4,828	5.2	33,738	4.5	6.5	41
2007	105	41	146	5,204	5.3	33,738	2.5	12	28
2008	181	96	277	5,299	5	36,628	N/A	N/A	35
2009	102	58	160	4,842	3.3	31,794	N/A	N/A	36
Avg.	128	59	188	5403	4	38099	4	7	31

BLACK BEAR STATUS AND TREND REPORT: REGION 2
OKANOGAN BLACK BEAR MANAGEMENT UNIT (BBMU 5)

SCOTT FITKIN, District Wildlife Biologist
JEFF HEINLEN, Wildlife Biologist

Population objectives and guidelines
Harvest guidelines are designed to provide maximum recreational harvest opportunity and minimize nuisance and damage complaints, while maintaining population health. The Okanogan BBMU currently meets the state management plan objective of a sustainable well-distributed black bear population.

Hunting seasons and harvest trends
The 2009 black bear season in the Okanogan BBMU occurred between August 1-November 15. Hunters had generally favorable conditions during the season. Hunter numbers declined in 2009 to 1,479, which is below the 12-year average. Hunters also spent fewer days in the field in 2009, which led to a decrease in hunter success of 6%, which is equal to the 12-year average (Table 1).

Population status and trend analysis
Bears have always been a difficult animal to survey and census. Results from WDFW black bear research have helped refine statewide population estimates; however, no estimate for the Okanogan BBMU exists.

Harvest figures and age population parameters for harvested animals in the Okanogan BBMU suggest a relatively stable population over the last 10 years, within the context of highly variable sample data. The female percentage of the total harvest increased in 2009 to 36%, which is within acceptable harvest guidelines. The 2009 median age data was not available during the writing of this report. However, in 2007 the median ages for harvested animals dropped to 12-year lows for both sexes, but sample sizes were quite small (12 animals for both sexes combined). The significance of this cannot be assessed with only one year's limited data, but if median ages stay this low in future years, then the current harvest rate is not sustainable.

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 from year to year as a function of weather and changes in natural food availability. Nuisance complaint levels remained fairly low in 2009. This is likely a result of good natural food availability in combination with better sanitation actions reducing the potential for bears to come into conflict with people while seeking alternative food sources.

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, forbs, and shrubs. 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.

Efforts to expand off-road use on public land in the District could negatively affect the bear population. Increased motorized use on the landscape will likely increase animal disturbance, degrade habitat and increase illegal harvest. This could undo many of the habitat gains associated with many years of aggressive, wildlife-related road management by several state and federal agencies. On the other hand, successful efforts to recover wild salmonid stocks could increase the bear forage base and positively affect bear populations.

Management conclusions
In general, harvest pressure decreased in 2009 but continued to be below the 12-year average and the percent female harvest is within acceptable harvest guidelines. Declining population parameters of harvested animals warrant close scrutiny of median ages in future harvests; however, for this data to be meaningful, hunter compliance with tooth submittal for aging must be improved to generate larger sample sizes.

Threats to habitat continue, and these will affect overall carrying capacity. Effort to maintain proactive road management should be supported and expansion of off-

road vehicle areas should be minimized and tightly managed. 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 and human conflict. WDFW's ongoing land acquisition in the Unit 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 that accommodate garbage disposal 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.

Table 1. Black bear harvest, hunter effort and median age for BBMU 5.

								Median Age		
Year	Male	Female	Total	# of Hunters	% Success	Hunter Days	Days / kill	Males	Females	% Females
1996	73	24	97	889	11%	4,181	43	2.5	4.5	25%
1997	30	20	50	858	6%	3,967	79	6.5	6.5	40%
1998	62	32	94	1,514	6%	6,823	73	4.5	5	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	75%
2001	77	41	118	1,922	6%	13,905	118	3	7.5	35%
2002	90	55	145	2,039	7%	14,077	97	8	4.5	38%
2003	59	31	90	1,669	5%	11,298	125	3.5	8.5	34%
2004	82	51	133	1,551	9%	11,654	88	3.5	3.5	38%
2005	62	30	92	1,687	5%	10,484	114	4.5	5	33%
2006	82	37	119	1,396	9%	8,461	71	4	5	31%
2007	83	30	113	1,594	7%	8,461	75	2	3	27%
2008	99	32	131	1,644	8%	9,678	74	n/a	n/a	24%
2009	61	34	95	1,479	6%	9,012	95	n/a	n/a	36%

BEAR STATUS AND TREND REPORT: REGION 4
BMU 3, NORTH CASCADES BLACK BEAR MANAGEMENT UNIT

RUTH L. MILNER, District Wildlife Biologist

Population objectives and guidelines

Black Bear Management Unit (BBMU) 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 2009 general season for the North Cascades BMU ran from August 1 through November 15, with a limit of 2 bears. Hunting conditions and access were generally favorable throughout the early season. Typical spring weather likely favorably influenced the availability of plant foods for bears.

The number of general season bear hunters hunting in BBMU 3 decreased in 2009 compared to 2008. Hunter success and harvest also decreased in 2009. The total 2009 harvest was 132 bears, the lowest harvest seen since 2005 and less than 1/3 the number harvested in 2008, when an unusually large number of bears were taken (Table 1). The statewide harvest objectives for Black Bear include: maintain a female harvest of 39% or less of the total harvest, with median age at harvest for males at 2 years or older, and for females at 5 years or older. Percentage of females taken during the 2009 general season harvest was 24%. Age data are not available.

To help alleviate bear damage in some locations, a spring permit hunt was initiated in 2008 in BBMU3. In spring 2009, 25 permits were issued in a portion of GMU 448 (Permit hunt #7015, Monroe Unit), and 20 permits were issued in portions of GMU 418 (Permit hunt #7014, North Skagit Unit). 20 hunters hunted the Monroe unit and harvested 9 bears, 6 males and 3 females. 14 hunters reported hunting the North Skagit unit and harvested 5 bears, 4 males and 1 female. Thus, the total harvest combining the spring hunts with the general season resulted in a total harvest of 146 animals, of which 25% were females.

Nuisance and damage activity

110 depredation permits were issued to industrial timberland owners concerned about tree damage in 2009, with a total of 58 bears taken of which 35 were male, 19 were female, and 4 were unknown sex. This is a higher number of bears taken in either 2008 (36 bears killed) or 2007 (46 bears killed).

When damage permit mortality is added, the total 2009 harvest equaled 202 animals, of which 33% were female. 29% of bears killed in 2009 came from damage permits issued to private timberland owners.

The number of problem bears seen along the urban-rural interface continued in all three counties contained within BBMU 3. WDFW staff engaged in ongoing efforts to educate the people living along the suburban/rural landscape interface, advising them to secure garbage, pet food, and other food items from bears. WDFW staff regularly work with citizens to reinforce the need to keep bears from associating people with food.

Habitat condition and trend

Human populations in BBMU 3 are expected to increase in the coming years and continued habitat loss is the expected result. Where human encroachment is not an issue, habitat is sufficient to support healthy black bear populations.

Management conclusions

Black Bear general season and spring permit harvest in BBMU 3 decreased in 2009 compared to the 3 previous years. The combined total of bears killed in damage hunts, permit hunts and the general season was 202 animals. Median age data are not available for 2009; however the percent of females in the harvest is consistent with statewide management goals.

Table 1. General season harvest data for BMU 3, North Cascades, 1995-2008

Year	male	female	total harvest	days/kill	# hunters	% hunter success	median age male age	median age female age	% female
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
2003	105	64	169	81	1660	10.2	3.5	3.5	38
2004	176	70	246	52.6	1626	15.1	3.5	4.5	28
2005	87	34	121	103	1465	8.3	4	6	28
2006	110	63	173	71	1662	10.1	4	4.5	36
2007	153	44	197	57.5	1922	10.2	4	6	29
2008	254	162	416	45.3	2443	17	NA	NA	39
2009	100	32	132	118	1897	7	NA	NA	24

2010 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 sustain healthy populations through all bear habitats. In addition, bear populations are managed to provide recreation, reduce timber damage, and minimize black bear/human interactions. Black bear population levels are monitored through harvest statistics (median harvest age for each sex and percentage of females in the harvest). Acceptable harvest parameters for black bears in the South Cascade Bear Management Unit (BBMU 4) are: <40% females in the harvest, with a median female harvest age of >5 and a median male harvest age of >2.

Hunting Seasons and Harvest Trends
In 2009, hunter success for the general black bear season in the BBMU 4 was 0.04%. This was a decrease from the 2008 success rate, but a similar rate as compared to the previous 10 seasons in the South Cascades. This success rate is lower than the majority of other bear management units in Washington. The reported 2009 general season black bear harvest (185) in the BBMU 4 is slightly lower than the 10 year average (205) (Table 1). Bear hunter numbers were similar to those in 2008.

Depredation Season
In addition to general season hunting, black bear depredation permits continued to be issued to commercial forest landowners during the spring of 2010 to mitigate timber damage. A total of 158 permits were issued to landowners this year, an increase from previous years. A total of 76 bears (39 males, 33 females, 4 unknown) were taken during the spring 2010 season. This represents a substantial increase in harvest to the previous year (42). Reports for 10 permits have not been received at this time and it is assumed that additional bear harvest has taken place. The overall effect of the spring depredation permit harvest on black bear populations and the benefit these hunts have in the overall reduction of timber damage needs further evaluation. Continued effort should be made to document the sex for all harvested bears associated with depredation. This will assist in our efforts to evaluate management goals.

Population Status and Trend Analysis
There was a decrease in the 2009 (185) general season bear harvest from the previous year (317). The 2009 harvest was slightly lower than the 10 year average in the South Cascades Bear Management Unit. In 2009, the median ages of the female harvest was 5.6 which does meet management goals for BBMU 4 (>5). The percentage of females in the 2009 harvest was 29% and meets the target level of less than 40% female harvest in the population.

Surveys
No bear surveys were conducted in BBMU 4 in 2009. Bear surveys are difficult and costly and did not rank high in our prioritization of activities for Region 5 in 2009.

Nuisance and Damage
WDFW responds to bear nuisance and damage complaints made by the general public. During the time period 1 January to 31 December 2009, 33 public complaints that had confirmed bear issues were addressed by WDFW Enforcement Division. This is a substantial decline from the number of confirmed black bear complaint issues in 2008 (102). No kill permits were issued for general nuisance and damage issues associated with bear in Region 5 in 2009. All bear issues, outside the commercial forest program, were resolved by WDFW enforcement agents by working with landowners to reduce bear attractants (i.e. garbage).

As urbanization continues to encroach on bear habitat in BBMU 4, bear/human interactions have continued, especially in Clark and Lewis counties. Many reports from the public are of bear sightings and do not warrant further investigation.

Damage to certain industrial and private timberlands continues to be addressed through the issuance of depredation permits. Many industrial timber companies, however, continue to administer feeding programs to reduce spring bear damage to young trees. Little information exists on the impact of bear feeding and the

impacts to local bear populations. Consideration is currently underway to shift from issuing depredation permits to a spring bear permit season.

Habitat Condition and Trend

Black bear habitat is affected by a variety of land use practices. Timber harvest in BBMU 4 has remained relatively constant on private timberlands. Timber harvest on United States Forest Service (USFS) land will remain low for the foreseeable future. Timber harvest on Washington State Department of Natural Resources (DNR) lands will continue to be moderate, while industrial timber harvest will vary more significantly. Bear damage will continue to be an issue on industrial timberlands. Encroaching residential development, however, poses the greatest threat to black bear habitat in BBMU 4. The human population in this bear management unit has increased in the past 10 years and further bear/human interactions are expected.

Management Conclusions

Black bear harvest numbers declined in 2009 (185) from reported 2008 levels (317). The 2009 black bear harvest represents an average harvest year compared to the 10-year average (205). Male and female harvest objectives, as determined by age class data, were met as per the current bear population management objectives. Percentage of females in the harvest currently meets bear management objectives.

To better evaluate black bear harvest, WDFW will continue to prioritize the collection of tooth samples returned from the bear harvest, particularly from bears taken during the spring depredation permit hunt. This information will improve sex/age data for bear harvest management.

Habitat management trends in large-scale forest landscapes will continue to provide habitat for black bear populations in the South Cascades. Continued long-term habitat changes (i.e. human development) in the suburban/forest interface will continue to be one negative factor that will impact future bear populations.

Table 1. General season black bear harvest in the South Cascades Black Bear Management Unit, 2000-2009.

Year	Male	Female	Total	Success	Hunters	Days Hunted	Days/Kill
2009	131	54	185	0.04	5107	41827	226
2008	211	106	317	0.06	5239	47297	140
2007	128	62	190	0.04	4835	31262	164
2006	110	49	159	0.04	4013	31262	196
2005	117	51	168	0.04	3818	31574	187
2004	162	80	242	0.05	4122	38119	157
2003	111	81	192	0.04	4132	36335	189
2002	134	61	195	0.04	4563	38997	198
2001	156	77	233	0.05	4690	41916	179
2000	127	44	171	0.02	7206	57733	338

Table 2. Median age of black bear harvested in the South Cascades Black Bear Management Unit, 2000-2009.

Year	Male	Sample	Female	Sample	Sexes Combined	Sample
2009	4.6	53	5.6	22	4.9	75
2008	n/a	n/a	n/a	n/a	n/a	n/a
2007	3.0	32	4.0	13	3.0	45
2006	3.0	63	4.0	27	3.5	90
2005	4.7	49	6.3	27	5.2	76
2004	4.0	42	4.5	24	4.5	66
2003	3.5	49	4.5	29	4.0	78
2002	3.5	39	5.5	14	4.5	53
2001	3.5	45	5.5	29	4.5	74
2000	4.5	27	5.5	17	4.5	44

BLACK BEAR STATUS AND TREND REPORT: REGION 6
COASTAL BLACK BEAR MANAGEMENT UNIT (BBMU1)

WARREN MICHAELIS, Wildlife Biologist
RICH BEAUSOLEIL, Bear/Cougar Specialist

Population objectives

Black bears are managed in western Washington to provide recreation, reduce timber damage, and black bear/human interactions. Black bear population levels are monitored through median harvest age for each sex and percentage of females in the harvest. Acceptable harvest parameters for black bears in the Coastal Bear Management Unit (BBMU 1) are: 35-39% females in the harvest, with a median female harvest age of 5-6 years-old and a median male harvest age of 2-4 years-old. No formal statewide bear surveys are conducted in Washington.

Hunting seasons and harvest trends

Mandatory reporting is required for black bear in Washington. However, reporting averages 60% and submission of biological data and a tooth for ageing is voluntary. The estimated total black bear harvest for the coastal region in 2009 was 188, 49% lower harvest than 2008 (Table 1), despite a similar number of hunters (4462 vs. 4582, respectively). About 66% of the total harvest was male and 34% female, similar in proportion with the reported 2008 harvest. Hunter success increased during the 2009 season from 3% to 5% (Table 1).

Table 1. Coastal BBMU1 bear harvest summary 2000-2009

Year	Male	Female	Total	Days/ Kill	Hunter Success
2009	125	63	188	306	5%
2008	260	125	385	113	3%
2007	174	76	250	138	5%
2006	169	79	248	140	6%
2005	173	69	242	145	6%
2004	200	93	293	119	8%
2003	135	71	206	176	5%
2002	150	77	227	198	5%
2001	178	97	275	184	6%
2000	127	32	159	327	2%

The 2009 general black bear season extended from August 1 through November 10. Spring bear hunt seasons were held April 15 to June 15. In the Copalis Unit (GMU 642) a total of 100 permits were issued and 15 bears (9 male and 6 female) were taken. Fifty permits were issued in the Capitol Forest Unit (GMU 663) and a total of 4 bears (3 male bear and 1 female) were taken. Capitol Forest permits have decreased from 100 (2005-2007) to 50 permits (2008-2009); the hunt was eliminated in 2010.

Additional hunts to reduce timber damage in Region 6 are conducted on an “as needed” basis and occur throughout the year. In 2009,a total of 79 bears were taken (42 males and 34 females).

During 2009 BBMU 1 constituted approximately 45% of the total western Washington damage harvest (Region 4, 5, and 6). In previous years, non-reporting of depredation permits has averaged about 40% and may represent additional take

Spring damage permits are issued through the regional enforcement Captain after area(s) of timber damage are identified. Private contractors with hounds are then given compensation for the removal of bear(s) which are suspected of causing damage.

Research

Capitol Forest Project

The Capitol Forest project was initiated to gather demographic data to monitor the impacts of spring bear hunt seasons. Capitol Forest is 371 km^2 and is a biologically complex forest managed for multiple use. The primary objectives are to estimate density and female survival. In 2004 and 2005, trap effort was on a trial basis (3 days and 7 days, respectively) until funding could be secured. Beginning in 2006, more formal trap effort was conducted (Table 2). On average 80 trap nights per bear visit was recorded.

Through June 2010, a total of 25 bears (14 female, 11male) have been captured and radiocollared. Approximately 57% of the females captured were adults and 73 percent of males captured were adults (>3yrs).

Table 2. Summary of black bear trap effort in Capitol Forest, Washington, 2004-2010, WDFW.

Year	# Traps	Total Trap Nights	# Bear Visits	# Trap Nights/ Bear Visit	# Bear Captures
2004	12	33	1	33	1[a]
2005	21	164	0	0	0
2006	67	562	2	281	2F
2007	66	669	9	74	3F, 4M
2008	46	477	5	95	1F, 2M
2009	47	443	9	49	5F, 3M
2010	30	277	7	40	3F, 2M
Total	289	2625	33	80	14F, 11M

[a] Bear was poached in trap

All documented mortality has been attributed to hunting season (1female and 3 males). A total of 14 bears have been censored (dropped radio or lost contact); 6 bears (4 females and 2 males) dropped radiocollars as designed (rotted spacers), 2 bears (2 males) pulled their collar within days of capture, and 6 radios are unknown fates (lost contact).

Table 3. Black bear harvest, by sex, in GMU 663 , Capitol Forest, 2000-2009, WDFW.

	Spring		Fall		
Year	Male	Female	Male	Female	Total
2000	0	0	7	3	10
2001	0	0	4	3	7
2002	0	0	7	1	8
2003	0	0	3	6	9
2004	0	0	6	4	10
2005	11	6	7	0	24
2006	5	1	6	6	18
2007	4	0	7	0	11
2008	2	0	13	5	20
2009	2	1	2	0	5

Management conclusions

Capture success on the Capitol Forest project seems to be correlated with low hunt success (higher captures in 2007 and 2009 when harvest was lower) (Table 3). This trend appears to be continuing into 2010 (Table 2) but the second trap session has not been conducted prior completion of this update.

The coastal BBMU has ample secure habitat for bears and a defacto bear reserve (Olympia National Park). So the long-term outlook for healthy and viable bear populations is good. The primary management need for bears in BBMU 1 is a comprehensive harvest management strategy that takes into account harvest from all sources (i.e., general seasons, permit seasons, and spring tree damage depredation take).

Mourning Dove and Band-Tailed Pigeon

WATERFOWL STATUS AND TREND REPORT: STATEWIDE

BAND-TAILED PIGEON AND MOURNING DOVE POPULATION AND HARVEST

DON KRAEGE, Waterfowl Section Manager

Introduction

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 established a population objective for band-tailed pigeons in Washington based on the WDFW call-count survey (Pacific Flyway Council 1984). PFC is currently working to develop a revised population objective based on the new mineral site survey. Population objectives for mourning doves are being developed as part of the national mourning dove harvest strategy.

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

Hunting season regulations

The band-tailed pigeon season was closed in Washington from 1991-2001. A limited season was reopened in 2002 and has continued since then, with season dates of September 15-23 and bag/possession limits of 2/4. The mourning dove season was September 1-15 from 1980 through 2007, and September 1-30 since 2008. Bag/possession limits have been 10/20 since 1980.

Methods

Band-tailed pigeon call-count survey

The WDFW band-tailed pigeon call-count survey was initiated in 1975, and was patterned after the mourning dove survey. A total of 50 routes, 5.7 miles in length comprised the survey, conducted in western Washington below 1,000 ft. elevation. Surveys were completed during a 16-day period beginning the Saturday closest to June 21, as designed by Jeffrey (1989). Data were sent to USGS in Laurel, MD (Bill Kendall) for analysis using route regression programs developed for the mourning dove survey (Sauer *et al*., 2003).

Band-tailed pigeon mineral site survey

USGS conducted mineral site surveys at 8 locations in 2001-03 (Overton and Casazza 2004). These included two in Region 4 (Pigeon Point and Sumas Springs), one in Region 5 (Cedar Creek), and five in Region 6 (Lilliwaup, McAllister Creek, Mud Bay, Potlatch, and Red Salmon Creek). In 2004, WDFW expanded surveys to 15 sites, as specified under protocols developed for the Pacific Flyway (Overton and Casazza 2004). The 15 sites included the 8 locations established in 2001, along with two in Region 4 (Lake Cavenaugh Rd.-Pefley and Warm Beach), four in Region 5 (Altoona, Newaukum River, St. Martin's Hot Springs, and Upper Kalama) and one in Region 6 (Willapa Estuary). Cooperators from WDFW and USFWS completed surveys during the July 10-20, 2010 survey period.

Mourning dove call-count survey

The mourning dove survey was completed between May 20-31, 2010 following USFWS (2010) methods. 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 survey.

Band-tailed pigeon harvest is estimated annually using mandatory harvest reporting. Written authorization and

harvest reports have been required of band-tail hunters in western Washington since the season reopened in 2002. 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 (Dillman 1978). Hunters were required to report harvest by species and county with mandatory harvest report cards by September 30, 2009. Hunters failing to comply with reporting requirements were ineligible to participate in the 2010 season.

Mourning dove harvest estimation

Mourning dove harvest was estimated as part of the statewide hunter survey conducted by WDFW (WDFW 2010).

Results

Band-tailed pigeon call-count survey

Past call-count survey results are presented in Table 1 and Figure 1.

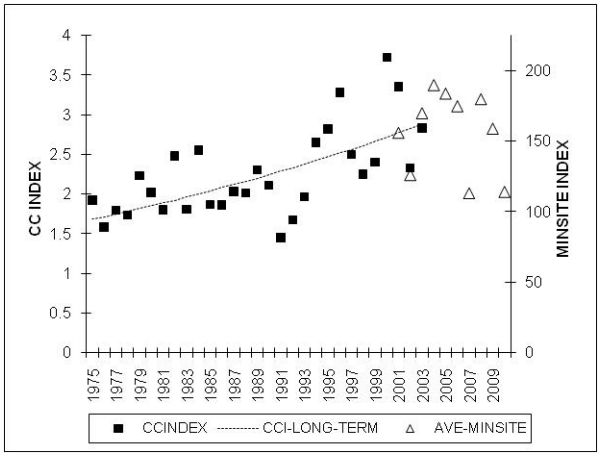


Figure 1. Band-tailed pigeon call-count results and mineral site raw data summaries.

Band-tailed pigeon mineral site survey

Mineral site survey raw data summaries are presented in Table 2 and Figure 1. Complete 2009 survey results are available through USFWS (2010), but the 2010 analysis will not be available until 2011.Mourning dove call-count survey

Mourning dove survey results are presented in USFWS (2010).

Band-tailed pigeon harvest

Harvest and hunter activity for the 2002-2009 seasons are summarized in Figures 2-3 and Table 3.

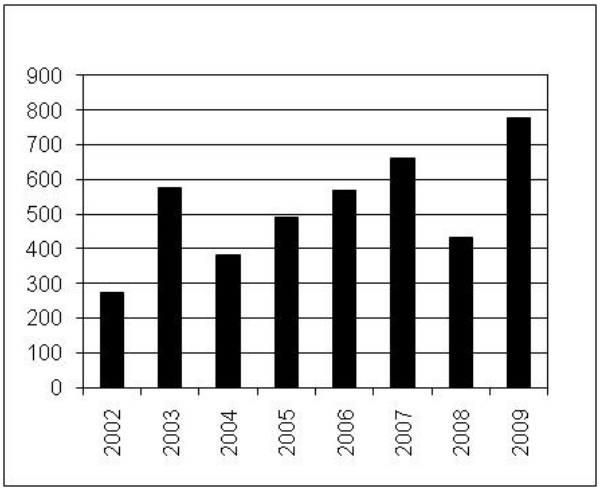


Figure 2. Band-tailed pigeon harvest.

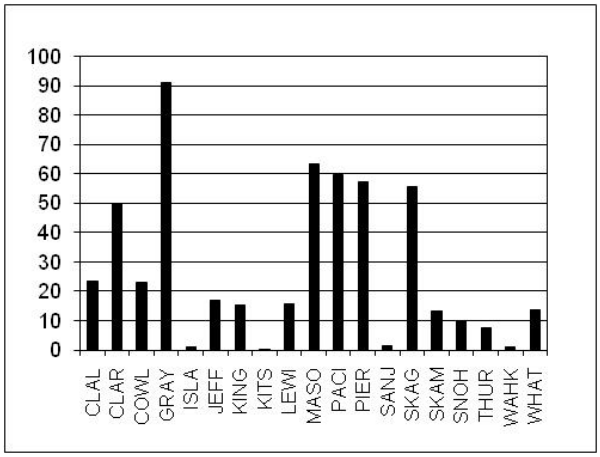


Figure 3. Band-tailed pigeon 2002-2009 average annual harvest by county.

Mourning dove harvest

As measured by WDFW surveys, harvest in 2009 was estimated at 68,725 doves, down 21% from 2008 (Figure 4). Hunter numbers were estimated at 4,315,

down 24% from 2008. Number of days hunted was 13,895, down 8% from 2008.

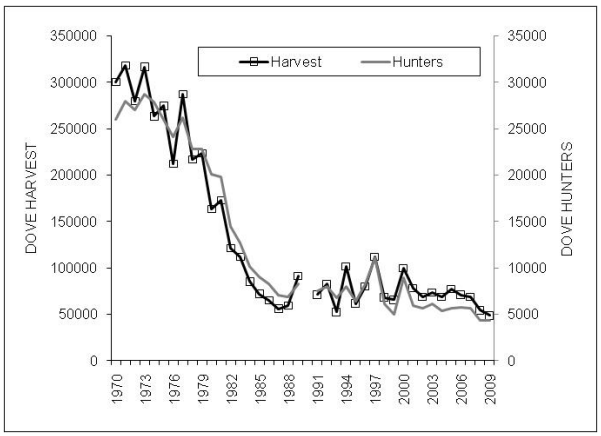


Figure 4. Mourning dove harvest and hunter numbers.

Population status and trend analysis

Figure 1 and Table 1 show that based on the call-count survey, the band-tailed pigeon population generally increased from 1975-2003. The route regression method is less precise in determining short-term trends than long-term trends, as evidenced by the large confidence intervals for the two-year trends in Table 1. The large spans of these intervals are caused by low sample size due to changing observers from year to year.

The mineral site survey in 2001-2003 exhibited the same general trend as the call-count survey when the two surveys were run concurrently (Figure 1). This rough correlation can be used in the future to develop population objectives consistent with the Pacific Flyway management plan. The 2010 mineral site survey raw data summaries point to declining numbers of band-tails present during the breeding season since 2004.

Literature Cited

Dillman, D. A.., 1978. Mail and Telephone Surveys: The Total Design Method. John Wiley & Sons, New York, New York, USA.

Jeffery, R. 1989. The band-tailed pigeon in Washington. Unpublished report. WDFW, Olympia WA.

Overton, C. and M. Casazza. 2003. Pacific Coast mineral site survey for breeding band-tailed pigeons – Washington. Unpublished report. USGS, Dixon CA.

Pacific Flyway Council. 1993. Pacific Flyway management plan for the Pacific Coast Population of Band-tailed Pigeons. Pacific Coast Band-tailed Pigeon Subcomm., Pacific Flyway Study Comm. [c/o USFWS], Portland, OR. Unpubl. rept.

Sauer, J. R., J. E. Hines, and J. Fallon. 2003. The North American Breeding Bird Survey, Results and Analysis 1966 - 2002. Version 2003.1, USGS Patuxent Wildlife Research Center, Laurel, MD.

USFWS. 2010. Mourning dove, white-winged dove, and band-tailed pigeon population status. Unpublished report. USFWS, Laurel MD.

WDFW 2010. 2009 game harvest report. Unpublished report. WDFW, Olympia WA.

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

Start Year	End Year	Change	Lower 90% CI	Upper 90% CI	Routes Used	Sig. level
1975	1992	-7.8%	-14.0%	-2.0%	63	p<0.05
1991	1992	10.1%	-50.0%	75.0%	11	n.s.
1975	1993	-6.0%	-11.0%	-1.0%	65	p<0.05
1992	1993	44.0%	-49.0%	152.0%	13	n.s.
1975	1994	-3.4%	-8.2%	1.4%	69	n.s.
1993	1994	71.0%	1.4%	141.0%	24	p<0.05
1975	1995	-2.7%	-9.8%	4.5%	70	n.s.
1994	1995	12.1%	-31.3%	55.3%	12	n.s.
1975	1996	-0.8%	-6.5%	4.9%	59	n.s.
1992	1996	24.3%	10.4%	38.2%	30	p<0.01
1995	1996	36.4%	-35.9%	108.7%	18	n.s.
1975	1997	-0.8%	-6.0%	4.3%	62	n.s
1993	1997	8.9%	0.2%	17.6%	32	p<0.10
1996	1997	-14.3%	-35.4%	6.7%	18	n.s.
1975	1998	-1.5%	-5.5%	2.4%	65	n.s.
1994	1998	2.1%	-8.7%	13.0%	34	n.s.
1997	1998	-11.0%	-45.8%	23.9%	11	n.s.
1975	1999	-0.1%	-4.1%	3.8%	67	n.s.
1995	1999	-3.3%	-11.5%	4.9%	38	n.s.
1998	1999	26.7%	-19.7%	73.1%	14	n.s.
1975	2000	-0.3%	-6.2%	5.5%	70	n.s.
1996	2000	5.9%	-2.3%	14.1%	41	n.s.
1999	2000	21.1%	-12.5%	54.8%	24	n.s.
1975	2001	1.7%	-2.3%	5.7%	70	n.s.
1997	2001	15.8%	8.0%	23.6%	44	p<0.01
2000	2001	1.8%	-16.6%	20.2%	36	n.s.
1975	2002	0.7%	-3.7%	5.0%	71	n.s.
1998	2002	9.4%	2.6%	16.2%	45	P<0.05
2001	2002	0.9%	-27.5%	25.8%	32	n.s.
1975	2003	1.8%	-1.7%	5.4%	71	n.s.
1999	2003	0.6%	-4.8%	5.9%	48	n.s.
2002	2003	5.2%	-30.5%	40.8%	25	n.s.

Table 2. WDFW band-tail pigeon mineral site survey – raw data summary.

SITE	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Altoona				64	0	5	0			
Cedar Cr.	328	215	157	215	185	231	191	312	163	154
L. Cavenaugh				108	172	76	71	117	70	89
Lilliwaup	60	77	108	199	143	273	141	89	110	123
McAllister	82	118	174	124	174	87	25	136	46	134
Mud Bay	164	154	222	134	371	294	95	203	130	70
Oyster Cr.	362		455	474	542	293	157	331	314	190
Newaukum				634	167	335	309	219		
Potlatch	135	147	90	297	285	306	168	295	480	129
Red Salmon	52	103	121	179	103	64	33	107	41	
St. Martins				220	128	191	189	141	210	214
Sumas	67	71	31	46		68				
U. Kalama				110	225	327	120	350	317	111
Warm Beach				48	58	62	83	36	29	29
Willapa				3	24	10	3	0	5	5
Oyster Bay										119
Mean	156	126	170	190	184	175	113	180	159	114

Table 3: WDFW band-tailed pigeon harvest report summary.

	2002	2003	2004	2005	2006	2007	2008	2009	2002-09 AVE.
NUMBER OF PERMITS ISSUED	522	657	766	809	909	894	917	567	755
TOTAL DAYS (SUCCESSFUL)	357	337	209	382	315	364	247	548	345
TOTAL HARVEST	273	574	383	492	569	661	434	776	520
HARVEST BY COUNTY									
CLAL	37	35	14	25	35	37	5	0	23
CLAR	29	45	29	35	60	51	56	94	50
COWL	28	54	4	2	3	32	24	39	23
GRAY	47	53	104	76	71	145	103	129	91
ISLA	0	0	0	0	9	0	0	0	1
JEFF	10	16	31	26	14	29	6	4	17
KING	4	23	13	6	11	14	9	43	15
KITS	0	1	0	0	0	0	0	0	0
LEWI	7	13	11	34	5	22	13	19	16
MASO	26	38	48	62	63	84	59	126	63
PACI	13	21	37	35	73	80	82	136	60
PIER	20	82	30	62	85	63	32	85	57
SANJ	0	0	12	0	0	0	0	0	1
SKAG	33	99	15	97	74	65	31	30	55
SKAM	5	16	0	10	16	21	11	27	13
SNOH	15	29	3	12	11	3	4	4	10
THUR	0	13	8	2	24	10	0	5	8
WHAT	0	34	24	6	14	4	0	7	1

Waterfowl

WATERFOWL STATUS AND TREND REPORT:

STATEWIDE
BREEDING POPULATIONS AND PRODUCTION

MIKAL MOORE, Waterfowl Specialist

Introduction

This report summarizes waterfowl productivity data collected during 2010, including breeding waterfowl populations, duck broods, pond indices, and goose nest surveys, for the State of Washington. Washington Department of Fish and Wildlife, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, Yakama Indian Nation, Colville Confederated Tribes, Washington Waterfowl Association, and Chelan County Public Utility District contributed 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 Valley Irrigated (Fig. 1).

Surveys are conducted on historical transects and sampling quadrats (sections or 1/4-sections; Fig. 1). Samples are multiplied by weighting factors to provide an index to the total number of breeding ducks and coots within the defined areas (Table 1). Weighting factors are determined from the proportion of areas within the strata that are sampled. Observations are treated as complete counts within sampling units (transects or quadrats) with no corrections for visibility bias. Surveys are conducted by ground counts, except helicopter counts are used for the 1/4-sections in the Desert Wildlife Area (Frenchman and Winchester Wasteways) within the Columbia Basin Irrigated strata.

In 2008, WDFW began the process of redesigning the existing eastern Washington waterfowl breeding population survey. The new design consists of aerial transects intended to replace existing ground counts. The goal of the new survey is to provide breeding population indices (with variance estimates) comparable to surveys conducted in other parts of the Pacific Flyway, for inclusion in the western mallard management protocols adopted by USFWS in 2008.

Survey design for 2010 was modified slightly from 2009 (Fig. 2). Irrigated stratum transects remained at 8 mile spacing (2.8% coverage). Potholes transects were narrowed from 15 to 10 miles apart (2.5% coverage), due to poor representation in the 2009 survey. Transects were modified slightly to run true east-west after detection of a GIS projection error. Based on 2009 observations, the stratum boundaries were trimmed slightly to remove non-breeding habitat, thereby reducing survey effort. The Kittitas Valley was dropped from the survey effort due to lack of breeding habitat. The entire Palouse stratum was removed from the survey due to lack of breeding waterfowl. Safety and efficiency concerns regarding the Northeast Highlands stratum led to the development of a more efficient survey design. Survey effort in the Highlands was confined to rivers, streams, and wetlands within 7 randomly selected 11.3 mi^2 grids. Overall, in eastern Washington, observers surveyed approximately 1,002 transect miles over an 8 day period between May 6 – 20, 2010.

In 1997, breeding duck surveys were initiated in western Washington using a stratified random quadrat design. Section lines or square mile areas define survey plots, selected at random from strata delineated based on knowledge of breeding duck densities. Most areas were surveyed by helicopter.

Beginning in 2010, line-transect surveys, similar to the new eastern Washington survey, replaced the existing western Washington breeding waterfowl population survey. Breeding waterfowl habitat in western Washington was identified and divided into 6 different strata: North Puget Lowlands (Skagit Valley), South Puget Lowlands, North Puget Sound Islands, Dungeness (Olympic Peninsula), Hood Canal, and Chehalis River Valley (Figure 3). Linear transects ran east-west and were spaced 10 miles apart, with the exception of the Chehalis River Valley where transects ran northwest-southeast and were spaced 7 miles apart. Due to the very urban landscape along some transects, observers flew as close to cities as they felt practical and safe. These shortened transects are shown in Figure 3. Observers surveyed approximately 695 transect miles over a 3 day period between April 26 – April 30, 2010. Survey coverage of western

Washington breeding waterfowl habitat was approximately 2.6%.

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 Traditional Survey Area

The 2010 index of breeding duck populations in eastern Washington, according to the traditional ground-based survey, was 105,036 (Table 2; Fig. 4), down 9% from 2009 and 31% below the long-term average. This count represents a four year of decline in breeding duck counts in eastern Washington, and the lowest count on record since 1979. Breeding pair counts declined in 3 out of 4 eastern Washington strata (Fig. 6, Table 3).

Irrigated Stratum--The Irrigated stratum increased 9% from 2009, 18% below the 1979-2009 average (Fig. 6, Table 3). Mallards, particularly in the Yakima Basin, were responsible for the increase, exceeding the 2009 estimate by 20% and the LTA by 17%. Other dabbling ducks, including gadwall (-10%, -19%), American wigeon (-37%, -77%), American green-winged teal (-76%, -76%), and northern shovelers (-50%, -41%) all declined from the previous year and fell below the long term average, respectively. The long-term decline in duck production on wetlands associated with Desert Wildlife Area wasteways continues (Fig. 7). This decline is believed to be the result of advanced succession of wetland vegetation in association with invasive wetland species, resulting in the loss of open water habitats preferred by breeding ducks. Redheads and mallards appear to be most heavily impacted by habitat conditions in the Columbia Basin (Fig 8).

Potholes Stratum--Breeding duck indices in the Potholes stratum were down 31% from 2009, 50% below the long-term average (Fig. 6, Table 3). All major breeding species declined from 2009 levels in the Potholes, and all fell below the long-term average. Mallards were 42% below the 2009 count, and 57% below the LTA. This was the lowest mallard count on record for the Potholes since 1992. Most of the long-term variability in Washington's breeding duck index has come from surveys in the Potholes area. This area has inconsistent precipitation patterns and many semi-permanent and ephemeral wetlands. The winter of 2009-10 was fairly mild in eastern Washington with very little precipitation. The wetlands did not fill in time for duck breeding season, although abundant spring rains later filled some potholes in time for brood rearing. It is likely that breeding ducks bypassed the area in 2010 in search of better habitat. The Potholes held 29% of all waterfowl surveyed in eastern Washington in 2010.

Northeast Stratum--The Northeast stratum was 7% below the 2009 count and 16% below the long-term average (Fig. 6, Table 3). This stratum represents 17% of breeding ducks in all eastern Washington strata in 2010. Mallard (+2%), gadwall (+40%), northern shoveler (+260%), wood duck (+150%), and bufflehead (+218%), all exceeded 2009 counts. All other major breeding duck species declined in the Northeast strata. In 2010, mallard (+13%), gadwall (+41%), northern shoveler (+164%), wood duck (+326%), goldeneye *spp.* (+40%), bufflehead (+102%), and merganser *spp.* (+346%) all exceeded the long-term average.

Palouse Stratum--Breeding pair counts in the Palouse stratum were 26% below the previous year and 63% below the long-term average (Fig. 6, Table 3). The Palouse stratum only represents 1% of all breeding ducks in the eastern Washington strata. Mallards are often the only species detected on the Palouse transects.

Total Mallards--Total mallards numbered 49,160 up 2% from 2009, and 7% below the long-term average (Fig. 5, Table 2). The Irrigated stratum hosts 60% of eastern Washington breeding mallards, on average. Breeding mallard counts in the Potholes were the lowest on record since 1992. A mild winter in eastern Washington failed to fill the precipitation-dependent potholes, resulting in fewer breeding ducks in the strata.

Total Gadwall--Gadwall breeding indices have declined for the fourth straight year, after peaking in 2007 (Fig. 5, Table 2). Gadwall breeding population counts fell below the long-term average by 19% in 2010. The population growth of gadwall has occurred gradually 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. Gadwall are similarly abundant in both the Irrigated and Potholes strata. This species appears to be more drought tolerant than other dabbler species due to their association with semi-permanent ponds and deep water rather than seasonal or ephemeral wetlands.

Total Redheads--Redhead numbers in 2010 were down 10% from the previous year and 55% below the long-

term average, continuing their long-term decline (Fig. 5, Table 2). Redheads are detected in greatest abundance in the Lincoln County Potholes and Columbia Basin Irrigated transects. Drought, loss of semi-permanent and open water habitat to wetland succession, invasive wetland plants, and loss of submerged aquatic vegetation and invertebrates to common carp are all detrimental to breeding redheads.

Results: Eastern Washington Helicopter Transects

Total breeding duck counts numbered 122,823 (+/- 11,525) within 3 eastern Washington strata (Table 4). This count exceeds the traditional survey total by 17,788. Total mallards numbered 52,510 (+/- 9,678), exceeding the traditional survey total by 3,350. Gadwall were the second most numerous species on the survey (n = 18,792), followed by blue-winged/ cinnamon teal (n = 12,890), and redhead (n = 9,553).

The Irrigated stratum accounted for 40% of the total duck count in the helicopter survey, and 53% in the traditional survey. The Potholes stratum comprised 50% of the total duck count in the helicopter survey, versus 29% is the traditional survey. The Northeast stratum represented 10% of the total duck count in the helicopter survey, and 17% in the traditional survey.

Compared to the 2009 helicopter survey, 2010 total breeding duck counts declined 16% in eastern Washington (Table 5). The ground count detected a 9% decline from the previous year. Total breeding mallards declined 32% in 2010, compared to 2009. These comparisons should not be given too much weight, considering the differences in survey design between the two years.

Results: Western Washington Helicopter Survey

The revised survey design for western Washington estimated the total duck breeding population at 78,744 (+/-17,675). Mallards comprised 50% of the total (n = 37,509), followed by blue-winged/cinnamon teal (15%), American wigeon (9%), and northern shovelers (9%); (Fig. 9, Table 6). The North Puget Sound Lowlands (Skagit Valley) stratum held the majority of breeding ducks in 2010 (61%), followed by the South Puget Lowlands (18%), North Sound Islands (6%), Dungeness (6%), Chehalis River Valley (5%), and Hood Canal (4%); (Fig. 8, Table 6). It is difficult to compare surveys between 2010 and 2009 due to the different design.

Pond Survey

Ponds are counted on 8 transects during the traditional eastern Washington survey within the Potholes Strata (Fig. 1) during to index water conditions and to monitor the availability of breeding habitat. Due to manpower constraints, three transects were not surveyed in 2010: Omak Lake, Ewan-Revere, and Sprague. We used 3-year averages to estimate pond counts in these areas. The 2010 pond index was 5,306, 12% below 2009 levels, and 20% below the long-term average (Fig. 10, Table 7). A mild winter in eastern Washington resulted in little runoff and fewer potholes in 2010.

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 strata 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. These surveys were not performed in 2006 due to personnel limitations.

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 2010 duck brood production survey index for the Potholes, Palouse, and Northeast strata was down 18% from 2009 and 49% below the long-term for all combined duck species (Fig. 11, Table 8). Green-winged teal (+25%) and wood ducks (+4%) were the only dabbling duck broods above the long-term average. Among diving ducks, ring-necked ducks

(+76%), goldeneye (+61%), bufflehead (+332%), and merganser (+31%) broods all exceeded the long-term average (Table 8).

Brood production declined over the previous year in all strata, except the Palouse which remained static. No long-term gains in brood production were achieved in 2010 (Fig. 11, Table 9).

Canada Goose Breeding Population Survey

Methods

Canada goose breeding populations are indexed by nest searches conducted within four major geographic areas, mainly along the Snake and Columbia rivers (Table 10). Surveys are conducted annually, biennially, or periodically. Total number of goose nest attempts found is used to index the goose breeding population. Geese are also recorded on the breeding duck surveys. Geese observed during the breeding duck surveys are weighted and provide an index to the goose population (Fig. 1, Table 2). Goose nest surveys are focused 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 also counted in the western Washington breeding duck survey.

Results

The 2010 index of goose nests decreased slightly across the survey area (-1%) from the previous year (Figure 12). Nine out of 21 surveys were conducted according to the variable survey schedule. The nest index was 11% below the 20-year average. The 20-year average provides a fair comparison for current goose nest counts.

The nest surveys in the Upper Columbia were up 7% from the 2009 nesting effort and 34% below the 20-year average (Fig. 13, Table 11). Goose nest counts on the Upper Columbia began a steep decline starting in 2003. Individual transects were fairly static in 2010, with the exception of Rufus Woods, which increased 83% from 2009.

The total number of nests found on the Lower Columbia decreased by 2% from 2009, 7% below the 20-year average (Fig. 13, Table 11). The transect with the most consistent survey is below the I-5 Bridge to Puget Island. For this area, 348 nests were recorded in 2009, a 5% decrease from 2009, and 22% below the long-term average.

Goose nesting effort on the Snake River in 2010 was down 1% from the previous year and 9% above the 20-year average (Fig. 13, Table 11). This is the second highest nesting effort on the Snake River pools survey since 1995. The Snake River cliffs are no longer surveyed by the USACE. Consideration should be made to remove this transect from the survey.

The total number of nests found in the Columbia Basin was down 8% from 2009, 5% above the 20-year average (Fig. 13, Table 11). The Moses Lake survey, conducted every other year, yielded 30% fewer nests (n = 118) than the previous survey. The highest goose nest count on Potholes Reservoir (n = 249) occurred in 1992.

The weighted number of geese observed during the breeding duck survey has been included in this report since 1995 (Fig. 14, Table 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 2010 index decreased 19% from 2009, 16% below the 20-year average.

In western Washington, the helicopter breeding pair survey detected 7,370 Canada geese. The majority of geese were found in the Chehalis River Valley stratum (46%), followed by the South Puget Sound Lowlands (29%), and the North Puget Sound Lowlands (9%); (Table 6, Fig. 9).

Potential Improvements to Waterfowl Breeding and Production Surveys

- Expand this report to better cover western Washington
- Expand databases to include older data.
- 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.

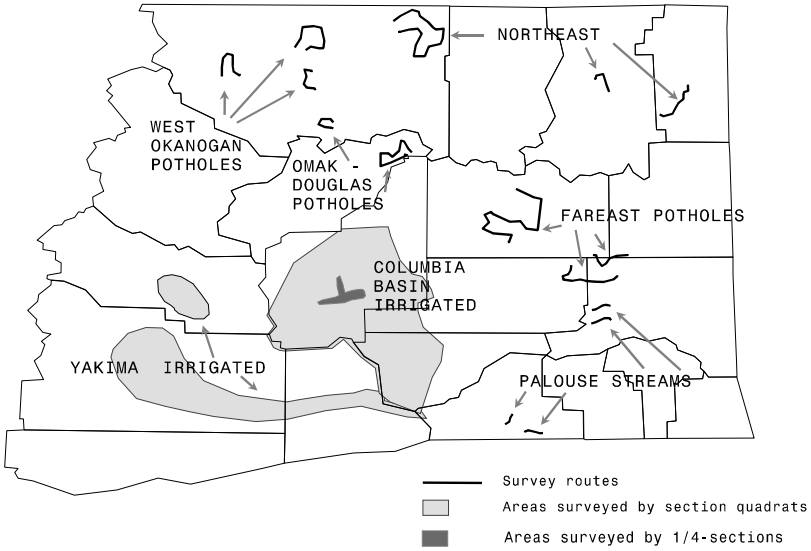


Figure 2. Eastern Washington aerial breeding waterfowl survey transects flown in 2010.

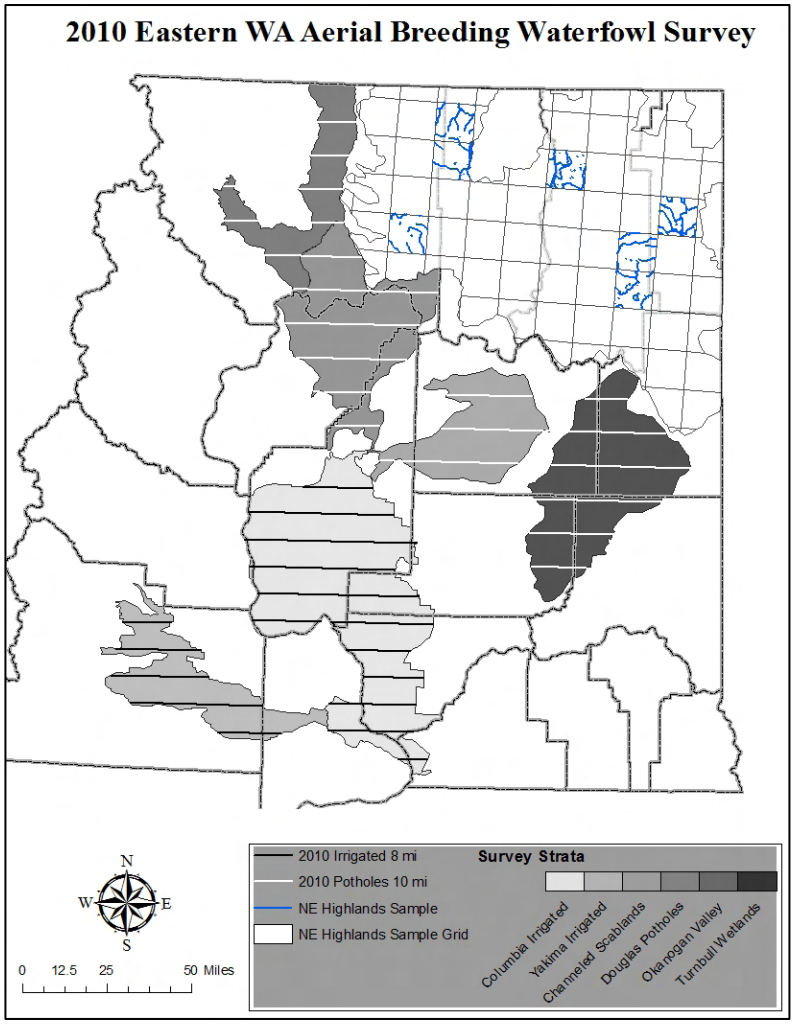


Figure 3. Western Washington aerial breeding waterfowl survey transects flown in 2010.

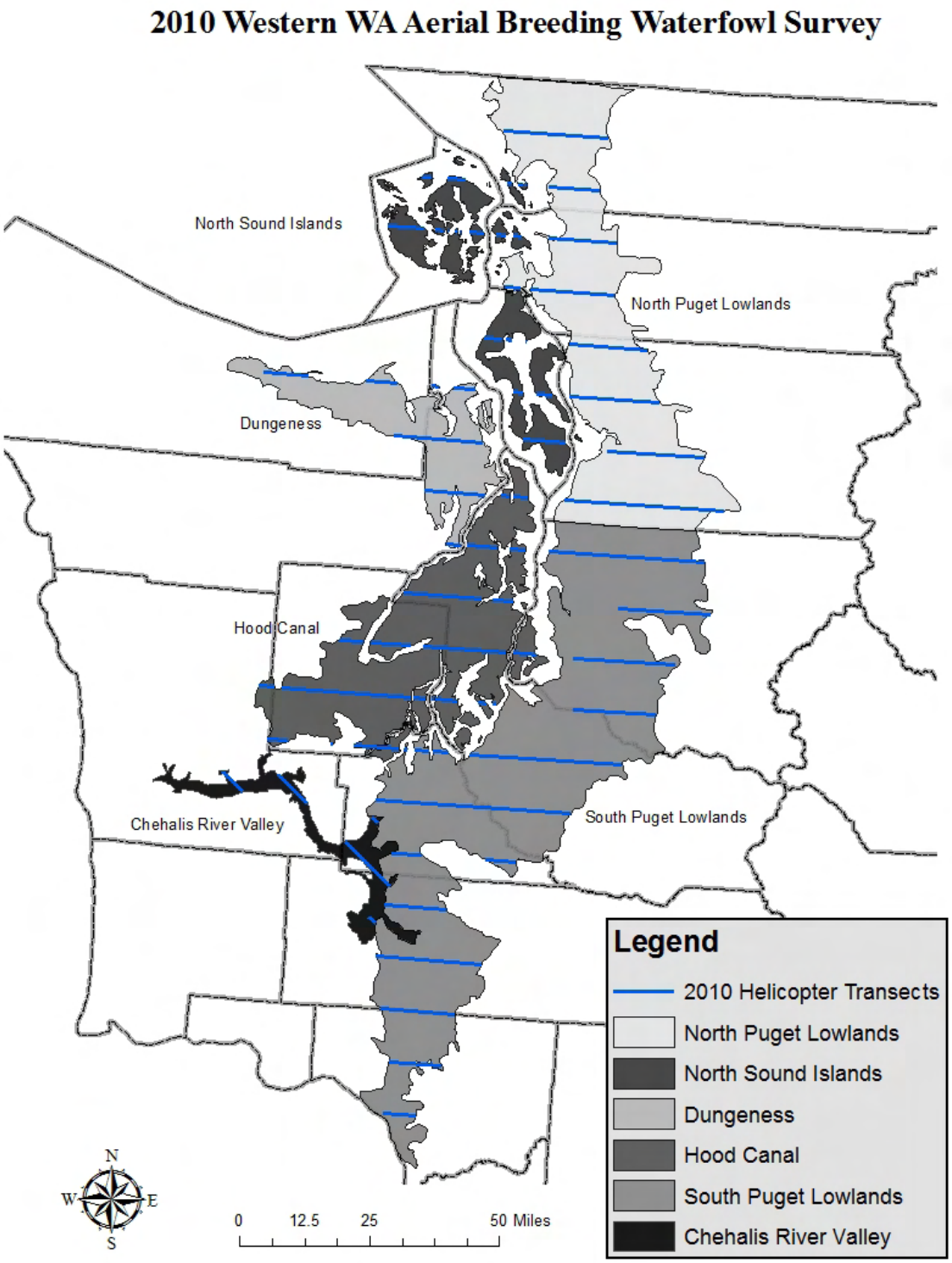


Figure 4. Total breeding duck population index for eastern Washington, 1961-2010

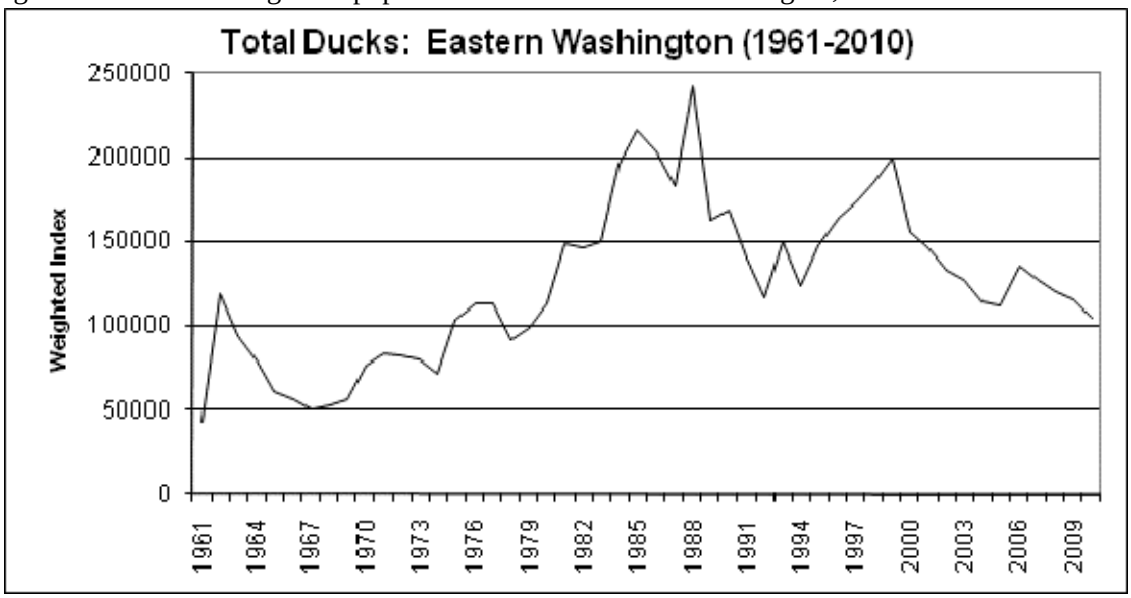


Figure 5. Indices of common breeding ducks in eastern Washington, 1962-2010.

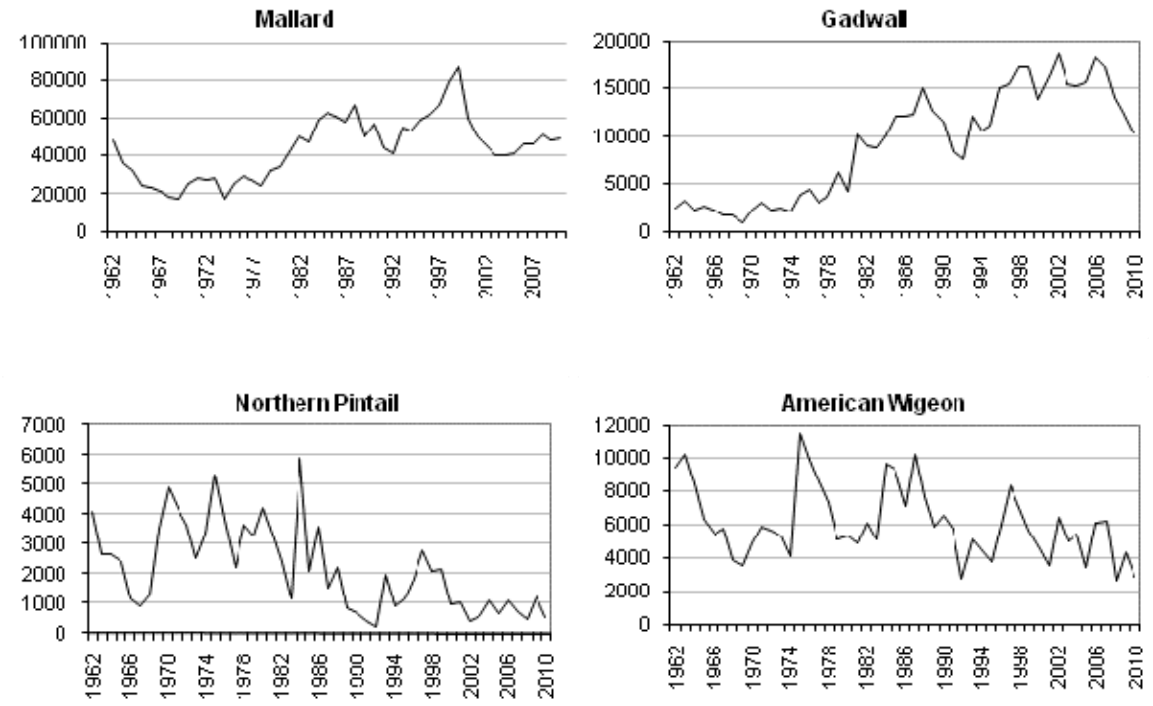


Figure 5. Continued.

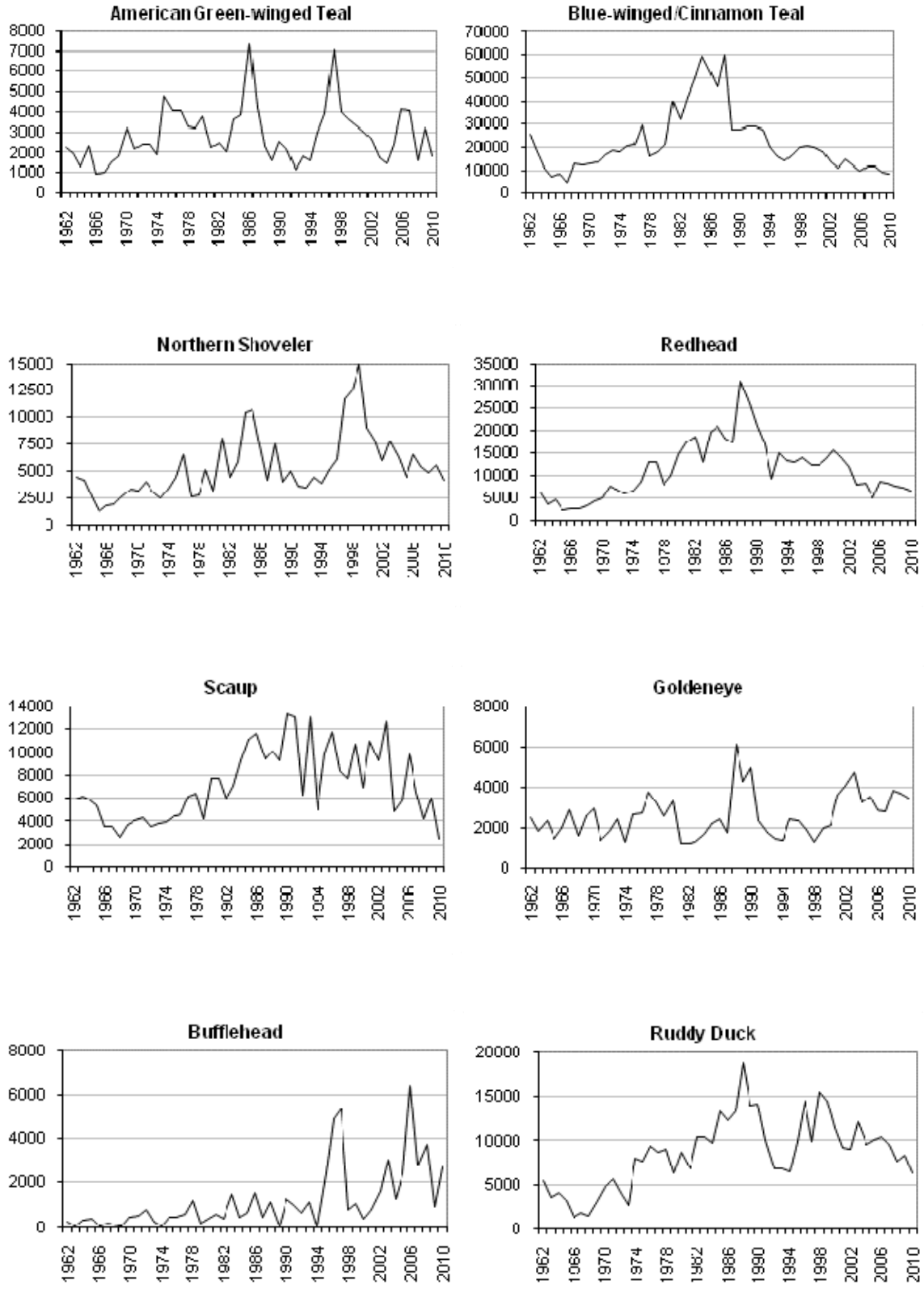


Figure 6. Weighted duck breeding population indexes by E. WA strata, 1962-2010.

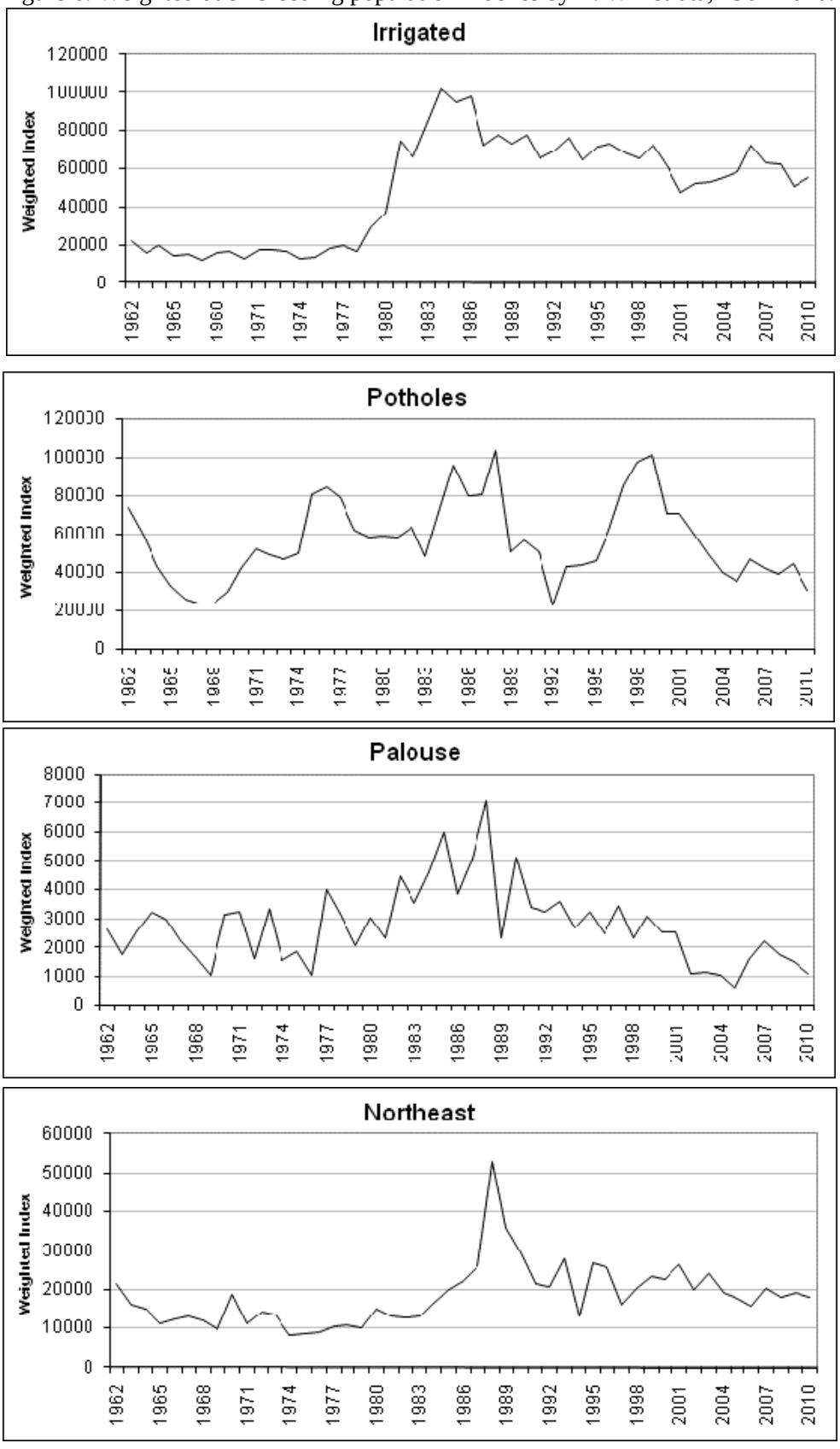


Figure 7. Weighted duck breeding population indices for the Columbia Basin, 1983-2010.

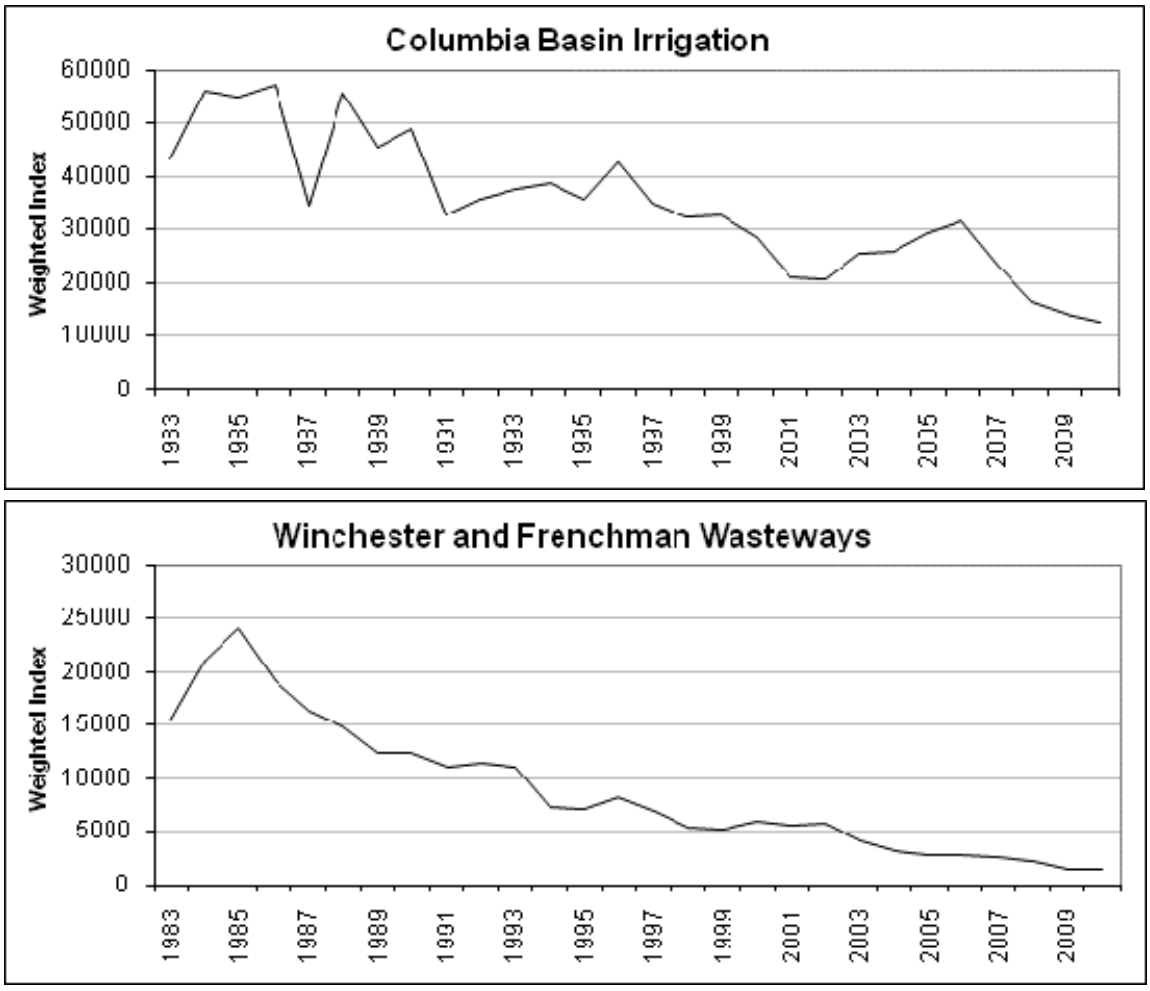


Figure 8. Mallard and redhead breeding pair trends on two Columbia Basin irrigation wasteways

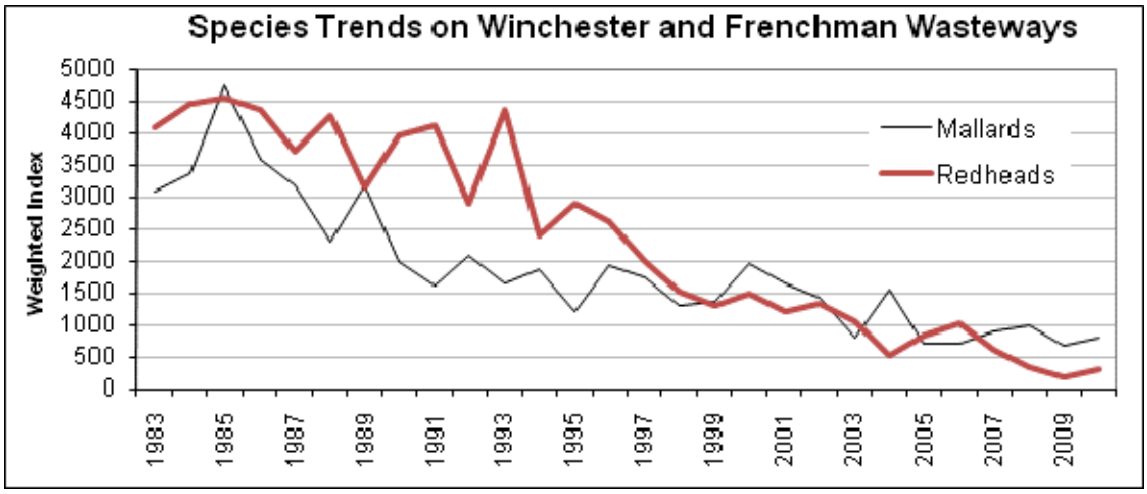


Figure 8. Western Washington weighted total duck breeding population survey, by strata, 2010.

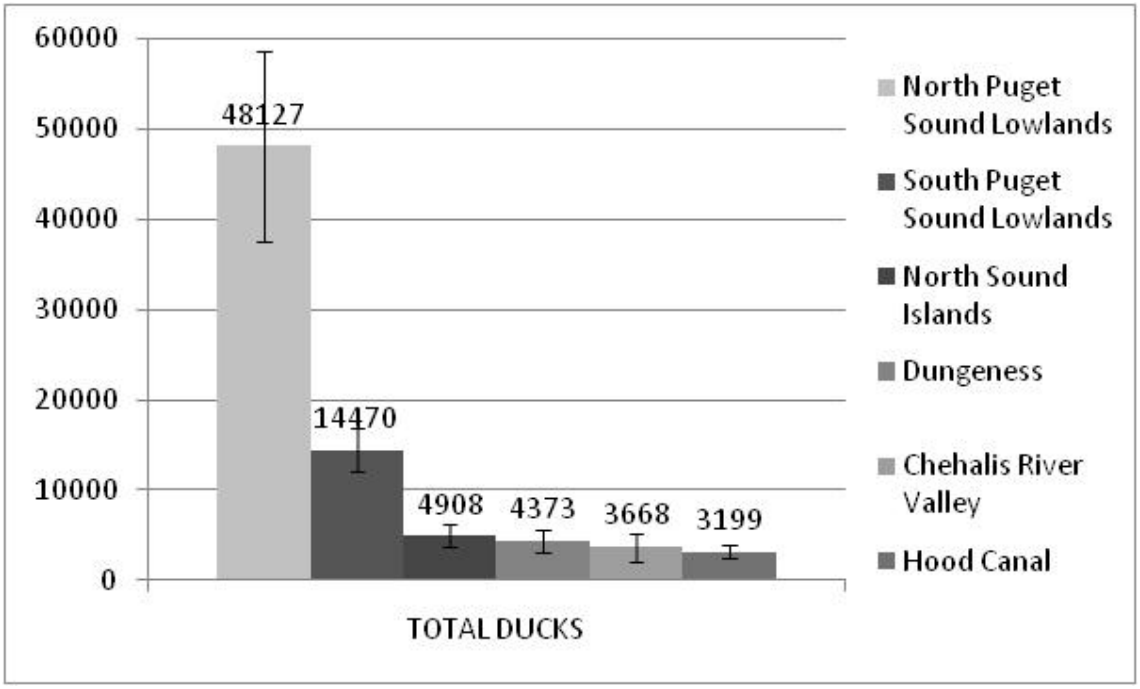


Figure 9. Western Washington weighted duck and goose breeding population survey, by species and strata, 2010.

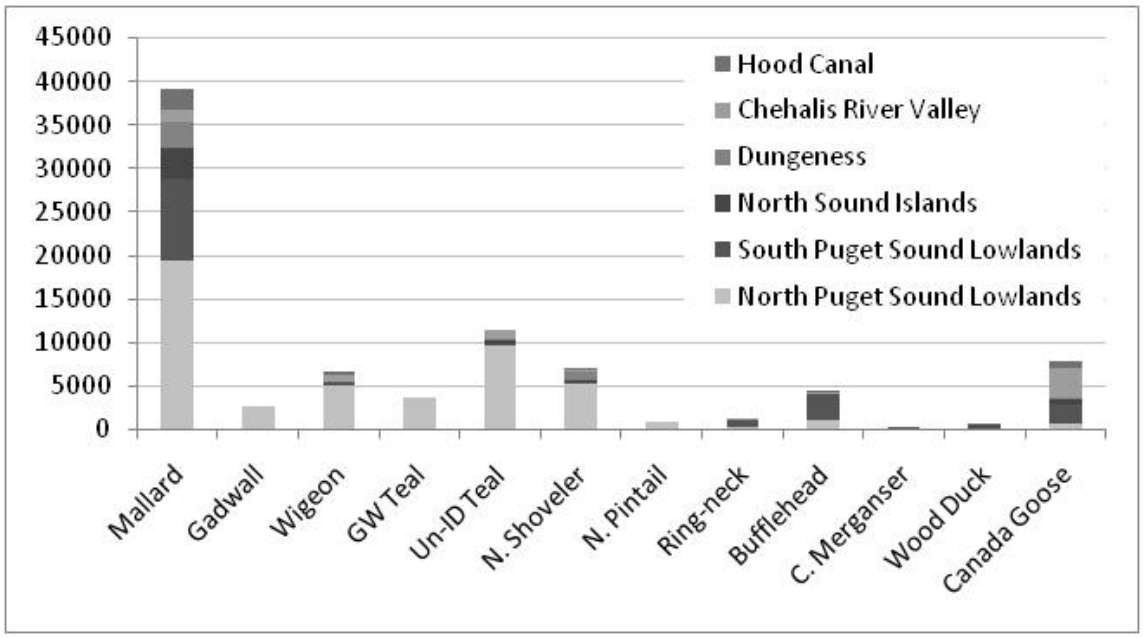


Figure 10. Index to pond numbers in the Potholes Strata, 1979-2010.

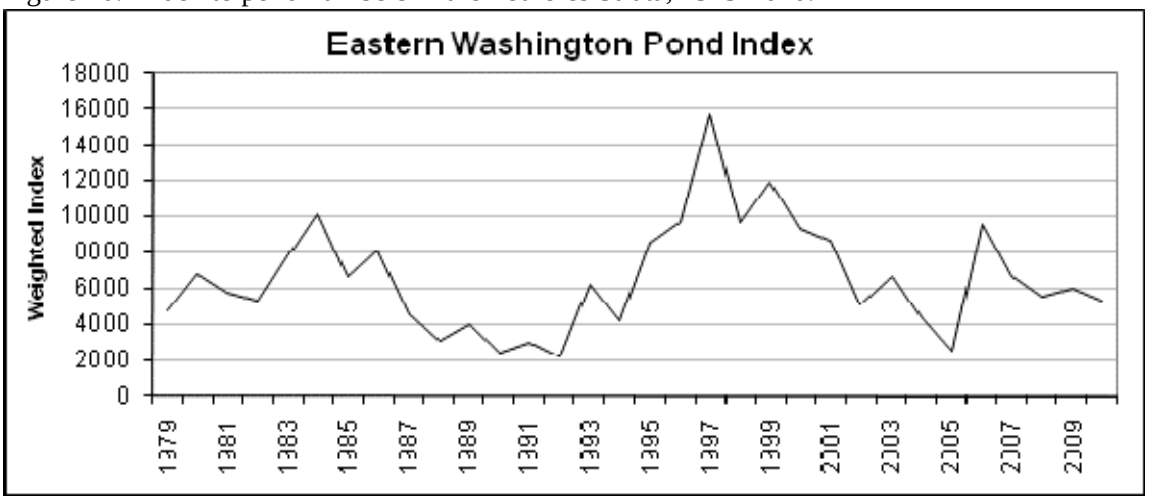


Figure 11. Weighted duck brood index (all species) for 3 eastern Washington strata, 1979-2010.

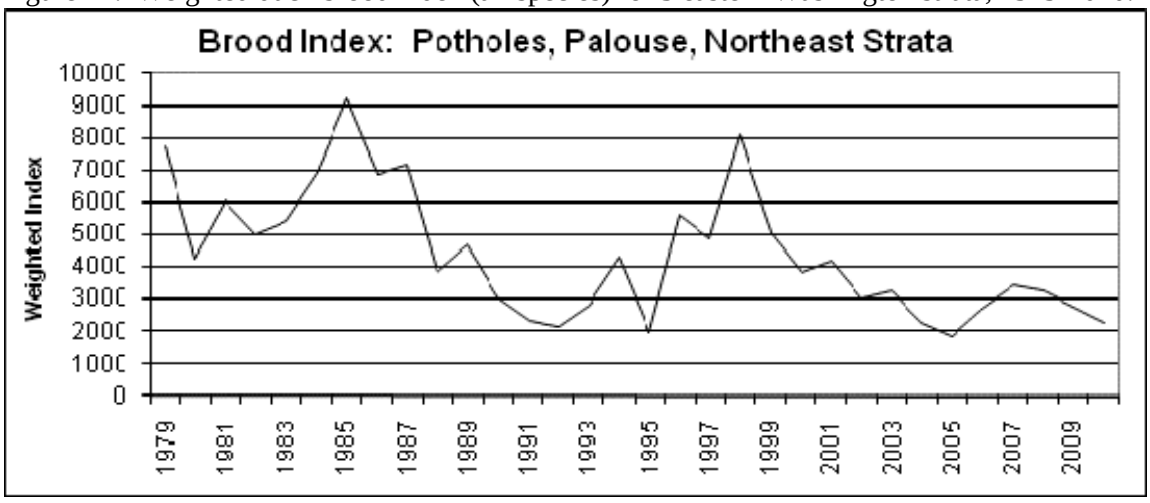


Figure 12. Total Canada goose nest attempts found on Columbia and Snake Rivers and in Columbia Basin, 1982-2010.

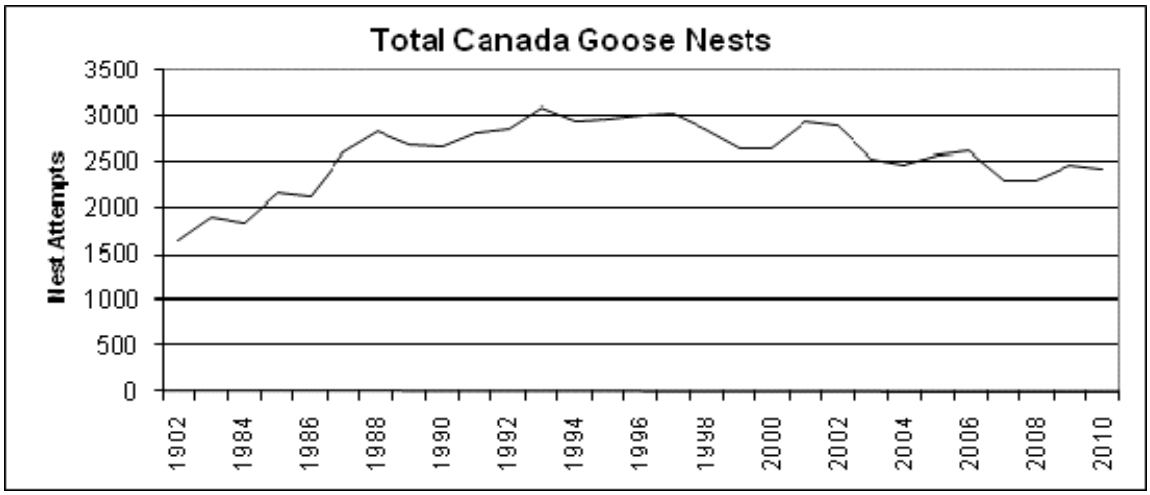


Figure 13. Canada goose nest surveys (number of nest attempts) by strata, eastern Washington, 1982-2010.

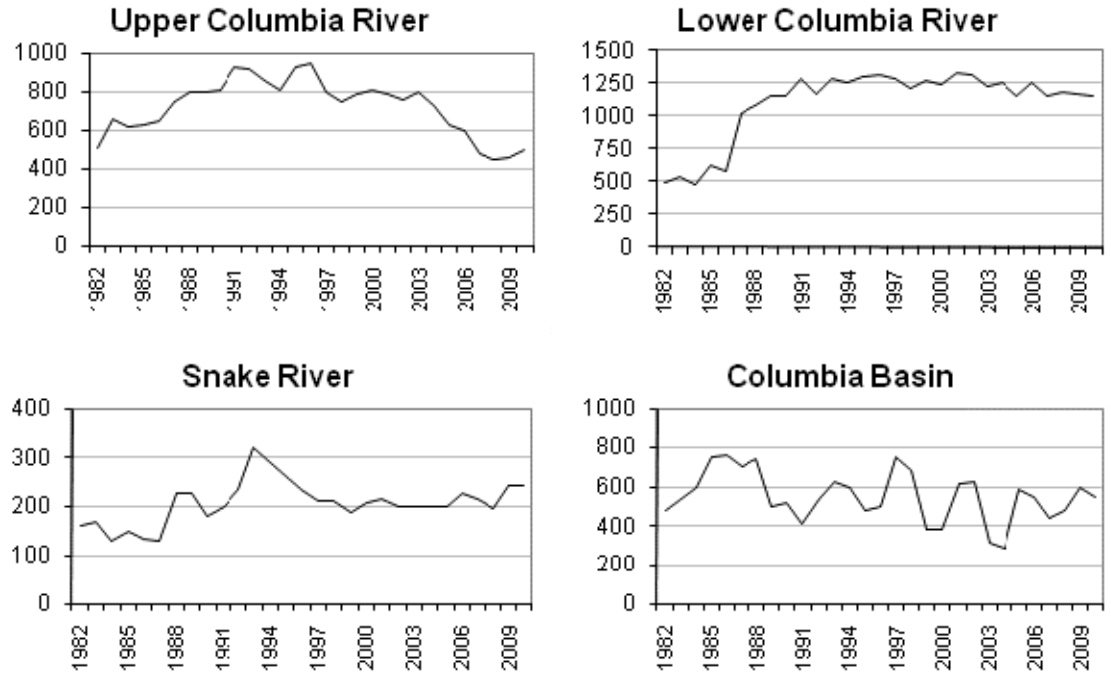


Figure 14. Breeding Canada goose index from eastern Washington breeding duck surveys, 1979-2010.

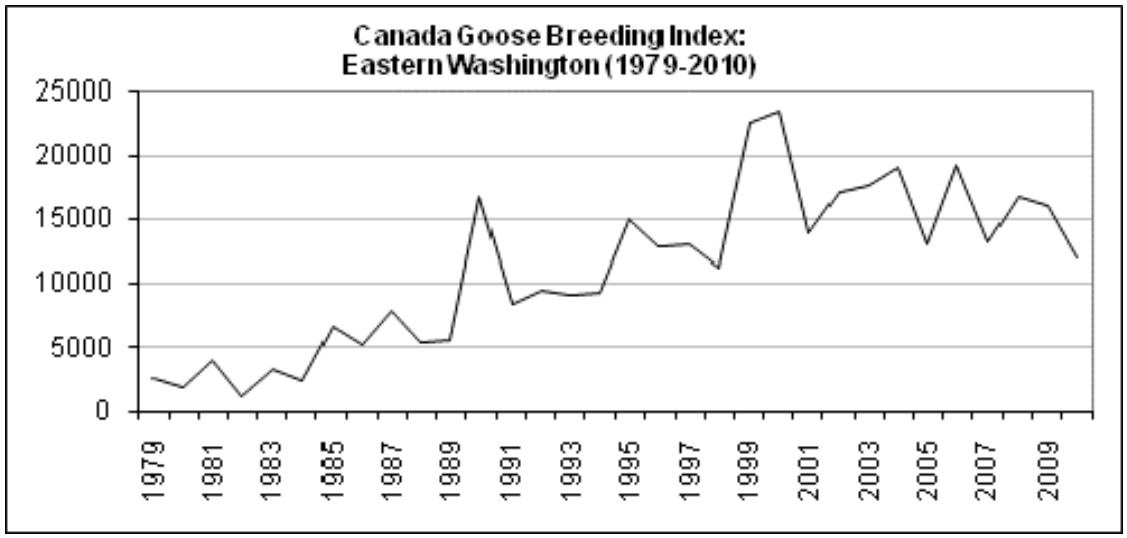


Table 1. Breeding duck routes, weighting factors and percent of area surveyed for areas and subareas surveyed for weighting breeding duck, goose, and ponds indices in Washington.

Area	Subarea	Survey	Weighting Factor	% of Total Area Sampled
Potholes	West Okanogan		14.06	7.1
		Methow Valley		
		Salmon Creek		
		Sinlahekin		
	Omak Lake		9.83	10.2
	Douglas County		15.26	6.5
	Far East Potholes		18.69	5.3
		Ewan-Revere		
		Sprague-Lamont		
	Lincoln County		47.59	2.1
Highland				
	Northeast		25.53	3.9
		Colville		
		Cusick		
		Molson-Sidley		
	Palouse Streams		32.52	3.1
		Union Flat		
		Palouse River		
		Walla Walla River		
		Touchet River		
Irrigated				
	Columbia Basin – 65 sections		37.25	2.7
	Wasteways[a] – 19 ¼ -sections		10.05	9.9
	Yakima – 35 sections		24.49	3.9

[a] Surveyed by helicopter beginning in 1994

Table 2. Weighted breeding duck population indices by species for eastern Washington traditional survey area (2001-2010).

Species	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	1979-2009 average	2010 vs. 2009	2010 vs. LTA
Mallard	50464	44676	39843	39958	40794	45485	46053	50647	47977	49160	52709	0.02	-0.07
Gadwall	16261	18527	15353	15185	15665	17995	17165	14065	10277	10277	12715	0.00	-0.19
American. Wigeon	3593	6501	5028	5442	3439	6012	6240	2618	4283	2844	5809	-0.34	-0.51
American green-winged teal	3037	2673	1749	1477	2406	4095	4060	1590	1612	1844	3072	0.14	-0.40
Blue-winged +cinnamon teal	17931	13717	11274	14619	12404	9544	11999	11921	9282	8657	25882	-0.07	-0.67
Northern shoveler	8000	5968	7794	6293	4477	6581	5409	4898	5555	4199	6643	-0.24	-0.37
Northern pintail	1018	395	608	1096	644	1089	723	450	1198	542	1713	-0.55	-0.68
Wood duck	2223	1863	616	1553	1375	1549	1870	1781	1327	2409	1670	0.82	0.44
Redhead	13915	11831	8117	8365	4978	8492	8265	7757	7156	6466	14281	-0.10	-0.55
Canvasback	1073	1507	919	618	610	1460	756	1132	873	385	813	-0.56	-0.53
Scaup *spp*.	10976	9289	12722	4807	5741	9709	6530	4244	5982	2484	8707	-0.58	-0.71
Ring-necked duck	3931	1405	3063	850	2525	3640	2732	2995	2521	2381	2804	-0.06	-0.15
Goldeneye *spp*.	3643	4036	4713	3255	3567	2847	2837	3841	3686	3495	2735	-0.05	0.28
Bufflehead	826	1606	3034	1280	2425	6361	2809	3728	949	2701	1602	1.84	0.69
Ruddy duck	9156	9023	12175	9624	10150	10464	9538	8262	8378	6400	10670	-0.24	-0.40
Merganser *spp*.	356	327	757	463	304	121	1279	969	1095	794	461	-0.27	0.72
Total ducks	146402	133343	127764	114883	111503	135442	128265	120897	115663	105036	152294	-0.09	-0.31
American coot	40172	18171	19328	19085	12346	22151	33763	22069	25521	20511	30793	-0.20	-0.33
Canada goose	13890	17179	17596	19137	13022	19253	13244	16342	16023	12014	11088	-0.25	0.08

Table 3. Weighted breeding duck population indices by area for eastern Washington traditional survey (1979-2010).

Year	Irrigated	Potholes	Palouse	Northeast	Total
1979	28948	57784	1951	9960	98643
1980	36870	58752	3057	15063	113742
1981	74711	58026	2341	13173	148252
1982	66161	63150	4455	12663	146429
1983	84969	48044	3545	12969	149527
1984	101486	73478	4618	16697	196278
1985	94789	95463	5984	19990	216226
1986	97901	79899	3837	22135	203771
1987	72503	80100	5073	25887	183564
1988	78137	103452	7068	53143	241799
1989	73411	50663	2341	35908	162323
1990	77838	56462	5138	29474	168912
1991	65698	50293	3382	21420	140793
1992	69547	22581	3252	20884	116264
1993	75969	42335	3577	27955	149836
1994	64537	43502	2699	13173	123912
1995	71513	46068	2472	26934	146987
1996	73364	62221	1691	25658	162933
1997	68589	85137	2667	16058	172451
1998	65503	96982	2341	20424	185251
1999	72697	101140	3089	23283	200210
2000	61126	70072	2537	22594	156328
2001	47438	70106	2537	26321	146402
2002	52341	59958	1106	19939	133342
2003	52648	49794	1170	24151	127764
2004	55098	39393	1041	19351	114883
2005	58339	35014	585	17564	111503
2006	72138	46672	1626	15650	135442
2007	63349	42119	2211	20271	128265
2008	62230	38710	1756	17999	120109
2009	50846	44020	1496	19301	115078
2010	**55631**	**30351**	**1106**	**17948**	**105036**
1979-09 Avg	67442	60367	3002	21484	152294
2010 vs. 2009	+9%	-31%	-26%	-7	-9
2010 vs. LTA	-18%	-50%	-63%	-16	-31

Table 4. Comparison of breeding waterfowl helicopter survey results (new method) and traditional survey (old method), Eastern Washington, 2010.

	Irrigated			Potholes			Highlands			Palouse			TOTAL		
SPECIES	**New method**	***SE***	**Old method**	**New method**	***SE***	**Old method**	**New method**	***SE***	**Old method**	**New method**	***SE***	**Old method**	**New method**	***SE***	**Old method**
Mallard	27448	*8066*	37087	*19563*	*4841*	6384	*5499*	*2276*	4800			1344	52510	*9678*	49160
Gadwall	3294	*986*	4668	*14754*	*3186*	4179	*745*	*473*	1430			0	18792	*3369*	10277
American Wigeon	213	*103*	204	*1223*	*412*	2232	*380*	*214*	408			0	1816	*475*	2844
Cinnamon Teal	5171	*3071*	5323	*4891*	*1547*	1694	*380*	*121*	715			0	10442	*3441*	7840
Blue-winged Teal	283	*177*	79	*2038*	*728*	308	*127*	*85*	408			0	2448	*754*	817
Am. Green-winged teal	602	*410*	201	*2445*	*643*	1212	*174*	*90*	408			0	3222	*768*	1844
Northern shoveler	4250	*1980*	1164	*2119*	*503*	2116	*428*	*231*	919			0	6797	*2056*	4199
Northern Pintail	0	*0*	306	*82*	*82*	134	*0*	*0*	102			0	82	*82*	542
Redhead	1523	*741*	2109	*7784*	*1971*	3667	*246*	*113*	689			0	9553	*2109*	6466
Canvasback	71	*72*	20	*0*	*0*	262	*0*	*0*	102			0	71	*72*	385
Scaup	1417	*805*	475	*489*	*253*	1090	*943*	*576*	919			0	2849	*1022*	2484
Ring-necked Duck	567	*199*	796	*1304*	*521*	1228	*975*	*335*	357			0	2845	*651*	2381
Goldeneye	0	*0*	0	*82*	*84*	814	*507*	*306*	2681			0	589	*317*	3495
Bufflehead	2479	*1267*	1226	*652*	*353*	581	*317*	*168*	1047			0	3448	*1326*	2701
Ruddy duck	248	*176*	994	*3383*	*1318*	4359	*452*	*242*	894			0	4082	*1351*	6400
Mergansers	283	*163*	130	*163*	*119*	63	333	*218*	536			0	779	*298*	794
Wood duck	1204	*602*	849	*408*	*266*	28	*887*	*469*	1532			0	2499	*808*	2409
TOTAL DUCKS	**49053**	***9102***	**55631**	***61379***	***6597***	**30351**	***12392***	***2538***	**17948**	**No survey**		**1496**	**122823**	***11525***	**105036**
American Coot	7544	*3926*	3310	*7010*	*2327*	13294	*3439*	*1006*	7251			65	17993	*4674*	20511
Canada goose	4569	*1660*	2657	*7540*	*2071*	4302	*673*	*414*	5157			1474	12782	*2686*	12014

Table 5. Comparison of 2009 and 2010 eastern Washington helicopter surveys for breeding waterfowl.

	Irrigated				Potholes				Highlands				TOTAL			
SPECIES	**2009**	***SE***	**2010**	***SE***	**2009**	***SE***	**2010**	***SE***	**2009**	**SE**	**2010**	***SE***	**2009**	***SE***	**2010**	***SE***
Mallard	45491	*8489*	27448	*8066*	16756	*4295*	19563	*4841*	13892	6044	5499	*2276*	77291	*11276*	52510	*9678*
Gadwall	7478	*2402*	3294	*986*	9309	*2413*	14754	*3186*	1292	1244	745	*473*	18159	*3625*	18792	*3369*
American Wigeon	1731	*801*	213	*103*	1513	*522*	1223	*412*	162	155	380	*214*	3405	*969*	1816	*475*
Cinnamon Teal	3723	*979*	5171	*3071*	4654	*1349*	4891	*1547*	1292	633	380	*121*	9670	*1783*	10442	*3441*
Blue-winged Teal	261	*145*	283	*177*	931	*752*	2038	*728*	162	147	127	*85*	1360	*780*	2448	*754*
Am. green-winged teal	523	*215*	602	*410*	465	*339*	2445	*643*	808	556	174	*90*	1802	*686*	3222	*768*
Northern shoveler	2286	*723*	4250	*1980*	1978	*901*	2119	*503*	162	155	428	*231*	4426	*1165*	6797	*2056*
Northern Pintail	0	*0*	0	*0*	233	*158*	82	*82*	0	0	0	*0*	233	*158*	82	*82*
Redhead	2384	*912*	1523	*741*	7331	*4452*	7784	*1971*	646	453	246	*113*	10361	*4567*	9553	*2109*
Canvasback	65	*66*	71	*72*	233	*231*	0	*0*	162	155	0	*0*	460	*286*	71	*72*
Scaup	2678	*1372*	1417	*805*	0	*0*	489	*253*	0	0	943	*576*	2678	*1372*	2849	*1022*
Ring-necked Duck	196	*102*	567	*199*	349	*208*	1304	*521*	1777	916	975	*335*	2322	*945*	2845	*651*
Goldeneye	0	*0*	0	*0*	0	*0*	82	*84*	323	326	507	*306*	323	*326*	589	*317*
Bufflehead	653	*283*	2479	*1267*	815	*477*	652	*353*	808	647	317	*168*	2275	*852*	3448	*1326*
Ruddy duck	163	*106*	248	*176*	1804	*1725*	3383	*1318*	1050	1011	452	*242*	3017	*2002*	4082	*1351*
Common merganser	327	*147*	283	*163*	349	*191*	163	*119*	1292	690	301	*217*	1994	*731*	747	*297*
Hooded merganser	0	*0*	0	*0*	0	*0*	0	*0*	323	209	32	*20*	330	*209*	32	*20*
Wood duck	2351	*865*	1204	*602*	1047	*600*	408	*266*	2423	1792	887	*469*	5828	*2079*	2499	*808*
TOTAL DUCKS	**70768**	***9146***	**49053**	***9102***	**47766**	***7169***	**61379**	***6597***	**26572**	**6723**	**12392**	***2538***	**146391**	***13429***	**122823**	***11525***
American Coot	12932	*5815*	7544	*3926*	14080	*9485*	7010	*2327*	10823	5066	3439	*1006*	37834	*12225*	17993	*4674*
Canada goose	8817	*2025*	4569	*1660*	10182	*3557*	7540	*2071*	8965	8452	673	*414*	28492	*9391*	12782	*2686*

Table 6. Summary of western Washington breeding waterfowl population survey, 2010

	South Puget Sound Lowlands		North Puget Sound Lowlands		Chehalis River Valley		Hood Canal		North Sound Islands		Dungeness		TOTAL	
SPECIES	**2010**	***SE***	**2010**	***SE***	**2010**	***SE***	**2010**	***SE***	**2010**	***SE***	**2010**	***SE***	**2010**	***SE***
Mallard	9247	*2203*	19484	*3817*	*1581*	*706*	2297	*366*	3599	*1087*	2915	*664*	39123	*8843*
Gadwall	0	*0*	2611	*1273*	*0*	*0*	0	*0*	0	*0*	0	*0*	2611	*1273*
American Wigeon	385	*229*	5062	*2663*	*791*	*992*	492	*539*	0	*0*	0	*0*	6730	*4422*
Blue/Cinnamon Teal	342	*244*	9601	*8398*	*980*	*977*	0	*0*	245	*279*	307	*291*	11476	*10189*
Am. Green-winged teal	0	*0*	3736	*2832*	*0*	*0*	0	*0*	0	*0*	0	*0*	3736	*2832*
Northern shoveler	171	*166*	5222	*2828*	*63*	*79*	246	*253*	409	*465*	1074	*931*	7186	*4723*
Northern Pintail	0	*0*	844	*427*	*0*	*0*	0	*0*	0	*0*	0	*0*	844	*427*
Scaup	214	*198*	0	*0*	*0*	*0*	0	*0*	0	*0*	0	*0*	214	*198*
Ring-necked Duck	685	*313*	362	*159*	*190*	*125*	0	*0*	327	*372*	0	*0*	1563	*969*
Bufflehead	2997	*1267*	1044	*488*	*63*	*61*	82	*84*	82	*86*	0	*0*	4268	*1574*
Common Merganser	171	*163*	80	*74*	0	*0*	0	*0*	0	*0*	0	*0*	252	*232*
Wood duck	257	*602*	80	*74*	*0*	*0*	82	*90*	82	*85*	77	*0*	578	*426*
TOTAL DUCKS	**14470**	***9102***	**48127**	***10501***	***3668***	***1569***	**3199**	***710***	**4908**	***1282***	**4373**	***1180***	**78744**	***17675***
American Coot	43	*3926*	80	*54*	*0*	*0*	0	*0*	0	*0*	0	*0*	123	*98*
Canada goose	2226	*1660*	683	*276*	*3510*	*4042*	615	*572*	491	*202*	115	*67*	7640	*5776*

Table 7. Weighted pond index from transects within the Pothole strata, eastern Washington, 1979-2008.

Year	Douglas	Okanogan	Omak	Lincoln	Far East	Total
1979	443	576	236	2475	1065	4795
1980	641	633	167	4378	935	6754
1981	809	675	344	3189	785	5801
1982	717	661	236	2808	935	5356
1983	1312	492	452	4283	1252	7792
1984	1312	815	482	5996	1514	10120
1985	1251	581	403	3046	1327	6608
1986	1099	591	334	4664	1458	8145
1987	824	478	315	2380	579	4576
1988	717	544	256	1142	449	3107
1989	794	520	216	1713	729	3972
1990	626	422	226	666	486	2426
1991	504	534	233	1047	673	2990
1992	275	394	157	904	430	2160
1993	855	366	157	3998	822	6197
1994	717	492	182	2046	729	4167
1995	1022	548	521	4902	1551	8545
1996	1236	633	442	5663	1645	9619
1997	1938	1125	678	9232	2691	15665
1998	1495	900	619	4949	1663	9627
1999	1389	998	550	7234	1757	11928
2000	1267	773	550	5330	1420	9341
2001	946	619	305	5330[1]	1420[1]	8620
2002	1022	520	246	2665	654	5108
2003	1541	675	216	3617	635	6685
2004	629	647	177	2147	673	4264
2005	336	492	177	904	617	2526
2006	1984	759	423	5378	1047	9590
2007	1190	773	374	3379	972	6688
2008	641	675	354	2760	1065	5495
2009	763	506	265	3093	1364	5992
2010	**717**	**506**	**331**	**2617**	**1134**	**5306**
1979-2009 avg	977	626	332	3591	1076	6602
2010 vs. 2009	-6%	0%	+25%	-15%	-17%	-12%
2010 vs. LTA	-26%	-19%	0%	-27%	+5%	-20%

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

Table 8. Weighted duck brood indices by species for the Potholes, Palouse, and Northeast areas of Washington, 2001-2010.

Species	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	79-09 Avg	% change from 2009	% change from Average
Mallard	1643	1183	1260	1284	1221	1200	1786	1419	1416	1035	1701	-27%	-39%
Gadwall	589	353	299	116	15	107	132	292	87	87	373	0%	-77%
Wigeon	135	126	170	95	146	54	54	48	43	10	259	-77%	-96%
Green-winged teal	239	143	158	14	26	118	94	151	183	176	176	-4%	0%
Blue-winged teal	275	228	212	92	26	15	0	42	48	0	550	-100%	-100%
Cinnamon teal	272	66	48	24	40	14	103	91	14	138	93	883%	49%
Northern shoveler	327	207	238	63	0	29	15	59	44	49	165	11%	-70%
Northern pintail	180	199	158	20	0	0	0	0	0	0	121	0%	-100%
Wood duck	51	0	14	42	33	82	107	28	28	42	41	50%	4%
Redhead	187	238	267	40	0	121	211	252	154	94	424	-39%	-78%
Canvasback	51	77	128	26	15	65	26	90	0	32	33		-3%
Scaup	0	0	82	0	0	20	14	21	94	17	49	-82%	-65%
Ring-necked duck	0	0	26	85	0	108	26	50	14	86	49	510%	76%
Goldeneye	195	26	26	266	163	438	444	412	331	275	170	-17%	61%
Bufflehead	0	179	26	0	26	0	40	14	24	43	10	79%	332%
Ruddy duck	51	0	167	86	110	201	222	219	183	104	227	-43%	-54%
Merganser	0	0	14	15	0	128	204	77	77	65	50	-15%	31%
TOTAL BROODS	**4417**	**2757**	**3089**	**3166**	**1819**	**4085**	**3477**	**3265**	**2741**	**2253**	**4462**	**-18%**	**-50%**

Table 9. Weighted duck brood indices for eastern Washington and total brood counts for Columbia Basin.

Year	Channeled Scablands	Okanogan	Northeast	Palouse	Total Broods	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	1345	1864	184	5095	179
1998	5193	1837	894	163	8086	279
1999	2816	1362	715	163	5055	170
2000	2898	239	536	163	3836	192
2001	2993	423	715	65	4196	167
2002	2360	139	460	65	3024	137
2003	2011	295	919	65	3291	164
2004	440	905	791	130	2266	147
2005	328	482	945	65	1819	178
2006	450	986	1200	65	2701	No survey
2007	435	984	1864	195	3477	160
2008	945	1413	842	65	3265	61
2009	860	1160	689	33	2741	64
2010	703	854	664	33	2253	51
LTA	2469	884	916	193	4462	163
2010 vs. 2009	-18%	-26%	-4%	0%	-18%	-20%
2010 vs. LTA	-72%	-3%	-28%	-83%	-50%	-69%

Note: Discrepancies in calculations from previous reports have been corrected on this table.

Table 10. Goose nest surveys conducted in Washington.

Survey Area	Year Survey Initiated	Agency Conducting Survey	Frequency of Survey	Average Rate of Change Per Year (% nesting attempts) 84-88	89-93	94-98	99-03	04-08	09-12
UPPER COLUMBIA				+4.1%	+1.8%	-2.3%	+1.4%	-8.3%	-2.0%
Hanford	<1974	WDFW	Biennial						
Priest Rapids	<1974	WDFW	Biennial						
Wanapum	<1974	WDFW	Periodic						
Rocky Reach	1975	Chelan Co. PUD	Annual						
Rock Island	<1974	Chelan Co. PUD	Annual						
Wells	1980	WDFW	Annual						
F.D.R.	1981	WDFW	Periodic						
Rufus Woods	1981	Army Corps	Annual						
Mouth of Yakima	<1974	WDFW	Biennial						
SNAKE RIVER				+10.7%	+8.5%	-7.9%	-1.0%	+4.3%	+13.9%
Snake River	1975	Army Corps	Annual						
Snake River Cliff	1979	Army Corps	Discontinued						
LOWER COLUMBIA				+18.9%	+4.0%	-1.2%	0	-0.7%	-0.8%
McNary	<1974	USFWS	Discontinued						
John Day	<1974	Umatilla NWR	Biennial						
Dalles	<1974	Army Corps	Periodic						
Bonneville	1982	Army Corps	Periodic						
Tri-Cities	1982	WDFW	Biennial						
I-5 to Bonneville	1981	Army Corps	Periodic						
I-5 to Puget Island	1981	WDFW	Annual						
COLUMBIA BASIN				+7.1%	0	+1.0%	0	+11.1%	+16.8%
Moses Lake	1981	WDFW	Biennial						
Potholes Res.	1981	WDFW	Biennial						
Lenore, Alkali, Park	1981	WDFW	Periodic						
TOTAL				+8.9%	+1.9%	-2.1%	-1.0%	-3.3%	+1.9%
Geese counted on duck surveys		WDFW	Annual	+31.9%	+32.1%	+7.0%	+18.8%	-7.3%	-8.2%

Table 11. Canada goose nest surveys in important areas of Washington, (1974-2010) and weighted number of geese observed during duck population surveys (1979-2010).

	Number of Nests					Geese observed on breeding duck surveys
Year	Upper Columbia	Snake River	Lower Columbia	Columbia Basin	TOTAL	
1974	279	0	363	0	642	
1975	297	50	344	0	691	
1976	310	51	345	0	706	
1977	358	51	384	0	793	
1978	329	51	330	0	710	
1979	303	87	292	0	682	2570
1980	393	112	339	0	844	1925
1981	500	145	332	249	1226	4053
1982	509	160	495	484	1648	1203
1983	656	171	535	541	1902	3225
1984	618	132	481	601	1831	2305
1985	630	150	631	757	2168	6674
1986	641	136	580	765	2122	5225
1987	745	130	1024	702	2601	7938
1988	794	229	1076	742	2841	5426
1989	799	227	1154	500	2680	5605
1990	808	180	1161	518	2667	16695
1991	923	199	1282	414	2818	8483
1992	916	236	1164	538	2854	9483
1993	858	319	1293	628	3098	9190
1994	806	290	1251	595	2942	9396
1995	929	261	1302	477	2969	15017
1996	944	236	1321	501	3002	12758
1997	798	210	1286	676	2970	13019
1998	744	210	1215	610	2779	11199
1999	783	187	1273	315	2558	22598
2000	797	207	1235	313	2565	23449
2001	790	214	1331	539	2874	13307
2002	751	199	1321	629	2915	17179
2003	793	199	1232	374	2598	17596
2004	728	199	1260	350	2537	19137
2005	626	199	1157	584	2566	13022
2006	593	248	1242	544	2627	19253
2007	479	217	1139	442	2277	13244
2008	441	197	1167	485	2290	16342
2009	460	243	1171	594	2468	14858
2010	**493**	**241**	**1153**	**544**	**2408**	**12014**
1990-09 avg	749	221	1242	518	2731	14325
10 vs. 2009	+7%	-1%	-2%	-8%	-1%	-19%
10 vs 20-yr avg	-34%	+9%	-7%	+5%	-11%	-16%

WATERFOWL STATUS AND TREND REPORT: STATEWIDE

WINTER WATERFOWL POPULATIONS AND HARVEST

MIKAL MOORE, Waterfowl Specialist

Introduction

This report summarizes the 2009-10 Washington winter waterfowl surveys, waterfowl hunting regulations, waterfowl harvest, and waterfowl hunter trends. This summary compares current data with data collected over the past 25 years in the state as well as the Pacific Flyway. These data are part of a long-term database archived by the Washington Department of Fish and Wildlife (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 throughout the Pacific Flyway is the January Midwinter Waterfowl Survey (MWS). This is a coordinated, comprehensive survey of the most important waterfowl wintering areas, using a combination of standardized surveys from fixed-winged aircraft and ground observation locations. The MWS is a combined effort among several agencies, including WDFW, ODFW, Yakama Nation, USFWS, and Canadian Wildlife Service.

Because the MWS does not capture migration peaks or patterns of habitat use throughout the fall/winter, additional fixed-wing and ground surveys take place in key wintering areas from October–March. Specific age structure surveys also take place in the north Puget Sound area for snow geese, brant, and swans, along standard ground observation routes.

Midwinter Waterfowl Survey Results

WDFW, tribal, and U.S. Fish and Wildlife Service (USFWS) personnel completed the 2009-10 MWS in January 2010. Washington's midwinter index for total waterfowl and coots was estimated at 956,661, a decrease of 2% from the previous year and 12% below the 10-year average (2000-2009; Table 1).

The 2010 Pacific Flyway midwinter index for total waterfowl was 6.2 million. This represents a 12.3% decrease from 2009 (7.1 million), 7% below the 10-year average (6.7 million), and 6% below the long-term average (6.7 million; 1955-2009).

Ducks--The 2010 midwinter indices for total ducks in the 11 Pacific Flyway states was 4.6 million (Fig. 1), down 19% from the 2009 count (5.2 million), 12% below the 10-year average (5.3 million), and 19% below the long-term average (5.7 million; 1955-2009).

In Washington, the 2010 total wintering duck population was 724,568, down 3% from 2009 levels of 743,870, and 5% below the 10-year average (Fig. 2). The Washington total duck count represents 15.7% of the Pacific Flyway wintering population, 1% above the state's 10-year average of 14.7% (Fig. 3). The highest ratio of Washington ducks to total Pacific Flyway ducks in the MWS was in 1991 (28.6%).

The 2010 mallard total for the Pacific Flyway was 931,377, up 9% from 2009, 14% below the 10-year average (2000-2009), and 41% below the long-term average (1955-2009). The total number of mallards counted in Washington in 2010 was 405,604, a 59% increase from the previous year, and 4% below the 10-year average (Table 1). Washington typically holds a high percentage of the Pacific Flyway mallard population with a 10-year average of 35.6% (Fig. 4). In 2010, Washington held 43.5% of the Pacific Flyway mallards during the MWS.

Canada geese--Canada geese are often not well represented in midwinter surveys as they forage in widespread agricultural areas, making them difficult to locate during aerial surveys. Wintering Canada goose numbers began to build in the 1990s when the MWS first indexed over 400,000 geese. The 2010 MWS for Canada geese in the Pacific Flyway was 413,621. The count declined 18% from the record count of 502,211 in 2009, fell below the 10-year average by 3%, but exceeded the LTA by 18%.

The number of Canada geese wintering in Washington has been variable over the past 20 years. Canada geese numbered over 90,000 during the winter of 1998-99 and 2000-01. The 2010 total of 53,259 was up 86% from the record low count in 2009 of 28,629, and 12% below the 10-year average (Table 1, Fig. 5).

Snow geese--The northern population of snow geese overwintering in northwestern Washington and the Fraser River Delta, B.C. nest primarily on Wrangel Island, Russia. Nesting conditions in 2009 at Wrangel Island's Tundra River colony were reported as excellent and one of the earliest nesting seasons on record. Following a very poor production year in 2008 with only 17% nest success, biologists estimated nest success at 80% in 2009. The 2009 spring population numbered 135,000-140,000 adults, with 50,000-60,000 nesting pairs. Juvenile snow geese comprised 40% of the wintering population in the Fraser and Skagit River Deltas in December 2009, suggesting an excellent production year. Juveniles typically comprise 25% of the population. Midwinter snow goose aerial photo counts by Canadian Wildlife Service in January 2010 numbered 73,964. This represents a 29% increase over the 2009 count of 57,511 snow geese, 16% above the 10-year average. (Table 1, Fig. 6).

Brant--The number of brant counted in Washington during the 2010 midwinter survey was 14,895, a 49% decrease from 2009, and 13% below the 10-year average (Table 1, Fig. 7). The number of brant counted during the northern Puget Sound midwinter aerial survey on January 7, 2010, was 10,384, down 56% from the previous year. The largest concentrations of brant were in Lummi Bay (36%), Padilla Bay (32%), and Samish Bay (26%). All brant counted in Skagit County are considered to be Western High Arctic (WHA), or “gray-bellied” brant. However, color composition surveys were discontinued in 2004-05. Starting with the 2006 hunting season, breast color measurements were taken from brant at Skagit County check stations in conjunction with avian influenza sample collection. In 2009-10, 47% of harvested birds (n = 198) were gray-bellied (WHA) brant (Munsell 4-8). Since 2006, the WHA harvest composition has ranged from 21-52%. These results refute the assumption that all brant counted in Skagit County during the MWS are WHA brant.

Swans--The 2010 northern Puget Sound (Skagit, Whatcom, and Snohomish counties) trumpeter swan MWS totaled 9,263 (Table 2), similar (+2%) to the 2009 count of 9,061. The 2010 survey is the highest count on record for trumpeter swans wintering in north Puget Sound. Juveniles accounted for 15.2% of the 2010 survey (Table 2), slightly below (-5%) the 1999-2009 average of 15.9%.

The 2010 northern Puget Sound tundra swan midwinter index was 2,301, 2% above the 2009 index and 13% above the 10-year average. Juveniles represented 15.5% of the population (Table 2), the second highest ratio on record for this survey. The 2000-09 average juvenile percentage of tundra swans in this survey is 13.7%.

Since 1999, trumpeter swans and, to a lesser degree, tundra swans wintering in northwestern Washington and southwestern British Columbia have experienced high rates of mortality due to ingestion of lead shot pellets. Of the 1,719 carcasses collected from 2000-2006, the majority of deaths were lead-related (77%). From 2001-2005, a total of 315 trumpeter and tundra swans were trapped and blood samples collected for lead residue analysis. Trumpeter swans were outfitted with VHF radio transmitters (n = 243) or satellite transmitters (n = 6); 61 tundra swans were fitted with neck collars. Locations of radio-tagged swans were used to identify primary forage and roosting areas. Judson Lake, a major roost site on the Washington/British Columbia border, was identified as a potential source of lead shot ingestion. During the winters of 2006-2009, hazing activities were used to discourage swans from using the lake. The successful hazing of swans from Judson Lake coincided with an approximate 70% reduction in lead-caused swan mortalities during the first 3 winters (average 67 lead-related mortalities in 2006-09) when compared to the average of 227 lead-related mortalities per year over the previous five years (2001-06). In 2009-10 hazing continued at Judson Lake, but only within the area of highest lead shot concentration. Bamboo poles and fencing prevented swans from landing in the exclusion area, while allowing them use of about 50% of the lake. Necropsy results from 2009-10 are pending.

Periodic Aerial Survey Results

Aerial waterfowl surveys in northern Puget Sound were accomplished by WDFW. Surveys in the Columbia Basin were conducted cooperatively between USFWS, Yakama Nation, and WDFW (Table 2).

North Puget Sound--The highest count during the North Puget Sound monthly surveys took place during December 2010, totaling 218,212 dabbling ducks. The record high count took place in

December 2006 (n = 974,180). Waterfowl frequently move between North Puget Sound, the Frazier River Delta, and Boundary Bay, B.C. depending on weather conditions.

Columbia Basin--The highest count in the North Columbia Basin during 2009-10 occurred during January with 266,546 total waterfowl (including coots). For the South Columbia Basin the highest count was in January, with 265,055 total waterfowl. The Yakama Nation conducts monthly winter aerial surveys of the Yakima Basin. The highest count on this survey took place in December, with 26,388 total waterfowl.

Long-term monitoring of small Canada geese (Lesser and Taverner's) staging on Stratford (Brooke) Lake and Round Lake has taken place since the early 1970s. These lakes are located near the town of Stratford in central Grant County. Both lakes are on private property and are not hunted. These October surveys were originally aerial counts but switched to ground counts in 2006. Observers counted a combined total of 16,849 undifferentiated Canada geese on the two lakes in October 2009. This count was 31% below the long-term average (1976-2008) of 24,333 (Fig. 8). The highest historical count was 80,050 in 1984. This population is of concern due to high harvest return rates of banded geese in the Columbia Basin. Additionally, the staging area at Stratford Lake is likely to be impacted by a new alternate feed route for irrigation water through Brooke Lake. The most likely scenario will result in widespread loss of mudflats on the lake that are heavily utilized by geese. The new feed route may be instituted as early as 2011.

Hunting Season Regulations

The 2009-10 waterfowl harvest was conducted under Washington State regulations (Table 3). The federal framework allowed the maximum number of days (107) under the Migratory Bird Treaty. Washington's season length was 105 days statewide with two additional days for the statewide Youth Hunt on Sept. 26-27. Canvasback season reopened after a statewide closure in 2008-09 with a daily bag limit of one bird. The reduced scaup season ran from Nov. 7-Jan. 31. The daily bag-limit was 7 ducks, to include not more than with 2 hen mallard, 1 pintail, 3 scaup, 2 redhead, 1 canvasback, 1 harlequin (season limit), 4 scoter, and 4 long-tailed duck (Table 3).

Substantial waterfowl populations in the Pacific Flyway over the last 8 years have allowed for liberal seasons and bag limits (Table 4). The season lengths between 1988-89 and 1993-94 were the most restrictive since 1950. Current regulations are among the most liberal ever offered in Washington. (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 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 2008-09 (Fig. 9).

Prior to 1984, the goose season length in southwest Washington was 93 days, with bag/possession limits of 3/6. Since that time, the season has evolved to 1) conserve the dusky goose subspecies, which has declined in numbers since the 1970's; 2) provide control of agricultural damage resulting from higher numbers of other Canada geese in the area; and 3) provide recreational opportunity. Historic season regulations for SW Washington are presented in Table 5. A special late season initiated in 1995-96 was continued in Area 2A during 2009-10, with season days of Saturdays and Wednesdays during February 6 – March 10, 2010 and a season quota of 5 duskys for the area.

For the 2009-10 season, the Aleutian goose bag limit was 1 in Area 2B (Pacific County), but 4 in all other areas. Previously listed as both a federal and state endangered species, Aleutian Canada goose populations have experienced exponential population growth in recent years and have caused crop and pasture depredation complaints in coastal areas south of Washington.

The January-only brant season took place in 2010, with 8 hunt days allowed in Skagit County and 10 days in Pacific County (Table 3). The Skagit County brant hunt is dependent on a pre-season January count of at least 6,000 brant. In 2010, the Skagit County survey estimated 6,002 brant (Table 2).

Harvest surveys

Methods

Harvest estimates were based on the Small Game Harvest Questionnaire sent to 10% of the hunting license buyers. Hunters were asked to report the numbers of ducks and geese they harvested by county. The species composition of the waterfowl harvest was derived from a Daily Waterfowl Harvest Report Card Survey. In this survey, cards were sent to waterfowl hunters prior to the start of the season to record the species of the birds they harvested. These data were used to tabulate the species composition of the waterfowl harvest.

Because statewide surveys are not accurate enough to measure harvest of several priority waterfowl species, special surveys have been developed that utilize written hunting authorizations and mandatory reporting. The sea duck (harlequin, scoter and long-tailed duck), 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 sea duck hunters in all of western Washington since 2004, brant hunters in all hunt areas since 1990, and snow goose hunters in the primary harvest area (Skagit, Island, Snohomish counties) since 1993. Harvest cards were provided at point of sale (POS) vendors rather than a postcard mailing from WDFW during the 2009-10 hunting season. Hunters were required to report harvest by species and county with mandatory harvest report cards by February 15, 2010. Hunters failing to comply with reporting requirements are ineligible to participate in the 2010-11 season. 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 in southwest Washington. During 1991-95, WDFW used a key developed by USFWS (Ridgefield NWR) to estimate dusky harvest based on culmen, total tarsus, age, and sex. Beginning in 1996, WDFW used standardized criteria for classifying duskys, where a dusky was classified as a dark-breasted Canada goose (Munsell #5) with a culmen length of 40-50 mm. Cacklers were classified at the check stations using culmen measurements of <32 mm. Total tarsus, age, and sex were taken from other geese with culmen >32 mm and <50 mm. The key was then applied via subsequent data analysis to determine subspecies for geese other than duskys and cacklers. Dark geese (Munsell #5) with culmen > 50 mm were classified as Vancouver Canada geese.

WDFW continued enhanced goose hunter training for people who wish to hunt geese in areas 2A and 2B of southwest Washington. The training program was initially developed in 1996, and revised in 1997 in conjunction with Oregon. In this program, hunters study a goose identification workbook and advised of the need to purchase a training videotape. The study materials, including the video, are now available from the WDFW website. Originally, hunters took a 40 question written test at one of eight testing locations and could choose from several testing dates. In 2007-08, WDFW provided the opportunity to take the same test online, and offered several testing dates at WDFW offices. Hunters are required to pass the test with a minimum score of 80%. Hunters who fail the test are required to wait 28 days before retesting, with a maximum of three tests per season.

Waterfowl Harvest Survey Results

The 2009-10 Washington duck harvest totaled 438,338, up 7% from the 2008-09 harvest of 410,257. The duck harvest in Washington declined steadily from over 1,000,000 in the late 1960's, to a low of 242,516 in 1993-94 (Fig. 10). Duck harvest rates in Washington have stabilized over the past 10 years, averaging approximately 433,000 birds annually.

Mallards made up 52% of Washington's 2009-10 harvest, followed by American wigeon (15%), American green-winged teal (12%), and northern pintail (6%); (Table 6).

The total Canada goose harvest for 2009-10 was 54,621, down 2% from the 2008-09 harvest of 55,692. A record low harvest of 26,479 occurred in 2004-05; the record high harvest (n = 72,721) was took place in 2006-07. During recent years, the presence of resident large Canada geese increased in Washington and has likely contributed to the increased harvest during the period from 1987 to 2001 (Fig. 10). The 2009-10 large Canada goose harvest (n = 34,075) was up 6% from the previous year and 6% above the long-term average.

The harvest of small Canada geese in 2009-10 (n = 20,546) decreased 10% from the previous year, 5% above the long-term average (Fig. 11). The highest recorded harvest of small Canada geese in Washington was 47,270 in 1979-80. The lowest

harvest (n = 8,880) took place in 2003-04. The reasons for the dynamics in small goose harvest are uncertain. Unfortunately, population trends in Washington's small Canada geese have not been well documented. Banding information is minimal and aerial surveys are logistically difficult.

Waterfowl harvest is summarized by WDFW administrative regions in Table 7 and Fig. 12. Except for the 2003-04 season, when Regions Two, Three and Four shared equal percentages (23.0%) of the harvest, Region Two has traditionally represented the highest percentage of the state's harvest. This was not the case for the 2009-10 season; Region Four accounted for 27% of the harvest followed by Region Two (24%), Region Three (19%), Region Six (12.0%), Region Five (9%), and Region One (8%).

Mandatory Harvest Reporting Results

The 2009-10 sea duck harvest survey, based on the sixth year of mandatory harvest report cards, indicated a total harvest of 3,902 (Fig. 13, Table 8). The harvest was dominated by surf scoters (67%), followed by white-winged scoters (17%), long-tailed ducks (9%), harlequin ducks (4%) and black scoters (3%). From a total of 2,129 authorizations, an estimated 575 hunters were successful and hunted a total of 1,510 days. Sea duck harvest was reported in 17 counties with Island County reporting 32% of the harvest followed by Mason County (22%), Skagit County (11%), Whatcom County (10%), and Jefferson County (7%). In general, interest in sea duck hunting is increasing. The number of authorizations has doubled since the inception of the program though the number of active sea duck hunters is unknown.

The 2009-10 pre-season count of brant in Padilla/Samish/Fidalgo Bays was above the threshold of 6,000, allowing a January brant season in Skagit and Pacific counties. The statewide harvest of brant was 576, 41% above the 2008-09 estimate of 409 (Fig. 14, Table 9). The 2010 harvest is the highest on record since 1999. Favorable tides exposing traditional gravel beds during hunting hours likely contributed to the increased harvest.

The 2009-10 snow goose harvest was estimated at 12,946, up 27% from the 2008-09 harvest. This is Washington's the second highest snow goose harvest estimate in over 25 years. The Wrangel Island snow goose flock had an excellent production year, resulting in numerous young birds that were vulnerable to hunting. Snow goose harvest in Washington is historically variable (Table 10, Fig. 15). It was on a negative trend during the mid-1980's and early 1990's. Harvest of snow geese increased since 1993 with an average harvest of 2,284 (Fig. 14). Snow geese have recently expanded their wintering range in northeastern Washington to portions of Snohomish and King counties. 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, as well as proportion of juveniles, may be of greater importance to harvest than total abundance, because the erratic annual harvest (Fig. 15) does not follow the number of geese counted in Washington during the MWS (Fig. 6).

In the SW Washington goose season, hunters who passed the identification test in 1996-2009 and didn't take a dusky in 2008-09 were authorized to hunt in 2009-10. New hunters and those harvesting duskys in 2008-09 were required to take a new test. Prior to 2009-10, authorizations were mailed to hunters by WDFW, but documents were issued by license dealers in 2009-10. The 2009-10 regular season ran to completion in all quota zones. The percentage of duskys in the harvest was 1%, unchanged from 2008-09. A total of 2,622 geese were checked during the regular season, a decrease of 25% from 2008-09 (Table 11. Fig. 16). A total of 520 individuals (down 8% from the 2008-09 season) checked birds at check stations. The 2009-10 late season had 74 Advanced Hunter Education (AHE) program participants, of which 42 checked geese at check stations. Total late season harvest was 186 geese, which was 42% below the 2008-09 late season. A combination of uniformed and undercover officers documented hunter compliance through individual field checks throughout the regular and late seasons. Compliance with regulations was estimated to remain within acceptable levels as determined by past emphasis patrols.

Hunter Numbers and Success

The Washington small game hunter survey is used to estimate the number of waterfowl hunters in the state. During the 2009-10 season, an estimated 25,678 hunters participated in the Washington waterfowl season, up 9% from 2008-09 (Fig. 17). The 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. 17). The 2004-05 estimate of Washington waterfowl hunters is the lowest on record.

The estimated average number of ducks harvested per hunter in 2007-08 was 17.1, the third highest average on record in Washington (Fig. 18). Hunter success, based on ducks harvested per hunter per year, has been on an upward trend since the mid-1990s (Fig. 18). Therefore, it appears the downward trend in duck harvest (Fig. 10) is more related to hunter numbers (Fig. 17) than decreased annual hunter success. The high success rate may indicate that the state has 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. 17), 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 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 is good. Decreased hunter numbers result in lower hunter densities in the field and success has remained stable to increasing. In addition, the state is holding a large percentage of the Pacific Flyway's ducks. Urban encroachment in traditional hunting areas will be one of the biggest challenges faced by waterfowl hunters and managers. Regardless, the value of Washington's waterfowl resources remains high and provides quality hunting recreation for the state's hunting population.

WDFW has recognized a decline of quality hunting opportunities found on public hunting areas. In response the agency has implemented 5 regulated access areas (RAA) including Winchester Ponds and Frenchman Ponds in Region 2, Bailie Youth Ranch and Windmill Ranch in Region 3, and the Fir Island Quality Snow Goose Hunt. All programs feature some type of limited access system designed to reduce hunter crowding and/or limit waterfowl disturbance (Fig. 19).

RECOMMENDATIONS

- Monitor and evaluate success of quality hunt areas and snow goose quality hunt.
- Provide summary of mallard and Canada goose band returns.

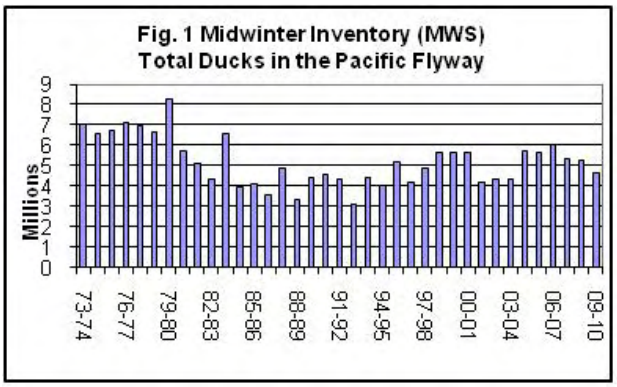


Fig. 1 Midwinter Inventory (MWS)
Total Ducks in the Pacific Flyway
Millions
0
1
2
3
4
5
6
7
8
9
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04
06-07
09-10

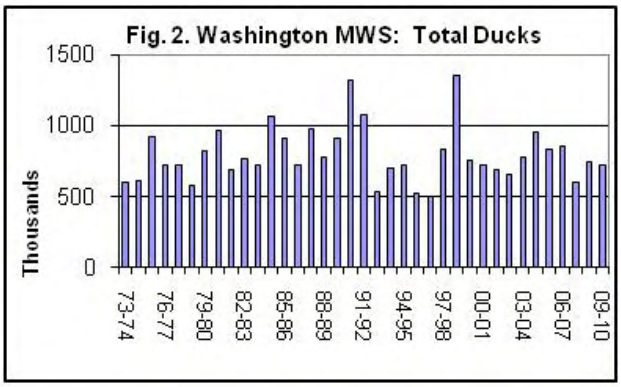


Fig. 2. Washington MWS: Total Ducks
Thousands
0
500
1000
1500
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04
06-07
09-10

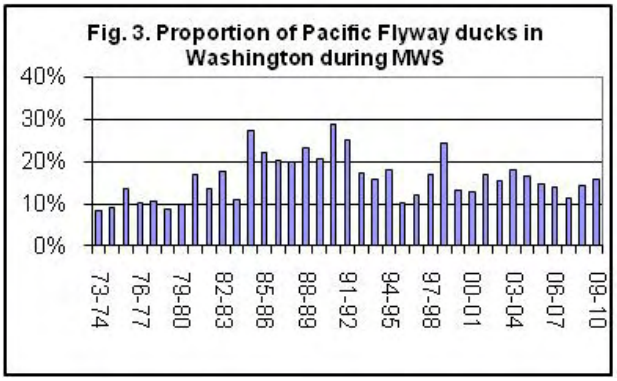


Fig. 3. Proportion of Pacific Flyway ducks in Washington during MWS
0%
10%
20%
30%
40%
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04
06-07
09-10

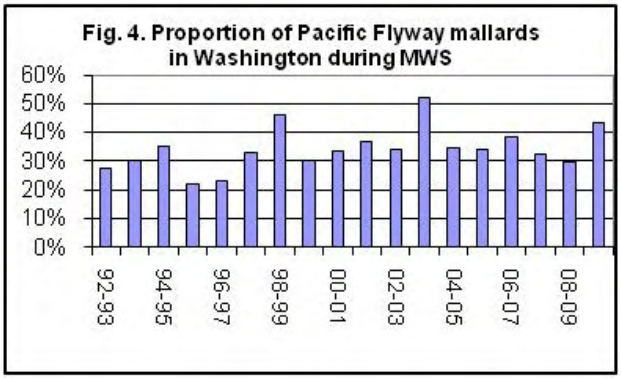


Fig. 4. Proportion of Pacific Flyway mallards in Washington during MWS
0%
10%
20%
30%
40%
50%
60%
92-93
94-95
96-97
98-99
00-01
02-03
04-05
06-07
08-09

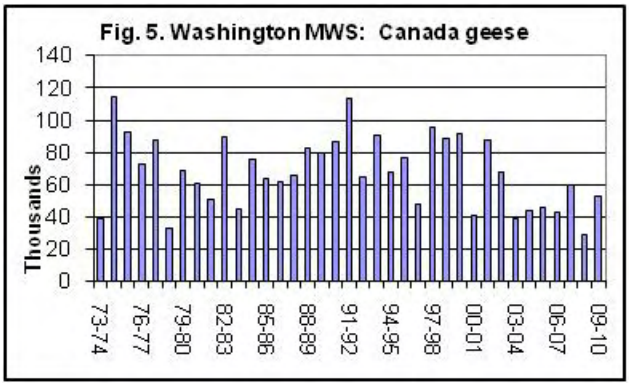


Fig. 5. Washington MWS: Canada geese
Thousands
0
20
40
60
80
100
120
140
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04
06-07
09-10

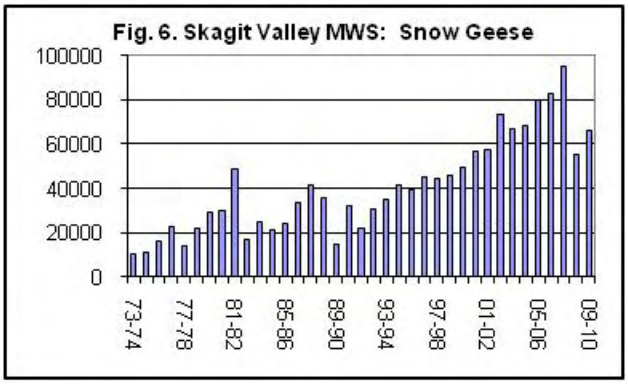


Fig. 6. Skagit Valley MWS: Snow Geese
0
20000
40000
60000
80000
100000
73-74
77-78
81-82
85-86
89-90
93-94
97-98
01-02
05-06
09-10

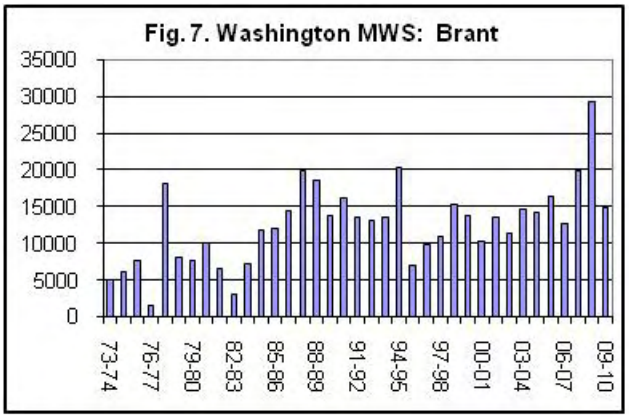


Fig. 7. Washington MWS: Brant
0
5000
10000
15000
20000
25000
30000
35000
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04
06-07
09-10

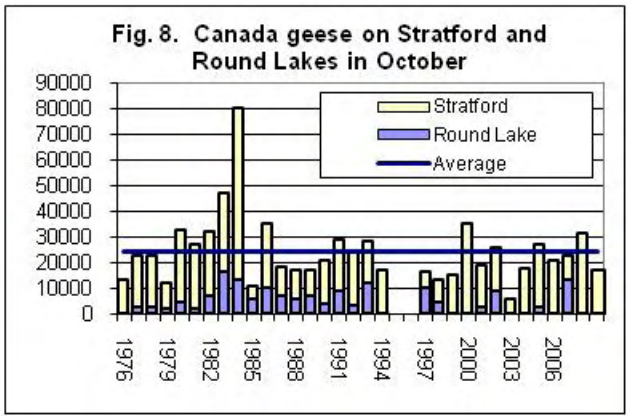
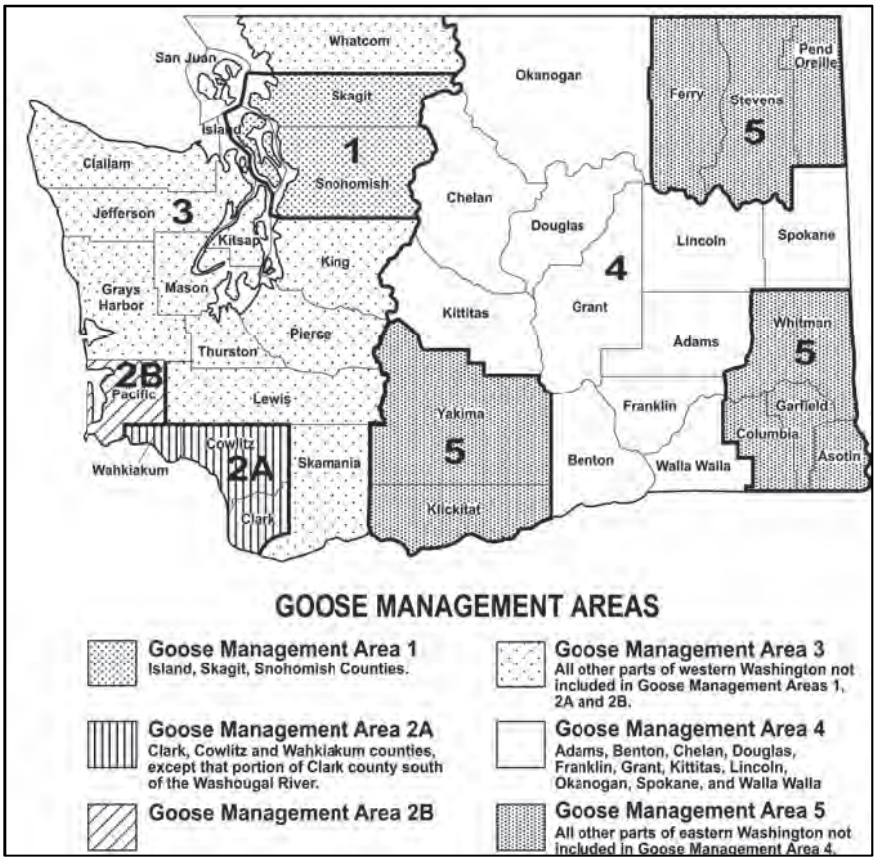


Fig. 8. Canada geese on Stratford and Round Lakes in October
Stratford
Round Lake
Average
0
10000
20000
30000
40000
50000
60000
70000
80000
90000
1976
1979
1982
1985
1988
1991
1994
1997
2000
2003
2006

Figure 9. Washington Goose Management Areas



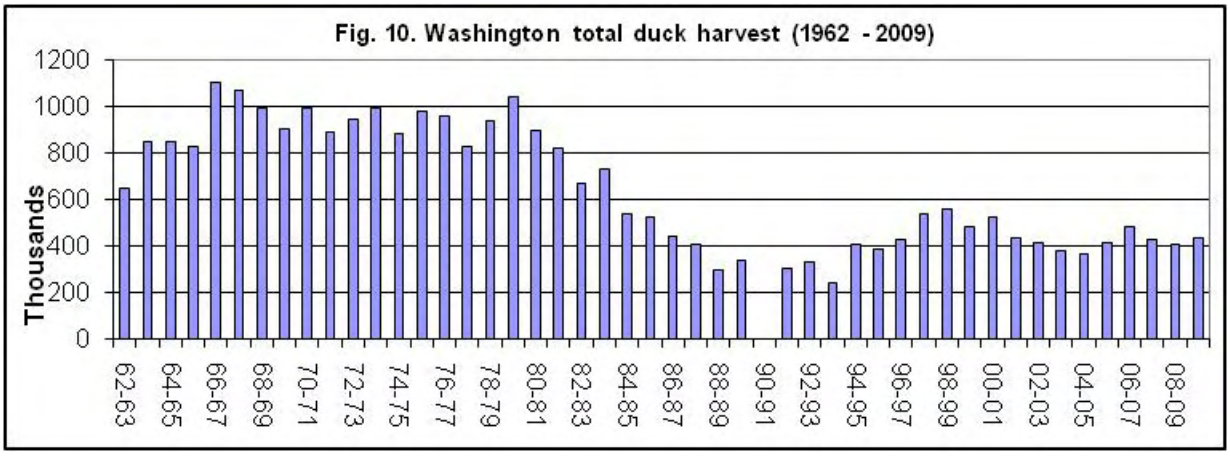
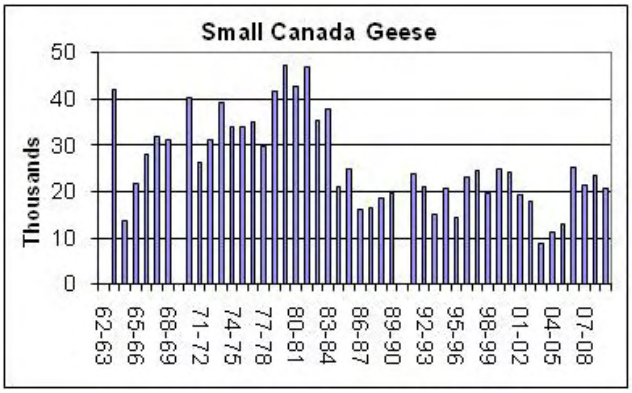


Fig. 11. Washington Canada Goose Harvest



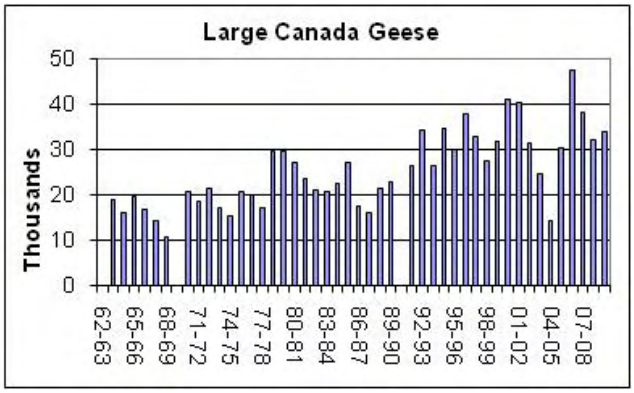


Fig. 12. Waterfowl Harvest by Region

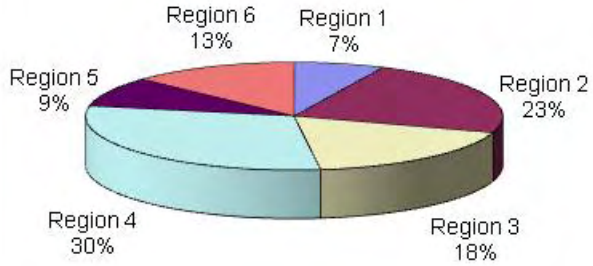


Fig. 13 Sea Duck Harvest (2009-10)

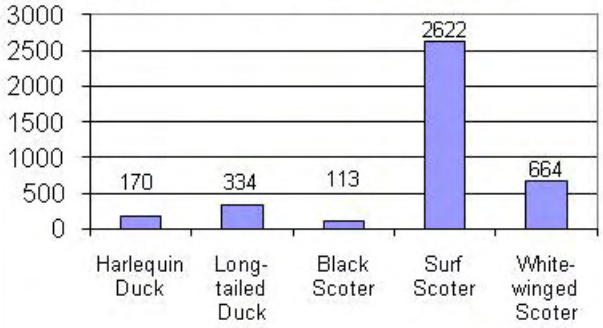


Fig. 14. Washington brant harvest

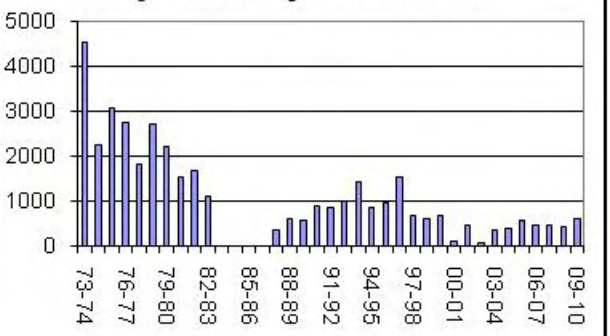


Fig. 15. Skagit snow goose harvest

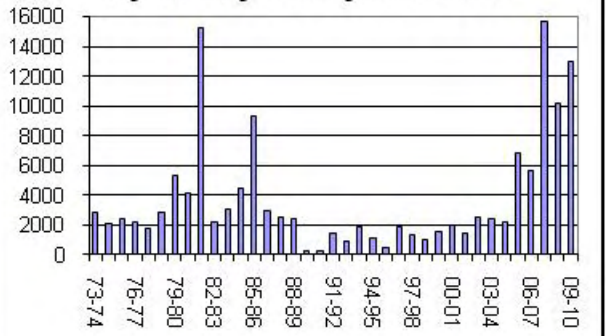
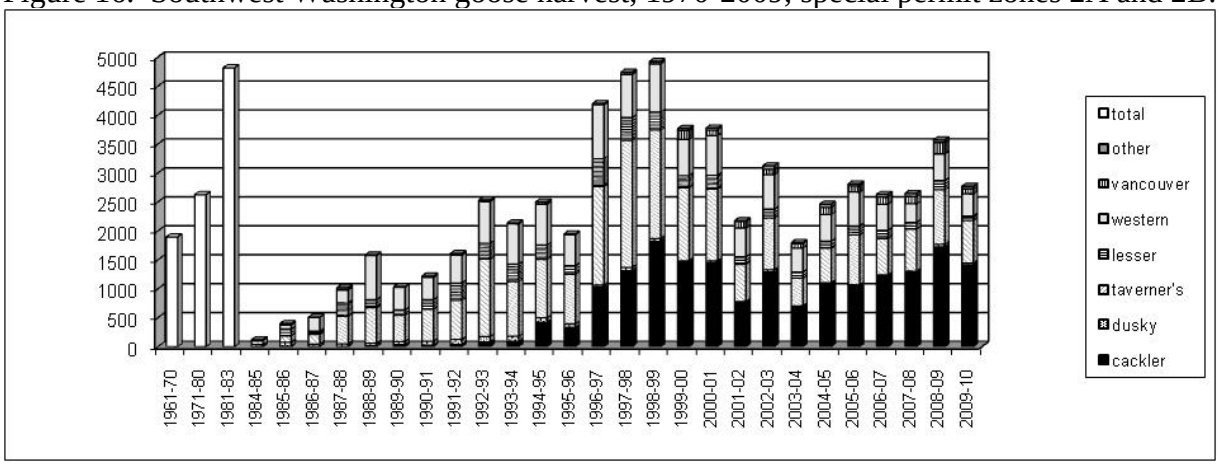
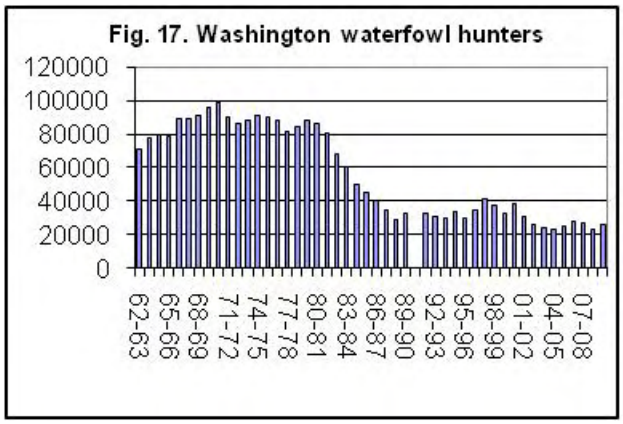


Figure 16. Southwest Washington goose harvest, 1970-2009, special permit zones 2A and 2B.





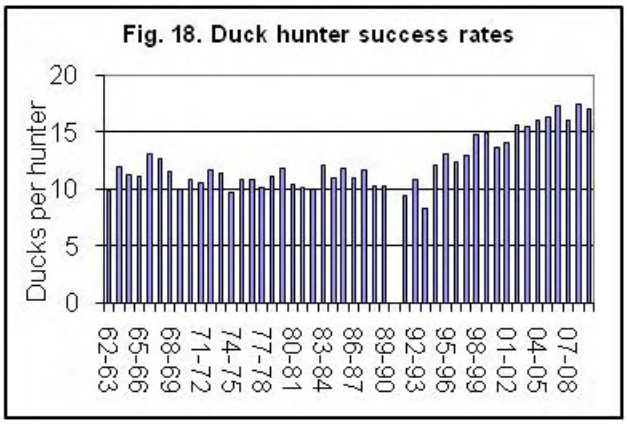


Figure 19. The waterfowl regulated access program promotes quality hunting opportunities by reducing hunting pressure.

TABLE 1. WASHINGTON DEPARTMENT OF FISH AND WILDLIFE ANNUAL WATERFOWL SURVEY - JANUARY 2010

SPECIES	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	10 vs. 09	00-09 avg	10 vs. avg
Mallard	442811	356830	348841	325459	432570	470186	374881	494597	313871	254655	405604	59%	422031	-4%
Gadwall	8043	10571	10595	11391	9252	10904	5780	5314	5854	5324	6877	29%	8991	-24%
Wigeon	112926	133465	124301	113838	151981	195798	170491	90734	89614	207236	126059	-39%	151644	-17%
Green-winged Teal	11089	6098	13695	8083	14565	33358	29492	30947	15506	15175	11554	-24%	18956	-39%
B.W. & Cinn. Teal	0	0	484	57	11	4	5	272	2	12	20	67%	87	-77%
Shoveler	3036	1358	1852	5801	3445	2553	4130	8763	2210	2671	2474	-7%	3829	-35%
Pintail	70040	75597	72106	57465	49567	117296	94327	113949	45848	117235	40787	-65%	85422	-52%
Wood Duck	84	206	356	59	132	472	173	99	378	309	1406	355%	367	283%
Redhead	1505	27918	11353	6867	2621	4795	13026	3645	2443	4668	3550	-24%	8239	-57%
Canvasback	2898	6020	3272	2131	3350	2929	2504	1501	3790	3239	3789	17%	3542	7%
Scaup	26933	28833	31970	41832	40744	34884	52519	29711	35052	40306	43003	7%	40579	6%
Ringneck	7488	6386	7306	6457	4583	8358	8507	12642	16568	19740	8763	-56%	10680	-18%
Goldeneye	13157	17177	15711	20098	14035	15941	19184	13973	15106	15976	14578	-9%	17494	-17%
Bufflehead	18017	20647	20266	26426	20009	23293	21857	17511	21230	25510	21609	-15%	23638	-9%
Ruddy Duck	3819	3075	3457	4966	2936	1937	1718	2179	3096	1508	1428	-5%	3012	-53%
Scoter	20326	15932	16597	14125	15876	16753	18265	15307	16742	12585	10445	-17%	17295	-40%
Oldsquaw	450	559	423	573	478	654	927	804	504	547	439	-20%	636	-31%
Harlequin	843	603	653	797	963	793	1015	733	902	670	839	25%	881	-5%
Merganser	7762	9535	10564	12325	10495	10202	8355	7443	6377	6523	7894	21%	9748	-19%
Unidentified Ducks	2577	1539	1606	3552	2660	5869	7458	4731	2515	9981	13440	35%	5593	140%
Snow Goose*	48843	47743	55480	73363	66801	47111	80060	75141	82583	55016	66176	20%	69832	-5%
White-fronted Goose	3	34	21	2	5	27	17	82	42	119	22	-82%	37	-41%
Canada Goose	91229	41351	88092	67941	39301	43908	45857	42759	60173	28629	53259	86%	60246	-12%
Brant	13859	10197	13478	11455	14544	14286	16305	12712	19775	29243	14895	-49%	17075	-13%
Tundra Swan**	4342	4597	2521	6393	1447	2778	3422	3548	3570	3380	3211	-5%	3921	-18%
Trumpeter Swan**	3896	4047	4562	4263	3996	5508	7904	9104	7747	9852	9457	-4%	7034	34%
Unknown Swan**	402	49	254	168	2432	2381	232	842	292	1100	540	-51%	869	-38%
Coot	62387	74250	80631	91284	91387	105522	119856	72265	69305	101951	84543	-17%	95338	-11%
TOTAL	978769	904617	940447	917171	1000186	1178500	1108267	1071308	841095	973160	956661	-2%	1087014	-12%
*B.C. Snow Geese Skagit/B.C.	879	8675	1770	0	0	1588	2939	0	12276	2495	7788	212%	6040	29%
Total	49722	56418	57250	73363	66801	48699	82999	75141	94859	57511	73964	29%	63752	16%

**Comprehensive western Washington swan surveys in 1989, 1991, 1996, 2001, 2006

Table 2. 2009-10 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.**	**Nov. 5**	**Dec.**	**Jan. 7**
Mallards		94,544		143,782
Total Ducks		141,485		197,533
Total Geese		30,088		12,294
Total Swans		320		65
Total Coots		47,471		56,654
SURVEY TOTAL		216,477		266,546
	No survey		No survey	
South Columbia Basin	**Oct.**	**Nov. 4**	**Dec.**	**Jan. 8**
Mallards		42,150		146,071
Total Ducks		67,809		202,422
Total Geese		33,666		38,465
Total Swans		94		62
Total Coots		18,577		24,106
SURVEY TOTAL		120,146		265,055
	No survey		No survey	
Yakima Basin	**Oct.**	**Nov. 9**	**Dec. 7**	**Jan. 6**
Mallards		5,942	20,553	13,526
Total Ducks		8,935	25,100	15,843
Total Geese		92	1,261	1,205
Total Swans		15	27	31
Total Coots		4	-	20
SURVEY TOTAL		9,061	26,388	17,099
	No survey			
Northern Puget Sound	**Oct.**	**Nov. 12**	**Dec. 2**	**Jan. 7**
Mallards		64,915	108,362	122,105
Northern pintail		56,960	48,815	24,145
American wigeon		31,065	43,076	47,440
Green-winged teal		4,505	18,024	1,415
Brant				
TOTAL DABBLERS		157,355	218,212	194,975
	No survey			

Snow Goose Aerial Photo Counts	**Date**	**Skagit/ Snohomish**	**Fraser**	**Total**	**% Young**
	12/10/09	51,960	27,299	78,989	40%
	1/13/10	66,176	7,788	73,964	

Brant Aerial Surveys	**Date**	**Skagit Co.**	**Whatcom Co.**	**Total**
	1/7/10	6,002	4,382	10,384

Age-ratios obtained from field observations – Northern Puget Sound				
Species	**Date**	**Sample size**	**Juveniles**	**% Young**
Trumpeter Swan	1/13-15/10	9,263	1,408	15.2%
Tundra Swan	1/13-15/10	2,301	357	15.5%

Table 3. Waterfowl hunting season regulation summary 2009-10.

	Area	SEASON DATES (inclusive)	Daily Bag Limit	Possession Limit
DUCKS (except Scaup) (d)	Statewide	Sept. 26-27, 2009 (Youth hunting only) (a)	7 (b)	14 (b)
		Oct. 17-21 and Oct. 24, 2009 – Jan. 31, 2010	7 (b)	14 (b)
Scaup	Statewide	Sept. 26-27, 2009 (Youth hunting only) (a) and Nov. 7 - Jan 31	3	6
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 Mgmt. Areas	Goose Mgmt. Areas 1 & 3	Sept. 10-15, 2009	5 Canada geese	10 Canada geese
	Goose Mgmt. Area 2A	Sept. 10-15, 2009	3 Canada geese	6 Canada geese
	Goose Mgmt. Area 2B	Sept. 1-15, 2009	5 Canada geese	10 Canada geese
	Goose Mgmt. Areas 4 & 5	September season closed	3 Canada geese	6 Canada geese
	Statewide, except Goose Mgmt. Areas 2A & 2B	Sept. 26-27 (Youth hunting only) (a)	4 Canada geese	8 Canada geese
	Goose Mgmt. Area 1 (d)	Oct. 17-29 & Nov. 7, 2009-Jan. 31, 2010, except snow, Ross', or blue geese may be taken Oct. 17, 2009-Jan. 31, 2009.	4	8
	Goose Mgmt. Area 2A (d)	Except Ridgefield NWR: 8am – 4pm, Sat., Sun., & Wed., only, Nov. 14-29 & Dec. 9, 2009-Jan. 31, 2010. Ridgefield NWR: 8am - 4pm, Sat., Tues., and Thurs. only, Nov. 19-28 and Dec. 10, 2009-Jan. 31, 2010, closed Nov. 26, 2009.	4 (c)	8 (c)
	Goose Mgmt. Area 2B (d)	8 a.m. – 4 p.m. Sat. and Wed. only, Oct. 17, 2009-Jan. 16, 2010	4 (c)	8 (c)
	Goose Mgmt. Area 3	Oct. 17-29 and Nov. 7, 2009-Jan. 31, 2010	4	8
	Goose Mgmt. Area 4	Sat., Sun., Wed. only, Oct. 17, 2009-Jan. 24, 2010; Nov. 11, 26, 27, Dec. 25, 28, 29, 31, 2009; Jan. 1, 18, 2010, and every day Jan. 25-31, 2010.	4	8
	Goose Mgmt. Area 5	Oct.17-21, & Oct. 24, 2009-Jan. 31, 2010	4	8
Brant (d,e)	Skagit Co.	Jan. 16, 17, 20, 23, 24, 27, 30, & 31, 2010	2	4
	Pacific Co.	Jan. 9, 10, 12, 14, 16, 17, 19, 21, 23, & 24, 2010	2	4
Swans	Statewide	Closed		

a) **Special youth hunting season** open to hunters under 16 years of age (must be with adult at least 18 years old who is not hunting).

b) **Daily bag limit:** 7 ducks – to include not more than 2 hen mallard, 2 pintail, 3 scaup, 1 canvasback, 2 redhead, 1 harlequin, 4 scoter, and 4 long-tailed duck.
Possession limit: 14 ducks – to include not more than 4 hen mallard, 4 pintail, 6 scaup, 2 canvasback, 4 redhead, 1 harlequin, 8 scoter, and 8 long-tailed duck. Canvasback season closed.
Season limit: 1 harlequin (see sea duck authorization requirement)

c) **Daily bag limit:** 4 geese – to include not more than 1 dusky Canada goose, 2 cackling geese, except not more than 1 Aleutian goose in Pacific County.
Possession limit: 8 geese – to include not more than 1 dusky Canada goose, 4 cackling geese, except not more than 2 Aleutian geese in Pacific County.
Season limit: 1 dusky Canada goose. A dusky Canada goose is definied as a dark-breasted (Munsell 10 YR, 5 or less) Canada goose with a culmen (bill) length of 40-50 mm. A cackling goose is defineid as goose with a culment (bill) length of 32 mm or less)

d) **Written authorization**: required to hunt sea ducks (harlequin, scoter, long-tailed duck) in western Washington, brant and snow geese in Goose Mgmt. Area 1, and Canada geese in Goose Mgmt. Areas 2A and 2B (except for the September goose season).

e) If the pre-season wintering population in Skagit County is below 6,000 (as determined by the January survey) the brant season in Skagit County will be canceled.

Table 4. Significant historical changes in duck hunting regulations.

	Season		Bag Limit		Special Limits		Stamp Fees		Hunting License	Steel shot Regulation
Year	East	West	East	West	Mallard	Pintail	State	Federal		
73-74	100	93	6	5	-	2 extra	-	$5.00	$6.50	-
74-75	100	93	6	5	-	-	-	5.00	6.50	-
75-76	100	93	7	7	-	-	-	5.00	6.50	-
76-77	100	93	7	7	-	-	-	5.00	7.50	-
77-78	100	93	7	7	-	-	-	5.00	7.50	3 zones[1]
78-79	100	93	7	7	-	-	-	5.00	7.50	" "
79-80	100	93	7	7	-	-	-	7.50	7.50	" "
80-81	100	93	7	7	-	-	-	7.50	7.50	1 zone[2]
81-82	100	93	7	7	-	-	-	7.50	7.50	" "
82-83	100	93	7	7	-	-	-	7.50	10.50	" "
83-84	100	93	7	7	-	-	-	7.50	10.50	" "
84-85	100	93	7	7	-	4	-	7.50	10.50	" "
85-86	84	79	5	5	5 (1 ♀)	5 (1 ♀)	-	7.50	12.00	" "
86-87	86	79	5	5	4 (1 ♀)	4 (1 ♀)	5.00	7.50	12.00	Large zones[3]
87-88	86	79	5	5	4 (1 ♀)	4 (1 ♀)	5.00	12.00	12.00	" "
88-89	66	59	4	4	3 (1 ♀)	1	5.00	12.00	12.00	" "
89-80	66	59	4	4	3 (1 ♀)	1	5.00	12.00	12.00	" "
90-91	66	59	4	4	3 (1 ♀)	1	5.00	12.00	12.00	" "
91-92	66	59	4	4	3 (1 ♀)	1	6.00	15.00	15.00	Steel statewide
92-93	66	59	4	4	3 (1 ♀)	1	6.00	15.00	15.00	" "
93-94	66	59	4	4	3 (1 ♀)	1	6.00	15.00	15.00	" "
94-95	76	69	4	4	3 (1 ♀)	1	6.00	15.00	15.00	" "
95-96	100	93	6	6	6 (1 ♀)	2	6.00	15.00	15.00	Bismuth-tin added
96-97	100	93	7	7	7 (1 ♀)	2	6.00	15.00	15.00	" "
97-98	106[5]	106[5]	7	7	7 (2 ♀)	3	6.00	15.00	15.00	Tungsten-iron added
98-99	106[5]	106[5]	7	7	7 (2 ♀)	1	6.00	15.00	15.00	Tungsten-polymer added
99-00	106[5]	106[5]	7	7	7 (2 ♀)	1	6.00	15.00	30.00[4]	Tungsten-matrix added
00-01	105[6]	105[6]	7	7	7 (2 ♀)	1	6.00	15.00	30.00	" "
01-02	105[6]	105[6]	7	7	7 (2 ♀)	1	6.00	15.00	30.00	Tungsten-nickel-iron added
02-03	105[6]	105[6]	7	7	7 (2 ♀)	1[7]	10.00	15.00	30.00	TINT[8] added
03-04	105[6]	105[6]	7	7	7 (2 ♀)	1[9]	10.00	15.00	30.00	" "
04-05	105[6]	105[6]	7	7	7 (2 ♀)	1[10]	10.00	15.00	30.00	Tungsten-bronze,and tungsten-tin-bismuth added
05-06	105[6]	105[6]	7	7	7 (2 ♀)	1	10.00	15.00	30.00	" "
06-07	105[6]	105[6]	7	7	7 (2 ♀)	1	10.00	15.00	30.00	Tungsten-iron-copper-nickel, tungsten-tin-iron added
07-08	105[6]	105[6]	7	7	7 (2 ♀)	1	10.00	15.00	30.00	Tungsten-tin-iron-nickel added
08-09	105[6]	105[6]	7	7	7 (2 ♀)	1	10.00	15.00	30.00	
09-10	105[6]	105[6]	7	7	7 (2 ♀)	2	12.00	15.00	36.00	

[1]Non-toxic shot zones were established at Barney Lake, Skagit Bay, and the Columbia River flood plain.
[2]Only Barney Lake was retained as a non-toxic shot zone.
[3]Steel shot in progressively larger zones from 86-87 through 91-92 when steel shot was required statewide.
[4]New small game license format.
[5]Youth hunt one additional day
[6] Youth hunt two additional days
[7]pintail season limited to 62 days (Sept. 21-22; Oct.5-11; Oct 26-Dec. 17)
[8]tungsten-iron-nickel-tin shot
[9] pintail season limited to 62 days (Sept. 20-21; Oct. 11-15, Dec. 2-Jan. 25)
[10]pintail season limited to 62 days (Sept. 18-19; Oct. 16-20; Dec. 7-Jan. 30)

Table 5. History of Southwest Washington Canada Goose Season Regulations

Year	Season	ID Class	Quota	Scheduled Dates (# days)	Closure (# Days Hunted / Sched.)
<1984	Regular	No	No	mid-Oct. to mid-Jan.	None (93)
1984-85	Regular	No	No	Nov. 17-Dec. 16 (30)	Dec. 4 (18/30)
1985-86	Regular	All	40	Nov. 17-Dec. 29 (43)	Nov. 22 (6/43)
1986-87	Regular	All	90	Nov. 15-Jan. 4 (15)	No (15/15)
1987-88	Regular	All	90	Nov. 14-Jan. 10 (17)	No (17/17)
1988-89	Regular	New	90	Nov. 13-Jan. 7 (16)	No (16/16)
1989-90	Regular	New	45	Nov. 26-Jan. 13 (8)	Jan. 2 (6/8)
1990-91	Regular	All	45	Nov. 25-Jan. 12 (8)	Dec. 27 (5/8)
1991-92	Regular	New	90	Nov. 23-Jan. 11 (15)	CC(4/15),RF(11/15),PW(15/15)*
1992-93	Regular	New	90	Nov. 29-Jan. 16 (15-23)	CSC(6/15),RF(8/15), PWNC(23/23)*
1993-94	Regular	New	90	Nov. 27-Jan. 23 (17-25)	CSC(8/17),RF(11/17), PWNC(23/25)*
1994-95	Regular	New	90	Nov. 26-Jan. 22 (16-24)	CSC(8/16),RF(12/16), PWNC(24/24)*
1995-96	Regular	New	67	Nov. 25-Jan. 21 (8-21)	C(8/16),SC(2/9),RF(5/8), P(5/21),WNC(21/21)*
	Late	New	5	Feb. 5-Mar. 10 (12) – CSC only	No (12/12)
1996-97	Regular	All	67	Nov. 23-Jan. 19 (23-25)	C(25/25),SC(25/25),RF(19/25), P(23/23),WNC(23/23)*
	Late	All	5	Feb. 5-Mar. 10 (15)	No (15/15)
1997-98	Regular	New	80	Nov. 22-Jan. 17 (25)	No (all zones 25/25)
	Late	New	5	Jan. 24-Mar. 9 (20)	No (20/20)
1998-99	Regular	New	80	Nov. 25-Jan. 17 (37)	RF (32/37)*, Others (37/37)
	Late	New	5	Jan. 23-Mar. 10 (22)	No (22/22)
1999-00	Regular	New	80	Nov. 24-Jan. 16 (38)	No (38/38)
	Late	New	5	Jan. 22-Mar. 10 (21)	No (21/21)
2000-01	Regular	New	80	Nov. 22-Jan. 14 (21-29)	RF (9/21)*, Others (29/29)
	Late	New	5	Jan. 20-Mar. 10 (23)	No (23/23)
2001-02	Regular	New	80	2A: Nov. 21-Jan. 13 (23-29) 2B: Nov. 10-Dec. 30 (23)	2A: RF (12/23)*, Others (29/29) 2B: No (23/23)
	Late	New	5	Jan. 19-Mar. 10 (23) – 2A* only	No (23/23)

* 2A=Clark, Cowlitz, Wahkiakum; 2B=Grays Harbor, Pacific; C=Clark Private; CC=Clark-Cowlitz Private Lands; CSC=Clark/S. Cowlitz Private Lands; P=Pacific; WNC=Wahkiakum/N. Cowlitz; PW=Pacific-Wahkiakum; PWNC=Pacific/Wahkiakum/N. Cowlitz; RF=Ridgefield; SC=S. Cowlitz

Table 5. History of Southwest Washington Canada Goose Season Regulations (continued)

Year	Season	ID Class	Quota	Scheduled Dates (# days)	Closure (# Days Hunted / Sched.)
2002-03	Regular	New	80	2A: Nov. 27-Jan. 26 (25-27) 2B: Nov. 9-Dec. 29 (23)	2A: RF (9/25)*, Others (27/27) 2B: No (23/23)
	Late	New	5	Feb. 1-Mar. 9 (17) – 2A* only	No (17/17)
2003-04	Regular	New	80	2A: Dec. 9-Jan. 24 (19) 2B: Nov. 15-Jan. 4 (15)	2A: RF (9/19)*, Others (19/19) 2B: No (15/15)
	Late	New	5	Jan. 31- Mar. 10 (12) – 2A* only	No (12/12)
2004-05	Regular	New	80	2A: Nov. 27-Jan. 22 (15, RF 25) 2B: Oct. 16-Jan. 15 (14)	2A: No (15/15, RF 25/25) 2B: No (14/14)
	Late	New	5	Feb. 5 - Mar. 9 (10) – 2A* only	No (10/10)
2005-06	Regular	New	80	2A: Nov. 12-27, Dec. 7-Jan. 29 (30, RF 25) 2B: Oct. 15-Jan. 14 (27)	2A: No (30/30, RF 25/25) 2B: No (27/27)
	Late	New	5	Feb. 5 - Mar. 9 (10) – 2A* only	No (10/10)
2006-07	Regular	New	80	2A: Nov. 11-26, Dec. 6-Jan. 28 (32, RF 25) P: Oct. 15-Jan. 14 (27)	2A: No (32/32, RF 25/25) P: No (27/27)
	Late	New	5	Feb. 3 - Mar. 7 (10) – 2A* only	No (10/10)
2007-08	Regular	New	80	2A: Nov. 10-25, Dec. 5-Jan. 27 (32, RF 25) P: Oct. 13-Jan. 12 (27)	2A: No (32/32, RF 25/25) P: No (27/27)
	Late	New	5	Feb. 2 - Mar. 5 (10) – 2A* only	No (10/10)
2008-09	Regular	New	80	2A: Nov. 8-23, Dec. 3-Jan. 25 (32, RF 26) P: Oct. 11–Jan. 10 (27)	2A: No (32/32, RF 26/26) P: No (27/27)
	Late	New	5	Feb. 7 – Mar. 7 (9)	No (9/9)
2009-10	Regular	New		2A: Nov. 14-20, Dec. 9-Jan. 31 (31, RF 28)	2A: No (31/31, RF 28/28)
	Late	New		Feb. 6 – Mar. 10 (10)	No (10/10)

* 2A=Clark, Cowlitz, Wahkiakum; 2B=Grays Harbor, Pacific; C=Clark Private; CC=Clark-Cowlitz Private Lands; CSC=Clark/S. Cowlitz Private Lands; P=Pacific; WNC=Wahkiakum/N. Cowlitz; PW=Pacific-Wahkiakum; PWNC=Pacific/Wahkiakum/N. Cowlitz; RF=Ridgefield; SC=S. Cowlitz

Table 6. Waterfowl harvest by species in Washington (2009-10)[1]

Species	Harvested	Composition
Mallard	220,477	51.9%
Northern pintail	25,136	5.9%
American wigeon	64,986	15.3%
Green-winged teal	48,815	11.5%
Other ducks	65,727	15.5%
Total ducks	438,338	
Large Canada	34,075	51.2%
Small Canada	20,546	30.9%
White-fronted	286	0.04%
Snow	10,919	16.4%
Brant	702	1.1%
Total geese	70,514	
Total waterfowl	508,852	

[1]The number of each species harvested is estimated from the Daily Waterfowl Harvest Report Card Survey. The total number of ducks and geese harvested is estimated from the more extensive Small Game Harvest Questionnaire.

Table 7. Waterfowl harvest by region (2009-10)

Regions	Ducks Harvested	% of State Total Ducks Harvested	Geese Harvested	% of State Total Geese Harvested
Region 1	31,033	7.1%	8,589	12.2%
Region 2	100,307	22.9%	21,955	31.1%
Region 3	79,547	18.1%	15,964	22.6%
Region 4	132,559	30.2%	13,282	18.8%
Region 5	39,526	9.0%	5,035	7.1%
Region 6	55,366	12.6%	5,689	8.1%

Table 8. Sea duck harvest, 2009-10[1].

Species	Harvested	Composition
Harlequin duck	170	4.4%
Long-tailed duck	334	8.6%
Black scoter	113	2.9%
Surf scoter	2,622	67.2%
White-winged scoter	664	17.0%
ALL SCOTERS	3,399	87.1%
TOTAL	3,903	

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

Table 9. Brant harvest report summary[1]

WASHINGTON BRANT HUNTING AUTHORIZATION: HARVEST REPORT SUMMARY						SKAGIT CO. HARVEST	WHATCOM CO. HARVEST	PACIFIC CO. HARVEST	TOTAL HARVEST
YEAR	MONTH	PERMITS ISSUED	SUCCESSFUL HUNTERS	HUNTER DAYS	SEASON DAYS				
1990	DEC	490	338	763	11	808	0	73	881
1991	DEC	654	330	647	11	790	3	52	845
1992	DEC	747	319	709	11	950	9	18	977
1993	DEC	1194	496	765	11	1347	7	53	1407
1994	DEC	1069	287	484	9	825	0	23	848
1995	DEC	1207	343	552	11	918	0	44	962
1996	DEC	1445	254	549	11	1493	0	41	1534
1997	JAN	1331	197	326	5	597	0	59	656
1998	JAN	1348	243	350	5	570	0	18	588
1999	JAN	1336	218	386	9	581	0	86	667
2000	JAN	1295	39	59	5*	0	0	108	108
2001	NOV				5	56	0	20	76
2001	JAN				5	347	0	17	364
2001	ALL	1436	187	277	10	403	0	37	440
2002	NOV				5	18	0	9	27
2002	JAN				5*	0	0	33	33
2002	ALL	1387	27	277	10	18	0	42	60
2003	NOV				5	22	0	13	35
2003	JAN				5	235	0	64	299
2003	ALL	1187	152	200	10	257	0	77	334
2004	NOV				5	36	0	11	47
2004	JAN				5	308	0	34	342
2004	ALL	1612	126	209	10	344	0	45	389
2005	JAN	1707	220	336	5	504	0	53	557
2006	JAN	1793	199	272	7	367	0	74	441
2007	JAN	1795	166	243	7	341	0	112	453
2008	JAN	2116	191	262	7	328	0	81	409
2009	JAN	1681	232	510	8	545	0	31	576

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

Table 10. Snow goose harvest report summary[1]

WASHINGTON SNOW GOOSE HUNTING AUTHORIZATION: HARVEST REPORT SUMMARY				ISLAND CO.	SKAGIT CO.	SNOHOMISH CO.	TOTAL
YEAR	PERMITS ISSUED	SUCCESSFUL HUNTERS	DAYS HUNTED[2]	HARVEST[3]	HARVEST[3]	HARVEST[3]	HARVEST[3]
1993	2298	572	1096	58	677	1124	1859
1994	2588	433	664	60	496	522	1078
1995	2313	221	373	57	99	331	487
1996	2363	427	996	39	381	1400	1820
1997	2795	424	812	38	545	749	1332
1998	3086	341	585	29	678	262	969
1999	3061	445	777	71	815	598	1484
2000	3076	460	1039	18	1058	919	1995
2001	3144	407	953	4	753	696	1453
2002	3196	442	1217	18	1419	1084	2522
2003	3013	530	1155	20	1465	889	2374
2004	3333	474	1075	37	1267	893	2160
2005	3546	895	2665	50	4588	2154	6792
2006	4068	1061	2566	7	3780	1876	5663
2007	4859	1662	5528	53	11462	4175	15690
2008	5583	1253	2912	117	6295	3743	10155
2009	4015	1370	9840	8	9979	2959	12946

[1]These figures are based on analysis of mandatory report returns, corrected for non-response bias, unadjusted for wounding loss
[2]Days hunted estimate from 1993-2008 included successful hunters only
[3]Harvest estimates do not include estimated wounding loss

Table 11. Southwest Washington Canada goose harvest summary

Season	Period	Aleutian	Cackler	Dusky	Lesser	Taverner	Vancouver	Western	Other	Total CAGO
1961-70	10 Year Average									1894
1971-80	10 Year Average									2624
1981-83	3 Year Average									4814
1984-85	Season Total		0	37	0	63	0	20	0	120
1985-86	Season Total		11	66	116	113	0	67	25	398
1986-87	Season Total		8	36	51	172	0	241	0	508
1987-88	Season Total		7	45	225	478	4	224	35	1018
1988-89	Season Total		17	43	136	617	0	763	7	1583
1989-90	Season Total		37	52	92	455	9	391	0	1036
1990-91	Season Total		28	65	165	555	20	383	3	1219
1991-92	Season Total		39	88	295	675	14	483	15	1609
1992-93	Season Total		84	91	270	1340	25	722	2	2534
1993-94	Season Total		93	90	299	944	8	697	4	2135
1994-95	Season Total		422	77	246	1011	31	704	6	2497
1995-96	Regular Season		321	57	134	787	12	515	1	1827
	Late Season		13	2	10	75	0	21	0	121
1995-96	Season Total		334	59	144	862	12	536	1	1948
1996-97	Regular Season		1001	32	327	1678	9	808	2	3857
	Late Season		29	3	148	27	9	124	1	341
1996-97	Season Total		1030	35	475	1705	18	932	3	4198
1997-98	Regular Season		1158	56	376	2042	31	672	5	4340
	Late Season		153	2	16	155	2	70	0	398
1997-98	Season Total		1311	58	392	2197	33	742	5	4738
1998-99	Regular Season		1588	44	292	1736	28	724	9	4421
	Late Season		232	2	14	141	6	109	0	504
1998-99	Season Total		1820	46	306	1877	34	833	9	4925
1999-00	Regular Season		1255	24	205	1150	140	540	32	3346
	Late Season		200	3	4	115	15	83	1	421
1999-00	Season Total		1455	27	209	1265	155	623	33	3767
2000-01	Regular Season		1310	30	130	1236	82	583	34	3405
	Late Season		140	2	105	6	13	104	1	371
2000-01	Season Total		1450	32	235	1242	95	687	35	3776
2001-02	Regular Season		664	22	130	601	87	430	11	1945
	Late Season		94	1	0	43	25	66	0	229
2001-02	Season Total		758	23	130	644	112	496	11	2174
2002-03	Regular Season		1183	37	152	836	88	551	60	2907
	Late Season		108	1	1	60	5	40	1	216
2002-03	Season Total		1291	38	153	896	93	591	61	3123
2003-04	Regular Season		598	24	102	470	73	372	19	1658
	Late Season		76	4	2	13	5	41	0	141
2003-04	Season Total		674	28	104	483	78	413	19	1799
2004-05	Regular Season		989	25	123	576	105	424	49	2291
	Late Season		90	0	0	21	17	37	4	169
2004-05	Season Total		1079	25	123	597	122	461	53	2460
2005-06	Regular Season		948	30	155	823	106	558	28	2648
	Late Season		89	1	2	40	2	26	4	164
2005-06	Season Total		1037	31	157	863	108	584	32	2812
2006-07	Regular Season	8	1085	26	141	580	110	410	44	2404
	Late Season		127	1	2	48	14	40	1	233
2006-07	Season Total	8	1212	27	143	628	124	450	45	2637
2007-08	Regular Season	2	1160	21	108	684	113	292	49	2429
	Late Season		122	1	5	45	12	31	2	218
2007-08	Season Total	2	1282	22	113	729	125	323	51	2647
2008-09	Regular Season	4	1636	43	154	887	195	406	41	3366
	Late Season		87	2	4	59	3	52	0	207
2008-09	Season Total	4	1723	45	158	946	198	458	41	3573
2009-10	Regular Season	13	1301	28	73	706	75	358	41	2595
	Late Season		111	4	3	30	12	25	1	186
2009-10	Season Total	13	1412	32	76	736	87	383	42	2781

Wild Turkey

WILD TURKEY STATUS AND TREND REPORT:

STATEWIDE

MICK COPE, Upland Game Section Manager

Population objectives and guidelines

Turkeys were introduced in Washington over 70 years ago. Population augmentation in the 1980's and 1990's resulted in increased distribution (Figure 1) and increased hunting and wildlife viewing recreation.

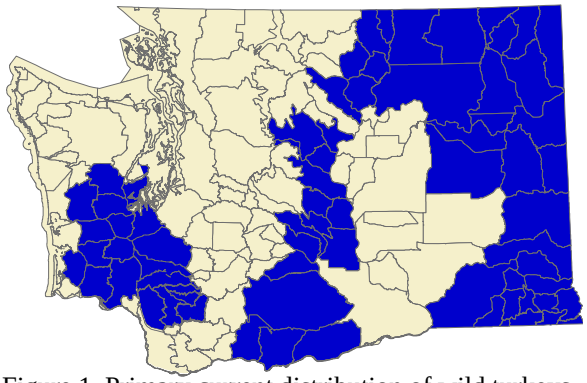


Figure 1. Primary current distribution of wild turkeys in Washington based on Game Management Units.

Very few translocation activities have occurred in recent years. As outlined in the WDFW management plans, trapping and translocation is used as a response to damage and nuisance complaints, however, none occurred during the 2009 reporting period.

In January 2006, the Department adopted a statewide turkey management plan. Population management strategies are included in the plan.

Hunting seasons and harvest trends

Estimated harvest of wild turkeys is based on analysis of mandatory hunter reporting of turkey tags. Hunters must report all turkey tags, even if they didn't go hunting. Successful hunters are supposed to submit a harvest report with date, location, sex, and age of harvested birds. This mandatory reporting system has produced more accurate estimates of harvest and hunter participation than those estimates made in the past.

Hunting seasons for wild turkeys have varied from a 2-day, fall season in 1965 to the current 31-day spring season with additional fall season opportunities.

Beginning in 2004, GMUs 105-124 had a weeklong general early fall season instead of permit-based hunting. In 2005, this was extended to 2 weeks, and in 2006, GMU 101 was included. In 2008, the early fall seasons in GMUs 105-124 were changed to "beardless turkeys only" with the intent to decrease the fall season male harvest. This strategy was successful as male turkey harvest decreased from approximately 55% to less than 20% in the target area.

In 2009, the early fall general season was extended to Mica Peak (GMU 127), Roosevelt (GMU 133), and Blue Mountains Game Management Units (GMUs 145, 149-16, and 172-186). Klickitat County (GMUs 382, 388, 568-578) remained permit only hunting.

In 2006 a late fall permit hunt (November 20-December 15) in NE Washington was also added for GMUs 101-124. This permit hunt was changed to a general season hunt in 2009 because hunting pressure did not exceed management goals for that population. In 2008 a late fall permit hunt was added for Game Management Units in Okanogan County (218-231 and 242). All late fall seasons are either sex.

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. In 2005, regulations changed to allow hunters to take two turkeys in one day in areas that allowed harvest of two spring turkeys.

Turkey hunting is open to shotgun and archery hunting during the spring and fall seasons. Dogs, baiting, electronic decoys, and electronic calls are not legal in Washington. Non-electronic decoys are legal. In 2006, the Fish and Wildlife Commission adopted a regulation permitting falconers to hunt

turkeys during the fall and winter. 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.

Records show that prior to turkey augmentation activity in the late 1980s, turkey hunter numbers fell to a low of 428 (1987) and turkey harvest averaged 65-birds per year (1983-1987). In 2009, a total of 15,709 people hunted turkeys, taking a total of 5,299 turkeys during the spring and fall seasons combined. Turkey harvest in 2009 was higher than 2008 and also higher than the most recent 10 year average. (Figure 2).

Game Management Units are grouped to define turkey populations into Population Management Units (PMUs). Washington State is divided into 7 PMUs: Northeast (P10), Southeast (P15), North Central (P20), South Central (P30), Klickitat (P35), Northwest (P40), and Southwest (P50) (Table 1).

Table 1. Game Management Units included in each Population Management Unit.

PMU	GMUs Included
P10	101-136
P15	139-186
P20	All 200 GMUs
P30	All 300 GMUs EXCEPT GMU 382
P35	GMUs 382,388,578,574,572,568
P40	All 400 GMUs PLUS GMUs 601-627
P50	All 500 GMUs EXCEPT 568-588 PLUS GMUs 633-681

In 2009, spring turkey harvest increased from 2008 in every PMU other than PMU P20 where harvest was basically unchanged (Figure 3). Hunters showed the largest increases in harvest in P15 (Blue Mountains), P 30 (south-central), and P35 (Klickitat).

Surveys

Between 2004 and 2009 the Colville District carried out pilot an annual winter survey of wild turkeys in northeastern Washington (PMU P10). The primary objective of this survey was to initiate the development of an annual harvest-independent population index for wild turkeys as called for in the agency Game Management Plan. The pilot project tested methodology, including using volunteers to help collect data. A corollary benefit has been that district biologists gained valuable experience from running a few of transects, which contributed to knowledge of local turkey range, movements, habitat availability, and usage.

District wildlife biologists ran three replicate counts on the most productive established transects during the December 15, – January 31 time period recommended in the summary report from the pilot project. The timing of the routes worked well for observing turkey flocks and usually a volunteer accompanied as a second observer and recorder.

Population Status and Trend

Using a combination of winter survey results and harvest estimates in P10 we can show that turkey numbers in P10 are likely down compared to the early 2000's. However, harvest trend information shows a slight increase in population from 2008.

Based on harvest trends (Table 2, Figure 3), the Blue Mountains population has expanded substantially over the past 10 years. The Blue Mountain foothills seem to provide excellent habitat conditions for Rio Grande turkeys as does the northern half of Lincoln County, which is in P10.

Turkey populations in Region 1 reached some level of population stability between 2000 and 2007, suffered a high winter kill in 2008, and recovered somewhat in 2009 (Figure 3, Table 2). Generally, available habitats in this region are occupied.

The turkey population in Chelan County and northeastern Kittitas County may be stabilizing based on counts of turkeys at winter concentration areas and trends in gobbler harvest during the spring season. While the harvest trends indicate some stability, local hunters continue to report concern over decreasing populations.

The turkey population in Okanogan County has been increasing in recent years, especially evident in areas where housing is increasing. Additional fall hunting opportunity will continue be available to permit holders.

Turkey harvest in PMU P35 peaked in 2007 with an all-time high spring harvest of 487 turkeys. Turkey harvest in 2008 returned to an average level at 370, but increased once again in 2009 (Table 2, Figure 3). These units provide the best habitat in Southwest Washington and make up the majority of turkey

Table 2. Estimated spring turkey harvest in each turkey Population Management Unit (PMU) 1996-2009.

PMU	1999	2000	2001*	2002	2003	2004	2005	2006	2007	2008	2009
P10	1098	1176	2382	3418	3333	3401	3445	3571	3660	2677	2870
P15	267	214	376	533	443	471	480	730	605	578	757
P20	21	32	78	119	176	209	215	220	258	232	228
P30	1	10	73	105	123	178	182	169	221	172	245
P35	183	134	190	300	329	301	345	362	487	370	447
P40	0	1	2	7	9	15	10	8	9	3	5
P50	46	48	47	54	52	54	53	77	62	50	65
Total:	***1616***	***1615***	***3148***	***4536***	***4465***	***4629***	***4730***	**5137**	**5302**	***4082***	***4617***

* = first year of mandatory reporting system

harvest in Region 5. Recent harvest trends indicate a healthy turkey population in this part of the region.

Determining population trends for the wild turkey population in PMU P50 is difficult. Sightings of wild turkey continue to be reported in locations away from release sites. In addition, turkeys continue to be harvested throughout the season. The 2009 harvest was similar to the 10-year average for the PMU (Table 2, Figure 3). These factors, considered together, suggest wild turkeys may be reproducing at low levels and perhaps maintaining a viable population in PMU P50.

Habitat condition and trend

Most of the turkey range in Region 1 is in close proximity to agricultural lands that provide abundant food in the form of waste grain as well as some berries and fruits through winter months. The Blue Mountains area provides good habitat for the Rio Grande subspecies. Stevens, Pend Oreille, Ferry, and northern Spokane counties contain excellent habitat for the Merriam's subspecies.

Ponderosa pine nuts are probably the most important winter food source for 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 limit population expansion.

Most of P30 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 and feeding is probably why the most recent transplants have been successful.

Winter conditions in Klickitat County (PMU P35) can impact the resident turkey population. Severe weather in 1996 impacted turkey harvest in 1997 and 1998. Mild winters since 1996 have improved the turkey population and hunting has improved to current levels. Winter conditions during 2004-2008 were moderate and no impacts were seen to the resident turkey population.

Although we do not specifically survey habitat conditions related to turkeys in Region 6, conditions should continue to be adequate, as there were no major changes in habitat management or weather conditions that would have changed turkey survival.

Augmentation and habitat enhancement

There were no new releases of turkeys in any PMU across the state in 2009. The 2005-2009 Wild Turkey Management Plan identified a potential introduction area in Skagit and Whatcom counties. Potential release sites were identified and an extensive evaluation of the preferred site (near Van Zandt Dike) was conducted using the process outlined in the management plan. In addition to a habitat evaluation and investigation of potential inter-specific conflicts, several public meetings were held near the potential release site. As a result of this thorough process, WDFW decided not to introduce wild turkeys into the preferred release site. While the evaluation did not identify negative biological

impacts to species or habitats of concern, it did identify other concerns related to potential negative economic impacts to local farming operations as well as substantial opposition from landowners and others living and working in the area surrounding the potential release site.

While WDFW did not think that an introduced turkey population in Whatcom County would ever reach the same level as those found in northeastern Washington, the concerns raised were substantial enough that moving ahead with an introduction was not an appropriate action at this time.

Habitat enhancement priorities are identified in the Wild Turkey Management Plan and the Game Management Plan. Of special interest are habitat improvements that increase habitat values for a variety of wildlife species in addition to turkeys. The Klickitat Oak Habitat Initiative began in May, 2009 focusing on improving oak stand health and understory habitat improvement on the Klickitat Wildlife Area and surrounding lands in Klickitat County.

During the last several years in Chelan County, the U.S. Forest Service and the Washington State Department of Natural Resources have thinned forests near communities to reduce the spread of wildfire. This thinning should enhance habitat for turkeys by opening the understory to increased light, which will increase forage for turkeys.

Management conclusions

Once again, PMU-10 and PMU-15 hunters experienced the highest success rates in the state with 39% and 40% harvest success respectively. Management decisions will focus on retaining good hunter success in this area while also addressing nuisance issues.

Habitat enhancement activities for wild turkeys will continue to focus on winter food enhancements, likely increasing available grain, clovers, fruiting shrubs, and mast producing trees. The Klickitat Oak Habitat Initiative will continue to strive to improve winter habitat for turkeys and other oak dependent species in PMU 35

Spokane County has seen an increase of turkeys despite the suburban nature of the area. Turkey nuisance complaints are being received from areas within PMU P10 as well as a few reports from north-central and western Washington. Additional hunting opportunities were created in the Spokane County area to help address these nuisance complaints.

The turkey population in Chelan County is expected to gradually increase through natural production until it reaches the long-term carrying capacity of the habitat. The population will likely fluctuate due to wet springs, dry summers, or harsh winter conditions. The population of turkeys in south-central Okanogan County appears to be stable or increasing following several mild winters. While no changes in the harvest are recommended at this time in Chelan County.

Nuisance problems caused by turkeys are escalating in the Methow and Okanogan watersheds of Okanogan County. Expansion of turkeys in the Methow area has been exacerbated by illegal releases of domestic turkeys. These birds end up as problem animals, particularly in winter when little natural forage is available. A fall season has been created for the Methow watershed to reduce nuisance conflicts with turkeys.

In 1994, regulations were changed to allow the harvest of up to 3 turkeys per year. Harvest and hunter participation projections are now based on reports received from hunters who are reporting their hunting activity in compliance with the mandatory hunter-reporting requirement. Future estimates will also be made using these data.

Between 1998 and 2000, WDFW released over 600 eastern wild turkeys in PMU P50 (southwestern Washington). There are no plans for further translocations in the near future.

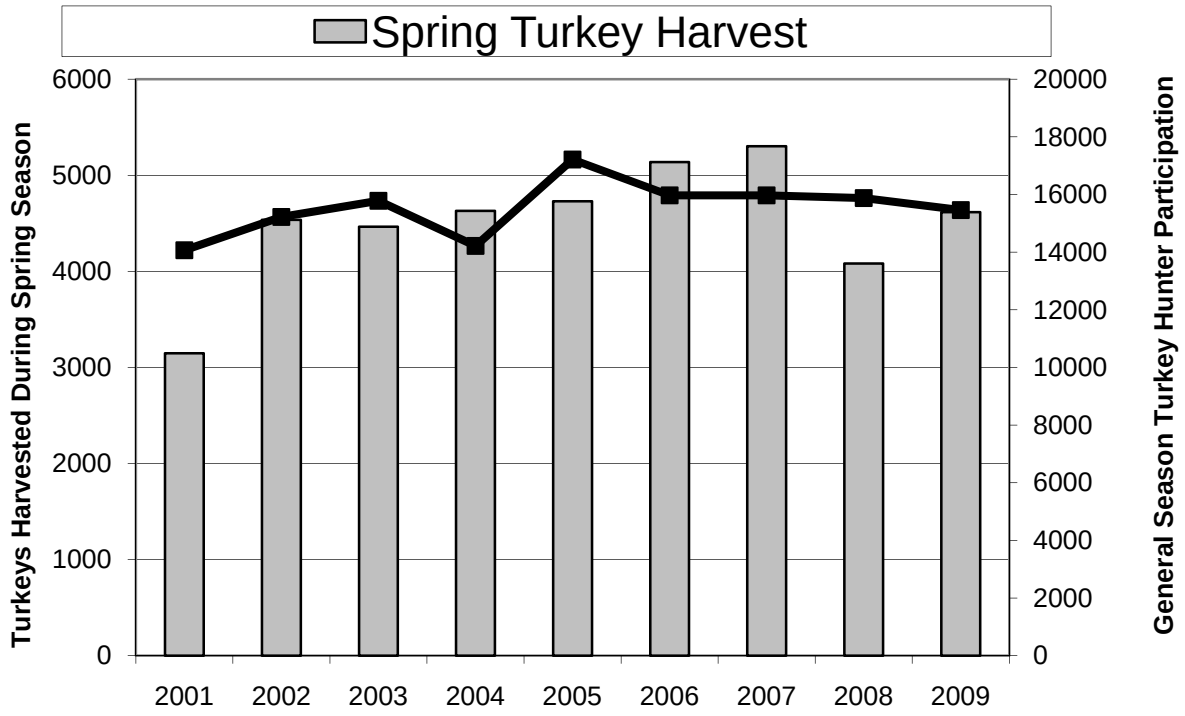


Figure 2. Estimated statewide spring turkey harvest and hunter participation 2001-2009.

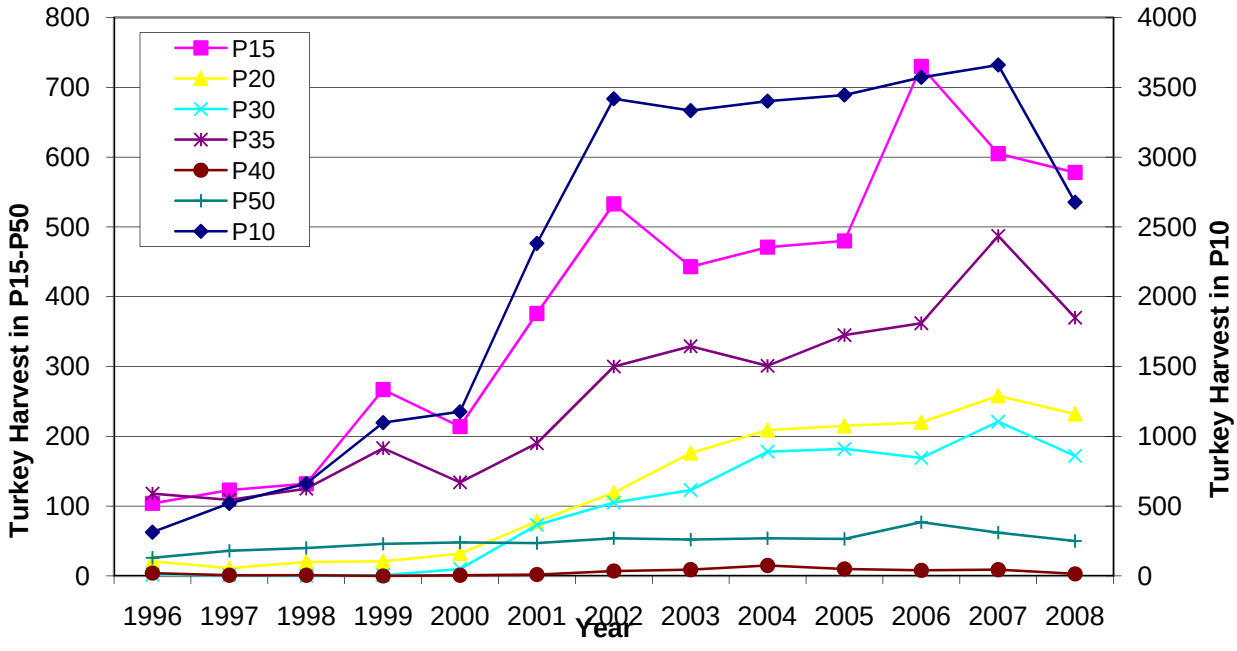


Figure 3. Estimated spring turkey harvest in each turkey Population Management Unit (PMU), 1996-2006.

Pheasant

PHEASANT STATUS AND TREND REPORT
STATEWIDE

JOEY J. MCCANNA, Upland Game Bird Specialist

Population objectives and guidelines
Pheasant management objectives are outlined in the Game Management Plan (WDFW 2008). Management goals are to preserve and perpetuate pheasants and their habitats to ensure healthy productive populations for a sustainable harvest.

Population Status
Pheasant harvest has varied widely over the past 50 years. Statewide 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. Since that time, pheasant harvest has steadily declined. 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. Surveys (crowing count and brood index) conducted between 1982 and 1998 also indicate a decrease in pheasant numbers in eastern Washington (Rice 2003).

Harvest estimation between 1984 and 2000 indicates a decline in pheasant numbers (Figure 1). It is important to note that in 2001 the Department changed the small game survey protocols by sampling 25,000 small game hunters to increase the precision of harvest and participation estimates.

Since nearly all wild pheasant (i.e., not pen-raised) populations occur in eastern Washington, estimates of harvest and hunter participation for this report include the following counties: Adams, Asotin, Benton, Chelan, Columbia, Douglas, Ferry, Franklin, Garfield, Grant, Kittitas, Klickitat, Lincoln, Okanogan, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman, and Yakima.

A primary pheasant management zone exits in Washington where populations have been historically high (Figure 2). Within this primary zone, WDFW has delineated a pheasant focus area in southeastern Washington (Columbia, Garfield, Walla Walla, and Whitman) to focus pheasant management efforts where adequate rainfall (i. e., 14 inches and over) is conducive to supporting desirable, appropriate plant communities.

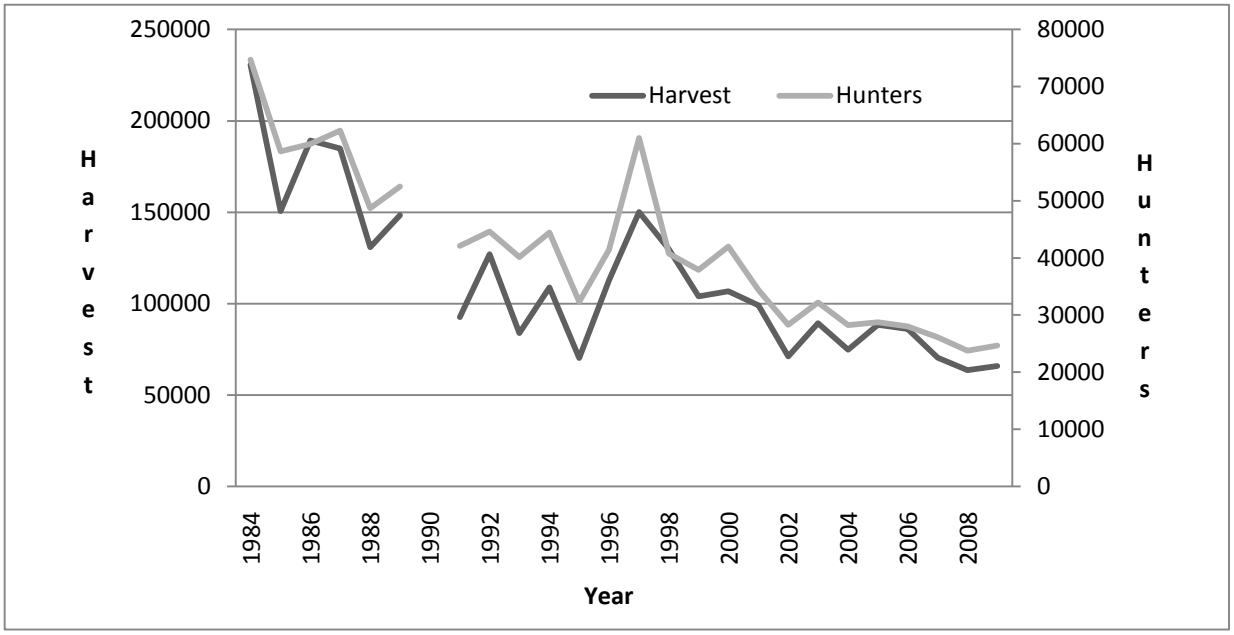


Figure 1. Estimated annual pheasant harvest and annual hunter participation in Washington 1984-2009.

Figure 2. Washington State ringed neck pheasant primary management zone.

Rooster pheasants have been released in the fall as part of the state-funded Eastern Washington Pheasant Enhancement Program (EWPEP) since 1997. Harvest estimates have included both released and wild birds since 1997, and therefore the current population of wild pheasants may be lower than indicated in Figure 1.

In 2009, the EWPEP was audited upon request of the legislature and found the department was fulfilling its legislatively mandated strategy of releasing pheasants. Auditors also concluded that pheasant populations continued to decline primarily due to loss of habitat. Releasing pen-raised pheasants has not been effective at sustaining or improving pheasant populations and hunting opportunities throughout eastern Washington. The 2009 legislature rescinded the requirement for the program to use 80 percent of EWPEP funding on releasing pheasants. In 2010 the department released 16,292 pheasants which is a reduction from the 2009 releases of 21,708 pheasants. Funding now allocated to habitat enhancements will help address Objective 98 in the 2009-2015 Game Management Plan; to double the number of acres of quality pheasant habitat by 2014.

While data shows statewide declines (Figures 1), harvest estimates for the Yakima, Columbia, and Snake River Basins reflect variable decreasing trends in populations from 2000 to 2009 (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.

The 2009 estimated harvest in the Snake River Basin of 26,146 was a 3% increase from 2008, but still 21% below the ten year average of 33,203. A 3% increase was also estimated in the Columbia River Basin with 23,178 pheasants harvested, still 15% below the ten year average of 27,274. The Yakima River Basin increased harvest by 14%, but the 10,034 pheasants harvested was still 15% below the ten year average of 11,856 (Figure 3).

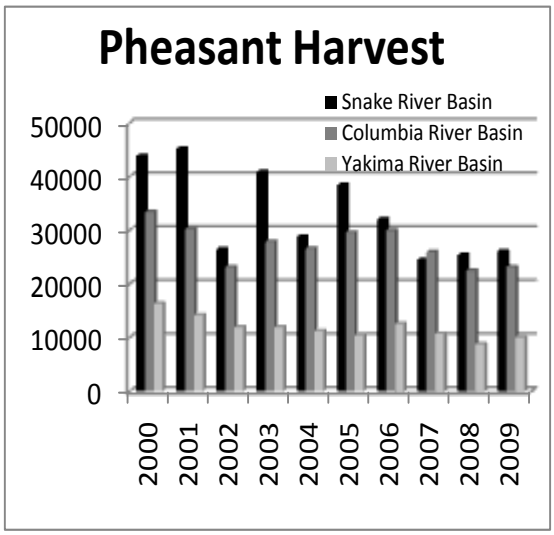


Figure 3. Estimated annual pheasant harvest for eastern Washington river basins between 2000-2009.

Hunters

Hunter numbers have also dropped dramatically since 1984 (Figure 1). A commonly held upland game philosophy is that hunters will participate in relation to the abundance of the targeted species. In the case of pheasant hunting in Washington, variations in harvest closely mirror hunter participation (Figure 1).

The estimated hunter participation in the Snake River Basin in 2009 decreased by 3% and is 21% below the ten year average of 9,226. Columbia River Basin pheasant hunters increased by 3% and remain 15% below the ten year average of 11,137. The Yakima River Basin increased hunter participation by 9% and is still 18% below the ten year average of 4,853 (Figure 4).

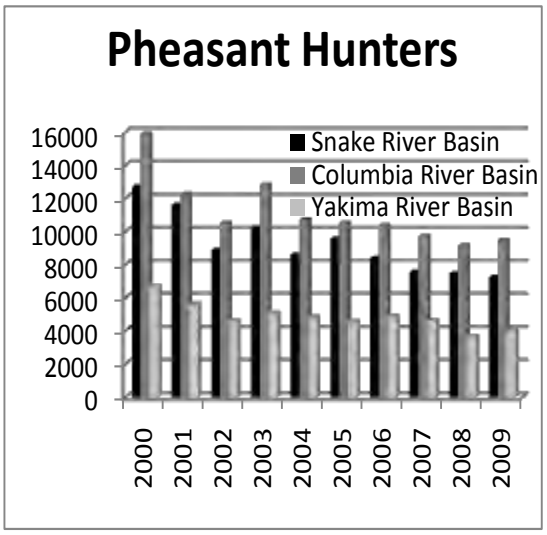


Figure 4. Estimated annual pheasant hunters for eastern Washington river basins during the period 2000-2009.

Habitat Trend

According to Farm Service Agency (FSA), approximately 35% of Eastern Washington Conservation Reserve Program will expire in the next three years. In an effort to reduce these losses, WDFW worked with FSA to develop criteria for the new CRP State Acres for Wildlife Enhancement (SAFE) program for private landowners to develop, restore, and enhance wildlife habitat in priority areas of Washington State.

Several of the WDFW private lands biologist staff in eastern Washington completed the Natural Resources Conservation Service (NRCS) Planning Certification which will provide better access and easier integration with our conservation partners. Private lands biologists provided technical assistance to over 100 landowners consulting about wildlife habitat and review exceptions from FSA for the nesting season management of CRP. Private lands staff also planted 195 acres of high-diversity mixes of grasses and forbs, 6 acres of shrubs, 32 acres of food plots in Region 1, and 13 shrub plots totaling 5.15 miles with another 23 acres of grass planted in Region 2.

Cause of Decline

The cause of the decline in pheasant populations in Washington is undefined, but it likely results from several causes. Research in many parts of the United States indicates that loss of habitat is the primary reason pheasant populations have declined (Labisky 1976, Warner et al. 1984). Of particular importance is breeding habitat (including nesting and brood rearing habitat), habitat for wintering and habitat that provides escape cover from predators (Warner 1979).

Farming practices are evolving and most changes have a negative impact on pheasants. During the 1970's, genetically modified wheat was beginning to be used due its high yielding capabilities and its dwarf stubble stalk. Herbicide application to wheat stubble and reduced stubble height are considered major causes of the long-term decline of pheasants on the central High Plains (Rodgers 2002) and may also play a role in Washington. Wheat stubble (and its associated waste grain, an important food source for farmland pheasants) is commonly tilled under and re-cropped in higher rainfall or irrigated areas of Washington.

Upland game bird fall population densities, and related harvest, also depend on spring weather conditions. Spring rains are needed to provide early plant growth for nesting cover while consistent warm early summer rains create an insect rich environment for pheasant chicks. Chicks depend on calorically dense, high protein insects as a major portion of their diet (Savory, C. J. 1989). Early spring drought conditions, even with normal temperatures may decrease insect availability. Lowered temperatures in experiments impacted pheasant chicks more than pheasant eggs in any stage of incubation (MacMullan, R. A. and L. L. Eberhardt 1953). Washington experienced a cold wet spring which may have contributed to poor nest and brood success.

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 removes important food resources (De Snoo, G. R. and J. De Leeuw 1996). Some pesticides, organophosphates for example, can also have a direct effect on individual pheasants (Blus, L. J. and C. J. Henny 1997). Herbicides impact plant diversity, which is an important component to quality pheasant habitat. Pesticides and herbicides appear to be used on a broader scale in Washington now than thirty years ago. Houses now occupy many of the areas that pheasants have utilized in the past. In areas of Southeastern Washington and in the Columbia Basin, many new housing developments have replaced valuable pheasant habitat.

Surveys

Surveys were discontinued in the late 1990s due to limited time and funding for district biologists. When survey data is routinely collected, it is possible to

combine with available state and national land use databases to link wildlife population changes to land use (Nusser 2004).

Two different pheasant surveys were established in the pheasant focus area with nine survey routes in 2010 (Table 1). The spring pheasant crowing survey was conducted twice between April 15 and May 25 to develop a spring male pheasant breeding population index. Biologists surveyed the same nine routes two more times between August 1 and August 31, extending each of them by ten miles (30 miles in total length) for the fall pheasant brood survey. In addition to evaluating brood production, the fall survey can help predict pheasant population changes, evaluate annual variability in brood size, and model annual counts with extrinsic factors (e.g., precipitation) to help describe trends in pheasant populations. This data will be provided to pheasant hunters with an annual forecast for the upcoming hunting season.

The spring pheasant crowing and fall pheasant brood surveys will be extended throughout the primary management zone as staff time allows in the future.

Pheasant Management Workshop

In March of 2003, the Washington Department of Fish and Wildlife (WDFW) held a workshop that collected information to help identify key 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 from South Dakota, Kansas, Washington D. C., and Iowa along with local conservation experts from Washington Natural Resource Conservation Service and Pacific Northwest Direct Seed Association to discuss research findings and management strategies that may help address population declines in areas where pheasant populations have been historically high. Approximately 75 people attended the meeting, including both the general public and state agency personnel. A complete 2003 Pheasant Workshop meeting summary can be found at **http://wdfw.wa.gov/publications/pub.php?id=00414**

The question "What are the things Washington should look at to move forward with pheasant management?" was posed to the panel. A summary of key points from the panel for the "Future Pheasant Management in Washington" follows:

1) Focus your efforts in select areas to avoid spreading resources too thinly.

2) Work at a regional scale to impact whole populations.

3) Prioritize habitat improvements that address limiting factors of pheasant populations.

4) Pheasants require adequate nesting cover and sufficient insect abundance during brood rearing. Insects are associated with diverse plant communities with substantial forb components.

5) Pheasants flourish when15% to 25% of the landscape is in relatively undisturbed grass with a significant forb component.

6) Releasing pen-raised pheasants for population establishment is expensive and ineffective.

7) The Farm Bill has many programs that can help landowners improve habitat conditions for pheasants.

Table 1. 2010 Brood and Crowing count survey results within the pheasant focus area.

Local Area	Pheasants Per Mile	Average Brood Size	Average Male Pheasant Crowing Counts
St. John	1.67	6.2	6.0
Lancaster	1.43	4.4	6.7
Union Flat Creek	1.94	4.9	6.0
Hay	1.94	6.9	7.98
Pomeroy	0.13	2.0	7.48
Dayton	1.10	5.4	10.85
Walla Walla	2.07	6.3	18.4
Colton	0.87	5.5	5.2
Colfax	1.13	7.5	3.9
Average	1.36	5.5	8.06

8) Retaining at least 12 inches, and preferably 15 inches, 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.
9) Direct seeding (no-till drilling) can increase soil quality, reduce erosion and increase value of the property for wildlife.
10) Habitat improvements must be compatible with farming practices to be effective across working landscapes.

Management conclusions

Pheasant populations declined dramatically in the 1980s and currently remain at low levels. Causes of the decline are not known definitively, but habitat loss and alteration is thought to be the primary cause of the decline. Further, habitats are increasingly fragmented and isolated. In order to address this situation, the following action items will assist WDFW in accomplishing habitats for more productive pheasant populations.

1) Continued support for Upland Game Bird Specialist to focus on pheasant priorities.

2) Use of Geographic Information System (GIS) technology to evaluate existing and potential pheasant habitat areas within the pheasant focus area.

3) Continue pheasant crowing counts and brood index counts in the pheasant focus area.

4) Continue working relationships with Pheasants Forever and Quail Forever.

5) Conduct study in coordination with science division to investigate insect response to planting native and non-native forbs and legumes in strips or blocks within existing CRP stands.

6) Utilize a variety of funding sources to place habitat technicians in the pheasant focus area to provide habitat implementation assistance to farmers.

7) Ensure biologists and technicians have full knowledge of all state and federal habitat programs available to assist farmers in improving pheasant habitats.

8) Utilize mid-contract management for existing CRP contracts.

9) Create and restore nesting cover and brood-rearing habitat.

10) Release rooster pheasants only as put-and-take enhancement of hunting opportunity, not as a population management tool.

11) Work closely with FSA to promote development of habitat for pheasants and other upland wildlife. This is critical as large CRP contracts expire over the next several years.

12) Continue efforts with Washington State University and the Pacific Northwest Direct Seed Association to retain stubble height.

Literature Cited

Blus, L. J. and C. J. Henny 1997. Field studies on pesticides and birds: Unexpected and unique relations. Ecological Applications 7(4): 1125-1132.

De Snoo, G. R. and J. De Leeuw 1996. Non-target insects in unsprayed cereal edges and aphid dispersal to the adjacent crop. Journal of Applied Entomology 120(8): 501-504.

Eggebo, S. L., K. F. Higgins, et al. 2003. Effects of CRP field age and cover type on ring-necked pheasants in eastern South Dakota. Wildlife Society Bulletin 31(3):779-785.

Labisky, R. F. 1976. Midwest Pheasant Abundance Declines. Wildlife Society Bulletin 4(4):182-183.

MacMullan, R. A. and L. L. Eberhardt 1953. Tolerance of Incubating Pheasant Eggs to Exposure. The Journal of Wildlife Management 17(3):322-330.

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.

Rodgers, R. D. 2002. Effects of wheat-stubble height and weed control on winter pheasant abundance. Wildlife Society Bulletin 30(4):1099-1112.

Savory, C. J. 1989. The Importance of invertebrate food to chicks of gallinaceous species. Proceedings of the Nutrition Society 48(1): 113-133.

United States Department of Agriculture. September 14, 2010. Conservation Reserve Program Sign-Up Benefits Producers, Protects Sensitive Habitat. Washington, D.C. News Release No. 0464.10

Warner, R. E. 1979. Use of Cover by Pheasant Broods in East-Central Illinois. The Journal of Wildlife Management 43(2):334-346.

Warner, R. E., S. L. Etter, et al. 1984. Declining Survival of Ring-Necked Pheasant Chicks in Illinois Agricultural Ecosystems. The Journal of Wildlife Management 48(1):82-88.

Washington Department of Fish and Wildlife. 2008. 2009-2015Game Mangament Plan. Wildlife Program, Washington Department of Fish and Wildlife, Olympia, Washington, USA.

Chukar

CHUKAR STATUS AND TREND REPORT STATEWIDE

JOEY J. MCCANNA, Upland Game Bird Specialist

Population objectives and guidelines

Management objectives of chukar partridge (Alectoris chukar) and gray partridge (Perdix perdix) are outlined in the Game Management Plan (WDFW 2008). Harvest management is designed to provide maximum recreation opportunity without negatively impacting populations.

Hunting seasons and harvest trends

The hunting season for chukar and gray partridge has varied in length over the years by regions. In the early 1960s and 1970s Region 1 had a split early and late season while the rest of eastern Washington was regulated with one general season. In 1997 the implementation of one, standardized season was set to start October 1and end the second Sunday in January. The season was changed again in 2003 starting on the first Saturday of October extending to mid-January. The current season is 3 October 2009 through 18 January 2010. In addition, a youth hunting weekend occurred on 26-27 September. Daily bag limits are 6 chukar and 6 gray partridge with 18 of each in possession.

The 2009 chukar harvest of 12,593 was a 12% increase from 2008 while remaining 37% below the ten year average of 19,929 birds (Figure 1). A gray partridge harvest of 5,435 in 2009 indicated an increase of 70% but harvest remains 39% below the ten year average of 8,979. Chukar hunter numbers also increased in 2009 by 11% and remain 21% below the ten year average of 5,374 (Figure 1).

Chukar hunting was a major recreational pursuit in southeastern Washington during the 1970s when harvest averaged more than 66,000 birds in Region 1 alone. Chukar hunter numbers in Region 1 increased 35% in 2009, increasing the estimated harvest 158% from 2008;, still 23% below the ten year average of 4,939. Chukar hunter numbers in Region 2 increased 29% in 2009, but harvest decreased by 10%, falling 43% below the ten year average of 9,597. A 6% increase in chukar hunters was seen in Region 3 with a 14% decrease in the 2009 harvest -, still 41% below the ten year average of 5,078.

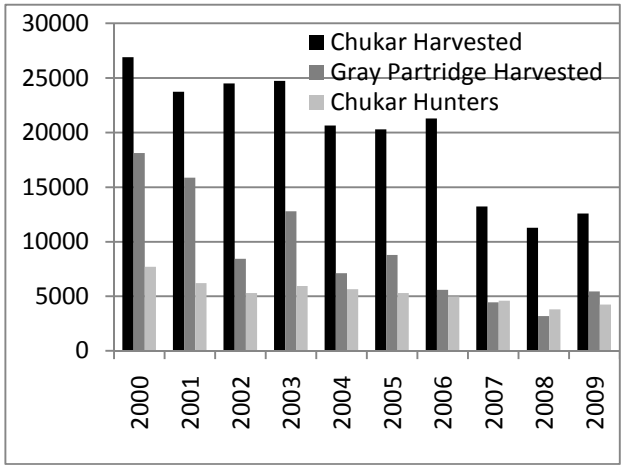


Figure 1. Chukar hunters, chukar and gray partridge harvest statewide for the period 2000 – 2009.

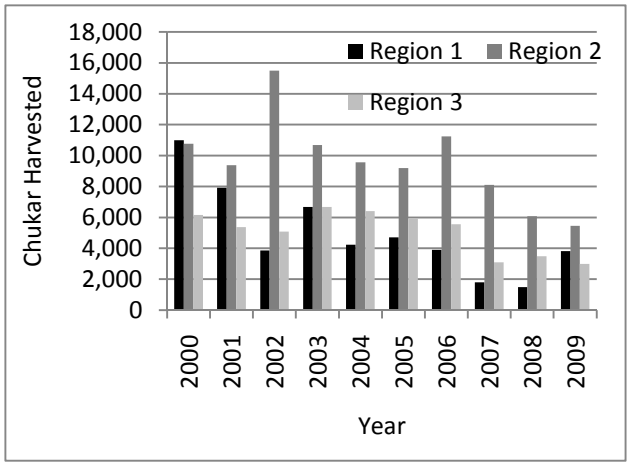


Figure 2. Estimated chukar harvest for Regions 1, 2 and 3 for the period 2000 – 2009.

Hunter participation peaked in the late 1970s and early 1980s, but has declined dramatically since then. Today, approximately 4,000 hunters pursue chukar throughout their habitats in the state of Washington (Figure 1).

Surveys

Chukar populations were surveyed by helicopter from 1987 to 1997, when aerial surveys were

terminated due to budget constraints. In Region 2, three routes are driven (Colockum-Tarpiscan, Swakane-Nahahum, and Chelan Butte) by volunteers and staff in early August to count chukar and other game birds. Each route is approximately 20 miles long, and replicated three times. For the third straight year, no chukars were observed during the driving routes. This has occurred only three times in the past eleven years. The lack of chukars observed might be attributed to the reduced mileage of the driven routes from road closure occurring in 2007. Averages of 5.6 chukar were observed on each route from 1998-2008. Though recent surveys have failed to record chukars, their calls continue to be heard from the rocky habitats in the Region. In other regions, field personnel note the abundance of broods during regular field operations and other surveys.

Population status and trend analysis

Harvest and hunter effort are used as an index to population trends. These data are estimated through a post-season survey of hunters. Harvest data indicate the chukar population remains below the 10- and 25-year averages by 37% and 56%. The 2009 estimates show an 11% increase in hunter participation and 12% increase in harvest.

The chukar population crashed in the early 1980's and has continued a long-term decline since then. The annual population is primarily dependent upon recruitment and over-winter survival influenced by weather and insect productivity. Persistent snow cover during the winters of 1992-93 and 1996-97 may have influenced the dramatic declines recorded in areas of the state. Populations rebounded rapidly following these rough years with assumed favorable nesting and brood rearing conditions, but recent spring drought conditions have likely been detrimental.

Habitat condition and trend

Chukar habitat includes arid areas with steep slopes, deep valleys, and rocky outcrops. Chukar habitat is found where topography, combined with shallow soils, prevented extensive agriculture and/or development. Cheatgrass is a staple of the chukar diet in spring and fall, and the availability of cheatgrass can have a significant impact on chukar populations.

In Region 1, some of the better chukar habitat has been inundated with yellow star-thistle (Centaurea solstitialis) during the last 20 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 likely hinders population recovery, but is not the likely ultimate cause of the regional population decline. The problem of star-thistle is now so wide spread, that several counties have halted control programs, leaving it up to the private landowners.

Chukar habitat is relatively stable in Region 2 because of the precipitous nature of the terrain. However, development is increasing (especially in the Wenatchee Valley) near chukar habitat, which could impact chukar populations.

In Region 3, WDFW and Department of Defense (DOD) manage the majority of chukar habitat. Since 1995, the DOD has excluded cattle grazing. Substantial sections of both WDFW and DOD lands have burned in the last few years, reducing shrub cover. Biologists report that chukar in these areas tended to utilize shrub cover during the winter and breeding times of the year, so losing this habitat type to fires likely impacted habitat quality.

Management conclusions

Continued population declines indicate that either habitat is deficient in some unknown component or there may be a population health problem. The invasion of yellow star-thistle has taken over thousands of acres of quality habitat in southeastern Washington with no quick solution to stop the spreading of this noxious weed. Habitat quality in some portions of the state may have actually improved over time with the abundance of wildfires that influenced the spread of cheat grass. However, the loss of shrub habitat due to fires may be detrimental.

While no genetic studies have been conducted on chukar in Washington, a population health problem could be the result of low genetic diversity of remaining chukar. Westemeier et al. (1998) described the reduction of genetic diversity and fitness in a small, declining population of greater prairie chickens (Tympanuchus cupido). If chukar populations throughout Washington are isolated, then there could be a reduction of genetic diversity, which could lead to reduction in reproductive success and inability to adapt to changing environmental factors. With budget constraints, investigating this potential is not likely at this time.

Habitat in Region 1 continues to be invaded by yellow star-thistle in the far southeast corner. The amount of habitat in Region 2 is relatively stable due to the precipitous nature of the terrain. However, development is increasing (especially in the

Wenatchee Valley area) which could impact localized populations. Habitat quantity in Region 3 had remained fairly constant until wildfires impacted large areas. In addition, residential development, irrigated agriculture, and wind energy facilities are creeping into chukar habitat and may reduce the amount of habitat in the future. Chukar populations can be expected to fluctuate annually in response to fluctuations in primary production. Improving chukar populations will likely require extensive research into currently suppressed population.

Literature Cited

Washington Department of Fish and Wildlife. 2008. 2009-2015Game Mangament Plan. Wildlife Program, Washington Department of Fish and Wildlife, Olympia, Washington, USA.

Westemeier, R. L., J. D. Brown, S. A. Simpson, T. L. Esker, R. W. Jansen, J. W. Walk, E. L. Kershner, J. L. Bouzat, K. N. Piage. 1998. Tracking the long-term decline and recovery of an isolated population. Science 282:1695-1698.

Quail

QUAIL STATUS AND TREND REPORT

STATEWIDE

JOEY J. MCCANNA, Upland Game Bird Specialist

Population objectives and guidelines

Objectives for California quail (*Callipepla californica*) are to maintain healthy populations in all suitable habitats within the state. At the same time, WDFW seeks to maximize recreational opportunities consistent with population management objectives outlined in the Game Management Plan (WDFW 2008).

Hunting seasons and harvest trends

The general hunting season for California quail and Northern bobwhite (Colinus virginianus) in Eastern Washington was 3 October 2009 through 18 January 2010. In addition, a youth hunting weekend occurred on 26-27 September. As in previous years, the general season bag limit was 10 per day of a mixed bag, with a possession limit of 30. The general season for Mountain quail (Oreortyx pictus) in Western Washington ran from 2 October through 30 November with a daily bag limit of 2 and a possession limit of 4. Mountain quail hunting was closed throughout eastern Washington.

The 2009 harvest of 92,588 represents a 2% increase from the 2008 harvest which has been on a downward trend since a peak of 190,062 in 2003 (Figure 1). Quail harvest in eastern Washington accounts for approximately 98% of the statewide quail harvest.

The 2009 harvest of 14,815 quail in Region 1 was a 10% reduction from 2008 and 52% below the ten year average of 30,868 (Figure 2). Harvest in Region 2 increased 2% with 35,251 quail being harvested but is still 37% below their ten year average of 55,720 birds per year. The harvest of 40,730 quail was an increase of 10% from 2008 for Region 3 and is still 15% below their ten year average of 48,100. Regions 4, 5 and 6 indicated a 26% reduction in harvest for 2009.

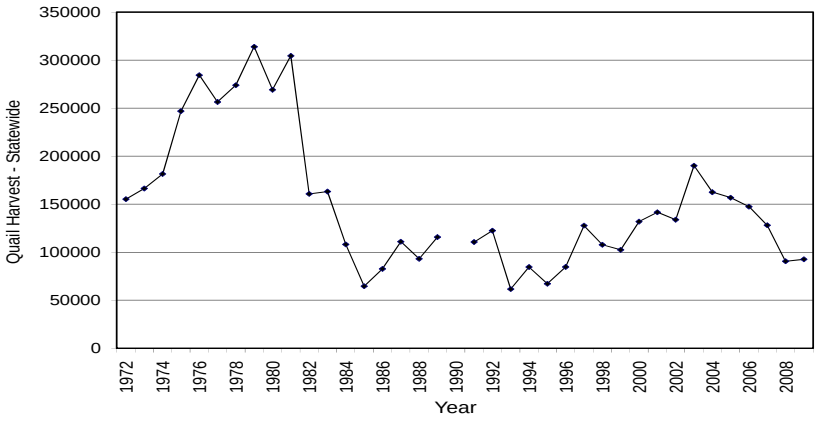


Figure 1. Washington State quail harvest data for the period of 1972 - 2009.

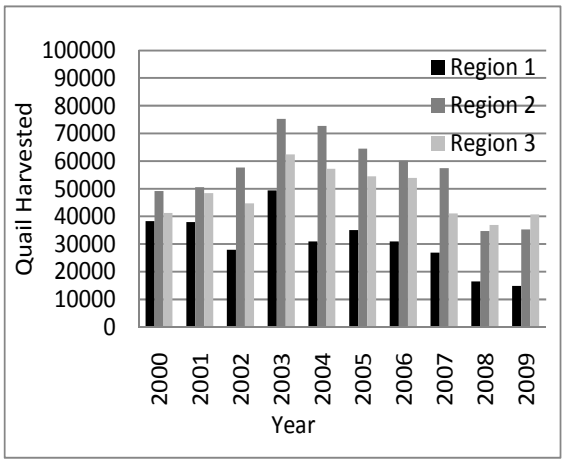


Figure 2. Quail harvest for regions 1, 2, and 3 for the period of 2000 – 2009.

Population status and trend

Using harvest as an index to population status, quail populations in Washington are currently much lower than they were in the late 1970's and early 1980's (Figure 1). The cause of the decline may be related to "clean" farming practices introduced in the early 1980's that encouraged the removal of shrubby cover along fence lines and in draws.

There is no clear cause for the decline in the quail population since 2003. While farming practices have not substantially changed during this time, hunters and biologists have reported seeing fewer quail in typical areas. Quail can be very productive if conditions are good, which may have been the key to the 2003 peak. According to harvest trend indicators, the current quail population is similar to population numbers 20 years ago (Figure 1).

Habitat condition and trend

Similar to other agriculturally associated wildlife, quail habitat quantity and quality has declined for decades. Of particular importance is breeding habitat (including nesting and brood rearing habitat), habitat for wintering and habitat that provides escape cover from predators. Land development and "clean farming" practices has dramatically minimized and fragmented available habitat for upland game birds.

A food habit study conducted in southeastern Washington performed an analysis on 157California quail crops from March – September in which male and female quail were selective in their feeding habitats with jagged chickweed the major food item during the spring months (23 and 34 percent, respectfully), among other unwanted weeds (Anthony 1970).

The Conservation Reserve Program (CRP) has benefited quail with diverse riparian plantings, field corner shrub plantings, and general CRP signup plantings. Since the inception of CRP, contracts have received new ten year contracts, one to five year extensions, or were rejected and farmed again. Dense vegetation, litter accumulation, and decreased species composition of older CRP fields may limit the habitat value for some species (Rodgers 1999).

In 2008 Farm Service Agency announced a new CRP program named State Acres for Wildlife (SAFE) which requires a diverse planting mixture of grasses and forbs including mid-contract management options to stimulate plant vigor during the contract life. This should provide additional quail habitat in Douglas, Lincoln, and Whitman counties.

The highest California quail densities are typically associated with brushy riparian areas and shrub-steppe habitat near riparian areas; however quail have adapted well to urban neighborhoods. Residents enjoy watching quail and often feed throughout the winter months. Urban quail populations with high survival may act as population reservoirs by providing brood stock to adjacent non-urban populations where survival is lower.

Augmentation and habitat enhancement

In previous years, Private Lands Biologists and Wildlife Area staff trapped California quail from urban populations to augment populations that appeared to be reduced. No California quail were trapped and relocated in 2009.

A three-year project to enhance mountain quail populations in southeast Washington was implemented in March 2005. Mountain quail were trapped in southwest Oregon for release in Idaho and Washington. Washington released 73 in March 2005 and 89 in March 2006 in the Asotin Creek watershed. Monitoring of the released birds was accomplished by fitting 50 of the birds with necklace-style radio collars each year. Of the 50 marked birds in 2005, 34% survived to 6 months post release. In 2005, 8 nests had 100% nest success. Average clutch size was 9.25, with average hatch date of July 2. Six of the eight successfully nesting birds had chicks present at 28 days post-hatch, the other 2 failed to have successful flush counts. In March 2006, 89 birds

were released with 49 being fitted with necklace-style radio transmitters. By August 2006, 82% of the radio-marked birds had died. Five of the 8 birds attempting to nest during 2006 successfully hatched their nests. Male mountain quail incubated sixty percent of the nests over the 2 years, with 47% of all successful nests raising chicks to 28 days of age.

Unfortunately, birds captured from southwestern Oregon during the winter of 2006/2007 all died in captivity in a holding facility in south-central Washington. There have been no birds released since the spring of 2006.

Surveys

Population/production surveys were discontinued in 1999 due to limited time and funding for district biologists. The post-hunting season questionnaire is used to estimate harvest and currently provides the best index of population status.

Five calling survey routes specifically designed to detect the presence of mountain quail were re-established in the Asotin Creek drainage in the spring of 2009. University of Idaho had originally established the routes with WDFW in 2005 using "Validation of a Mountain Quail Survey Technique" protocol (Heekin and Reese 1995). Mountain quail were either heard or observed on 2 of the 5 survey routes. Another supplemental release may be considered in the future, depending upon available stock.

Management conclusions

The mountain quail augmentation project for southeastern Washington may continue in the spring of 2011. The department will need to construct a holding facility so birds trapped during the winter in other areas (e.g., Oregon) can be held until the March release time.

The California quail is a major upland game bird species and a species of significant interest to wildlife viewers. Continuous programs in the CRP program will most likely benefit quail the most as these signups include Conservation Reserve Enhancement Program (CREP) and Riparian Forest Buffers. These riparian signups may consist of a mixture of shrubs, grasses, and forbs that should benefit quail.

References

Anthony, R. G. 1970. Food Habits of California Quail in Southeastern Washington during the Breeding Season. The Journal of Wildlife Management. 34(4): 950-953.

Heekin, Patricia E., and Reese, Kerry P. 1995. Validation of a Mountain Quail Survey Technique. Department of Fish and Wildlife Resources, University of Idaho.

Rodgers, R. D. 1999. Why Haven't Pheasant Populations in Western Kansas Increased with CRP? Wildlife Society Bulletin. 27(3): 654-665.

Washington Department of Fish and Wildlife. 2008. 2009-2015Game Mangament Plan. Wildlife Program, Washington Department of Fish and Wildlife, Olympia, Washington, USA