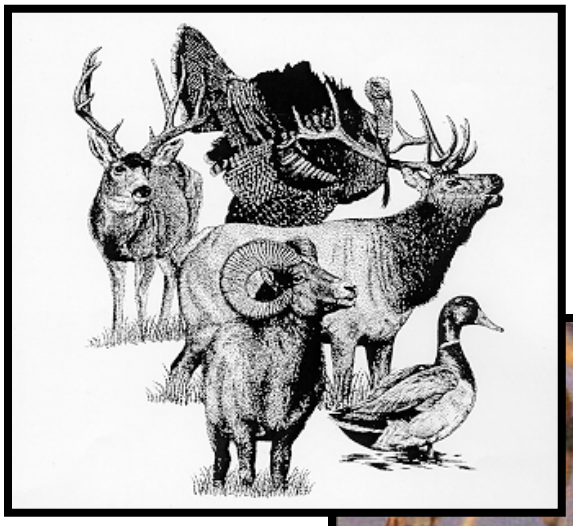
STATE OF WASHINGTON

2012 Game Status and Trend Report



Washington Department of FISH and WILDLIFE

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2012 GAME STATUS AND TREND REPORT

July 1, 2011 – June 30, 2012

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

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

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Deer

DEER STATUS AND TREND REPORT: REGION 1

PMU 11 – GMU 101
PMU 13 – GMUs 105, 108, 111, 113, 117, 121, 124

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Population objectives and guidelines

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 (WDFW 2008). In addition, population goals from WDFW's White-tailed deer management plan (WDFW 2010) for the Selkirk Zone are to 1) increase deer counted per mile in the late summer surveys to fall within the range of 9 to 11 deer counted per survey mile, and 2) increase the white-tailed deer harvest success rate and the white-tailed deer buck success rate in data collected at check stations and through hunter reporting to more closely reflect the 2003 to 2007 average rates. The stated strategy to achieve this population increase is to reduce the amount of antlerless hunting opportunity, while still attempting to maintain some opportunity for all user groups.

Management goals for mule deer are to provide conservative hunting opportunity, maintain a range of 15 to 19 bucks per 100 does in the post-hunting season population, and allow population levels to increase by managing antlerless hunting opportunity (WDFW 2008).

Hunting seasons and harvest trends

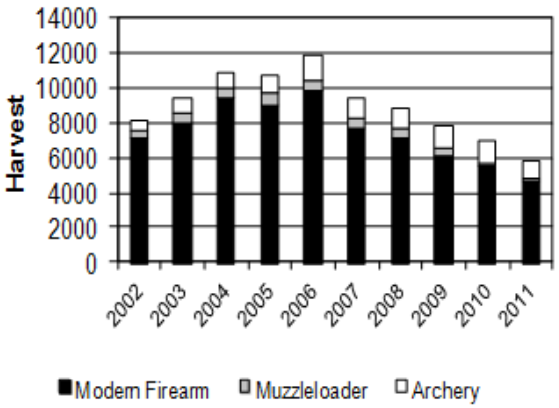

Figure 1. Trend in total general deer harvest for GMUs 101-124 from 2003 to 2011.

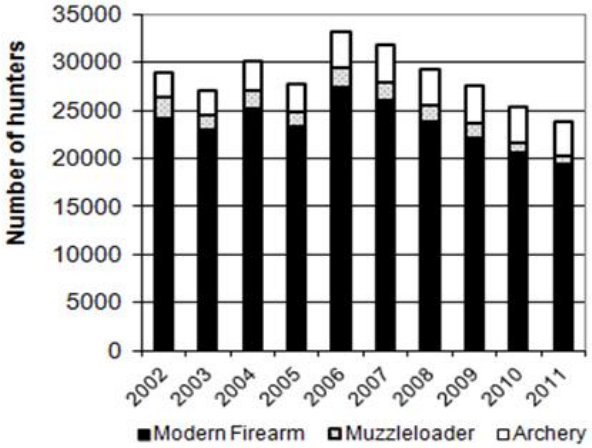

Figure 2. Trend in the number of deer hunters for GMUs 101-124 from 2003-2011.

In 2011, the Fish and Wildlife Commission changed the white-tailed buck hunting season structure in GMUs 117 and 121 from "any buck" to a "4-point or better" antler restriction. Antlerless hunting opportunity was further reduced over the previous two years. Figure 1 depicts the trend in total estimated deer harvested by hunters within the Colville District from 2006 through 2011. The total harvest has decreased

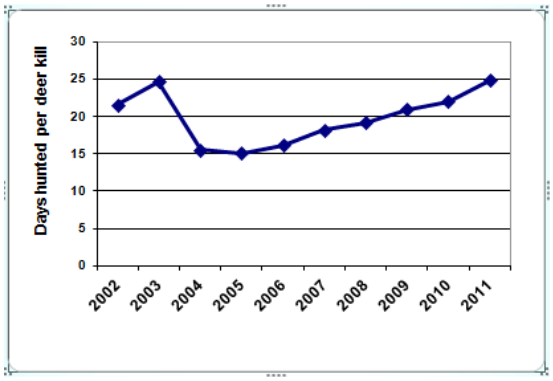

Figure 3. Ten-year trend in the number of days hunted per deer harvested within the Colville District.

approximately 51% since 2006. In addition modern firearm and muzzleloader hunting methods have shown a marked decrease in participation from 2006 to 2011 (Figure 2). The number of days hunted per deer harvested has gradually gone up over the last six years

from about 15 days in 2005 to 25 days in 2011, though these rates are similar to 2002 and 2003 levels (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). Since 2006 the total mule deer harvest in GMU 101 has largely ranged between 200 - 300 bucks annually (Table 1).

Table 1. Mule deer buck harvest trend from hunter reports by user group within GMU 101 from 2003-2011. (Arc = Archery ;MZL = Muzzleloader ; MF = Modern Firearm hunter harvest).

Year	Arc	MZL	MF	Total	%4pt+
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%
2010	24	14	261	299	52%
2011	17	23	156	202	48%

The reported harvest of antlerless white-tailed deer was 1,123 and a total of 4,415 antlered white-tail bucks were reportedly taken within PMUs 11 and 13 combined (GMUs 101-124) during the 2011 season (Table 2). Harvest of white-tail bucks decreased from 5,545 taken in 2010. Beginning in 2010 Youth, Senior, and Hunters with Disability (Y/S/D) were allowed to take any white-tail (including antlerless) for only 4 days including the second week-end of the Early (October dates only) Modern Firearm Deer Season within GMUs 105-121. There were only 75 antlerless white-tailed deer permits allocated for modern firearm deer hunters within GMUs 105-121 in 2010, a tremendous decrease from previous seasons. Overall the proportion of antlerless white-tails taken in 2011 was the same as it was in 2010, at 25 per 100 antlered bucks taken. This is the lowest ratio obtained since 2001.

Surveys

Age, antler, and sex ratio data are collected from harvested deer for monitoring harvest and developing season recommendations. One way that the ratio of mature white-tail bucks in the harvest is monitored is by taking tooth samples from adult deer for age analysis. Excluding yearling white-tail bucks, the proportion of adult bucks over 4 years of age that were sampled at hunter check stations in 2011increased considerably from previous years back to 2006 (Figure 4).

White-tail buck antler data are also collected from check stations and mandatory hunter reports. This includes tallies of bucks that have 5 or more points on

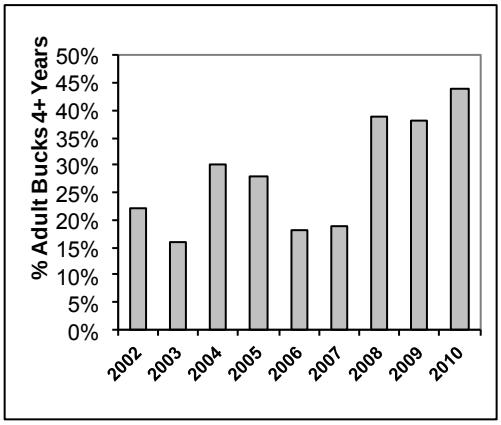

Figure 4. Percent of adult white-tail bucks 4 years and older from hunter check stations, 2003-2011.

the high side of their antlers. Field checks and hunter harvest reports in 2011 yielded 30% and 23% respectively of hunter-killed white-tail bucks having 5 points or more within the Colville District. These data substantiate an increase in the proportion of mature bucks represented in the harvest since 2006 (Table 3 and Figure 5).

The proportion of white-tail yearling bucks brought to hunter check stations decreased from 2010 to 2011 (Table 3). Amongst white-tail bucks, 33% (n = 15 of 46) were yearlings and there were no yearling white-tail does examined (n = 0 of 16). There were also 3 fawns in the antlerless harvest checked in 2011. The mean age of adult white-tail bucks (yearlings excluded) checked in 2011 was 4.8 years, which is up substantially from the previous 3-year average of 3.5 years. This is likely due to the new antler point restrictions in GMUs 117 and 121.

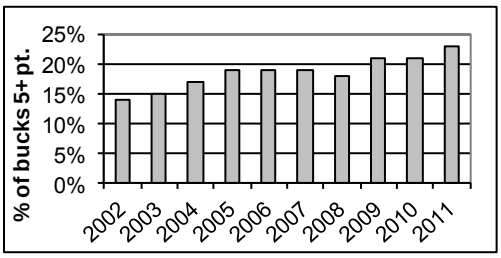

Figure 5. Percent of PMU 13 (GMUs 105-124) white-tail bucks 5 point or better from hunter reports.

Table 2. Hunter harvest of antlered and antlerless white-tailed deer by Game Management Unit in 2011.

		Antlerless					Antlerless per
PMU	*GMU*	Archery	Permit	Y/S/D*	Total**	Antlered	100 Antlered
11	*101*	30	0	123	163	402	41
13	*105*	9	0	30	39	262	15
	108	13	0	25	38	282	13
	111	0	0	56	56	363	15
	113	0	0	41	41	360	11
	117	32	0	88	120	523	23
	121	26	2	157	185	587	32
	124	187	4	290	481	1636	29
Total:		**297**	**6**	**810**	**1123**	**4415**	**25**

* 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+
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%
2010	30	60%	22	32%	48%	14%	21%
2011	13	62%	34	24%	30%	30%	23%

For GMUs 105-121 the proportion of white-tail bucks to does for summer 2011 increased from 2010, going from 24 to 28 bucks per 100 does (Table 4). In 2011, the fawn to doe ratio also increased to 54 from 48 fawns per 100 does as observed in 2010. 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).

Table 5 summarizes the numbers of white-tailed deer tallied on late summer surveys from 6 road transects surveyed with consistent effort from 2003 through 2011. The average number of white-tailed deer observed per transect mile has steadily declined from a high of 11.0 in 2007 to a low of 5.2 in 2011. This density remains substantially below the goal of 9 to 11 deer counted per survey mile (WDFW 2010).

Population status and trend analysis

The total 2011 deer harvest declined from 2010 (Figure 1) mainly on account of the reduced number of antlerless white-tail permits as well as opportunity for Archery, Muzzleloader, and white-tail.

In addition, a regulation change within Youth/Senior/Disabled hunters to take an antlerless GMUs 117 and 121 requiring legal white-tail bucks to have at least 4 antler points on the high side contributed to a substantial decline in both hunting pressure and the number of bucks harvested. Total deer hunter numbers decreased about 6% in 2011 from 2010 with most of this decline in the number of Modern Firearm and Muzzleloader 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. After 1999 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 (Figures 4 and 5). We are currently at a level that has reasonably good representation of mature bucks in the white-tail population. Now better than 1 in 5 white-tail bucks harvested is 5 point or better.

The total antlerless white-tailed deer harvest increased dramatically from 2001-2008. The proportion of antlerless white-tails taken per 100 antlered bucks went from 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 25 per 100 in 2010, and the same proportion in 2011. The largest reductions in this ratio took place within GMUs 105-113 (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 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 1990s. In recent years general boot hunter harvests and special hound hunting opportunity to reduce populations for protection of livestock and human safety appear to have reduced cougar numbers. Cougars are a prominent predator of deer in northeastern Washington, but the impact on deer populations is likely inconsequential except on a localized basis at this time. Black bears and coyotes are also abundant within the Colville District. Gray wolves have recently established new packs within Washington including the northeastern part of the state where there is a prey base of elk and moose as well as deer.

Habitat condition and trend

White-tailed Deer seem to be recovering, but at a slow rate from the two consecutive severe winters of 2007-2008 and 2008-2009. Two of the three winters since were mild to very mild, and the third was only moderate in severity. Consequently, winter deer kill has probably been negligible since 2009.

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 occasional severe winters and prolonged summer droughts has probably led to a reduction in white-tailed deer abundance but not their 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 stabilize deer populations and control excessive damage. While deer continue to be a problem for farmers, the population and the damage complaints are presently at a reasonably tolerable level. White-tailed deer 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

Once again the total deer harvest in the Colville District decreased in 2011, as did the overall deer harvest per unit effort. The low proportion of 25 antlerless white-tails harvested per 100 antlered deer taken in 2011 should help increase escapement of female deer for growing the white-tail population back to previous levels. The proportion of mature white-tail bucks in the harvest appears to be maintaining a reasonably high level of approximately 23%. Maintaining adequate hunter field checks (check stations) along with analyses of harvest reports will be necessary to continue monitoring the age structure and antler classes of the deer population.

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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
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
2010	1522	24	+/- 5	1533	48	+/- 7
2011	765	28	+/- 9	1098	54	+/- 15

Table 5. Trend in late summer classification surveys of white-tailed deer as collected from 6 secondary road survey transects run consistently within GMUs 105-121, the Selkirk Zone, 2003-2011.

Transect Name and GMU:	**Length, miles (total = 73.1)**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Flat Creek – 105	17.5	116	123	138	147	117	143	122	117	50
Douglas – 108	11.0	231	288	196	301	190	179	131	103	92
Deep Creek – 108 / 111	19.8	38	42	48	53	84	61	78	51	23
Clayton – 117	7.2	95	58	51	83	97	61	48	38	38
Dunn Mountain – 121	5.3	189	213	192	165	161	106	42	103	117
Daisy / Maud – 121	12.3	48	43	33	51	45	75	50	50	59
Total White-tailed Deer Counted		**717**	**767**	**658**	**800**	**694**	**625**	**471**	**462**	**379**
Mean Number per Transect Mile		**9.8**	**10.5**	**9.0**	**10.9**	**9.5**	**8.5**	**6.4**	**6.3**	**5.2**

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

The white-tailed deer (*Odocoileus virginianus*) population in PMU 14 & 15 are at acceptable levels. Management objectives for the Palouse Zone populations are to maintain the population at current levels and to retain the current hunting season structures (WDFW 2010). Increase in the population would be acceptable as long as agricultural damage does not become a problem (WDFW 2010). The mule deer (*O. hemionus*) populations in PMU 14 & 15 are also currently within acceptable levels. The mule deer management plan is not complete at this time, interim management objectives are to maintain the population within landowner tolerance 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 2008) guidelines for buck escapement (20 to 24 bucks per 100 does post-season) and to maintain healthy fawn to doe ratios while minimizing agricultural damage from deer.

Hunting Seasons

Game Management Units (GMUs) 127 through 142 make up deer Population Management Units (PMUs) 14 and 15. PMU 14 contains a mixture of forest, shrub-steppe, and agricultural habitats, along with some areas of high urbanization. PMU15 is relatively open shrub-steppe and agricultural habitats. 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 in mid October for both mule and white-tailed deer. The modern firearm general late white-tailed deer season was removed in 2006 and replaced with a special permit only late white-tailed buck hunt in November. 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) are offered in all six GMUs.

Archers are offered both early and late general hunting seasons. The early archery deer hunt occurs in September and the late season run in late November or early December (varies by GMU). Muzzleloaders are offered both early and late general admission seasons, as well. Muzzleloader early season runs from late September into early October. The late season is in late November.

Harvest trends

Total deer harvest historically has been higher in PMU 15; however, harvest in recent years is effectively equal between the two PMUs (Table 1). Across both PMUs there was a pronounced reduction in harvest during 2006. PMUs 14 and 15 had 15.6% and 30.3%, respectively, 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 special permit hunt and severe winter condition. Harvest rebounded in 2008, reaching pre- 2006 levels in harvest in both PMUs, but has fallen since. 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, declined from 2004 – 2008, and is showing stable to slight increase since 2008 in both PMUs (Fig. 1). Decline in modern firearm hunters is the main driver behind the negative trend in hunter numbers between 2004 and 2008 in both PMUs. In 2001, modern firearm hunters made up 83% and 93% of hunters in PMUs 14 & 15, respectively. In 2011 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 PMUs 14 and 15, averaging 683 and 350 respectively.

Hunter success rates in PMU 14 and 15 average 29% and 34%, respectively, over the past eleven 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 was 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 too much snow in the winter of 2008 leading to poor recruitment and too little snow in 2009 producing poor hunting conditions. Success has remained stable and close to the eleven year average since 2009 in PMU 14. In PMU 15 success has continued to decline since 2009.

Catch per unit effort (measured as kills per day) has averaged 0.07 and 0.10 for PMU 14 and 15, respectively. The kill per day rate has varied little (± 0.01 kill/day for both PMUs) from these averages over the past eleven years. Catch per unit effort hit a high in 2008 in both PMUs, but have since declined back to the average (Fig. 4).

Results for the first five years of the Palouse special hunt show higher success rates than in the general season modern firearm hunt (Table 2), though in 2010 success was not substantially higher. If we include those permit hunters that successfully harvested a buck in GMUs 127-142 during the general season then success increases to 65%, 51%, 66%, 64%, 44%, 67% in 2006, 2007, 2008, 2009, 2010, and 2011, respectively. Additionally, 4+ and 5+ bucks make up a greater percentage of the harvest in the Palouse hunt then in the general season, where 4+ bucks and 5+ bucks have averaged 77% and 25%, respectively, over the past eleven years.

Surveys

Available resources, land ownership, and deer behavior all combine to limit WDFW's ability to conduct surveys over the entire District (GMUs 124-142) and during all seasons. Pre-season ratios come from ground surveys conducted during August (for buck to doe ratio) and September (for fawn to doe ratio). They provide an estimate of fawn production for the year and buck ratios pre hunt. Post-season ratios come 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 that is intensified by hunting, the post-season buck:doe ratio is probably a conservative measure of true composition.

The pre-season mule deer ratios show a slow decline in both buck and fawn ratios over the past 10 years (Table 3 & 4). However, the 90% Confidence Intervals would indicate that there is no significant difference in these ratios across time. Pre-season ratios for white-tailed deer show a similar trend (Table 5 & 6). Both species also show high variability in the buck and fawn ratios in 2011. These negative trends in ratios may indicate a decline in the number of bucks and fawns, or an increase in the number of does, or the trend may just be a product of survey effort. Without population estimates it is difficult to determine which is occurring. However, given the increase in number of surveys in recent years (via use of volunteers) and the overlap in 90% C.I. between years, it is likely due to the increased survey effort in recent years and lower sample sizes in early years.

All post season composition data in Table 7 was collected via helicopter or fixed wing flights. The number of flights is limited due to available funds, which results in incomplete coverage of the district. White-tailed post season buck to doe ratios have been high the past four years, while fawn to doe ratios are lower than ideal, but appear to be improving relative to previous years. However, all of the post season surveys have been focused in more open GMUs (133-142) with high visibility and have not been conducted in forested GMUs of 124 and 127 which are the 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. Since 2009 mule deer fawn numbers appear to have rebounded. Post season mule deer buck to doe ratios have been very stable the past six years no matter the number of or coverage of the surveys. If we limit the analysis to legal bucks (3+ points) the average buck:doe ratio for the past six years is 3:100. This indicates that the current mule deer harvest is sustained by recruitment of yearling and 2.5 year old bucks.

Habitat and Disease

Mass 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 expired. Current outlook for the farm bill is for a reduction in CRP acreage which will negatively impact deer in this district.

Additionally emergency haying and grazing of CRP acreage occurs often in response to a severe drought or similar natural disaster. 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 is of primary concern in this district, especially in GMU 124, 127, and 130, with the redistribution of Spokane's urban populations outward into rural settings. High density development (>1house per acre) removes less habitat then low density, but tends to permanently displace the deer. While low density development (<1house per 10 acres) incorporates more habitat, direct disturbance is less and post construction more habitat is usable by deer. However, these deer tend to become damage/nuisance deer. Currently the district promotes high density cluster development with larger open space areas with the hope of maintaining larger connecting tracts of habitat.

Epizootic Hemorrhagic Disease (EHD) mortalities in PMUs 14 & 15 white-tailed deer populations were high in 1998, 1999, 2003, 2004, but almost nonexistent from 2005 onward. Drought conditions coincided with these large EHD outbreaks and likely exasperated them. There are some indications that mule deer have increased in areas that were occupied by white-tailed deer prior to 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 and Montana, which have 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 indicate that our harvest is being sustained solely 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 declines in harvest and hunter success. Discussions on long-term management of mule deer in Washington will address these and similar issues. Short-term recommendations are to continue monitoring buck escapement and to propose restrictions in hunting opportunity if declines in populations are observed.

We are meeting the Game Management Plan guidelines for post season buck ratios for white-tailed deer these past three years (WDFW 2008). However, post season surveys have been focused more in mule deer habitat (i.e. open terrain) than in white-tailed deer habitat and thus may not accurately reflect the entire district. Post season survey attempts in the more forested GMUs (124,127, & 133) have routinely produced low buck:doe ratios. However this is more likely due to the poor visibility and the almost nocturnal activity patterns of bucks once hunting season has opened, than an actual decrease in buck numbers.

Those units near urban centers continue to receive high hunting pressure and will need to be closely watched to avoid over or under harvest. So 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 antlerless 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 white-tailed antlerless opportunity for archery, muzzleloader, youth, senior, and disabled hunter seasons in units near the urban area of Spokane for white-tailed deer.

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Washington Department of Fish and Wildlife. 2010. Washington State Deer Management Plan: White-tailed Deer. Wildlife Program, Washington Department of Fish and Wildlife, Olympia.

Table 1. Summary of general season harvest in PMU 14 and 15 (special 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
2010	1228	408	1636	1409	334	1743
2011	1133	494	1627	1301	284	1585
AVERAGE	1313	363	1676	1416	365	1781

Table 2. Palouse special permit hunt results

	2006	2007	2008	2009	2010	2011
Num. Of Hunters*	342	395	344	411	459	380
Hunter Success**	57%	42%	59%	57%	36%	58%
% 4+ bucks**	85%	88%	89%	85%	91%	89%
% 5+ bucks**	29%	37%	37%	35%	50%	33%

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

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

Table 3. Preseason Mule Deer Buck to 100 Doe

	Buck :	90% C. I.		#	# Deer
Year	100Doe	Lower	Upper	Survey	
2002	50	26	97	4	112
2003	57	43	77	4	358
2004	34	21	53	9	257
2005	38	29	49	16	687
2006	45	37	55	9	270
2007	32	19	51	9	175
2008	42	31	56	12	481
2009	29	20	42	26	588
2010	30	20	45	17	648
2011	37	19	74	22	578

Table 4. Preseason Mule Deer Fawn to 100 Doe

Year	Fawn : 100Doe	90% C. I. Lower	90% C. I. Upper	# Survey	# Deer
2002	74	64	85	15	373
2003	92	82	103	6	320
2004	87	70	109	7	248
2005	64	43	94	5	168
2006	71	55	93	12	442
2007	76	63	92	9	278
2008	74	53	103	9	242
2009	57	47	69	21	733
2010	59	46	75	18	665
2011	80	44	146	20	824

Table 5. Preseason White Tailed Buck to 100 Doe

Year	Buck : 100Doe	90% C. I. Lower	90% C. I. Upper	# Survey	# Deer
2002	42	30	58	12	514
2003	34	26	44	9	512
2004	33	17	64	7	269
2005	35	25	48	14	453
2006	35	20	60	9	484
2007	33	24	44	8	605
2008	29	22	38	16	517
2009	25	21	29	38	1531
2010	28	21	37	28	1099
2011	23	14	38	26	934

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	276
2003	97	72	130	5	68
2004	76	67	86	10	296
2005	45	38	54	14	5
2006	65	54	79	12	598
2007	63	49	83	10	346
2008	61	54	70	10	447
2009	47	40	56	34	1662
2010	44	37	52	18	891
2011	54	37	78	25	1312

Table 7. Post season sex and age composition ratios.

Species	Year	(Buck:Doe:Fawn) Post-season	# Days	# GMU
Mule Deer	2006	25:100:70	4	5
	2007	22:100:59	1	1
	2008	22:100:52	2	2
	2009	22:100:71	4	4
	2010	20:100:79	4	3
	2011	24:100:79	5	4
White-tailed Deer	2006	9:100:63	4	5
	2007	10:100:44	1	1
	2008	36:100:48	2	2
	2009	31:100:64	4	4
	2010	30:100:62	4	3
	2011	25:100:83	5	3

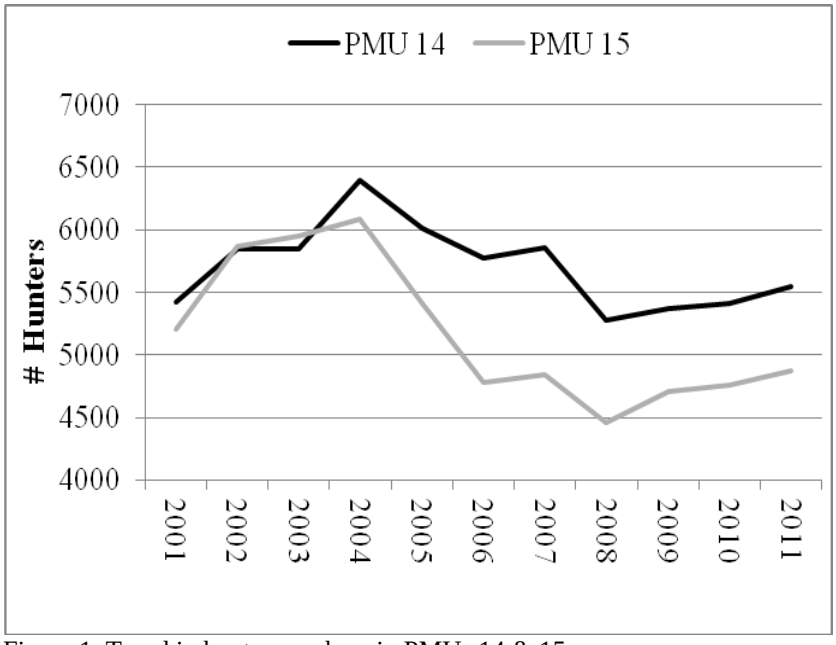

Figure 1. Trend in hunter numbers in PMUs 14 & 15.

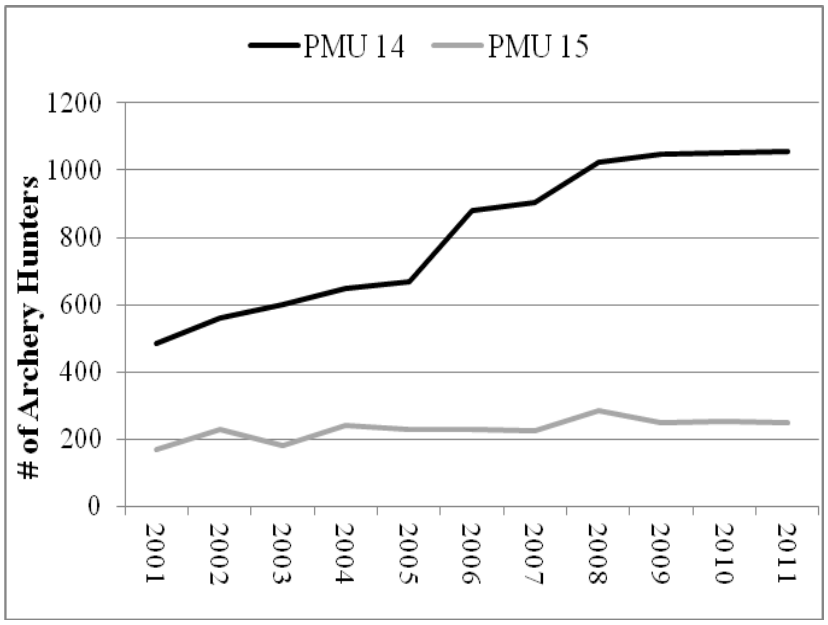

Figure 2. Trend in archery hunters in PMUs 14 & 15.

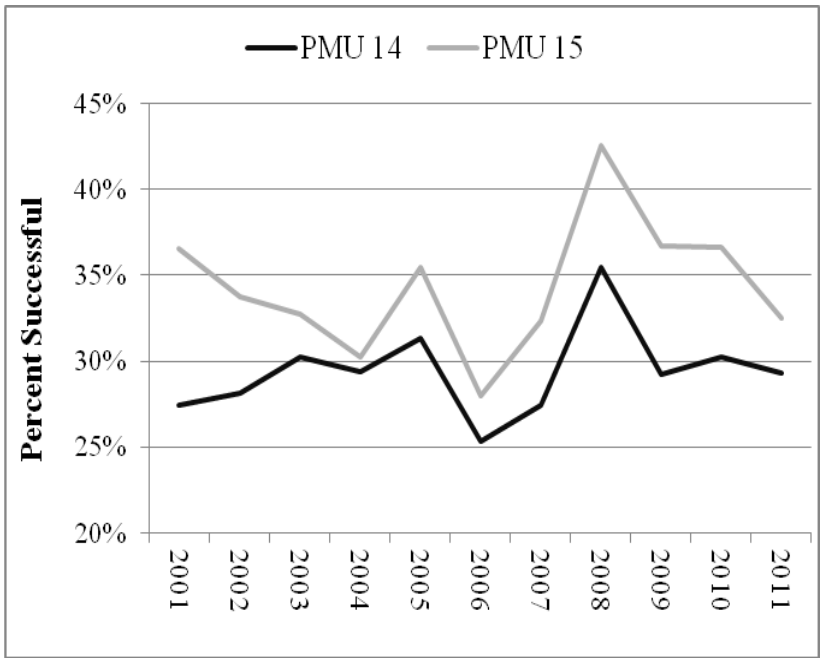

Figure 3. Hunter success rates in PMUs 14 & 15.

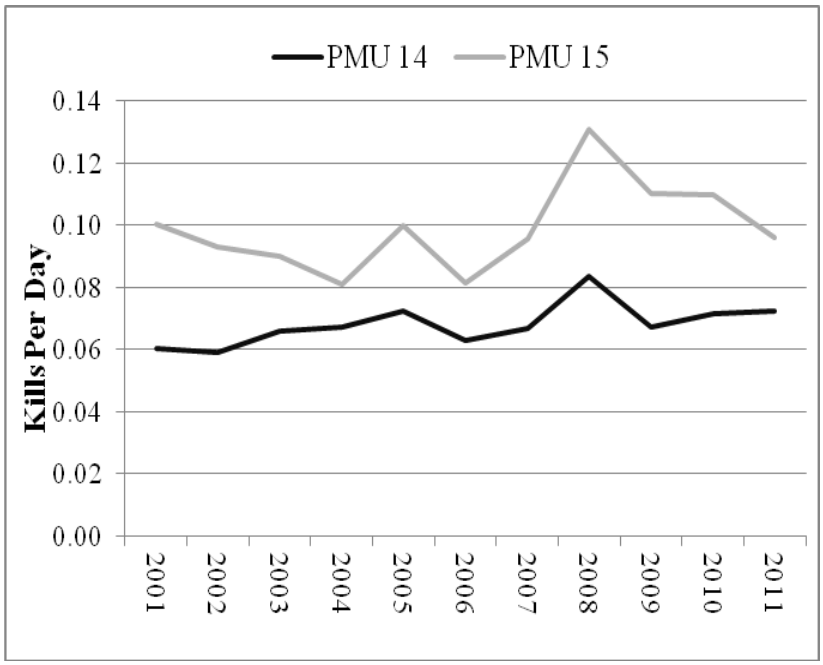

Figure 4. Catch per unit effort in PMUs 14 & 15.

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

Paul Wik, District Wildlife Biologist
Mark Vekasy, Assistant District Wildlife Biologist

Population Objectives and Guidelines

The goal set by the Washington Department of Fish and Wildlife (WDFW) for the management of deer populations in Washington is to maintain numbers within habitat limitations. Landowner tolerance, a sustainable harvest, and non-consumptive deer opportunities are considered within the land base framework (WDFW 2008). Our deer management goals are to maintain both white-tailed deer (*Odocoileus virginianus*) and mule deer (*O. hemionus*) numbers at levels compatible with available habitat and landowner tolerance, 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 2008) guidelines for buck escapement (post-hunt) by PMU, which are 15-19 bucks per 100 does in PMU 16, and 20 to 24 bucks per 100 does in PMU 17, and to maintain healthy fawn to doe ratios while minimizing agricultural damage from deer. In addition, the population goal from WDFW's White-tailed deer management plan (WDFW 2010) for the Palouse Zone and Blue Mountains Zone is to maintain the population at its current level or allow a slight increase as long as agricultural damage does not become a problem. The stated strategy to achieve this goal is to recommend hunting season structures and opportunity that will maintain white-tailed deer at their current numbers and distribution, while still attempting to maintain some opportunity for all user groups.

Based on limited aerial surveys, ground counts, and harvest estimates, the mule deer (*Odocoileus hemionus*) population in the Blue Mountains has remained relatively stable along the breaks of the Snake River. Mule deer populations in the mountains may still be depressed, but appear stable to slowly improving. White-tailed deer (*O. virginianus*) populations have recovered from EHD outbreaks and past high antlerless harvest in the western Blue Mountain foothills.

Hunting seasons and harvest trends

The accuracy of harvest data has improved since implementation of mandatory hunter reporting in 2001. From 2001-2010, District 3 combined general and permit season buck harvest averaged 2,097 bucks/year, and ranged from 1,789 to 2,599 . In 2011, hunters harvested 1,963 bucks (Table 1), 6% below the 10-year average. In 2011, the mule deer buck harvest averaged 58% four point or better, which is the same as 2010 and slightly above the 10-year average of 52%. General season hunter success was 25%, spread across all user groups (Table 2).

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 7,152 in 2011 (Table 2). Modern firearm (MF) hunters harvested 1,804 deer in 2011; 1,595 bucks and 209 antlerless deer. General season MF hunter success was 25%. While much of the decrease in harvest numbers can be attributed to decreasing hunter numbers, we need to be aware of other factors that may be affecting deer populations and harvest numbers, such as habitat loss (CRP, noxious weeds, conversion) or changes (fire, fire suppression, logging), predation (wolf, cougar, bear), weather (drought, winter severity), and disease (EHD).

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, but appear to have stabilized recently at close to 500 hunters, with 449 participating in 2011. Muzzleloader hunters harvested 159 deer in 2011, 125 bucks and 34 antlerless. Muzzleloaders enjoyed a success rate of 35% (Table 2), which was the highest success rate for any user group in the Blue Mountains.

Archery hunter numbers appear to be stabilizing, with 1,143 participating in 2011. Archers harvested 205 deer (115 bucks, 90 does), which is similar to the long-term

average (198 deer). The archery success rate was the lowest for all user groups at 18% (Table 2).

Species composition of the general buck harvest in 2011 was 61% mule deer and 39% white-tailed deer, more white-tails than in 2010 but similar to previous years. The MF antlerless harvest consisted of 21% mule deer, higher than 2010, despite most of the antlerless harvest being focused on white-tailed deer through special permits and general season hunts (Youth, Senior, and Disabled general seasons). The antlerless deer harvest continues to focus on white-tailed deer, due to persisting low numbers of mule deer in many units. A total of 261 general antlerless permits (either species) along with 300 permits for antlerless white-tailed deer were issued in 2011.

The 2011 permit-controlled and general season antlerless harvest totaled 491 antlerless deer (general season 337, permit season 154), 107 mule deer and 384 white-tailed deer. We have reduced antlerless hunting pressure on mule deer over the last few years due to drought impacts on mule deer fawn recruitment, while slowly allowing increased hunting opportunity for antlerless white-tailed deer due to increasing white-tailed deer numbers since the EHD outbreak. Antlerless deer were harvested at a rate of 25 antlerless deer per 100 bucks (Table 1); mule deer at 9 does/100 bucks and white-tailed deer at 51 does/100 bucks.

The antlered permit controlled hunt opportunities have been expanded in recent years, with modern firearm rut hunts available for mule deer in limited numbers and muzzleloader opportunities in the mountain GMUs prior to the modern firearm general season. The largest opportunity is still the late white-tailed deer hunts during November for modern firearm and muzzleloader hunters, which increased last season from 210 to 237 permits (Table 3). With limited returns from permit hunters, we calculated the following success rates: archery hunters, 50%; modern firearm, 65%, multi-weapon, 29%, muzzleloader, 41%. Overall, permit hunters had a 58% success rate.

Surveys

Both aerial and ground surveys are used to determine pre- and post-hunt herd composition. We conducted pre-hunt surveys from the ground, and classified 641 mule deer. This was a substantial increase over the 227 classified in 2010, and future efforts need to maintain the number of animals being surveyed in order to reduce the variance associated with the estimates.

Post-hunt surveys were conducted from the ground and air, with 1,029 mule deer classified (Table 4). Unlike last year, there was no funding available for additional surveys in the Lower Snake River Wind Development area (Garfield County), resulting in much lower numbers counted compared to 2010 (3,704 mule deer classified). The December fawn:doe ratio estimate was 56 fawns/100 does (*90% CI* 51 - 61), which was above the 5 year average (48 fawns/100 does).

The post-hunt mule deer buck:doe ratio was higher in 2011at 24 bucks/100 does (90% CI 21-27), compared to the average for the previous 6 years (17 bucks/100 does , *90% CI* 15 – 18) (Table 4). This increase in mule deer buck escapement may be another indication of a recovering mule deer population, or closure of wind farm development areas to hunting may have provided a temporary refuge for mule deer in adjacent habitat along the Snake River breaks. Although data on post-hunt herd composition for white-tailed deer is limited, buck ratios have averaged 21 bucks/100 does since 1995 and appear to be stable, with 23 bucks/100 does being estimated post-hunt in 2011.

Population Status and Trend

The mule deer population appears to be stable in the lowlands and along the Snake River breaks, but is still below the population levels that occurred from 1996-2003 based on harvest data. An initial effort to determine population size was implemented in the winter of 2010 in the area of the Lower Snake Wind Development. We conducted surveys following sightability protocols (Unsworth et al. 1994) and generated a population estimate for a given area in northern Garfield and Columbia Counties. It will be necessary to replicate this effort in future years to improve our knowledge of this population, but we were not able to replicate the effort in 2011.

White-tailed deer populations are improving since an EHD die-off in 2008 in the Touchet River drainage. In general, white-tailed deer numbers in the eastern Blue Mountains appear to have declined, while numbers on the westside of the Blues have improved.

Habitat

Summer-fall drought has occurred six out of the last 11 years (2001-2003, 2005, 2007, 2011), which can have a negative impact on recruitment. 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 increased fecundity. A drought during the summer-fall is thought

to result in poor physical condition for breeding and increased winter mortality, and can also result in poor fawn production/survival the following spring. Fall precipitation in 2010 was adequate and would not have been expected to impact 2011 recruitment numbers. Late Summer/Fall precipitation in 2011 was well below normal, but mild early winter conditions 2011-2012 coupled with higher than normal precipitation allowed for visible late season green-up and may reduce any impacts of the dry fall. It is unknown whether this will affect recruitment in 2012.

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 habitat provide connectivity between sub-herds, quality 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. To date, the CRP acreage in District 3 has shown only a slight decline, but nationally a lower cap on CPR acreage has been established and is likely to result in decreased CRP habitat as contracts expire. 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. While WDFW has partnered with private landowners and the Rocky Mountain Elk Foundation to fund star-thistle control efforts along the forest/ag-land interface, there has not been a similar focus on rangeland habitats. If partnerships and funding sources could be identified and developed, there may be the opportunity to improve deer habitat throughout rangeland areas of District 3.

Habitat conditions on 163,000 acres of National Forest and private land continue to improve following the extensive wildfires that occurred in 2005 and 2006 (School Fire- 53,000 acres, Columbia Complex Fire- 110,000 acres). The Columbia Complex Fire produced excellent conditions for habitat regeneration on over 80% of the acreage burned, whereas the School Fire burned extremely hot and will take decades to recover in some areas.

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. WDFW is currently working with private landowners in southern Columbia County on elk winter and summer range improvement. These activities will benefit mule deer and white-tailed deer as well.

Wind power development continues to expand in southeast Washington. In 2011, construction was completed on 150 turbines in northern Garfield County, and resulted in a temporary hunting closure over a significant area of the county. This new construction is phase 1 of the Lower Snake River Wind Development. This development is planning on approximately 850 turbines to be constructed in northern Garfield County. Another development has been proposed for northeastern Garfield County, effectively making these combined developments the largest planned windpower site in the country. It is unknown whether windpower development will negatively affect deer populations. WDFW has proposed to conduct research on this question, but funding is currently limited.

Damage complaints attributed to deer have been minimal in southeast Washington, compared to deer densities, although we are seeing increasing complaints in some of the winery areas near Walla Walla.

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 thought to be considerably below desired levels, but are slowly improving.

Periodic summer/fall drought along with localized severe winter conditions over the last eleven years (2001-2003, 2005, 2007, 2011) 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 2010 was slightly higher than the average for the past 5 years, and fawn survival was well above average in 2011, which, given favorable winter conditions and good over-winter survival, may bode well for both the 2012 and 2013 hunting seasons (Table 4).

The 2011 post-hunt mule deer buck ratio was higher than recent years at 24 bucks/100 does. Twenty-one percent of the post-season bucks classified were 3-years old or older, and these were predominantly observed on private land. A majority of the breeding occurring within the population is likely being done by yearling bucks (63% of the observed bucks post hunting season), but this has improved over last year's 78% yearling composition.

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.

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Washington Department of Fish and Wildlife. 2010. Washington State Deer Management Plan: White-tailed Deer. Wildlife Program, Washington Department of Fish and Wildlife, Olympia.

Table 1: Blue Mountains deer harvest summary (2002 – 2011)

Year	Antlered	Antlerless	Total	Mule deer % ≥ 4 point*	Does:100Bucks Harvested
2002	2,599	1,150	3,749	47%	44
2003	2,254	1,497	3,751	50%	66
2004	1,994	1,240	3,233	48%	62
2005	1,929	904	2,833	53%	47
2006	1,919	721	2,640	55%	38
2007	1,789	572	2,361	51%	32
2008	2,031	576	2,607	53%	28
2009	1,953	508	2,461	53%	26
2010	2,098	549	2,647	58%	26
2011	1,963	491	2,454	58%	25

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

Table 2. 2012 General season hunter success and effort for each GMU within the Blue Mountains district.

		GMU												
Weapon	Data	145	149	154	162	163	166	169	172	175	178	181	186	Totals
All Weapon	Reported Kill	269	593	281	328	86	76	23	62	47	224	188	27	2,204
	Success	39.6%	33.4%	24.3%	18.4%	18.1%	12.7%	8.3%	21.5%	9.3%	33.4%	35.5%	22.1%	24.9%
	Days/GMU	2,014	5,731	4,455	6,745	1,830	2,301	1,166	1,223	2,306	2,443	2,013	380	32,607
	# Hunters	680	1,777	1,157	1,781	476	600	277	289	507	670	529	122	8,865
	Days/Kill	7.5	9.7	15.9	20.6	21.3	30.3	50.7	19.7	49.1	10.9	10.7	14.1	14.8
Archery	Reported Kill	10	24	53	36	20	11	1	2	4	35	10	0	206
	Success	23.8%	24.2%	25.1%	15.3%	15.4%	11.8%	4.2%	11.1%	3.4%	25.2%	31.3%	0.0%	18.0%
	Days/GMU	272	538	1,109	1,227	695	558	150	136	687	730	160	15	6,277
	# Hunters	42	99	211	236	130	93	24	18	115	139	32	4	1,143
	Days/Kill	27.2	22.4	20.9	34.1	34.8	50.7	150.0	68.0	171.8	20.9	16.0	0.0	30.5
Modern	Reported Kill	245	475	223	288	65	64	21	55	42	187	116	23	1,804
	Success	41.4%	33.1%	23.9%	18.9%	19.2%	12.8%	8.4%	24.4%	11.4%	35.8%	32.1%	21.7%	25.2%
	Days/GMU	1,599	4,366	3,244	5,386	1,099	1,719	1,000	898	1,517	1,670	1,253	328	24,079
	# Hunters	592	1,434	933	1,522	339	501	249	225	367	523	361	106	7,152
	Days/Kill	6.5	9.2	14.5	18.7	16.9	26.9	47.6	16.3	36.1	8.9	10.8	14.3	13.3
Multi Weapon	Reported Kill	5	15	5	4	1	1	1	0	0	2	1	0	35
	Success	71.4%	48.4%	38.5%	17.4%	14.3%	16.7%	25.0%	0.0%	0.0%	25.0%	11.1%	0.0%	28.9%
	Days/GMU	20	120	102	132	36	24	16	28	41	43	40	7	609
	# Hunters	7	31	13	23	7	6	4	5	6	8	9	2	121
	Days/Kill	4.0	8.0	20.4	33.0	36.0	24.0	16.0	0.0	0.0	21.5	40.0	0.0	17.4
Muzzle loader	Reported Kill	9	79						5	1		61	4	159
	Success	23.1%	37.1%						12.2%	5.3%		48.0%	40.0%	35.4%
	Days/GMU	123	707			No Hunt			161	61	No Hunt	560	30	1642
	# Hunters	39	213						41	19		127	10	449
	Days/Kill	13.7	8.9						32.2	61.0		9.2	7.5	10.3

Table 3: 10-year summary of late white-tailed deer harvest, modern firearm and muzzleloader combined.

Year	Permits	Bucks	Does	Total	Success Rate	%Harvest ≥ 5 pt.*
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%
2010	210	77	3	80	58%	40%
2011	237	87	5	92	65%	37%

* Note: % 5 point for 2002-2004 is average for all seasons prior to 2005

Table 4. Post-hunt mule deer surveys 2002-2011, Blue Mountains, Washington

	Bucks					Ratios (90% C.I.)	
Year	Adults	Yrlg	Doe	Fawn	Total	Fawn (CI)	Bucks (CI)
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)
2010	80	290	2,232	1088	3,704	49 (46, 52)	17 (15, 18)
2011	74	124	831	466	1,495	56 (51, 61)	24 (21, 27)

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

The general modern firearm season remained at 9 days in 2011. Antlerless permit numbers for youth, senior, and disabled hunters remained conservative in 2011 due to mediocre over-winter fawn recruitment in recent years. The number of antlerless permits for the private land hunt on the Methow Valley floor stayed at 100 in 2011; however, only 25 permits will be issued in 2012 in response to declining damage issues. Antlerless permits for private land in the North Okanogan, Central Okanogan, Omak, and Conconully areas remain unchanged.

Hunter numbers, hunter success, and harvest have been quite stable over the last six years in both PMU 21 and PMU 22 (Figures 1-3). WDFW check station personnel surveyed 245 hunters and examined 43 deer in 2011 (Table 1). In 2010 we moved the check station site to a new location to co-locate with USFS personnel and improve station safety logistics. Consequently, data totals are not comparable to years before 2010. No biological sampling other than age-data collection occurred in this district in 2011.

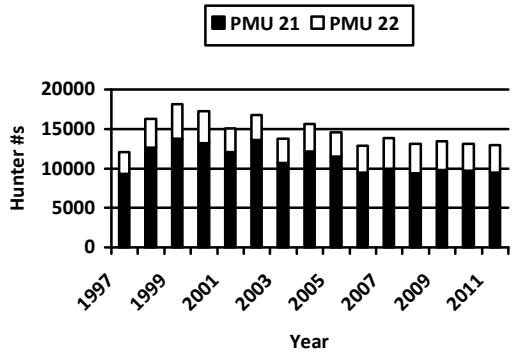

Figure 1. Trend in hunter numbers in PMUs 21 & 22.

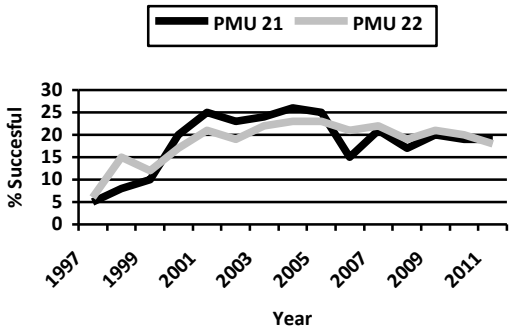

Figure 2. Trend in hunter success in PMUs 21 & 22.

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.

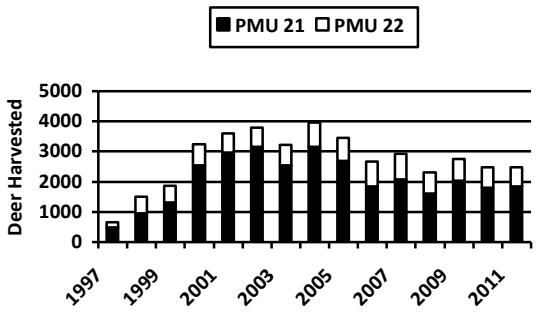

Figure 3. Trend in harvest in PMUs 21 and 22.

Table 1. Chewuch Check Station Results.

	Deer Type				
Year	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
2010	66	11	77	529	15
2011	37	6	43	245	18

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. In both seasons, surveys are not designed to census deer and differences in count totals are likely more reflective of changes in survey effort and survey conditions, rather than changes in actual population size.

Table 2. Post-season mule deer population composition counts in PMU 21 from 2011, by watershed. F:100:B is fawns and bucks per 100 does.

	Bucks					
Area	≥3 pt	<3 pt	Doe	Fawn	Total	F:100:B
Methow	114	178	959	767	2018	80:100:26
Okanogan	38	57	368	283	746	77:100:30
Total	152	235	1327	1050	2764	79:100:29

Biologists classified 2,764 mule deer during helicopter surveys of PMU 21 in early December 2011 (Table 2). The counts yielded overall buck:doe and fawn:doe ratios of 29:100 and 79:100 respectively. Buck ratios reached a 20+ year high, far exceeding the minimum management objective of 15. Fawn production came in right at the 15-year average (Table 3). Fawn recruitment improved a bit overall, but again varied considerably between the Methow and Okanogan watersheds, reflecting marked differences in winter severity in the two basins (Tables 4 and 5).

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.

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

	Buck Antler Class						
Year	≥3 pt	<3 pt	Subt	Doe	Fawn	Total	F:100:B
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
2010	147	183	330	1371	1126	2827	82:100:24
2011	152	235	387	1327	1050	2764	79:100:29

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 middle of the twentieth century.

Table 4. Spring mule deer population composition counts from 2012, by area for PMU 21. F:100A is fawns per 100 adults.

Area	Adult	Fawn	Total	F:100A
Methow	1454	446	1900	31:100
Oka	690	282	972	41:100
Total	2144	728	2872	34:100

For roughly the last 35 years, harvest data and population estimates suggest a gradually declining population. This is likely a function of the reduced shrub diversity, declining 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). Since then, herd size has fluctuated moderately in response to changes in winter severity.

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
2011	2259	696	2955	31:100
2012	2144	728	2872	34:100

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 now be fairly stable. Whitetail also sustained significant winter losses in the 90s, but populations rebounded with milder winters and have likely fluctuated since similar to mule deer.

In contrast to population size, herd composition is tied to harvest rather than habitat. Heavy hunting pressure on antlered mule deer in the past caused the buck:doe ratio to 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 15 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

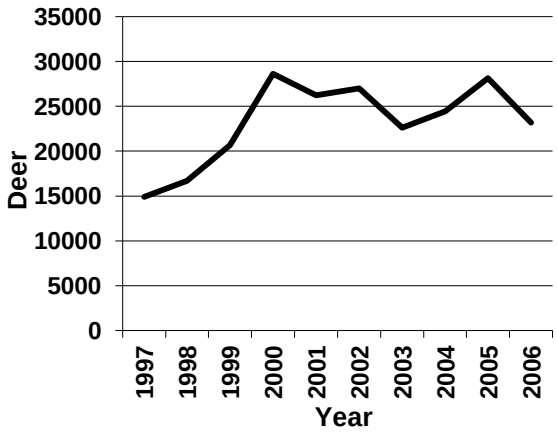

Figure 4. PMU 21 modeled deer population.

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.

In recent years, wild fires burned over 400,000 acres of deer habitat within the district, primarily at mid to higher elevations. This improved 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.

Several years of proactive road management have benefited deer and other wildlife; however, 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 national attempts to reverse protections for roadless areas, could result in expanded road construction and motorized use locally. Increases in motorized use and roaded forest land would result in 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 15 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, moderately tough winters have reduced recruitment and led to a noticeable herd decline. As a result, we have reduced antlerless permits accordingly.

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, fluctuations in fawn recruitment will likely be reflected in similar fluctuations in legal buck availability. Depending on hunting season conditions, buck harvest should improve in 2012 due to high mature buck carryover. The recent shortening of the general hunting season and corresponding earlier closing date have improved buck escapement and raised the post-season buck:doe ratio.

Over the last decade or two, populations of resident deer on the Methow and Okanogan Valley floor had increased significantly to problematic levels. Nuisance/damage complaints had risen sharply and population levels had 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. To date, the program is operating smoothly and appears to be successful in reducing deer nuisance/damage complaints, particularly in the Methow. Ultimately, long-term success will hinge on community acceptance and landowner cooperation.

DEER STATUS AND TREND REPORT: REGION 2

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

RICH FINGER, District 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 2011, only 5% (16 deer), 0%, and 7% (20 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 and minimize landowner conflicts.

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 early muzzleloader season were available in GMUs 272, 278, and 284.

All special permit opportunities in GMU 272 were restricted to antlerless permits in Deer Area 2011 (Lakeview) and in areas managed by the BuckRun Landowner Hunting Permit (LHP) Program. Special 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 any buck. No special 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 for any white-tailed deer, while GMUs 278 and 284 were open during the early muzzleloader general deer season for any white-tailed buck.

GMU 290 is restricted to special permit only. Opportunities in 2011 were available for modern firearm, muzzleloader, and archery hunters.

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).

Since 2001, hunters participating during the general modern firearm season have, on average, accounted for 74% of the total harvest in GMU 272. In 2011, harvest during the modern firearm season again constituted the majority (61%) of harvest, while harvest during the archery, muzzleloader, and permit seasons constituted 23%, 6%, and 6% of the total harvest, respectively (Figure 1).

The number of deer harvested on BuckRun has been steadily declining since 2005 and averages 63 deer annually. Declining trends in harvest levels on BuckRun have been a result of decreases in landowner harvest rather than decreases in local deer herds.

Table 1. Estimated number of mule deer harvested in GMU 272, number of hunters, hunter success (Suc), and days/kill (D/K), 2001–2011. Harvest estimates include mule deer harvested on BuckRun LHP.

	Harvest[1]					
Year	**B**	**D**	**T**	**Hunters**	**Suc[2]**	**D/K**
2001	275	63	338	1,649	0.20	18.2
2002	332	47	379	1,602	0.24	15.4
2003	277	57	334	1,254	0.27	15.5
2004	367	38	405	1,461	0.28	13.4
2005	257	86	343	1,325	0.26	14.5
2006	294	52	346	1,165	0.30	12.7
2007	304	35	339	1,210	0.28	14.7
2008	268	51	319	1,350	0.24	17.4
2009	263	33	296	1,359	0.22	18.7
2010	290	58	348	1,337	0.26	15.2
2011	254	66	320	1,410	0.25	17.6
Avg.	*289*	*53*	*342*	*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.

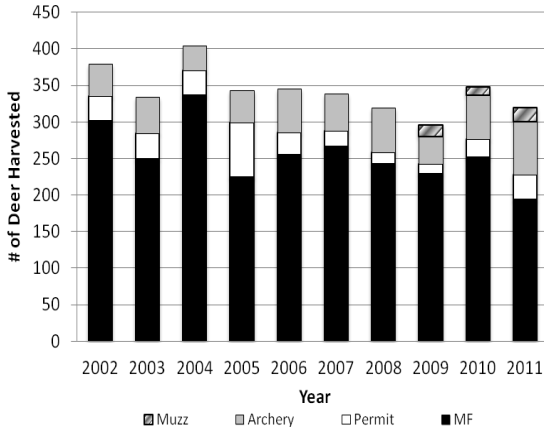

Figure 1. Estimated number of deer harvested by permit holders (permit) and during the general modern firearm (MF), muzzleloader (Muzz), and archery seasons in GMU 272, 2002–2011. Data includes deer harvested on BuckRun LHP.

GMU 278.—With only 43 mule deer and no white-tailed deer harvested in GMU 278 during the 2011 season, harvest levels remained low. Hunter numbers steadily increased from 158 in 2001 to 272 in 2011. Overall hunter success was 16% and close to the long-term average of 17%.

GMU 284.—After late season muzzleloader opportunities were removed following the 2002 season, harvest levels in GMU 284 followed a slight downward trend until they increased slightly in 2008 (Figure 2). Hunter numbers have been relatively consistent since 2003 (Table 2). Harvest during the general modern firearm season accounted for 73% of the harvest in 2011, which was nearly identical to the 10-year average of 76%. Hunter success was 37% in 2011 and has remained relatively stable since 2001(Table 2).

Table 2. Estimated number of mule deer harvested, number of hunters, hunter success rate (Suc), and days/kill (D/K) in GMU 284, 2001–2011.

	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
2010	220	37	257	692	0.37	8.6
2011	240	36	276	752	0.37	9.7
Avg.	*256*	*39*	*295*	*775*	*0.38*	*8.7*

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

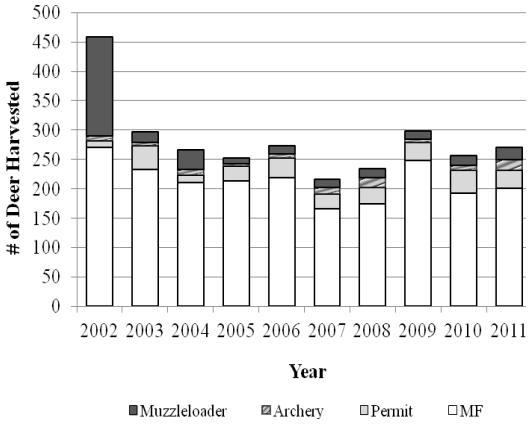

Figure 2. Estimated number of deer harvested during the general modern firearm (MF), archery, and muzzleloader seasons and by permit holders in GMU 284, 2002–2011.

GMU 290.—Hunters harvested 21 bucks and 22 does in 2011 (Table 3). Success rates remained high during the modern firearm any deer season where 95% of hunters reported harvesting a deer. Success rates of 65% during the modern firearm antlerless season were comparable to the long-term average

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, 1997–2011. Values in parentheses are the number of permits that were available.

	Harvest			Hunter Success				
Year	**Buck**	**Doe**	**Total**	**MF Any**	**MF Doe**	**Archery**	**Muzzleloader**	**Youth**
1997	22	0	22	0.84 (26)	na[1]	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)
2010	21	22	43	0.89 (19)	0.63 (50)	0.13 (18)	0.50 (2)	na
2011	21	22	43	0.95 (19)	0.65 (50)	0.06 (20)	1.00 (2)	na
Average	*17*	*15*	*32*	*0.93*	*0.66*	*0.14*	*0.43*	*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, these data allow managers to evaluate the current status of mule deer populations. Due to the limited number of deer 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.) and survey date has varied from late-October to early-January. However, surveys are typically conducted by ground during late-October. In 2011, biologists conducted post-hunt surveys in November using ground based road surveys. A total of 734 deer were observed with a resulting buck:doe:fawn ratio of 30:100:70. Thirty-six percent (263) of the mule deer observed were located on BuckRun LHP.

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. From 2009-11, 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 2011, biologists classified more than 4,944 mule deer with a resulting buck:doe:fawn ratio of 24:100:80. 825 mule deer were located in GMU 284 with an estimated buck:doe:fawn ratio of 26:100:81.

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 between permit seasons to avoid disrupting ongoing hunts. In 2011, 49 volunteers surveyed more than 35,500 acres and classified 364 mule deer.

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

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 (%), 1996–2011.

Year	B	D	F	Total[1]	B:D:F	%
1996	47	223	187	457	21:100:84	0.23
1997	29	213	133	375	14:100:62	0.31
1998	64	181	157	402	35:100:87	0.44
1999	50	213	176	439	23:100:83	0.48
2000	38	201	166	405	19:100:83	0.29
2001	85	435	282	802	20:100:65	0.36
2002	84	510	331	925	16:100:65	0.40
2003	77	517	306	900	15:100:59	0.25
2004	63	435	208	706	14:100:48	0.40
2005	62	272	146	480	23:100:54	0.39
2006	67	377	197	641	18:100:52	0.30
2007	72	415	227	714	17:100:55	0.38
2008	77	366	252	707	21:100:69	0.31
2009	49	256	97	439	18:100:38	0.39
2010	100	425	246	872	24:100:58	0.43
2011	105	348	244	734	30:100:70	0.34
Avg.	*67*	*337*	*210*	*625*	*22:100:58*	*0.36*

[1] Deer that were observed during surveys but could not be positively classified by observers are included in the Total.

fawn:doe ratio from 2007–2011 has been 58:100 (Table 4) and with the exception of data from 2009 has shown low to moderate variability [Coefficient of Variation (CV) = 23%].

Long-term average buck:doe ratio is 22:100 (CV = 28%). The long-term average proportion of adult bucks (≥ 2.5 years old) observed during post-hunt surveys average 36% and has shown low variability (CV = 7%).

Trends in the total number of deer harvested in GMU 272 suggest a stable population (Table 1). 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 (< 57 deer harvested annually since 2001), but have shown a significant degree of variation (CV = 26%). 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 2001–2011 was 67:100 and showed marginal amounts of annual variation (CV = 14%; Table 5). This suggests that herd productivity remained relatively constant during this time period. Relatively stable harvest levels (total harvest CV = 10%) and trends in hunter effort (CV = 10%) since 2003, also indicate the rate of increase for this deer herd has remained relatively stable.

Adult sex ratios (buck:doe ratio; CV = 37%) and age

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 (%), 2000–2011. 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	Total[1]	B:D:F	%
2000	43	167	121	331	26:100:72	0.42
2001	25	69	42	136	36:100:61	0.64
2002	40	156	96	292	26:100:62	0.60
2003	90	491	300	927	18:100:61	0.27
2004	63	445	270	778	14:100:61	0.60
2007	15	241	117	373	6:100:49	0.47
2008	51	211	123	416	24:100:58	0.35
2009	83	438	360	881	19:100:82	0.34
2010	46	100	82	228	46:100:82	0.26
2011	36	122	83	250	30:100:68	0.44
Avg.	*55*	*244*	*164*	*471*	*27:100:67*	*0.44*

[1] Deer that were observed during surveys but could not be positively classified by observers are included in the Total.

structure of the male segment of the population (% of bucks ≥ 2.5 year old; CV = 34%) have both shown significant amounts of annual variation since 2000. Post-hunt buck:doe ratios were close to the long-term average following the 2011 season (Table 5).

GMU 290.— With the exception of archery, 2011 harvest levels were very close to the long-term average (Table 3). Survey data also suggests a slightly decreasing population in GMU 290 (Table 6, Figure 3).

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, 1998–2011.

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
2010*	61	47,861	144	291	116	12	563	52:100:43	0.63
2011*	49	35,557	97	207	60	7	371	50:100:32	0.57
Avg.	*41*	*38,097*	*108*	*240*	*113*	*28*	*489*	*45:100:49*	*0.57*

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

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

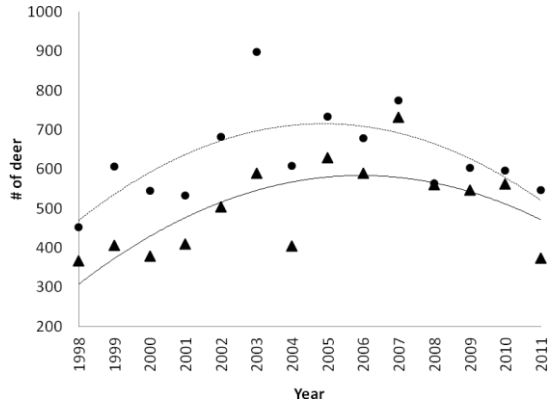

Figure 3. Long-term trends for the number of deer observed during post-hunt surveys in GMU 290 (▲) and projected number of deer that would have been observed had all sectors been surveyed (●), 1998–2011.

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.

Using this approach to project population sizes from data collected 1998–2011 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 slowly declined 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 and were not double counting deer.

Fawn:doe ratios indicate productivity rates for this herd remained at moderately low levels since 2003, but have shown a slight increase since 2007 (Table 6 and Figure 4). However, coincident aerial survey data during 2011 confirmed suspicions that fawns are often misclassified during the volunteer ground count. GMU 290 provides high quality habitat and fawn development is rapid, making them difficult to differentiate from does based on size alone. Aerial surveys have the added advantage of giving surveyors a better view and more time to make accurate classifications. The fawn:doe ratio difference between aerial and ground surveys was 49:100 and 32:100, respectively, suggesting our fawn:doe survey data cannot be relied upon entirely.

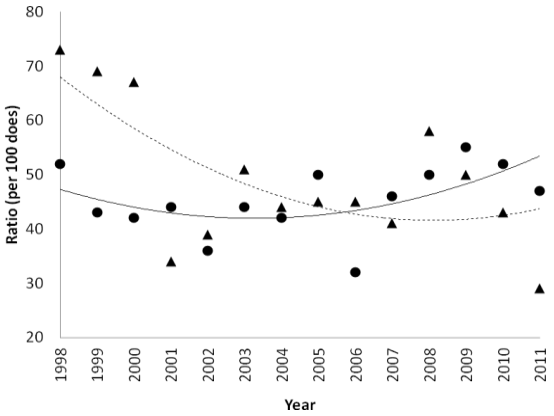

Figure 4. Long-term trends for post-hunt fawn:doe (▲) and buck:doe (●) ratios in GMU 290, 1998–2011.

Buck:doe ratios show an increasing trend since 2006 (Figure 4), and are well above the management objective of 30 bucks:100 does. The proportion of bucks observed during surveys that were ≥ 2.5 years old has declined in recent years but is equal to the long-term average (Table 6).

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*).

Bitterbrush (*Purshia tridentata*), an important deer browse, 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 2011.

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

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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 2011 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 2011, 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. 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. Twenty muzzleloader special permits were issued during 1-8 October for any buck in GMU 381.

The modern firearm general season was 9 days long (15-23 October) with a 3-point minimum restriction for mule deer and any white-tailed deer in PMU 31. Ten youth, 10 senior and 10 disabled special modern firearm permits for antlerless deer were issued. In addition, 10 modern firearm quality deer permits for mid-November and 20 modern firearm antlerless permits for early-December were issued in GMU 381.

Total deer harvest has averaged 344 (range 147 - 539; SE = 31.8) since 2000. The 2011 harvest was the highest for the 12-year monitoring period and represented a 36% increase over the 12-year average (Table 1). Most of this increased harvest was due to a substantial increase in doe harvest during the muzzleloader late general season, but there also was an increase in the buck harvest as well. Modern firearm general season hunters harvested more bucks (75% of total) than all other hunters combined. The percentage of harvest contributed by muzzleloader general season hunters continued to increase; from 37% in 2010 to 42% in 2011. This same group took 83% of the antlerless deer harvested in 2011. Archery remained a small portion of the total harvest at 1%.

Table 1. Deer harvest and hunters in PMU 31 during 2000 - 2011. Data are combined for general and permit seasons.

	Harvest			Hunters	
Year	Buck	Doe	Total	Success	Number
2000	119	28	147	25%	579
2001	205	72	277	40%	699
2002	239	99	338	42%	808
2003	220	60	280	31%	913
2004	214	67	281	25%	1125
2005	251	62	313	31%	997
2006	190	86	276	27%	1017
2007	235	100	335	29%	1158
2008	303	85	388	33%	1180
2009	335	170	505	40%	1249
2010	282	165	447	38%	1192
2011	337	202	539	40%	1356
Avg.	244	100	344	33%	1023

Surveys

In 2011, coordinated aerial surveys across Regions 1, 2, & 3 (and PMUs) were completed for a third year in late November and early December to estimate deer herd size at a meaningful scale. The surveyed area included randomly selected units in Whitman, Franklin, and Adams Counties. 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 aerial surveys 5,053 mule deer were classified. Of this total, 1,356 were classified in GMU 381, primarily on private land above the breaks of the Snake River. Estimated ratios for the GMU were 19 bucks and 67 fawns per 100 does.

Post-hunt roadside composition surveys were initiated in 2004 to estimate buck:doe:fawn ratios. These surveys are conducted from vehicles in the eastern portion of GMU 381 near the Snake and Palouse Rivers in winter prior to antler drop. Two surveys of two driving routes in mid-December 2011 yielded estimates of 19 bucks and 59 fawns per 100 does, and a high count of 573 deer classified. Both the 2011 buck and fawn ratios were close to the 2010 estimates (Table 2). The buck ratio estimates from the aerial and roadside surveys were similar, providing confidence in the ratio estimate. In contrast, the fawn ratio from the roadside survey was lower than the aerial survey estimate (i.e., 59 vs. 67). 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.

Table 2. Post-hunt deer surveys in GMU 381 during 2004 - 2011. Buck, doe, and fawn numbers were from the survey that yielded the highest count. Ratios were averaged across the two 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
2010	57	365	210	632	20	56
2011	58	332	183	573	19	59

Over 80% of the bucks observed during roadside and aerial 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 11 years, greater than 3 point bucks have comprised over 40% of the buck harvest and have comprised over 60% the last three years (Figure 1).

Population status and trend analysis

The results of the coordinated aerial survey across regional 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 & 2).

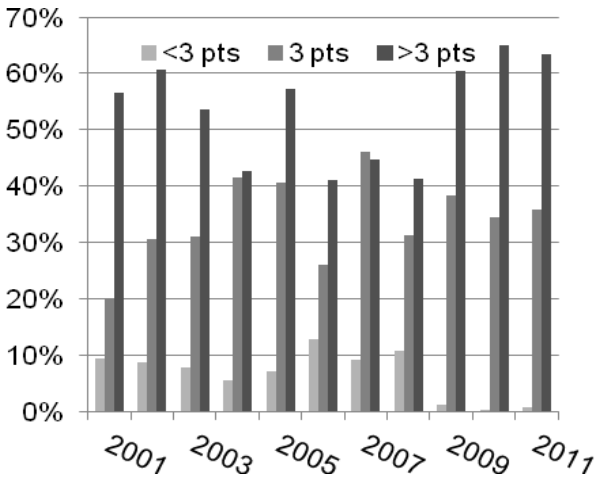

Figure 1. Antler points as a percentage of buck harvest in GMU 381.

No survey data are available for GMU 379. For several years the GMU was managed with very liberal harvest seasons to reduce crop damage risk. Because of no recent deer damage complaints, it was decided to reduce harvest beginning in 2009 to increase the herd, especially on the Hanford Monument. As a result, harvest in the unit has declined from an average of 76 deer during the 2006 through 2008 period to an average of 29 during the 2009 through 2011 period. In the short term, harvest has declined, especially of does. In the long term, it is anticipated that the herd will increase and eventually more deer will be available for harvest.

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 cultivation. Most of these lands receive various levels of livestock grazing. Numerous irrigation waterways traverse this

landscape, providing some deer habitat. Wildfires on the Hanford Reach National Monument in 2005, and again in 2007, reduced the amount of habitat, especially shrub cover, 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 and cover. 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. Changes with the 2008 Farm Bill and increased commodity prices, especially for wheat, are influencing farmers' decisions on whether to reenroll their fields in CRP or return to farming. If the latter case prevails, then deer habitat in the GMU 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 substantial increase in doe harvest since 2009 with advent of the late muzzleloader general season requires monitoring to assure harvest is not reducing the population below 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 were similar to 2010, 54% below the average for the 1990s, and 15% below the 10 year average (Table 1). This is likely a response to lower deer numbers and less antlerless hunting opportunity. Harvest increased slightly in all PMU's except PMU 35 (Table 2).

Surveys

In December of 2011, ground surveys were conducted in PMU's 32, 33 and 36 (Table 3). There was a slight decrease in deer seen on the surveys compared to 2010.

Table 1. Number of deer hunters and success rate PMUs 32-36, 1991-2011.

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
2010	8,650	672	2,332	11,654	7
2011	8,587	632	2,337	*11,887	8
10-yr avg	10,207	731	3,110	14,049	11

*Includes multi weapon tags

Buck ratios were above objective in PMU's 32 and 33. PMU 36 was below objective, but the sample size was fairly small.

PMU 32 was aerial surveyed for population in April 2012 (Table 4). The estimate (4916 ±808) was 35% above the last survey in 2008.

Population status and trend analysis

Deer populations in the district now appear to be stable or increasing the last few years, but still well below historic highs. Above average precipitation combined with mild winters have help boost populations slightly.

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
2010	311	0	266	0	120	8	64	0	100	0	861	8
2011	339	0	328	0	134	6	52	0	130	0	983	6
10 yr avg.	452	104	368	110	154	34	110	36	131	39	1,215	321

There appears to be a strong relationship between the expansion of an exotic louse *Bovicola tibialis* and deer population decline around 2004. Observations of deer with hair loss are still common throughout the district, but populations are slowly recovering. *Bovicola tibialis* is different from the exotic louse *Damalinia* (*Cervicola*) sp., which has caused hair loss in the black tailed deer in western Washington and Oregon. 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. However, the decline in both harvest and population estimates since 2004 is not due to winter weather or regulation change. The winter of 2004-05 was one of the mildest on record. There have been droughts in the lower elevations from 2003-2009, 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 36 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 cycle was broken in 2009 and 2010 in the lower elevations. Forage production on winter range has increased the last few years. Houses are also being built in prime winter range.

Management conclusions

It is unknown how the lice will affect mule deer in the long-term. Despite no antlerless hunting since 2006 and relatively favorable weather, the deer population in the district is still low. Statewide, the average deer hunter success is 22% compared to 8% in 2011 for the district. The increase in harvest and deer seen in PMU 32 is somewhat encouraging. . The Muckleshoot Indian Tribe (MIT) surveyed PMU 33 and also noted higher populations in spring 2012. MIT is also planning to study doe survival, which should help better understand both movements and population dynamics.

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
2010	32	273	54	20
2011	32	127	48	26
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
2010	33	322	55	17
2011	33	316	48	19
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
2011	36	108	52	9

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
2011	NA	2691± 206	NA	NA
2012	4916 ±808	NA	NA	NA

DEER STATUS AND TREND REPORT: REGION 4

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

Paul M. DeBruyn, Wildlife Biologist

Population objectives and guidelines

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. 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. 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. Although by definition all deer of the black-tailed/mule species *Odocoileus hemionus*, west of the Cascade crest are considered black- tailed deer, GMU 426 differs from other areas in that high elevation habitats support predominately mule deer or mule/black-tail hybrid populations, as opposed to black-tailed deer only in lower elevation units.

Hunting seasons in GMU 410 (islands) are characterized by any deer hunts for all weapon types, Firearms restrictions (except Cypress Island) and liberal second deer (antlerless) special permit hunts.

Hunting seasons in 407 feature any buck modern firearms season and any deer archery and muzzleloader seasons. There are firearms restrictions in place west of Interstate 5. GMUs 407 and 410 have early and late seasons for all weapon types running from September first through the end of December.

Hunting seasons in GMU437 are the same as GMU407 with the exception of there being a two point minimum antler restriction for bucks hunted with all weapon types and no late seasons for modern firearms or muzzleloaders.

Hunting seasons in GMUs 418 and 426 are the same as GMU 407 with the exception of no late season hunts for any weapon types. There is a quality (special permit) modern firearm hunt in GMU418 during November.

Harvest and recreational opportunity profiles for GMUs 407-437.

Black-tailed deer harvest in GMUs 407 – 437 during the 2011 season totaled 1,657 animals (Table 1). Antlerless harvest for the 2011 season totaled 419 animals (25% of total harvest) while antlered harvest totaled 1238 animals (75% of total harvest). In 2011, the number of general season hunters in GMU 407 increased from 2010, and the number of deer harvested increased (Figure 1) yet hunter success decreased 7 % to 22%. The number of hunters in GMU 410 also increased from 2010 (figure 2), and hunter success was up 5 % to 40%. In 2011 the second deer harvest was restricted to antlerless animals in all deer areas in GMU 410. In addition the price of second deer tags was raised from $26.00 to $68.00. Lower hunter numbers and lower harvest of deer using second tags in GMU 410 was due at least in part to these changes (Table 2).In GMUs 418, 426, and 437, the number of hunters was down from 2010, and harvest was lower however hunter success increased from slightly from 17% in 2010 to 18% in 2011 (Figure 3). The proportion of deer harvested within GMUs 407 – 437 (1,657 animals) as compared to the statewide harvest for the 2011 season (31,670 animals) indicates that these northern Region Four GMUs represent 5.2% of the statewide total harvest, up slightly from 2008 through 2010. Tribal harvest in GMUs 407-437 for the 2010 season consisted of 12 bucks and 13 does harvested in GMU 407, 3 bucks in GMU 410, 22 bucks and 21 does in GMU 418, and 16 bucks and 12 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 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 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.

Population status and trend analysis

The only monitoring of population status and/or trends in the mainland GMUs is the anecdotal observations of hunters, 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 2011. Six kill permits were issued by WDFW enforcement officers in Whatcom County, of which 3 were used to remove antlerless deer from agricultural operations experiencing damage problems.

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.

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.

Management conclusions

Future goals for effectively managing north Region Four deer populations include:

1. Explore a comprehensive habitat analysis of deer range in Whatcom, Skagit, and San Juan counties.

2. Start developing deer herd monitoring protocols for Whatcom, Skagit, and San Juan counties.

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 through a private lands hunter access program.

4. Continue to conduct targeted surveillance for chronic wasting disease in Whatcom, Skagit, and San Juan counties' deer populations.

5. Continue monitoring local deer populations for presence/absence, distribution and severity of hair loss syndrome.

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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.

Table 1. Deer harvest summary for GMU's 407-437, 2011

Harvest	Modern Firearm	Archery	MZL	Multiple Weapons	Special Permit	Total
Antlerless	124	162	53	9	71	419
Antlered	1004	154	37	27	16	1238
Total	1128	316	90	36	87	1657

Table 2. Second Deer Harvest Results by Island 2010-2011

Island Name	2010 Hunters	2011 Hunters	2010 Antlered	2010 Antlerless	2010 Total Harvest	2011 Total Harvest (Antlerless)	2010 Success (%)	2011 Success (%)
Shaw	18	9	5	2	7	5	38	55
Lopez	25	27	11	5	15	5	60	15
Orcas	19	17	10	2	12	9	63	12
Decatur	7	6	2	2	4	6	57	53
Blakely	17	15	6	6	12	8	71	53
Cypress	17	14	3	6	9	6	35	43
San Juan	18	21	10	4	14	13	78	62
Camano	16	13	3	2	5	2	31	15
Whidbey	42	39	8	7	15	14	36	36
Guemes	12	14	3	3	8	3	66	21
TOTAL	191	165	61	37	98	71	54	43

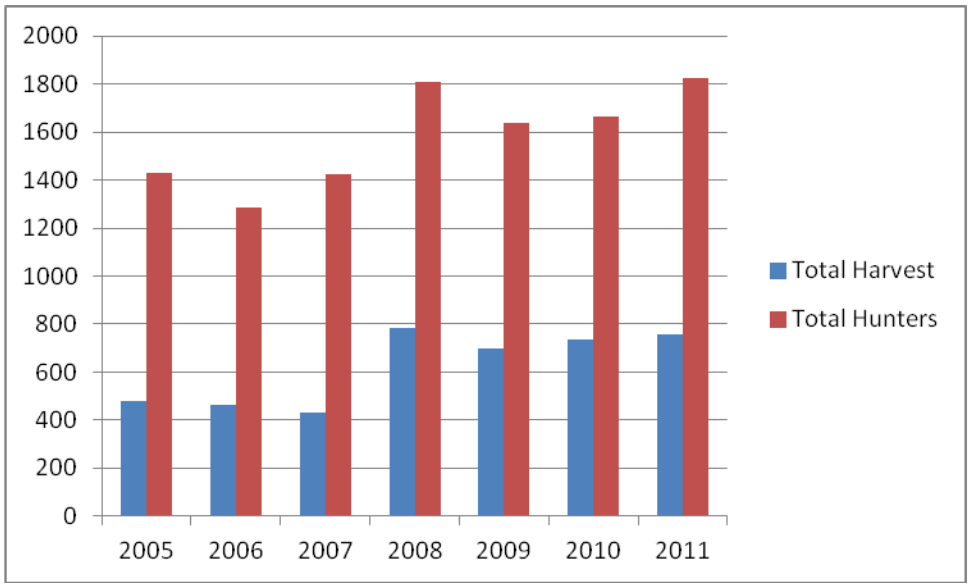

Figure 1. Deer Harvest and Number of Hunters in PMU 41 GMU 410 2005-2011

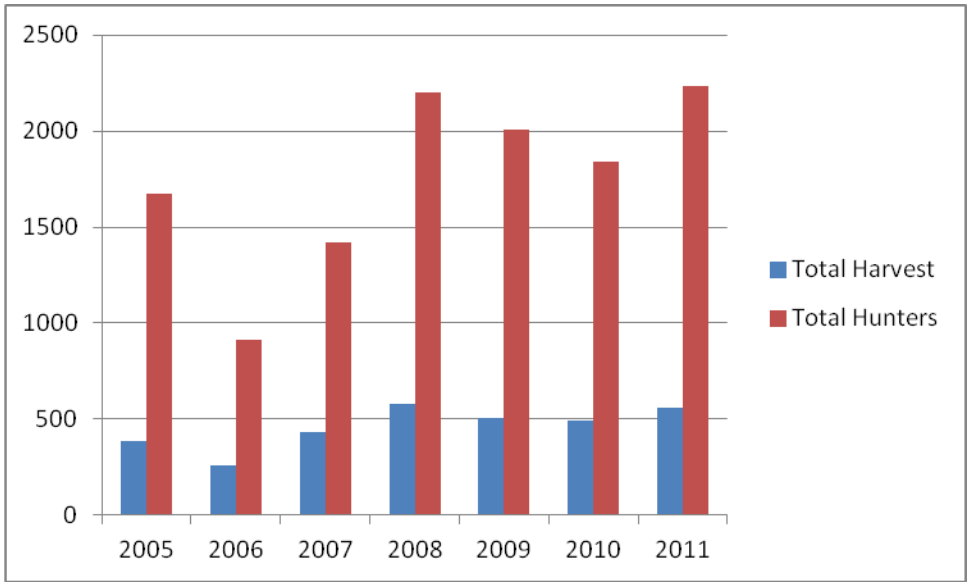

Figure 2. Deer Harvest and Number of Hunters in PMU 43 GMU407 2005-2011

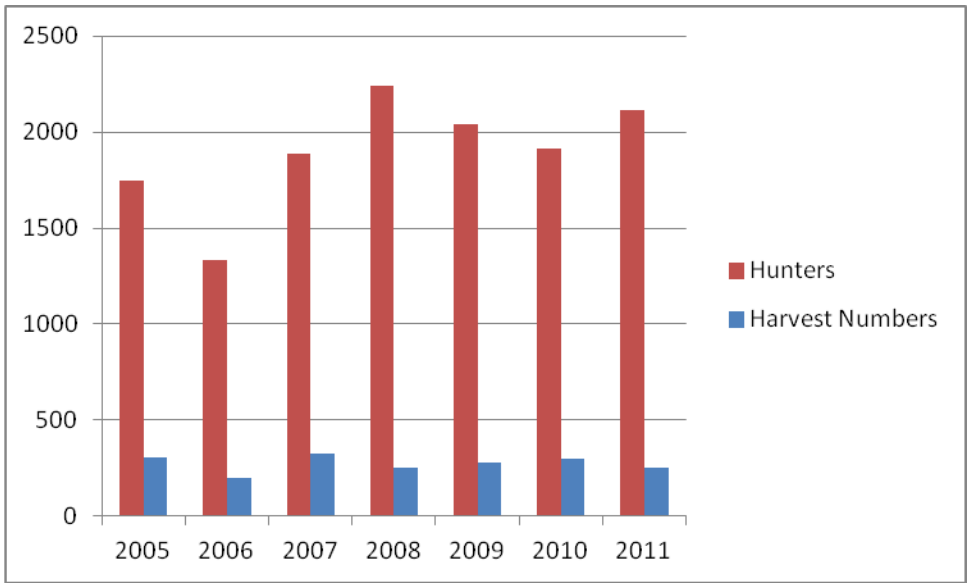

Figure 3. Deer Harvest and Number of Hunters PMU 45 GMUs 418, 426 and 437

DEER STATUS AND TREND REPORT: REGION 4

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

CHRIS ANDERSON, Acting 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 and late archery season, for any deer. GMU 454 has both an early and late muzzleloader season for any deer.

GMU 454's more liberal seasons are designed to maintain the population 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 buck harvest beginning in 1999 (Fig. 1). Total buck harvest post 1998 showed an approximate 82% 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 generally been low with some annual variation. This is likely due to dry early fall weather and early winter snowfall, both influencing hunter success in this unit.

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			

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. The late buck season closure in 1998 certainly contributed to a 45% decline in total buck harvest compared to 1997. Since the late buck closure, harvest has been lower with less variation; averaging around 165 deer taken annually from 1998-2011 (Fig. 4). Access fees in Hancock Forest Management lands in GMU 460 have increased over time and may contribute to lower number of hunters.

Table 2. Postseason Deer Composition Ratios per 100 Does 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)

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 deer with harvest type varying A youth hunt was added in 2006. 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. 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.

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 are not likely to be detected. 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 2012).

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
2010*	No	Data	-	-
2011	59	63	30	719 ± 641

* Poor weather prevented completion of the survey.
Per 100 ratio.

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.

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.

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 keep deer at acceptable levels in developing areas. Isolated groups of deer, generally on the eastern boundary of the GMU, should continue to offer hunting and recreational viewing opportunity.

In GMU 460, the Region will maintain the late buck season closure for modern firearms and measure response by monitoring post-hunt buck:doe ratios.

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

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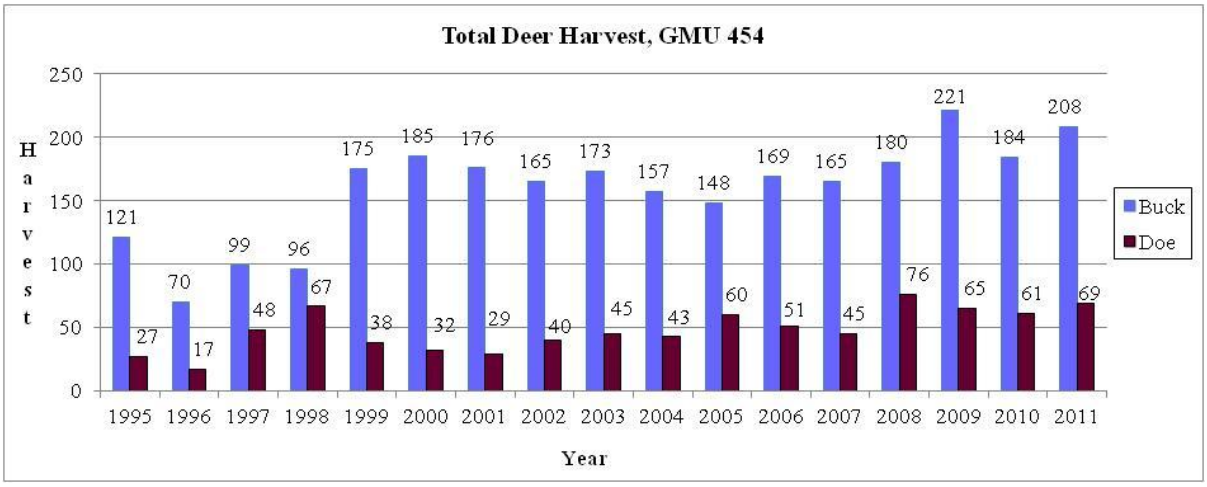


Figure 1. Annual deer harvest in GMU 454, all weapon types, 1995-2011.
*2004 harvest reflects uncorrected raw data reported from hunter report.

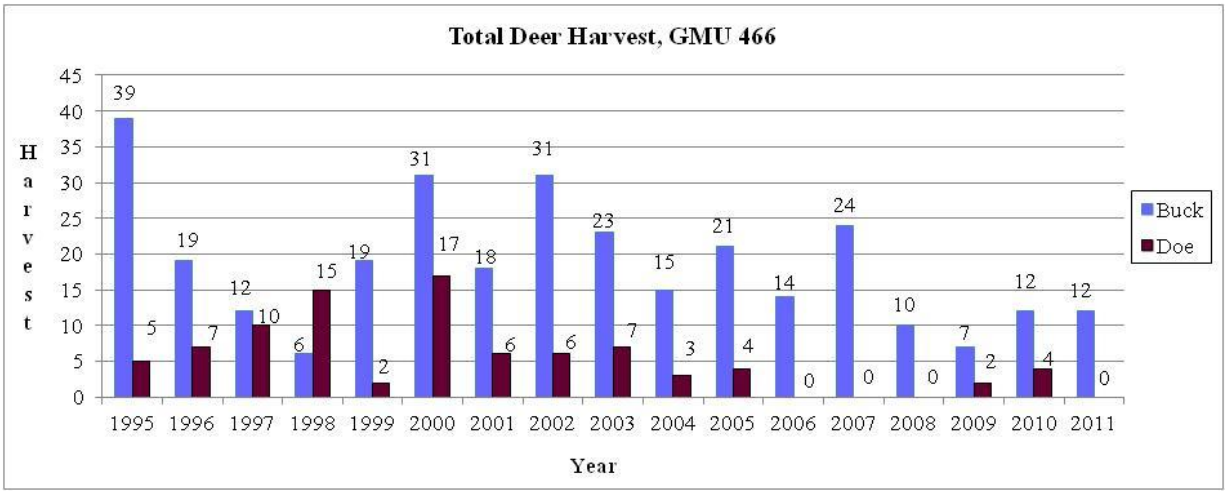


Figure 2. Annual deer harvest in GMU 466, all weapon types, 1995-2011.
*2004 harvest reflects uncorrected raw data reported from hunter reports.

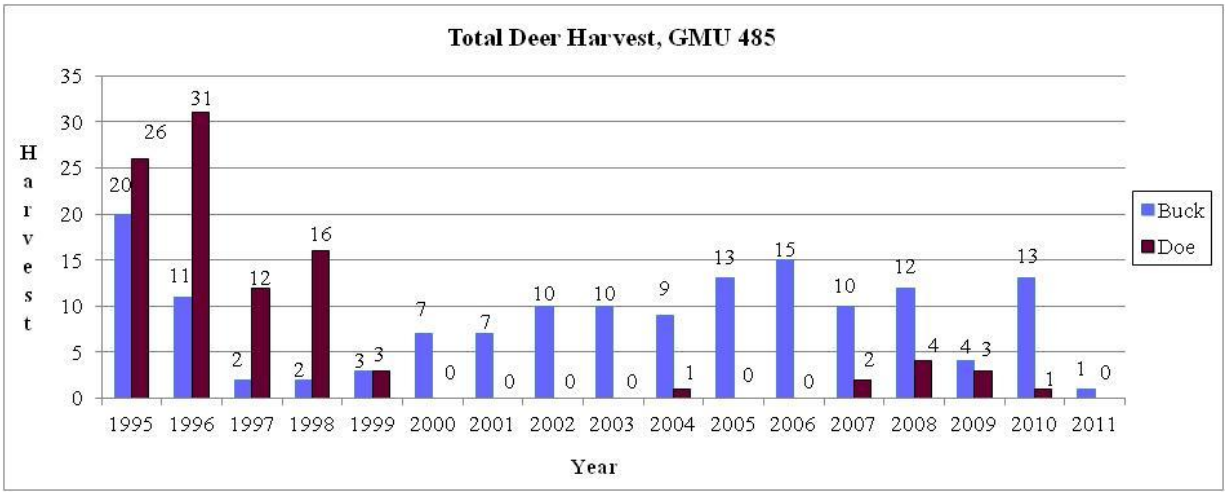


Figure 3. Annual state deer harvest in GMU 485, 1995-2011.

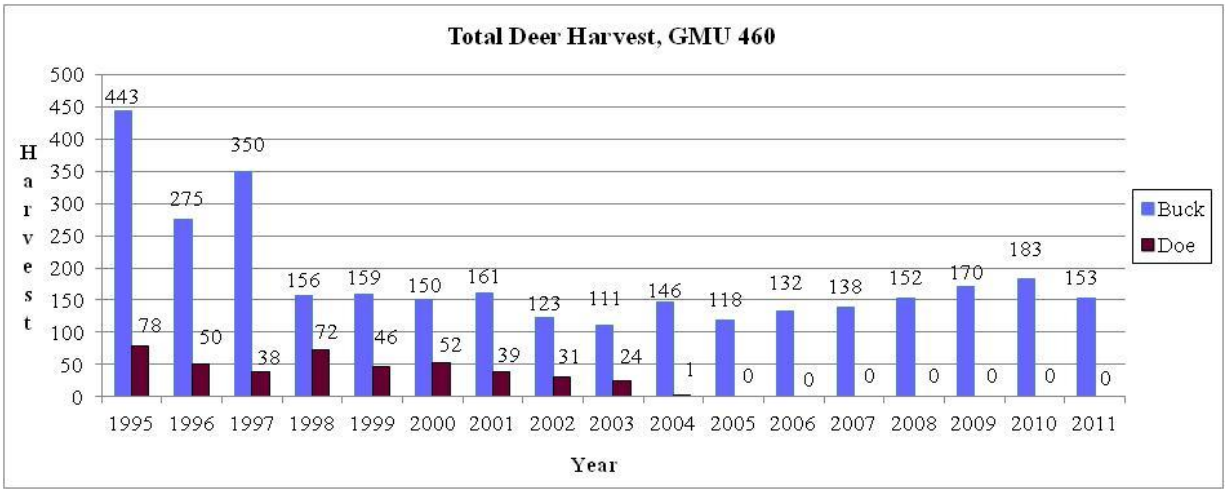


Figure 4. Annual deer harvest, GMU 460, 1995-2011, general season and special permit combined.

1997 was last year of late buck hunt.
2004 1st year of buck only archery hunt

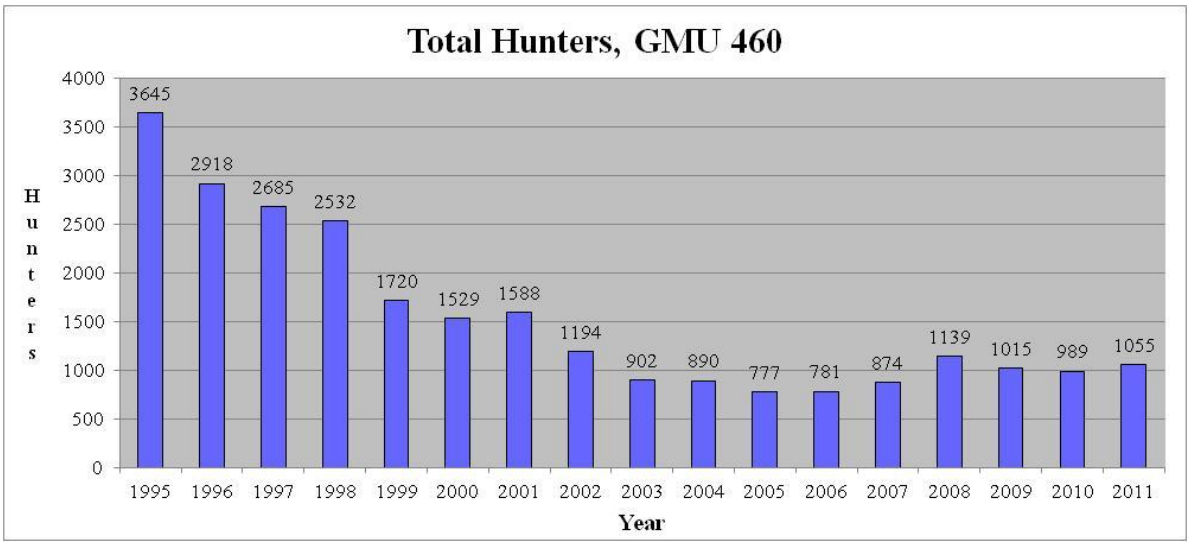


Figure 5. Number of deer hunters, GMU 460, 1995-2011, general season and special permit combined.
1997 was last year of late buck hunt.
2002 increase in access fee-Hancock Forest Management.

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 2011 hunting season in GMU 448 began with the early archery season open for any deer from through Sept. 1- 23, the early muzzleloader season open for any buck from Sept. 24 through Oct. 2, and the general modern firearm season open for any buck from Oct. 15-31. Ten modern firearm permits were issued in GMU 448 for a late buck hunt from November 18-23.

Hunter numbers increased slightly in 2011 compared to 2010 in GMU 448, with just over 800 hunters in 2010 compared to 917 in 2011. The number of people hunting GMU 448 has declined by over 50% since the 1990's when the average number of people hunting the unit was around 1900 each year.

General season harvest in GMU 448 decreased in 2011 compared to 2010, with 176 deer harvested in 2010 compared to 115 in 2011. Hunter success rates for all weapons combined also declined to 13% in 2011. This is lower than previous years; 20% of hunters were successful in 2010, and 16% were successful in 2009, for example (Figures 1&2). Archery hunter success remained the same in 2011 at 18% with 28 animals harvested, of which 18 were does. Archery success in 2010 and 2009 was also 18% (27 deer harvested). Modern firearm hunter success decreased to 12% in 2011 with 84 bucks harvested, compared to a 23% success rate in 2010, when 147 deer were harvested. Only 23 muzzleloader hunters reported hunting in GMU 448, with 1deer harvested.

Figure 1. Total Deer Harvest: GMU 448 2001-2011

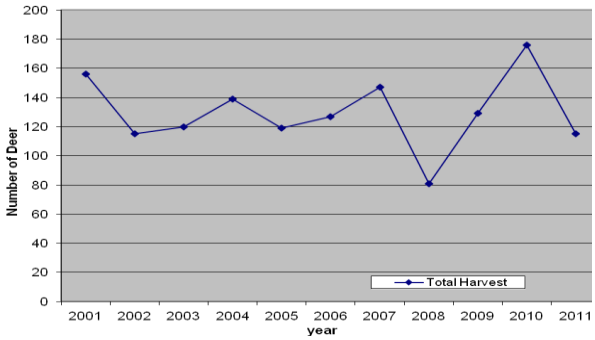
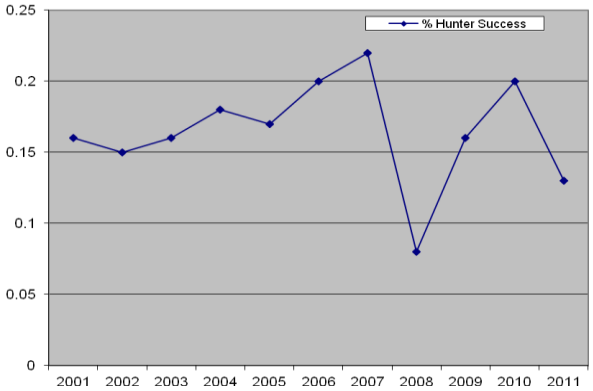


Figure 2. Percentage of Successful Hunters: 2001-2011



As in previous years, relatively few people hunted in GMU 450. One hundred thirty-five hunters harvested 11 deer during the general season in 2011, with a success rate of 11%. In 2010, 106 hunters harvested 18 bucks and 3 does, for a 20% success rate. For the previous 5 years, from 2005 through 2009, the average harvest was 9 animals (range: 5 deer in 2005 to 16 deer in 2009); hunter numbers averaged 75 (range: 60 hunters in 2005 to 90 hunters in 2009); and average success rate was 12% (range 8% in 2005 to 17% in 2009).

Ten late buck season modern firearm special permits were issued in this PMU(GMU 448) for the 2011 season, and 4 bucks were harvested.

In GMU 448, 78% of hunters used modern firearms, and this group harvested 73% of the deer in 2011. Archery hunters comprised 17% of hunters and took 24% of the deer. Muzzleloader hunters accounted for

3% of hunters (23 people); 2% of hunters (19 people) had multiple weapon tags and harvested 2 deer. One hundred twenty-three hunters hunting in GMU 450 used modern firearms, harvesting 11 deer; 13 hunters used archery equipment and one person had a multiple weapons tag. All deer harvested in GMU 450 were taken with modern firearms.

PMU 46 is hunted by the Stillaguamish, Tulalip, and Sauk Suiattle Tribes. The tribes report harvesting 5 bucks and 2 does from GMU 448 and no deer from GMU 450 in 2011.

Surveys

Population surveys were not conducted in GMUs 448 or 450 in 2011.

Population Status and Trend Analysis

Insufficient data exist to model the deer population in PMU 46. Total harvest and hunter success decreased in 2011. 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 reduced 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

GMU 448 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.

2012 DEER STATUS AND TREND REPORT: REGION 5

PMU 51 - GMUS 578 (WEST KLICKITAT), 388 (GRAYBACK), 382 (EAST KLICKITAT)
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)

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 is 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 2011 general deer season in Region 5, modern firearm hunters made up 75% of the hunters, archery accounted for 16%, and those choosing to hunt with a muzzleloader made up 7%. Finally, those utilizing "multi-season" tags accounted for approximately 2% of the Regional deer hunting effort.

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. The 3 Klickitat County GMUs (578 –West Klickitat, 388-Grayback, and 382-East Klickitat), are managed under a 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 issued 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 2011, an estimated 28,680 hunters spent a total of 152,388 days deer hunting in Region 5 (Table 1). Total general-season harvest in 2011 was 4,120 with a hunter success rate of 14% (Table 1). The percentage of hunters that harvested a deer in 2011 was below the previous 10-year mean of 18%. Similarly, the total deer harvest was below the mean harvest of approximately 5,550 during the period from 2001-2010.

Table 1. Deer Hunter Numbers and Harvest Statistics for Region 5, 2002-2011.

Year	Hunters	Days	Harvest	Success (%)
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
2010	30,394	163,342	5,316	17
2011	28,680	152,388	4,120	14

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 2011 Deer Hunters, Hunters/Square Mile, Harvest, Harvest/Square Mile, and Success / PMU.

PMU	Hunters	Hunters /SQ Mile	Total Kill	Kill/SQ Mile	Success (%)
51	5429	3.1	956	0.54	18
52	4568	3.8	786	0.66	17
53	1266	3.4	153	0.41	12
54	3453	2.0	299	0.17	09
55	1074	2.4	167	0.37	16
56	7511	7.5	930	0.93	12
57	5379	4.3	829	0.67	15

In addition to the general-season deer hunting effort and harvest discussed above, tags were offered for special permit hunts open only to permit holders in 2011.These special permits 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 were offered as a quality hunting opportunity for those fortunate enough to draw these permits. Hunters selected for deer special 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 2011.

Table 3. Region 5, 2011 Special Deer Permit Harvest Summary.

PMU	Antlered Kill	Antlerless Kill	Total Kill
51	41	110	151
52	24	24	48
53	1	13	14
54	0	6	6
55	0	7	7
56	0	25	25
57	0	12	12
SUM	66	197	263

In aggregate, general and permit-only deer seasons in Region 5 during the 2011 hunting season resulted in a total harvest of 3,761 antlered and 621 antlerless deer.

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.

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 2011 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 25-50% across the Region. Because of the advantages in generating the AYBP in this manner, no check stations were operated in 2011.

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 (2002-2011) 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 2011, 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 2011 productivity surveys, a total of 561 deer were classified. The mean value of 0.54 fawns/doe is very similar to the historical average of 0.53 per doe for the Region. The surveys are conducted after the peak of neo-natal mortality, so these values are 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 26-27, 2012 (Table 4). Transects were driven on the evening of the 26th and morning of the 27th . 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 276 deer were classified during the March 2012 Klickitat deer survey. The resulting fawn:adult ratio of 0.99 is the highest value recorded in the 33-year history of this survey. It is likely that this value represents a combination of excellent over-winter fawn survival among the Klickitat deer and observer bias, i.e. yearlings that may have been misclassified as fawns. The long-term mean (1980-2012) ratio for this area is 0.50.

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.

Table 4. Historic Fawn:Adult Ratios for the Klickitat Spring Deer Survey, 1998-2012.

Year	Total Deer Classified	Fawn:Adult
2012	276	0.99
2011	363	0.45
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

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 for PMU 51 outlined in the Game Management Plan (WDFW 2008). Specifically, the post-season buck to doe objective in the 3 Klickitat County GMUs is 15-19 bucks per 100 does. 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 conduct the surveys during December. The timing of post-season surveys is designed 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. A summary of these post-season deer surveys is listed in Table 5.

Table 5. Post-Season Deer Composition Survey Summary, GMUs 388, 382 and 578, 2003-2011.

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
	2010	601	9:100:53
	2011	454	23:100:76
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
	2010	660	11:100:68
	2011	220	18:100:65
578			
	2009	243	32:100:55
	2010	283	6:100:64
	2011	85	10:100:67
Klickitat Pooled			
	2003	646	15:100:68
	2004	297	11:100:63
	2005	529	6:100:58
	2006	1017	14:100:63

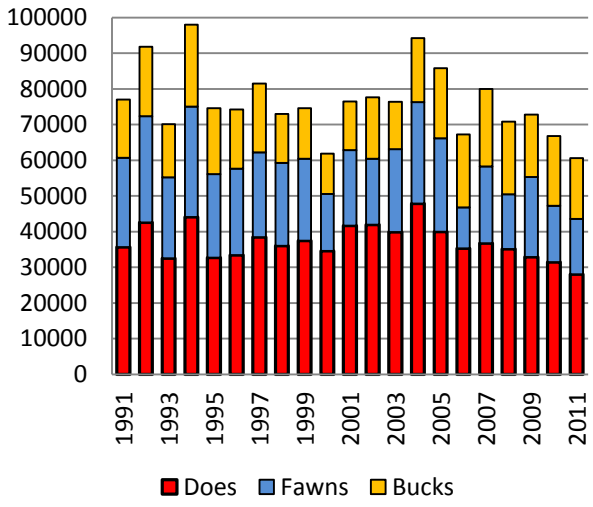
The results from these survey efforts indicate that 2006 changes in management regimes had a beneficial impact on the post-season buck to doe ratios in the Grayback GMU. Specifically, the change to 3-point minimum with a reduction to 14 days of modern firearm hunting appears to have had a positive effect 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 strategies. Ideally, this would include the availability of funding for additional aerial surveys.

Population Status and Trend

Information compiled from hunting activity suggests a slow decline of the deer population in the Region. Hunter success rates over the past 11 years have declined from approximately 20% to 15% (R^2=-0.57). Similarly, hunter days per kill has edged upwards from roughly 30 to 35 days during the same period (R^2=0.12). Finally, total deer harvest has also declined (R^2=-0.57) from roughly 7000 to 4500 annually during the same period. The reduced harvest in recent years can be partially explained by a concurrent reduction in the number of hunters choosing to pursue deer in Region 5. During the past 11 years deer hunters in Region 5 have declined from approximately 34,000 to 30,000.

Furthermore, 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 1 for a graphic illustration of the estimated deer population in Region 5, generated from the Sex Age Kill Model.

Figure 1: Region 5 Estimated Pre-Season Deer Population 1991-2011



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 the establishment of "competing" vegetation (WADNR 2005; WADNR 1997). The broadleaf shrubs, trees, and forbs delayed by these efforts are the plants that primarily comprise the black-tailed deer diet (Crouch 1981; Brown 1961). Also, the stocking rates for seedlings in forest plantations are high, further reducing the competitive advantage that many forage species would normally have in early-successional forests. Once the densely stocked conifer seedlings reach approximately age 12, very little light is able to reach the ground, further reducing forage production. This removal of deciduous tree species along with shrubs and forbs comes at the detriment of deer and other early successional species in the forested environment. 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. However, silvicultural practices operate within a complex ecological relationship among geographic features, climate, soil, herbivory, etc. The complexities of these relationships are poorly understood and additional research into these dynamics could offer useful insights into both wildlife habitat management and forestry (e.g., the interaction effect of herbicides and herbivory on forage production).

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 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 7% of the deer observed during the March 2012 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).

Both the hunter generated and the biological data discussed earlier in this document suggest a slow decline in the Regional deer population. 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

Under the direction of WDFW's Research Science Division, an effort to better understand the ecology and demographics of western Washington black-tailed deer is being conducted. Study animals are distributed in several locations on a combination of State forestlands and private industrial forests. Within Regions 5, eight does from the western portion of GMU 568 (Washougal), and 10 does from GMU 550 (Coweeman), were captured via helicopter net-gun in March of 2012. 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 facilitate the capture of fawns.

In 2012, intensive monitoring was conducted during the May-June birthing period by Regional Wildlife Program Staff. Thirteen does remained alive during the birthing period and a total of 20 fawns associated with the study does were captured and radio-collared (VHS only). 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, and hairloss syndrome have combined to slowly reduce the Region's deer population in relatively recent years. Furthermore, 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 federally-managed lands. Favorable habitat changes of these magnitudes are not realistic in the foreseeable future of western Washington State.

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DEER STATUS AND TREND REPORT: REGION 6
PMUs 61 – 67; GMUs 601 – 684

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Population objectives and guidelines

Black-tailed deer (*Odocoileus hemionus columbianus)* 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) (Table 1).

Table 1. WDFW Population Management Unit/Game Management Unit Framework, Region 6.

PMU	61	62	63	64	65	66	67
	658	652	642	621	607	601	653
	660	666	648	624	615	602	654
	663	667	651	627	618	603	
GMU	672			633	636	612	
	673				638		
	681						
	684						

Hunting seasons and harvest trends

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.

Hunters must select a specific weapon type, modern firearm, archery, or muzzleloader to hunt deer in Washington. Alternatively, a limited number of multi-season permits allow a hunter to hunt with all three weapon types; 2,000 permits were issued statewide during a special draw in 2011.

Region-wide black-tailed deer harvest was 4,602 in 2011; of these, 13% were does and 87% were bucks. Deer harvest by PMU ranged from 235–1,005 in 2011 (Table 2).

Modern firearm hunters comprised 76% of all general season hunters and harvested 79% of all deer harvested during the 2011 general season in Region 6. This group had up to 20 days to hunt during the general season and hunter success by PMU ranged from 14 – 22%. Modern firearm hunters reported killing 3,479 bucks and 8 does during the general season.

Table 2. Total number of bucks and antlerless deer harvested in general and special permit seasons by PMU from 2009-2011, Region 6.

PMU	YEAR	BUCKS	ANTLERLESS	TOTAL
	2009	1,059	182	1,241
61	2010	1,044	245	1,289
	2011	836	151	987
	2009	1,066	215	1,281
62	2010	1,073	195	1,268
	2011	833	172	1,005
	2009	752	160	912
63	2010	809	172	981
	2011	601	84	685
	2009	962	231	1,193
64	2010	1,002	900	1,202
	2011	875	129	1,004
	2009	215	22	237
65	2010	260	30	290
	2011	212	23	235
	2009	280	28	308
66	2010	237	3	240
	2011	251	2	253
	2009	415	42	457
67	2010	378	71	449
	2011	375	58	433

Seventeen percent of all deer hunters in Region 6 during 2011 were archery hunters. This group killed 15% of all deer harvested and had as many as 62 days to hunt during the general seasons (early and late); depending upon the GMU hunted. Hunter success by PMU among this group ranged from 9–20%. Archery hunters reported killing 304 bucks and 370 does.

The muzzleloader group totaled 5% of all general season hunters in the Region and they harvested 4% of deer harvested in 2011. Muzzleloaders had up to 30 days to hunt during the general seasons (early and late), depending on the GMU hunted. Hunter success by PMU for this group ranged from 3–17 %. Muzzleloader hunters reported killing 95 bucks and 63 does.

The number of hunters using a multi-season permit in Region 6 totaled 519 in 2011. Hunter success by PMU for this group ranged from 9–28%. Region 6 hunters with a multi-season permit harvested 83 deer; of these, 13 were does and 70 were bucks.

A total of 898 special deer permits were issued in Region 6 during 2011. Of these, 512 hunters reported using their special permit to harvest 165 does and 35 bucks. In comparison, during the 2010 hunting season, 768 special permits were issued and 468 hunters harvested 209 deer.

Eight GMUs- Olympic (621), Kitsap (627), Skokomish (636), Wynoochee (648), Satsop (651), Mashel (654), Capitol Peak (663), and Skookumchuck (667), had a limited, special permit hunt opportunity

designed to allow buck hunting during the peak of the black-tailed deer rut in November. Of the 50 quality buck permits issued to modern firearm hunters, 41 hunters reported hunting with this permit, harvesting 24 bucks during the 2011 season; two spikes, ten 2-points, six 3-points, four 4-points, and two ≥5-points. Of the 20 quality buck archery permits issued, 11 hunters reported hunting with this permit, harvesting one 2-point and one 5-point. Only 3 of 5 quality buck muzzle loader permit holders reported hunting in GMU 621, harvesting two 2-points. Hunter success ranged from 14–90% for modern firearm hunters, and was 30% for archery hunters and 67% for muzzleloaders using this permit.

PMU 61 consists of 7 GMUs (Table 1). Total general season deer harvest has been increasing since 2005; however, deer harvest in 2011 declined by 23% compared to 2010 (Figure 1). General season hunter participation has remained relatively stable from 2001-2011 (Figure 2). Success rates have averaged 18% (SE=0.01) for archery hunters, 20% (SE=0.01) for rifle hunters, and 18% (SE=0.02) for muzzleloaders. Multi-season permit holders ranged from 47 in 2006 to 112 in 2011; averaging 19% (SE=0.02) success in this PMU. Although hunter success (modern firearm only) declined in 2005, the trend has been relatively stable in recent years (Figure 3).

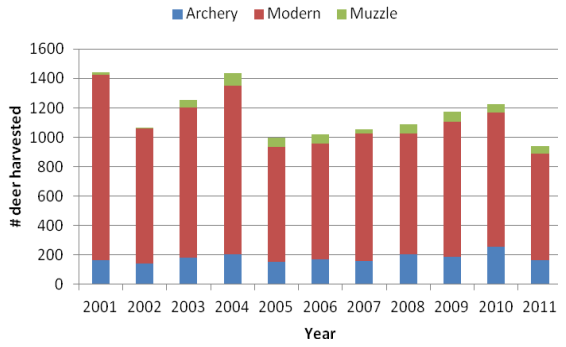

Figure 1. Total number of black-tailed deer harvested during the general season by weapon-type in PMU 61, from 2001–2011.

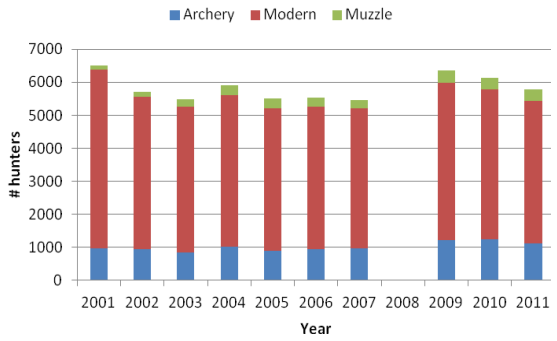

Figure 2. Number of deer hunters by weapon type in PMU 61, 2001–2011. 2008 data not available at this scale.

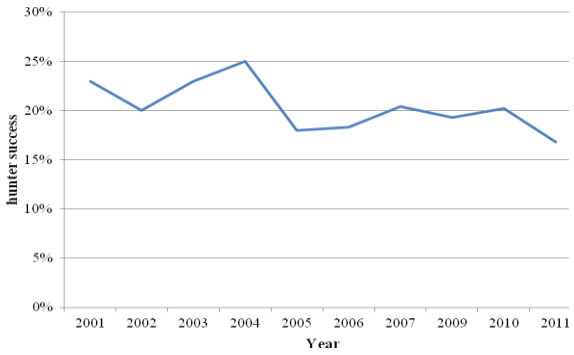

Figure 3. Hunter success (modern firearm only) in PMU 61, from 2001–2011. 2008 data not available at this scale.

PMU 62 consists of 3 GMUs (Table 1). General season deer harvest has been declining (Figure 4), while hunter participation has been generally stable in this PMU (Figure 5). Success rates have averaged 19% (SE=0.01) for archery hunters, 23% (SE=0.01) for modern firearm hunters, and 16% (SE=0.01) for muzzleloaders. Multi-season permit holders ranged from 45 in 2006 to 124 in 2011; averaging 18% (SE=0.03) success in this PMU. Although generally stable in recent years, the overall trend in hunter success (modern firearm only) has declined since 2001 (Figure 6).

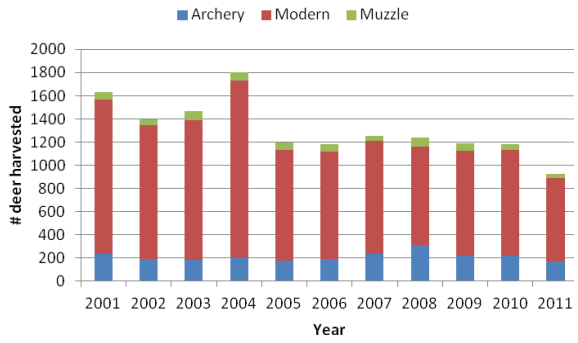

Figure 4. Total number of black-tailed deer harvested during the general season by weapon-type in PMU 62, from 2001–2011.

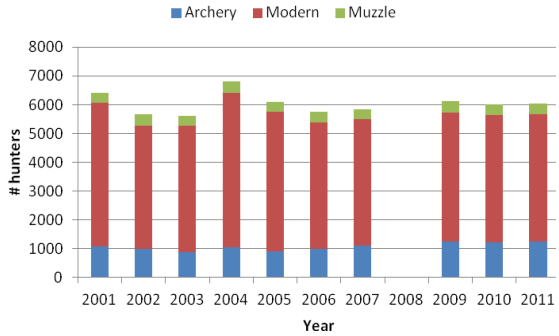

Figure 5. Number of deer hunters by weapon type in PMU 62, 2001–2011. 2008 data not available at this scale.

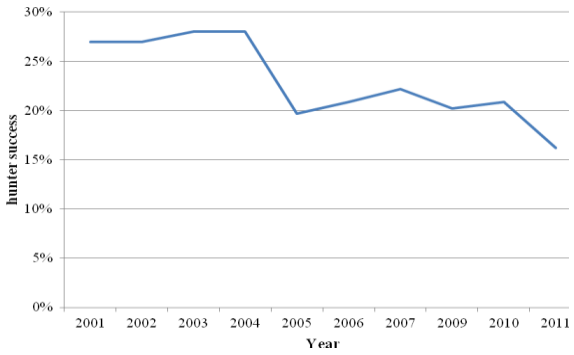

Figure 6. Hunter success (modern firearm only) in PMU 62, from 2001–2011. 2008 data not available at this scale.

PMU 63 consists of 3 GMUs (Table 1). General season deer harvest and hunter participation remains below levels reached in 2004, but both have been generally stable until 2011 (Figures 7 and 8). Success rates have averaged 21% (SE=0.02) for archery hunters, 22% (SE=0.01) for modern firearm hunters, and 22% (SE=0.04) for muzzleloaders. Multi-season permit holders ranged from 39 in 2007 to 60 in 2011; averaging 24% (SE=0.04) success in this PMU. There has been an overall declining trend in hunter success (modern firearm only) since 2001 (Figure 9).

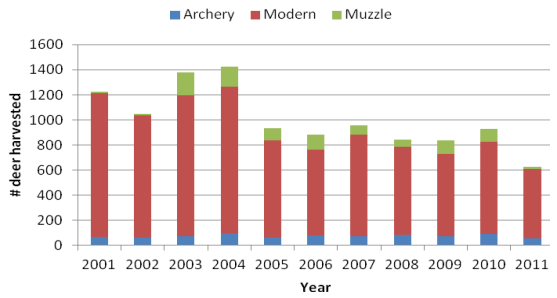

Figure 7. Total number of black-tailed deer harvested during the general season by weapon-type in PMU 63, from 2001–2011.

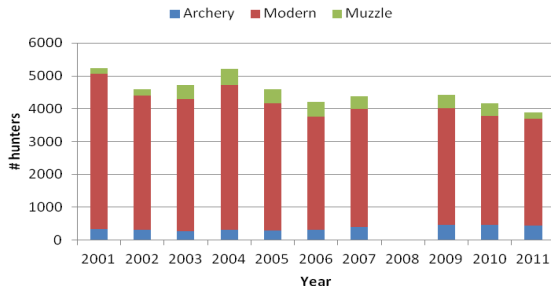

Figure 8. Number of deer hunters by weapon type in PMU 63, 2001–2011. 2008 data not available at this scale.

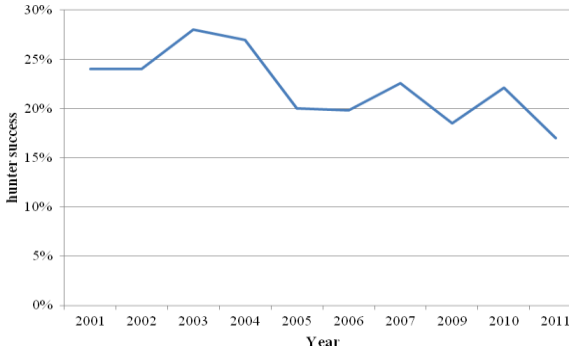

Figure 9. Hunter success (modern firearm only) in PMU 63, from 2001–2011. 2008 data not available at this scale.

PMU 64 consists of 4 GMUs (Table 1). General season deer harvest has been increasing in this PMU since 2005 (Figure 10). General season hunter participation declined from 2001 through 2005, but has been increasing since 2006 (Figure 11). Success rates have averaged 23% (SE=0.01) for archery hunters, 23% (SE=0.01) for modern firearm hunters, and 16% (SE=0.01) for muzzleloaders. Multi-season permit holders ranged from 38 in 2006 to 81 in 2011; averaging 25% (SE=0.02) success in this PMU since 2006. Hunter success (modern firearm only) has been relatively stable in this PMU (Figure 12).

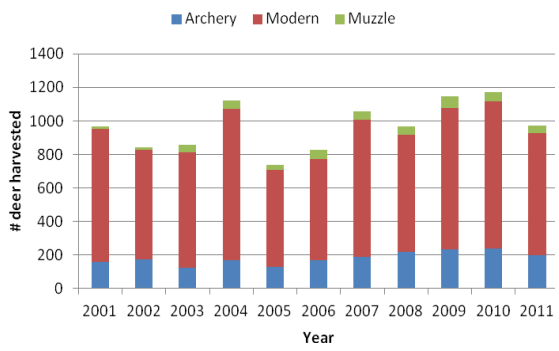

Figure 10. Total number of black-tailed deer harvested during the general season by weapon-type in PMU 64, from 2001 – 2011.

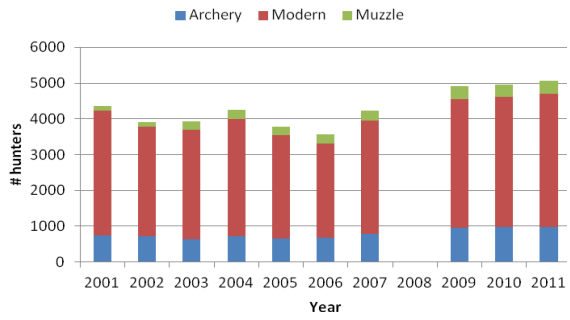

Figure 11. Number of deer hunters by weapon type in PMU 64, 2001–2011. 2008 data not available at this scale.

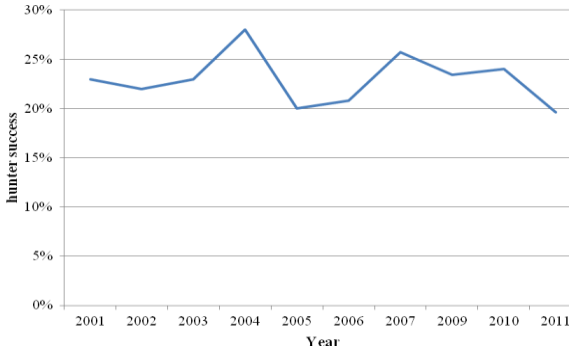

Figure 12. Hunter success (modern firearm only) in PMU 64, from 2001–2011. 2008 data not available at this scale.

PMU 65 consists of 5 GMUs (Table 1). General season deer harvest has declined in this unit (Figure 13); while hunter participation has remained marginally stable (Figure 14). Success rates have averaged 12% (SE=0.01) for archery hunters, 16% (SE=0.01) for modern firearm hunters, and 11% (SE=0.08) for muzzleloaders. Multi-season permit holders ranged from 14 in 2006 to 32 in 2011; averaging 12% (SE=0.02) success in this PMU. There is a slightly declining trend in hunter success (modern firearm only) in this PMU (Figure 15).

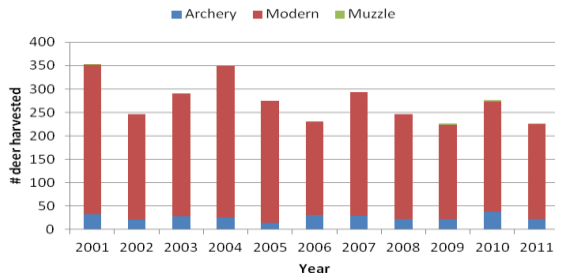

Figure 13. Total number of black-tailed deer harvested during the general season by weapon-type in PMU 65, from 2001–2011.

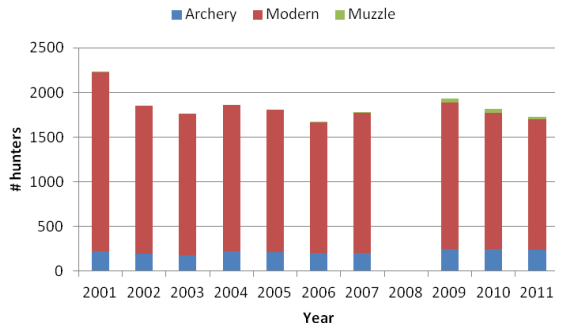

Figure 14. Number of deer hunters by weapon type in PMU 65, 2001–2011. 2008 data not available at this scale.

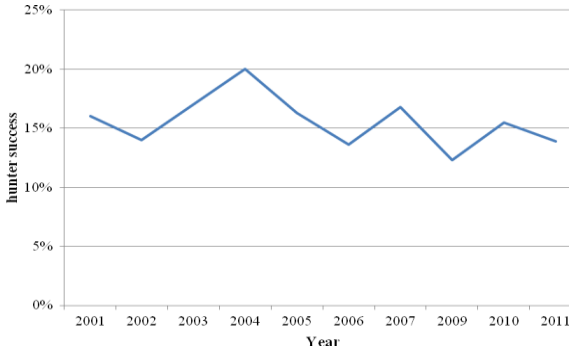

Figure 15. Hunter success (modern firearm only) in PMU 65, from 2001–2011. 2008 data not available at this scale.

PMU 66 consists of 7 GMUs (Table 1). General season deer harvest declined from 2001 through 2006, however the trend has been positive since 2007 (Figure 16). General season hunter participation also declined from 2001 to 2006 and has been marginally stable since then (Figure 17). Success rates have averaged 19% (SE=0.02) for archery hunters, 21% (SE=0.01) for modern firearm hunters, and 9% (SE=0.02) for muzzleloaders. Multi-season permit holders ranged from 4 in 2006 to 18 in 2011; averaging 21% (SE=0.03) success in this PMU. Hunter success (modern firearm only) has been increasing in this PMU (Figure 18).

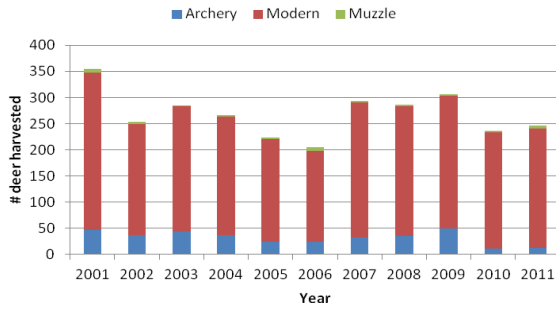

Figure 16. Total number of black-tailed deer harvested during the general season by weapon-type in PMU 66, from 2001–2011.

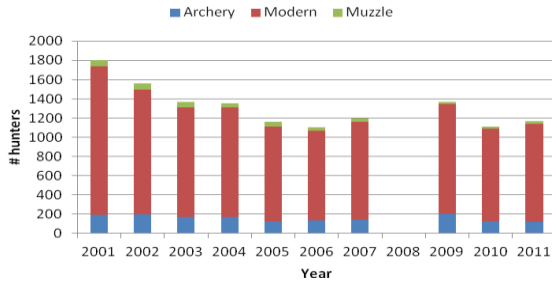

Figure 17. Number of deer hunters by weapon type in PMU 66, 2001–2011. 2008 data not available at this scale.

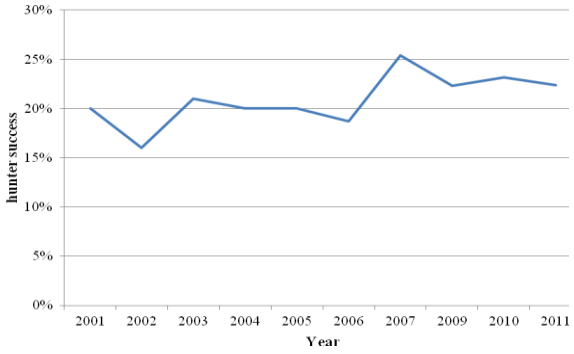

Figure 18. Hunter success (modern firearm only) in PMU 66, from 2001–2011. 2008 data not available at this scale.

PMU 67 consists of 7 GMUs (Table 1). General season deer harvest has been declining in this PMU (Figure 19), while hunter numbers have remained stable to slightly increasing (Figure 20). Success rates have averaged 18% (SE=0.01) for archery hunters, 19% (SE=0.01) for modern firearm hunters, and 19% (SE=0.03) for muzzleloaders. Multi-season permit holders ranged from 42 in 2006 to 92 in 2011; averaging 24% (SE=0.02) success in this PMU. There is no observable trend in hunter success (modern firearm only) in this PMU (Figure 21).

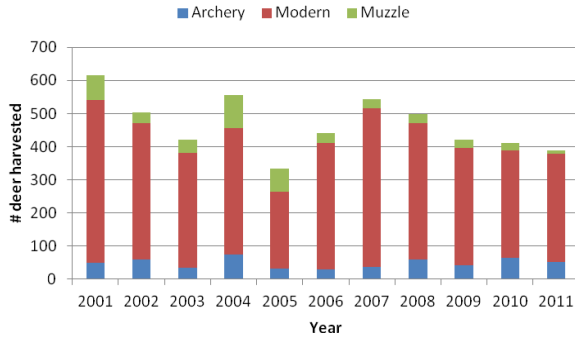

Figure 19. Total number of black-tailed deer harvested during the general season by weapon-type in PMU 67, from 2001–2011.

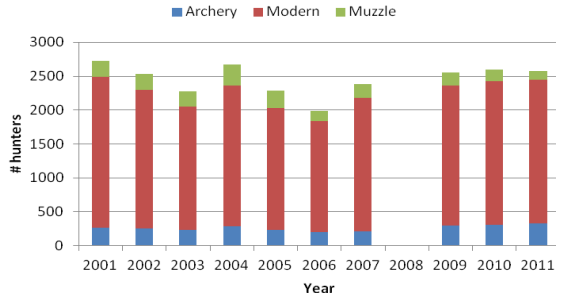

Figure 20. Number of deer hunters by weapon type in PMU 67, 2001–2011. 2008 data not available at this scale.

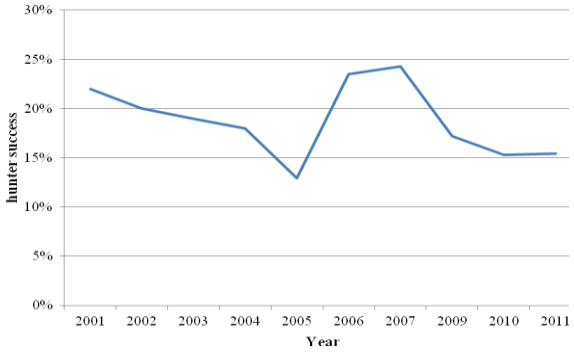

Figure 21. Hunter success (modern firearm only) in PMU 67, from 2001–2011. 2008 data not available at this scale

Tribal hunting is generally quite low in Region 6 (Figure 22) and accounted for only 6% of the overall deer harvest in Region 6 in 2011-2012 (NWIFC Big Game Harvest Reports from 2001 to 2012). Deer harvest in the 2011-2012 hunting season was reported to be 99 does and 199 bucks (NWIFC Big Game Harvest Report 2011-2012).

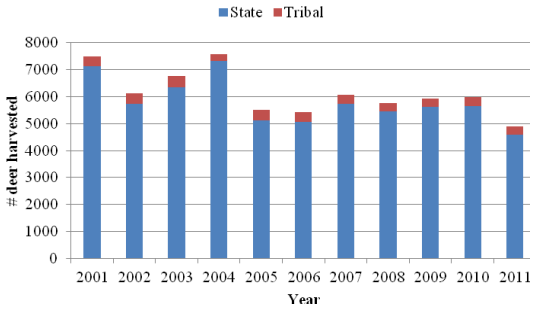

Figure 22. Total state and tribal deer harvest in Region 6, 2001-2011.

Research and Monitoring

For a study of the relationship of timber management and black-tailed deer reproduction, 83 does have been fitted with GPS collars in Regions 5 and 6 (36 in 2012). Eighty-five fawns associated with these does have been fitted with VHF tracking collars (45 in 2012) to monitor their survival. Preliminary analysis of data collected through 2011 has been completed. The project is expected to continue through 2017.

When funding is available, WDFW conducts sex- and age- composition counts in Region 6 to assess fawn productivity and estimate pre-season buck to doe ratios. In 2011, fall surveys were limited to Copalis (642), Capitol Peak (663), Skookumchuck (667), and Fall River (672) GMUs. Fall buck: and fawn: doe ratios were at or below management objectives for those units surveyed; however, sample sizes of deer classified were well below desired levels (Table 3).

Table 3. Estimates of fall buck: and fawn: 100 doe ratios from composition surveys conducted in August/September 2011.

PMU/ GMU	Count Summary				Ratio per 100 does	
	Bucks	Does	Fawns	Total	Bucks	Fawns
61/663	5	33	18	56	11	55
61/672	11	85	56	165	13	66
62/667	10	76	33	119	13	43
63/642	4	29	11	46	14	38

A deer check station was run at the Vail Tree Farm (Skookumchuck GMU (667)) on 8 days during the 2011 modern firearm season with the help from Eyes in the Woods and Master Hunter volunteers. On average, 719 hunters were checked each weekend day during the general season. A total of 122 deer were checked; 104 bucks and 18 antlerless deer. Yearlings accounted for 46% of the bucks (n=49) and 29% of the does (n=4) based on tooth eruption/replacement. Other species checked included 1 black bear, 3 cougar, and 42 grouse.

Population status and trend analysis

An examination of harvest statistics (deer harvest, hunter numbers, success, and catch per unit effort) suggests deer population trends vary by PMU. PMUs 61, 62, 63, 65, and 67 appear to be stable or slightly declining, while PMUs 64 and 66 appear to be stable or slightly increasing.

Management conclusions

No major changes to the general seasons are anticipated for the 2012 deer season. A total of 935 antlerless permits will be offered in the 2012 deer season, which represents a 4% increase from 2011 levels.

Five quality permits were added to the Sol Duc GMU (607) to provide additional rut hunting opportunity in the Region. Antlerless permits were added where deer trends suggest additional opportunity could be supported or to address deer damage issues, usually associated with agricultural crop damage. Antlerless permits were added to the antlerless, 2nd tag, and disabled categories; Mashel (654) (n=50), deer area 6014 (n=4), deer area 6020 (n=10), North River (658) (n=6), and Capitol Forest (663) (n=3). Also, 20 antlerless permits were added to the master hunter category, which will be used as needed throughout Region 6. Antlerless permits were reduced in the Skookumchuck (667) by a combined 30 permits in the antlerless, youth, and disabled categories; as harvest trends suggest deer numbers are declining in this unit.

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Elk

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

DANA L. BASE, District Wildlife Biologist
JAY SHEPHERD, Assistant District Wildlife Biologist

Population objectives and guidelines

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

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 difficult both to survey and to harvest. Population data are limited, but there is currently no clear indication that bull:cow ratios or opportunities for quality bull hunting are declining.

A considerable change was made in the 3-year season package for 2003-2005 shifting the archery season later to September 8 through 21. That season structure remained in place until 2009 when it was changed to run from September 8 through 20 and then from September 7 through 19 in 2010. In 2003, muzzleloaders gained the opportunity to hunt the Selkirk GMU (113). Muzzleloader hunter opportunity in the former "any elk" units (GMUs 101, 105, 108, 121) shifted from running concurrent with the modern firearm hunt to a muzzleloader only hunt in early October. In 2006, GMU 117 was added to the muzzleloader season making all GMUs open to any hunt methods during their respective seasons in 2006, 2007, and 2008. The season timing and increased opportunity for archers and muzzleloaders resulted in a significant increase in harvest for those groups. Hunter numbers have generally increased as has harvest, but it appears that most of the increase in numbers has been in the primitive method hunts, particularly archery (Figures 1and 2).

Beginning in 2012 as a result of development of the Selkirk Elk Herd Management Plan, hunting opportunity for any elk within GMUs 101, 105, 108, and 121 was changed to antlered bull only. This change applied to all general seasons except for early archery. Antlerless elk may still be taken within these GMUs, however, except for early archery season, may now be taken only by special permit. For the 2012 season 40 special permits have been allocated for GMUs 101, 105, 108, and 121, divided equally between modern firearm and muzzleloader seasons.

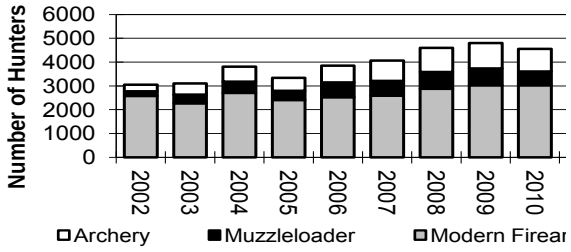

Figure 1. Trend in elk hunters by hunt method for GMUs 101-121.

Since mandatory hunter harvest reporting began, the number of elk hunters reporting hunting GMU's 101-121 increased from a low of 3,296 in 2001 to a high of 4,560 in 2010 (Washington Department of Fish and Wildlife 2010). During that time the total elk harvest increased nearly five-fold from a low of 57 elk in 2001

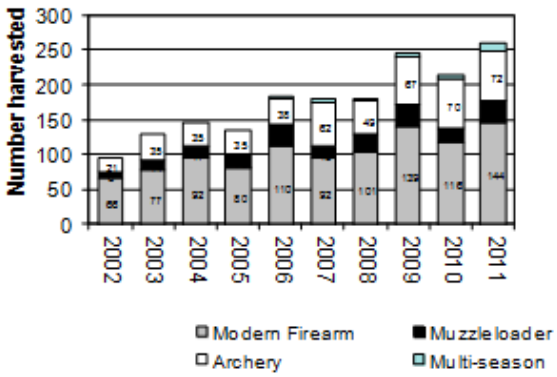

Figure 2. Trend in elk harvested by hunt method for GMUs 101-121.

to a high of 276 elk in 2009. Last year, 2011, there were 258 elk harvested (Table 1).

In 2006, the "multiple season" elk tag was introduced. This tag has resulted in a modest, but steady increase in harvest, going from 2 elk in 2006 to 10 elk taken in 2011. Hunter success has been substantially higher for multi-season tag holders at approximately 19% in 2011 compared to general methods at about 5%.

The "antlerless" special permit hunts are designed to provide added hunter opportunity for antlerless elk and address landowner conflict where it occurs. The elk special permit harvest in 2011 was 24 taken for a success rate of 18% (Table 2). Special permits for antlerless elk provide enhanced recreational opportunity for hunters, but the harvest is modest and of limited utility in addressing elk damage concerns.

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. For management decisions, we currently rely primarily on trends in bull mortality rates based upon implied age estimates from antler point data obtained from hunter harvest reports (Table 3). From 2003 – 2011 the proportions of bulls harvested by antler point category has ranged fairly evenly.

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.

The best opportunity to observe elk from ground-based surveys is in the early spring from mid-March to early May. Qualified volunteers are enlisted when available to help survey elk. Observations during early mornings or early evenings before dark are made of elk that concentrate on "green-up" fields or within forest openings. 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 2012 survey effort yielded a ratio of 66 calves per 100 cows, which is the highest observed since 2001. 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).

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 early successional forest and the accompanying forage 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 5 years Forest Practice Applications & Approvals were received for treating over 13,000 acres mostly within south Stevens County. Although the moose population will likely bear the brunt of this impact from such a broad scale of herbicide application, elk may also undergo a reduction in population due to decreased habitat carrying capacity.

Wildlife damage

Elk damage to standing hay, baled hay, and stored hay continues in the Cottonwood Creek drainage (GMU 117) southeast of Chewelah and recently began occurring in the Skookum Flats area of GMU 113. Antlerless permit opportunity was increased substantially within GMU 117 beginning in 2008 with a permit season that included December 16-31. All user groups currently have general seasons within both GMUs 117 and 113, which puts pressure on elk that frequent agricultural land there. WDFW may issue Landowner Damage Prevention 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 2010 these projects including all partners amounted to a total of 57,799 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. 2010).

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. While there are unreliable post-season survey data on bull:cow ratios, the prime bull (6 point +) percentage in the 2011 bull harvest was 31% 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 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 special permits issued for "antlerless elk" has increased from 54 in 2001 to 135 in 2011 for the three primary elk GMUs, 111, 113, and 117. While there was considerable interest in these special permits including 1,652 modern firearm and 379 muzzleloader applications for 2007, the resulting harvest was modest. Consequently, within GMU 117 where there are areas of chronic agricultural damage by elk, the special permit season was extended to December 16-31 beginning in 2008. In 2010 the success rate made a big jump with better than 1 in 5 special permit holders harvesting an antlerless elk.

In April of 2012, the Fish and Wildlife Commission adopted hunting seasons allowing only antlered bulls rather than any elk to be harvested for most general seasons within GMUs 101, 105, 108, and 121. This change is recommended in the Selkirk Elk Herd Management Plan as a means to moderately increase the elk population and its distribution throughout the Colville District.

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Table 1. Antlered and antlerless elk harvest in the Colville District, GMUs 101-121 from 2001 through 2011.

Year	Antlered Harvest	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
2010	147	85	232
2011	158	100	258

Table 2. Special permits and hunter take within the Colville District, GMUs 101-121.

Year	Special Permits Issued	Antlered Kill	Antlerless Kill	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	120	0	16	14%
2010	120	0	25	21%
2011	135	0	24	18%

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
2010	35 (24%)	51 (35%)	61 (41%)	147
2011	43 (27%)	66 (42%)	49 (31%)	158

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*) subherd 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 (WDFW 2011).

These harvest strategies are mainly 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, which has resulted in fewer damage complaints, increased hunter access, and subsequently, increased harvest.

Hunting seasons and harvest trends

The 2011 general elk hunting seasons for Game Management Units (GMUs) 124-142 did not change from the previous year. All units allowed the harvest of Any Elk.

Hunter numbers have varied with a high of 2707 in 2007 to a low of 2223 in 2005(Fig. 1). This year there were 2698 hunters, almost equaling the high point. This past year, the number of archery hunters decreased, while both modern firearm and muzzleloader hunter numbers increased (Fig. 1). This year's overall hunter success was 11.93% just short of last year's ten-year high of 11.97%. Only muzzleloader's success was lower this year when compared to last year. Modern firearm hunters had the highest with 13.3% success while archers had 7.86% (Table 2). Modern firearm harvest (215 this year) has increased around 170% since 2008 when the harvest was 123 (Fig. 2).

Total elk harvested during the general season was 322 which is the highest harvest ever (Table 1 and Fig. 2). This is an increase of over a hundred more animals than were harvested in 2004. When looking at the harvest for each GMU (Fig. 5), this overall increase appears to be due, in part, to the increasing range and numbers of elk in what were formerly GMUs with few elk.

For all weapon types but muzzleloader, general harvest increased (Fig. 2). Similar to the overall harvest, harvest of bulls has shown an increasing trend since 2001 with 168 being harvested this year - the highest ever (Table 1 & Fig. 3). The majority of bulls were taken from 3 GMUs – 124, 127 and 130, with the majority being taken in GMU 130. Sixty-two bulls were harvested in GMU 130 this year, compared to 66 last year (Fig. 4). General antlerless harvest dropped this year with a total harvest of 154 compared to a high of 176 cows taken last year (Table 1).

These increases in general harvest can be attributed to an increasing population but may also be partially attributed to the new permit hunt offered on Turnbull National Wildlife Refuge (NWR). This permit hunt coincides with the general seasons off the refuge, thus creating the potential for permit hunters to push the elk off of Turnbull NWR where they have a greater chance of being harvested. The same as last year - sixty-three permits – 1 bull and 62 antlerless, were offered on the refuge this year. A total of 23 cow elk and one 5+ bull were harvested on Turnbull NWR (Table 4). This was one cow less than last year.

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 an increase of 6+ bulls (Table 3) after two low years in 2009 and 2010.

Surveys

Composition counts have been conducted primarily in GMU 130 on and around Turnbull NWR due to limited survey funds, the lack of success in earlier attempts of aerial surveys in the more forested area of GMU 124 and 127, and the fact that GMU 130 comprises on average ~50% of the harvest. Surveys are also conducted in this area because Turnbull

NWR has been able to share survey costs. Some post-season composition data may irregularly be collected while conducting annual moose surveys in December and January in GMUs 124 & 127, if elk are observed.

Composition count data from GMU 130 (Table 6) show that since 2004, the bull:cow ratio has been at or above the 12 to 20 bulls:100 cows management objective (WDFW 2008).

The 2011 survey yielded a ratio of 21 $\pm$ 6 bulls observed per 100 cows (90% C.I., Skalski et. al 2005), which may represent a slight decrease from previous years. The calf to cow ratio was 54 $\pm$ 10.9 calves per 100 cows, slightly lower than last year (Table 6).

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 (~40% in 2011) with GMU 124 and 127 providing in combination another ~40% (Table 5).

Habitat condition and trend

The greatest concern for our elk herds in the past had been related to agricultural conversion of native habitat in the area. Now, elk habitat degradation due to urban expansion, increased roads, and human disturbance has become the highest concern. Habitat loss due to development continues to occur, especially in GMUs 124, 127, and 130 around the main Spokane metropolitan area, with the redistribution of urban populations outward into rural settings - impacting the elk population in these GMUs. There has been a concern for habitat damage to aspen and other vegetation from high elk numbers on Turnbull National Wildlife Refuge. This concern resulted in the limited entry hunt being offered on the refuge and also an on-going research project at Eastern Washington University studying the movements of collared elk in and around Turnbull and the vegetation on the refuge as well.

Elk Damage

During the last few years, elk damage complaints have decreased in this area now that landowners have discovered that having elk can be an economic benefit to them by leasing their land to hunters. When localized complaints are received, 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 139, and 142; consequently, we have begun receiving some complaints from these more southern GMUs. Many of these elk migrate back and forth from Washington to Idaho. 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 will remain “any elk”.

Management conclusions

Harvest data from the last 10 years indicates a small but constant increase in population levels in the District. This year there was an increase in the total general harvest, with the majority of the increase occurring in the number of antlered elk harvested. This is most likely due to the new Turnbull NWR permit hunts moving animals off the refuge and making them more available for harvest. The Turnbull permit hunts were created to address damage to aspen stands on the refuge and complaints from neighboring landowners.

The increase in harvest will hopefully result in reduced damage on the refuge and complaints from local landowners. However, we will maintain aerial surveys in this area to insure that herd numbers or ratios do not drop below management objectives (WDFW 2008).

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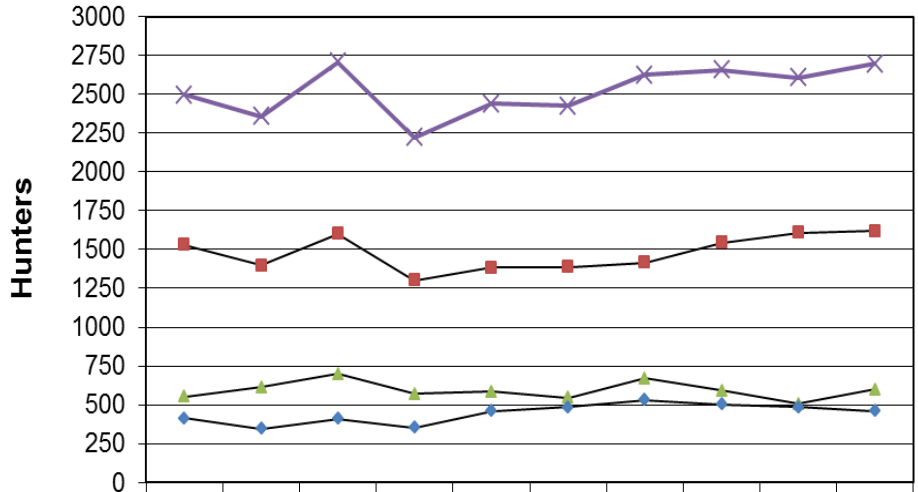
All figures and tables reflect general season harvest results only, unless noted otherwise.

Figure 1. Number of Elk Hunters by Weapon Type.



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Modern	1530	1399	1600	1300	1384	1386	1415	1545	1607	1620
Muzzle	554	614	697	572	586	545	671	593	507	599
Archery	413	346	410	351	460	484	532	504	483	458
Total	2497	2359	2707	2223	2441	2427	2624	2659	2607	2698

Figure 2. Harvest of Elk by Weapon Type.

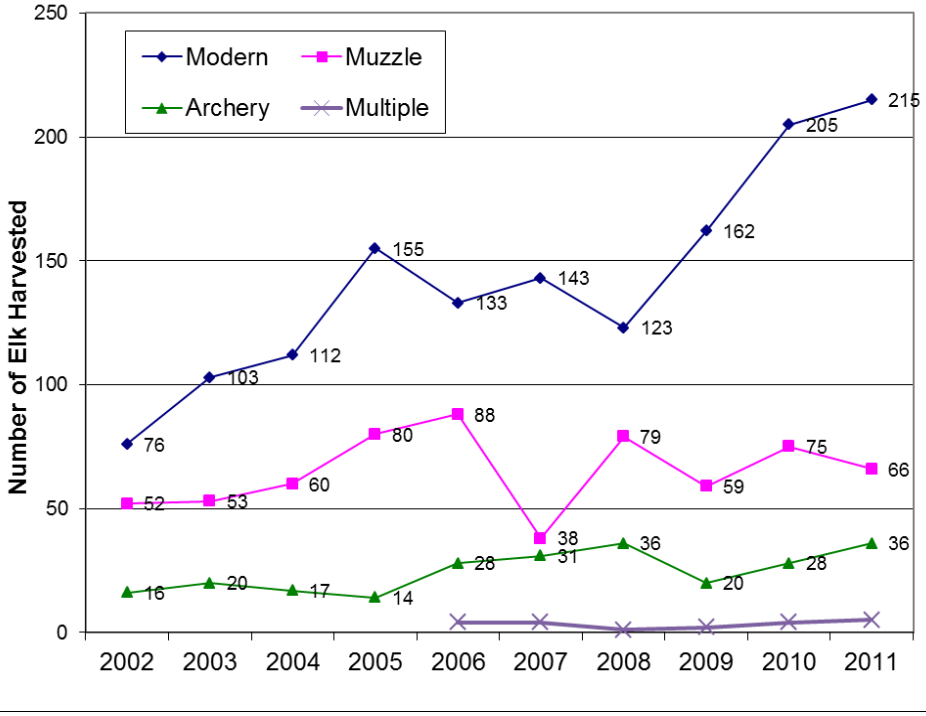


Figure 3. Bulls Harvested from 2001.

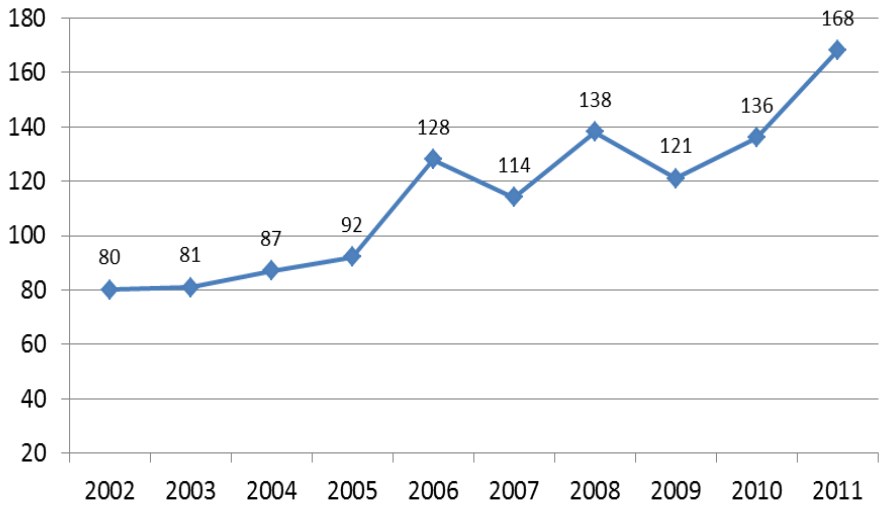


Figure 4. Number of Bulls Harvested by GMU.

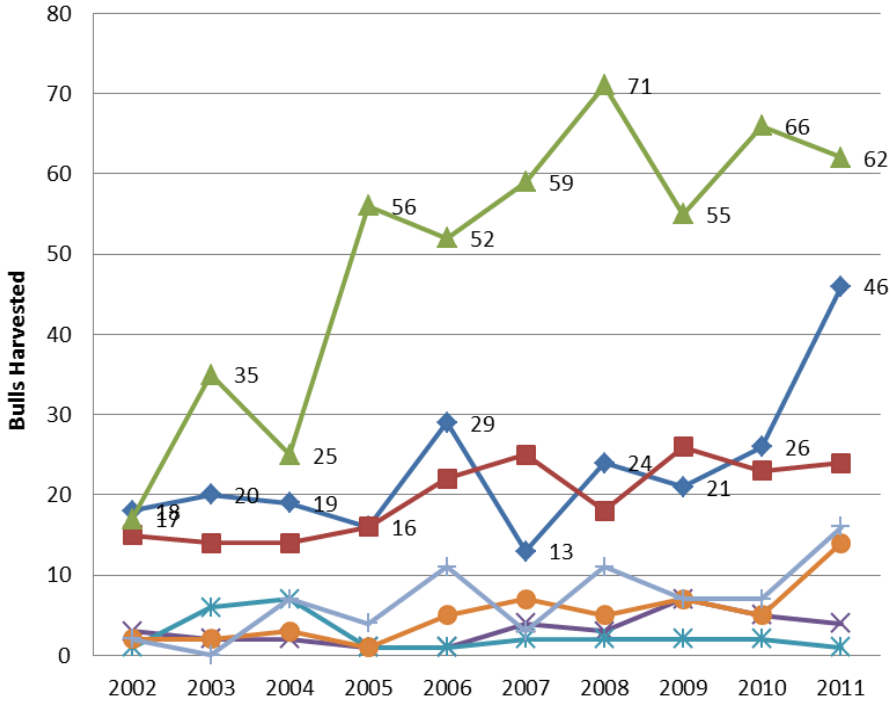


Figure 5. Elk Harvested in GMUs 124-142.

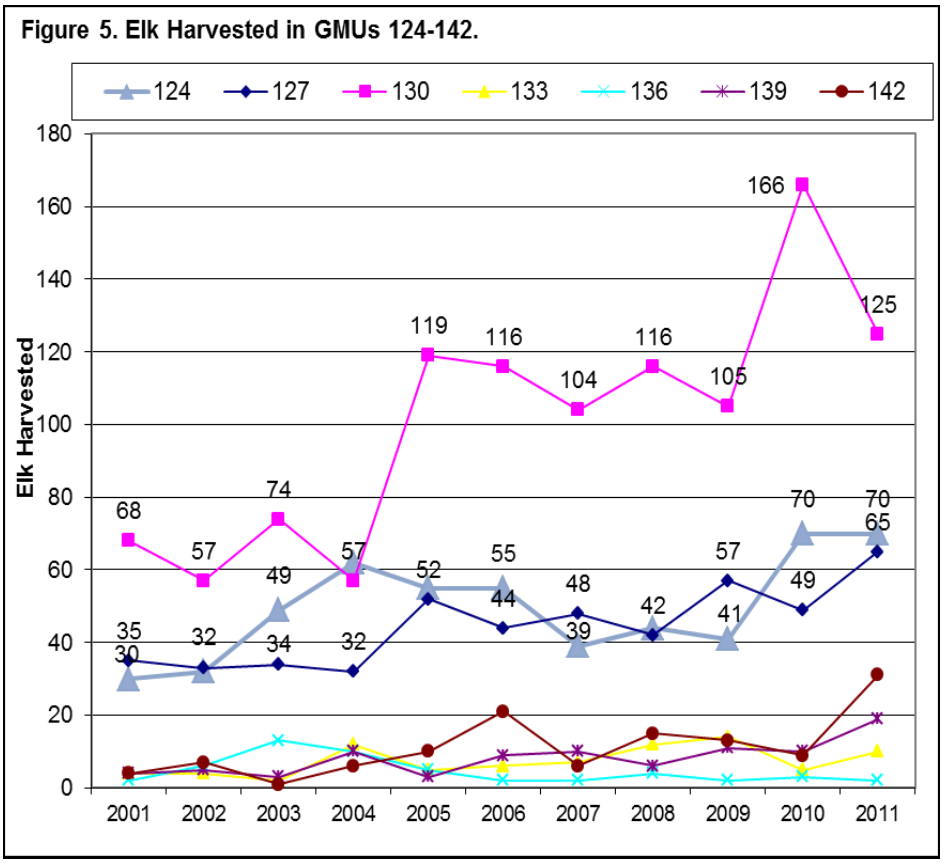


Table 1. Elk harvest, hunters and hunter days for GMUs 124-142.

Year	Bulls	Antler-less	Total	Hunters	Hunter Days	Hunter Success
2002	80	64	144	2497	11,210	5.77%
2003	81	95	176	2,359	10,221	7.46%
2004	87	102	189	2,707	6,246	6.98%
2005	92	157	249	2,223	8,992	11.20%
2006	128	125	253	2,441	10,323	10.36%
2007	114	102	216	2,427	10,663	8.90%
2008	138	101	239	2,624	11,134	9.11%
2009	121	122	243	2,659	10,955	9.14%
2010	136	176	312	2,607	10,807	11.97%
2011	168	154	322	2,698	11,394	11.93%

Table 2. Hunter Success By Weapon Type for GMUs 124-142.

	Archery	Modern	Muzzle	All
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%	9.95%	11.76%	9.14%
2010	5.80%	12.76%	14.79%	11.97%
2011	7.86%	13.27%	11.02%	11.93%
Average	5.47%	9.59%	11.20%	9.28%

Table 3. Antler Point Proportion for GMUs 124-142

	1-2 Pts	3-5 Pts	6+Pts
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%
2010	41.35%	39.85%	18.80%
2011	48.46%	55.38%	25.38%

Table 4. 2011 Turnbull NWR Elk Permit Hunt Summary.

Hunt Number	Weapon Type	Appli-cants	Permits Issued	Actual Hunters	Total Harvest	% Hunter Success (of Actual Hunters)	% Success of Permits Issued	Permit Type
2000	F	671	1	1	1	100%	100%	Quality
2203	F	580	6	5	2	40.0%	33.3%	Antlerless
2204	F	533	6	5	1	20.0%	16.7%	Antlerless
2205	F	574	6	6	3	50.0%	50%	Antlerless
2260	A	186	14	9	2	22.2%	14.3%	Antlerless
2275	M	157	9	7	4	57.1%	44.4%	Antlerless
2276	M	216	9	6	3	50.0%	33.3%	Antlerless
2600	Any	129	6	4	3	75.0%	50.0%	Disabled
2700	Any	122	6	6	5	83.3%	83.3%	Master Hunter
Totals		**3168**	**63**	**49**	**24**	**49.0%**	**38.1%**	

Table 5. 2011 Harvest and proportion of Harvest for District 2 by GMU.

	Harvest	Proportion
GMU 124	70	21.7%
GMU 127	65	20.2%
GMU 130	125	38.8%
Subtotal GMU 124-130	260	80.7%
Subtotal GMU 133-142	62	19.3%
Total	322	100%

Table 6. Summary of Turnbull NWR composition surveys (±90%CI).

Year	Bulls	Cows	Calves	Total	Ratio (bull:cow:calf)
2004	36	211	106	353	17 ±5.1 :100: 50 ±9.8
2005	No Survey Flown				
2006	49	207	113	369	23 ±6.2 :100: 54 ±10.5
2007	50	140	78	268	35 ±9.7 :100: 55 ±12.9
2008	61	145	111	317	42 ±10.6 :100: 76 ±15.9
2009	35	146	79	260	23 ±7.4 :100: 54 ±12.4
2010	66	248	146	460	26 ±6.1 :100: 58 ±10.1
2011	41	193	106	340	21 ±6 :100: 54 ±10.9

ELK STATUS AND TREND REPORT: REGION 1

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

Paul Wik, District Wildlife Biologist
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Population objectives and guidelines

Elk (*Cervus elaphus*) populations in six of eight major elk game management units are at or near management objective. Most of the elk population within the Blue Mountains is at or near population management objective, with the exception of the Wenaha and Tucannon. The Wenaha unit held the most elk in the Blue Mountains until the late 1980's, but declined during the 1990's to less than 500 elk. Elk numbers in the Wenaha are still struggling, but appear to be slowly increasing. The Blue Mountains Elk Management Plan is currently being revised, which will update the population objective.

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 (>12 bulls:100 cows) within 3 years. Currently, a diverse age structure is observed in the post-hunt bull population.

Total bull harvest in the Blue Mountains has been relatively stable over the last 10 years. Between 2001 and 2010, the bull harvest averaged 216 bulls/year. Hunters harvested a total of 277 bulls in 2011 (Table 1), which is 22% above the 10-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" special permits.

Branched-antlered bulls are harvested under special permits in all GMUs (Table 2). In 2011, 191 "any bull" special permits were issued in nine spike-only units for rifle, muzzleloader, and archery hunters, excluding auction, raffle, and incentive permits. Branched-antlered bull special permit hunters, excluding GMU 157, averaged 57% success with 191permit holders harvesting 109 bulls. Six point or larger bulls comprised 98% of the harvest. Large, mature bulls continue to be harvested in the Blue Mountains, and generate much public interest for both hunting and viewing.

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 special permits in 2011. Weather conditions during the hunting season allowed for good access throughout the hunt period. Normally, some Watershed special permit holders do not hunt because they fail to research the area before applying, and are not aware of the rugged terrain. Hunters within GMU 157 reported 39 of 45 special permits being hunted, harvesting 15 bulls and 0 cows. Bulls harvested in the Watershed consisted of 100% 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. A total of 505 antlerless elk permits were issued in 2011, which doesn't include hotspot hunts or landowner damage control permits: modern firearm 335, ML 150, archery 20. Hunters harvested a total of 137 antlerless elk from eight GMUs. Modern Firearm hunters harvested 77 antlerless elk, muzzleloaders harvested 22, and archers 38.

The antlerless harvest is generally focused on sub-populations on private land to alleviate agricultural damage. In 2011, permit levels were decreased slightly to address declining counts in private land zones. The strategy of targeting antlerless elk on private land has been 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 2011, compared to 50+ bulls between 2000-2002.

Surveys

Post-season surveys are conducted to determine population estimates and herd composition in late winter. The 2012 survey was conducted between March 5 and 10. The 2012 survey, the Blue Mountains elk population is estimated to be 4,900 (90% CI +/- 610). Some surveys are conducted on winter range in Oregon north of the Wenaha River and an unknown percentage of those elk likely do not return to summer range within Washington.

Population status and trend analysis

Winter calf ratios in 2012 were estimated at 31 calves:100 cows (*90% CI* +/- 2.9), a decline from the previous year. Post-hunt bull/cow ratios in 2012 were estimated at 27 bulls:100 cows (*90% CI* +/- 11.9). Surveys conducted along the Oregon border (GMUs 157, 169, 172, and 186) include survey zones within Oregon. It is thought that a majority of these animals wintering in Oregon, north of the Wenaha River, migrate into Washington later in the spring, but little data is available to confirm this. Some historic data (Mace 1967) described movement patterns of wintering elk at Bartlett and Eden (south of the Wenaha River) Benches in Oregon. Approximately 35% of the elk wintering at these 2 feed sites summered in Washington.

Research

No current elk research is being conducted within the Washington portion of the Blue Mountains at this time.

The results from the Washington Blue Mountains Elk Vulnerability Study were published in the Journal of Wildlife Management (McCorquodale et al. 2011) and through a department report, which was made available to the public in 2011.

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 and 2011 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 constructed a 29-mile ATV trail within GMU-166 and GMU-175 in 2010. Although the Pomeroy District constructed 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 Pomeroy Ranger District is also struggling to find funds to replace broken gates and patrol for gates incorrectly left open. This has increased the vulnerability of elk in large areas of summer range within GMU's 166 and 175. WDFW will need to continue working with the USFS on this issue for the foreseeable future.

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.

Habitat enhancement

Projects to control weeds on WDFW Wildlife Areas and elk winter range on private land were implemented in 2009-2011. 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 GMU-154 Blue Creek and GMU-162 Dayton. In the damage season of July 1, 2011-March 31, 2012, 66 depredation permits were issued to private landowners in the Blue Mountains and at least 24 cow elk were killed. Not all permits had been reported on at time of publication, it is likely that the harvest estimate was higher than reported.

The sub-population that inhabits the wind power project lands in the Marengo unit (GMU 163) has become 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 200 elk were herded out of the Peola unit (GMU 178) and back into GMUs 166 and 175 in 2011, but elk still need continual harassment to keep numbers at an acceptably low level in GMU 178. Efforts will continue to herd these elk back inside the elk fence and onto public land in GMUs 166 and 175 during 2012-2013.

Management conclusions

The spike-only management program has been in place for 23 years. Management objectives 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 (Noyes et al. 1996). Most cows (93%, WDFW unpublished data) are now being bred by October 2, compared to only 55% prior to the management 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.

Winter calf ratios have improved and have remained at a more desirable level for a few years; average of 31 calves/100 cows (2008-2012, range 28-37). Low calf survival has had negative impact on hunting opportunity through reduced recruitment from the mid-1980s through mid-2000s. Low calf recruitment is thought to be the major factor still preventing Wenaha elk 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 GMUs 154, 162, 166, 169, 172, and 175 is extremely intense during March and April. Elk use patterns in GMUs 154, 166, 169, 172, and 175 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 occur in site specific locations in GMUs 154, 162, 163, 172, 178, and 181 resulting in damage control hunts being implemented by the Department. The current damage control strategy to target specific groups of elk on private land for damage control has reduced complaints on a majority of private lands.

Habitat values have declined in some areas due to roads (GMUs 154, 175) and noxious weeds (154, 169, 175, & 186), although extensive wildfires in 2005 and 2006 have improved habitat conditions on 163,000 acres in GMUs 154, 162, 166, 175, and 178.

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Noyes, J.H., B.K. Johnson, L.D. Bryant, S.L. Findholt, and J.W. Thomas. 1996. Effects of bull age on conception dates and pregnancy rates of cow elk. Journal of Wildlife Management: 80(3):508-517.

Table 1. Blue Mountains Elk Harvest (PMU 13), 2002-2011

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	Bulls					Antlerless Harvest
Year	Spikes	Adult	Total	Antlerless	Total	Cows:Bulls
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
2010	129	117	246	154	400	63
2011	168	109	277	161	438	58

Table 2. Special Permit Bull Elk Harvest-All Weapons, Blue Mountains WA., 2002-2011 (Spike-only GMUs).

	Bull		Hunter	Percent
Year	Permits	Harvest	Success	6 Point+
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%
2010	172	100	63%	98%
2011	191	109	57%	100%

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

Elk hunting seasons in Region 3 have changed frequently over the years. The major changes in recent years have been:
1994: All branched antler bull hunting became permit only in all PMU's except 34.
2000: Entire region came under one eastern elk tag by weapon.
2003: Early archery general season changed from September 1-15 to September 8-21. The late Archery season was set at November 20-December 8. Damage hunts changed from muzzleloader to any Advanced Hunter.
2004: Antlerless elk were no longer legal for Archers in PMU 32
2009: PMU 32 true-spike only. .
In 2011, the general seasons outside of PMU 34 were:
Archery: Early season September 6-18, true-spike only in PMU 32, spike or antlerless in PMU's 33,35and 36. Late season: November 23- December 8, spike or antlerless all units except GMU 328 (true-spike only).
Muzzleloader: October 1-7, PMU 32: True-spike only. PMU 33, 35 and 36 spike-only.
Modern Firearm: October 29- November 6, PMU 32: True-spike only. PMU 33, 35 and 36 spike-only.

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 size of the sub-herd. In 2011, a modern firearm general season for antlerless elk occurred in the Blackrock Elk Area (private land west of Hanford) September 8-21. A general modern firearm season in all of GMU 372 for any elk occurred October 29-November 6. In PMU 31 and GMU 373, general seasons for modern firearm, muzzleloader and archery seasons occurred simultaneously October 29-November 15.

In 2011, the reported number of elk hunters in Region 3 decreased for the sixth year in a row (Table 1). The reported hunter numbers were 22% below the 10-year average. Elk tag sales have been stable during the period of decline. Almost 30% of hunters are apparently purchasing tags to apply for special draw permits. If not drawn, they don't hunt.

Reported harvest and hunter success was below average for both the Colockum and Yakima herds. The recent change to a "true-spike" regulation in Colockum (PMU 32) was designed to decrease harvest and increase yearling bull escapement. Bull harvest in the Colockum has been the lowest in recent history since the change to "true-spike". 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 2011, field personnel documented a harvest of 95 elk (47 bulls, 48 antlerless).

No elk were reported harvested in GMUs 373 and 379 in 2011. In GMU 381, 4 bulls and 4 antlerless 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 2012. In the Yakima herd, over 70% of the winter range was flown and ground counts were conducted on feed sites in February.

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, 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). The observed bull ratio in the Colockum remains below objective (Table 2). The change to "true-spike" greatly increased the number and percentage of yearling bulls that survived through the hunting seasons and the ratio is increasing.

The Yakima bull ratio continues to be within objective, but had been declining (Table 3). In 2010, a low harvest resulted in relatively high numbers of yearling bulls on the winter range, reversing the trend.

Population status and trend analysis

In February and March 2012, the Colockum and Yakima herds were estimated at 5,305 $\pm$ 11 and 12,048 $\pm$ 1110 (Tables 2 and 3). Both herds are now above d objectives

There are 2 possible reasons for the increases in observed elk population: reduced antlerless harvest (Table 1) and increased use of aerial photography during surveys. Experiments with photography indicated that elk numbers were being under-estimated in large groups. Photography is now used for all large groups of elk. In the Colockum, roads on the winter range have been closed for ~ 4 years. Large numbers of elk are now appearing within the closure. Those elk may have moved in from outside the survey area. The survey area in the Yakima herd has also been expanded in recent years.

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 2012 yielded a herd size estimate of 720 $\pm$ 69 elk (386 cows, 156 calves, 178 bulls). Ratios per 100 cows were 46 bulls and 41 calves. No surveys were conducted in GMU 373, 379 or 381.

Habitat condition and trend

The overall acreage of summer range forage for the Colockum herd is increasing due to timber harvest, but most is also heavily grazed by livestock. Large areas now lack hiding cover and when human activity increases in late summer, many of the elk concentrate in and around the Coffin Reserve.

The U.S. Forest Service (USFS) and Washington Department of Natural Resources (DNR), and WDFW 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 recent timber harvest has reduced forage production on a portion of summer range. Insect outbreaks have recently killed timber over substantial 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 the resultant increased number of shed antlers in the spring. Stories and observations 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. 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.

The Colockum herd is not fenced and damage is being managed by hunting. The boundaries of the hunts are adjusted frequently, 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 payments 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), which owns the land, objected to public hunting on this site at that time. In 2011, WDFW, the Yakama Nation and USFWS drafted another hunt plan for the ALE. The plan was supported by DOE and was published on the Federal Register for public review. All indications were that a hunt was going to occur fall of 2012. Unfortunately, two other northwest tribes objected to the hunt and the USFWS has backed off plans for the 2012 hunt.

Management conclusions

The recent rapid increases in observed elk populations within the Colockum and Yakima herds might be partially due to changes in survey techniques. The Yakima herd is relatively healthy and permits are being increased to reduce the observed population. One problem in the district has been the chronically low bull ratio in the Colockum. The recent (2011 and 2012) record yearling bull recruitment is encouraging.

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 over 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.

	Colockum harvest		Yakima harvest		Regional hunter numbers				
Year	Bull	Cow	Bull	Cow	Modern	Muzz	Archery	Total	Success (%)
1992	611	652	1,348	1,246	26,928	4,086	5,865	36,879	10
1993	801	613	1,513	1,020	26,513	4,618	5,989	37,120	11
1994	550	433	782	770	26,328	5,503	6,114	37,945	7
1995	542	731	970	2,418	21,341	5,517	5,622	32,480	15
1996	469	660	631	892	20,288	6,190	4,819	31,297	8
1997	449	593	911	1,069	21,237	5,490	5,558	32,285	9
1998	335	255	717	426	18,253	3,918	3,701	25,872	7
1999	492	239	975	889	20,128	4,705	4,362	29,195	9
2000	392	214	1,140	1,058	25,383	4,554	5,549	35,486	8
2001	385	245	1,450	1,549	23,278	4,305	5,363	32,959	11
2002	379	358	1,184	1,442	22,204	4,791	6,177	33,172	10
2003	513	591	1,017	1,157	21,926	6,119	5,914	33,959	10
2004	424	393	1,083	1,373	20,888	3,342	6,521	30,751	11
2005	449	218	1,013	772	23,291	3,789	6,760	33,840	6.5
2006	418	302	927	1,093	20,654	3,497	5,972	30,123	9
2007	381	241	802	695	19,045	2,743	5,618	27,406	8
2008	327	282	799	826	18,552	2,898	5,578	27,028	8
2009	250	160	1,019	787	17,160	2,474	5,141	24,775	9
2010	182	121	694	440	16,320	2,400	4,942	23,662	7
2011	188	119	658	761	15,047	2,262	4,651	*22,371	7
10 YR AVG	361	279	924	919	19,633	3,431	5,731	28,602	9

*Includes multi-weapon tags

Table 2. Colockum elk winter survey results 1999-2012.

	Antlerless		Bulls		Total	Ratios (per 100 cows)	
Year	Cow	Calves	Spike	Branched	Elk	Calves	Bulls
1999	3,871	1,061	84	242	5,258 ± 2,048	27	8
2000	2,697	570	60	130	3,457 ± 940	21	7
2001	3,464	719	100	170	4,453 ± 543	21	8
2002	2,800	829	119	391	4,172 ± 566	30	18
2003	3,060	526	96	238	3,920 ± 445	17	11
2004	2,388	782	63	209	3,442 ± 168	33	11
2005	3,084	770	46	86	3,986 ± 391	25	4
2006	2,244	873	73	116	3,306 ± 160	39	8
2007	2,829	843	118	104	3,918	30	9
2008	2,859	917	43	77	3890±20	32	4
2009	3,723	732	80	85	4,621 ± 21	20	4
2010	3,549	839	69	137	4,594	24	6
2011	3,695	995	121	68	4,880±15	27	5
2012	3,924	1,121	153	107	5,305±11	29	7

Table 3. Yakima elk winter survey results 1999-2012.

	Antlerless		Bulls			Ratios (per 100 cows)	
Year	Cow	Calves	Spike	Branched	Total Elk	Calves	Bulls
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
2011	6,902	2,534	442	678	10,556±161	37	16
2012	7,847	2,963	472	766	12,048±1110	38	16

Table 4. Rattlesnake Hills Elk Harvest 1983-2011. 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%
2010	50	32	0	82	61%
2011	47	48	0	95	49%
29-yr avg	23	22	2	47	61%
last 5 yrs avg	42	40	0	81	53%

ELK STATUS AND TREND REPORT: REGION 4

PMU 43 - GMU 407
PMU 45 – GMUS 418, 437
PMU 46 – GMUS 448, 450

Chris Danilson, Wildlife Biologist
Paul M. DeBruyn, Wildlife Biologist

Population Objectives and Guidelines

Proposed management objectives are outlined in the draft North Cascade Elk Herd Plan (WDFW 2012) and include the following:

- Manage the North Cascade elk herd using sound, objective science to inform decision-making.
- Increase elk population numbers to approximately 1,500 animals in the Nooksack and North Sauk units (418 and 437) and approximately 1,900 for the entire herd.
- Manage hunted elk units for minimum post-season bull ratios consistent with the statewide Game Management Plan 2009-2015 (WDFW 2008) (currently a range of 12 - 20 bulls per 100 cows) in combination with overall bull mortality rates of less than or equal to 50 percent.
- Enhance public safety by reducing elk/vehicle collision rate on SR 20 (Sedro Woolley – Concrete).
- Minimize elk damage complaints on private property. Use current documented damage complaints as a measure of success.
- Expand hunt-able elk range available to both tribal and non-tribal hunters by promoting the expansion of this herd into the proposed elk closure area in the Sauk unit.
- Develop a community-based, elk damage management plan for the lower Skagit River Valley area and the Acme agricultural area similar to the Upper Snoqualmie Elk Management Model and/or the Blue Mountain Elk Damage Plan.
- Encourage the U. S. Forest Service, DNR, and private timberland owners to maintain current elk habitat capability.
- Increase public awareness of the elk resource and promote viewing and photographic opportunities.

Hunting season and harvest trends

Conservation closures were established in both GMUs 418 and 437 in 1997 until 2007 when a limited-entry bull only permit hunt was initiated in GMU 418. In 2011, the total number of permits in 418 was 40 (20 spike only, 20 any bull), which were divided equally among state and tribal hunters. The 20 state permits were allocated as 4 archery (2 spike only, 2 any bull), 4 muzzleloader (2 spike only, 2 any bull), 10 modern firearm (6 spike only, 4 any bull), with the contingency for the westside raffle tag and auction tag holder potentially being used in GMU 418. In 2011, neither the auction tag holder nor the westside elk raffle tag holder hunted in GMU 418, so the total number of state permits used was 18. Of the 18 state permit holders who drew GMU 418 bull elk permits, 12 harvested bulls (5 spikes, 7 bulls). Tribal hunters harvested 16 bulls using their permits from their allocation of 20 tags. 2011 general season state harvest outside of GMU 418 included 1 bull taken by archery in GMU 407 and one bull in GMU 448. Tribal hunters harvested one bull in GMU 407 and nine elk in GMU 437. In the Acme area, 6 archery and 8 modern firearm damage permits were issued, resulting in a harvest of 6 cows. Fifteen special cow permits were issued to master hunters targeting elk-related agricultural conflicts in elk area 4941 (within unit 437), resulting in a total of 7 cow elk harvested. 4 additional cows were harvested by state hunters in unit 448 in response to elk-related agricultural conflicts.

There were three documented poaching/closed season violations in units 418 and 437 with four elk (one branch antlered bull, one spike and two cows taken. Other reported sources of human-related mortality include at least 17 elk/vehicle collisions on Hwy 20.

Surveys

In 2005, biologists from WDFW and the Point Elliott Treaty Tribes initiated a study to assess the size of the North Cascades elk herd and develop a practical monitoring strategy (McCorquodale et al 2005). This study concurrently evaluated 2 monitoring approaches: sightability-correction modeling and mark-resight modeling, taking advantage of existing radio-marked elk from the 2003-2005 Mount St. Helens translocations. Additional capture and radio collaring of bull elk was required since they were under represented in the marked sub-population. Between 2005 and 2011, more than 40 bull elk were captured and radio tagged as part of this study and subsequent population modeling efforts. The culmination of this work (McCorquodale et al 2012) supports the ongoing use of radio collared elk in a mark-resight modeling approach to estimate population parameters. This involves two post-hunt aerial surveys conducted in late winter when elk sightability is maximized. As of June 2011, 67 animals in the North Cascades herd had functioning radio collars. Ongoing population monitoring will require future capture and radio collaring of elk to maintain an adequate number of marked animals. Beginning in 2011, biologists from WDFW and the Point Elliott Tribes began to assess the feasibility of using alternative trapping methods due to the costs and safety issues associated with helicopter darting.

In 2008 and 2009, WDFW and Tribal biologists deployed GPS (Global Positioning System) collars on a total of 15 elk as part of a project funded by the Sauk-Suiattle Tribe to examine habitat use throughout the existing and proposed future range of this population. Data from this project were used to validate habitat models developed by biologists from the US Forest Service Pacific Northwest Research Station. A project that involves using this large data set to model herd expansion alternatives is currently being scoped.

Population status and trends

The North Cascade elk herd steadily increased in size following successful reintroduction efforts in 1946 to an estimated peak of 1,700 animals in 1984 (M. Davison, Washington Department of Fish and Wildlife, unpublished data). Overharvest, poaching, and habitat-related impacts lead to a major population decline in the 1990s. By the late 1990's, the entire population had decreased to an estimated 425 animals. Efforts to rebuild the herd (including herd augmentations in 2003 and 2005, forest road access management, forage enhancement, and a moratorium on hunting) appear to have reversed the decline.

Based on 2011 survey data, the current population estimate for the core Nooksack herd is approximately 1,250 animals. Estimates of bull:cow and calf:cow ratios (shown in Table 1) illustrate that this growing herd is meeting most of its population management objectives. Due to low sightability of bulls, the bull:cow ratio estimates (particularly branch antlered bulls) are likely to be biased low. Overall, these estimates suggest that the ongoing limited-entry bull harvest is successfully providing harvest opportunity without adversely affecting population growth or age stricture within the bull cohort.

Recent aerial surveys and ground observations also indicate that the herd expanding into previously vacant historical range. A pattern of outward migration from the central range to peripheral agricultural areas, first observed in the late 1980s, has continued.

Habitat condition and trends

Comprehensive habitat analysis using modern spatial analysis techniques has not been conducted for the North Cascades elk herd, but remains one of the highest priorities. Location data from 15 elk that were outfitted with GPS collars between 2008 and 2009 was used to validate summer forage habitat models developed by the US Forest Service Pacific Northwest Research Station. WDFW staff is working with a graduate student to scope a project that will utilize this data set and GIS data layers from the Forest Service habitat models focusing on the North Cascades elk herd. The primary objective of this project is to evaluate different habitat modeling alternatives to develop project that will encourage herd expansion into areas that minimize the potential for future elk-related agricultural conflicts.

Problems limiting the effectiveness of the current elk range include the loss of habitat associated with housing development and conversion of forestlands above the floodplain, high road densities and mortalities from elk-vehicle collisions, and disturbance from multiple recreational uses on the land (e.g. hiking, horses, snowmobiles, and ORVs).

The core management area of the North Cascade herd within the South Fork Nooksack River has gone through a series of ownership changes. In 2005, the Sierra Pacific Industries purchased much of the core

range. Sierra Pacific has closed the road system to the public. Other than standard timber operations permitted elk and bear hunters, access is limited to foot traffic only. Any increase in public access would likely have a negative effect on the herd.

Elk-Related Agricultural Conflicts

The current estimate of elk within areas with prevalent agricultural-related conflicts is 150 – 200 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, issuing damage permits to harvest elk in problem areas appears to reduced crop damage somewhat, but may not have appreciably reduced the number of animals in the agricultural landscape. Implementing a hazing program and creating new forage enhancement sites on forest uplands away from agricultural conflict areas are two strategies outlined in the draft herd plan (WDFW 2012) intended to address this issue. As the elk population continues to increase in size and expand its distribution, elk damage complaints in the traditional problem areas will likely persist and potentially increase. Besides the traditional areas of elk complaints coming from Acme and the middle Skagit River, a newer damage problem on the Sauk Prairie near Darrington has developed involving some of the elk that were translocated from the Acme area.

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. This site (referred to as Hurns Field) has been very successful in providing a year round opportunity for public elk viewing. Establishing a similar site in Whatcom County has the potential to provide additional public viewing opportunities. Such a site would have to be situated so as not to exacerbate elk damage issues.

The limited-entry bull permit hunt in unit 418 was expanded for 2012 to include a total of 50 tags (26 any bull, 24 spike only) divided equally between state and tribal hunters. The allocation to state hunters was 11 modern firearm tags (5 any bull, 6 spike only), 6 muzzleloader (3 any bull, 3 spike only) and 6 archery (3 any bull, 3 spike only), and the contingency for the westside raffle tag, and auction tag holder potentially being used in GMU 418 Extremely limited general hunt opportunities exist outside of the core elk herd range in GMUs 407 and 448, but could improve as the herd grows and expands its range. If successful, encouraging expansion of the herd east of the Sauk River will also provide hunting opportunities in the future. Special damage control hunts will continue to be adapted to address elk-related agricultural conflicts while providing harvest opportunities – particularly for those enrolled in WDFW's master hunter program.

Management Goals

The goals for the North Cascades elk herd are to:

- Manage the North Cascades herd for a sustained yield;
- Manage elk for a variety of recreational, educational and aesthetic purposes including hunting, wildlife viewing, photography, cultural and ceremonial uses by Native Americans, and scientific study;' and,
- Manage and enhance elk and their habitats to ensure healthy and productive populations.

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Table 1. Late winter/early spring elk herd ratios per 100 cows			
Year	**Bulls/ 100 Cows**	**Branch/ 100 Cows**	**Calves/ 100 Cows**
2007	25.9	15.6	38.0
2008	31.1	15.9	41.8
2009	30.4	17.4	35.8
2010	23.5	17.7	25.8
2011	30.0	18.2	47.0

ELK STATUS AND TREND REPORT: REGION 4

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

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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 2012).

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 1995-2011 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 1995-2011 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 (Fig. 3).

Tribal harvest as reported by the Northwest Indian Fisheries Commission (NWIFC) (see http://nwifc.org/publications/big-game-harvest-reports/ in GMU 466, has also added to the total elk harvest for this GMU. 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 State, Muckleshoot Tribe 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 special 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; 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.

Table 1. GMU 485 Post-hunt elk herd composition, 1984-2011 (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
2010 [a]	20	32	389 ± 51
2011 [a]	17	30	443 ± 108

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

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 Hanson 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 Hanson 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, 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.

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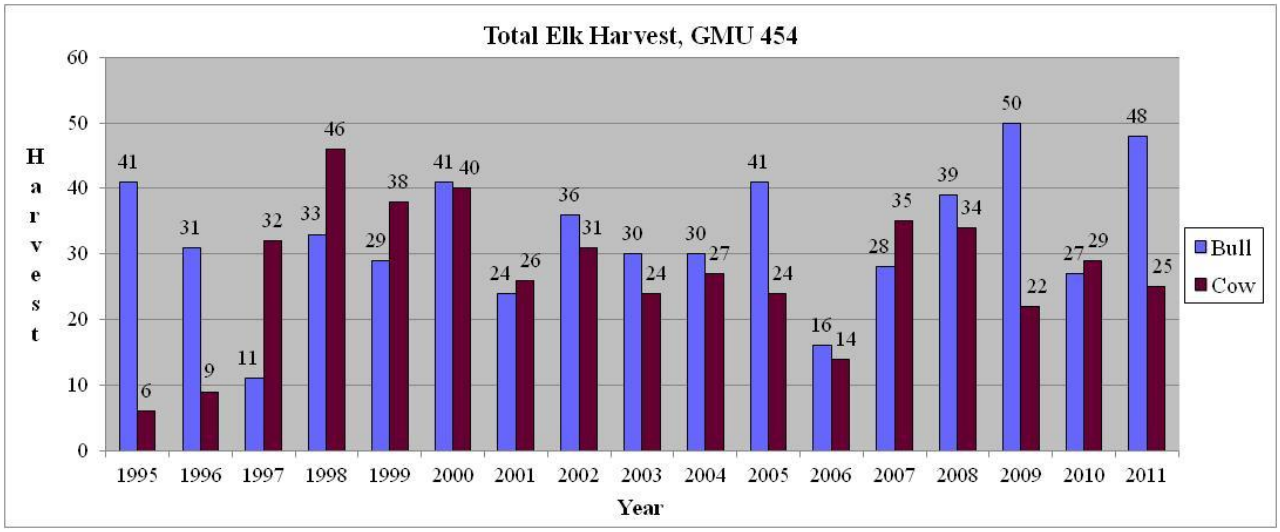

Figure 1. Annual elk harvest, GMU 454, 1995-2011 (all weapon types combined)

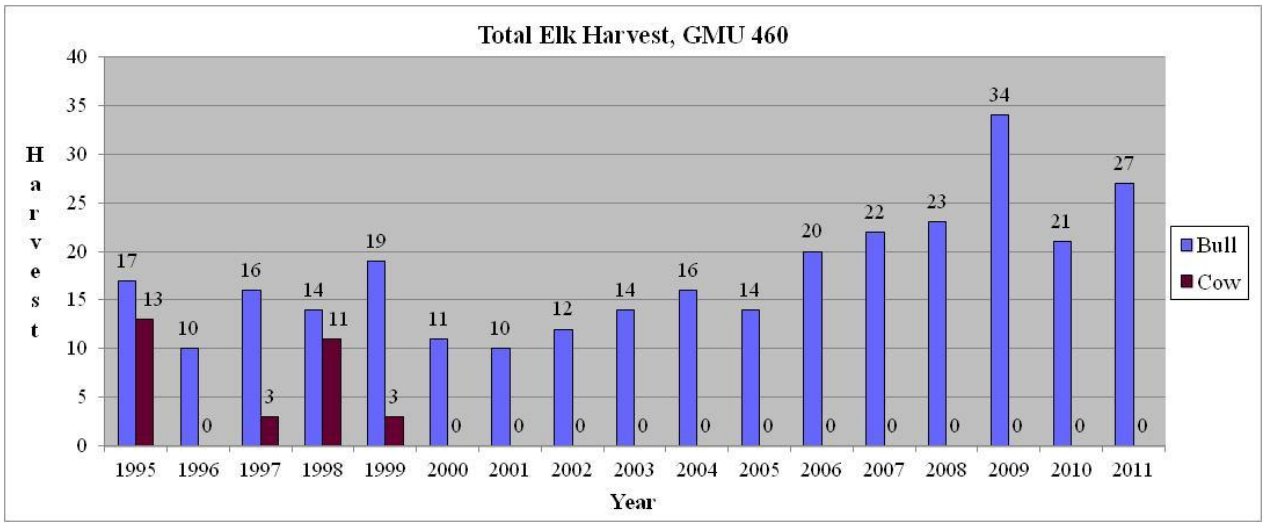

Figure 2. Annual elk harvest, GMU 460, 1995-2011 (all weapon types combined)

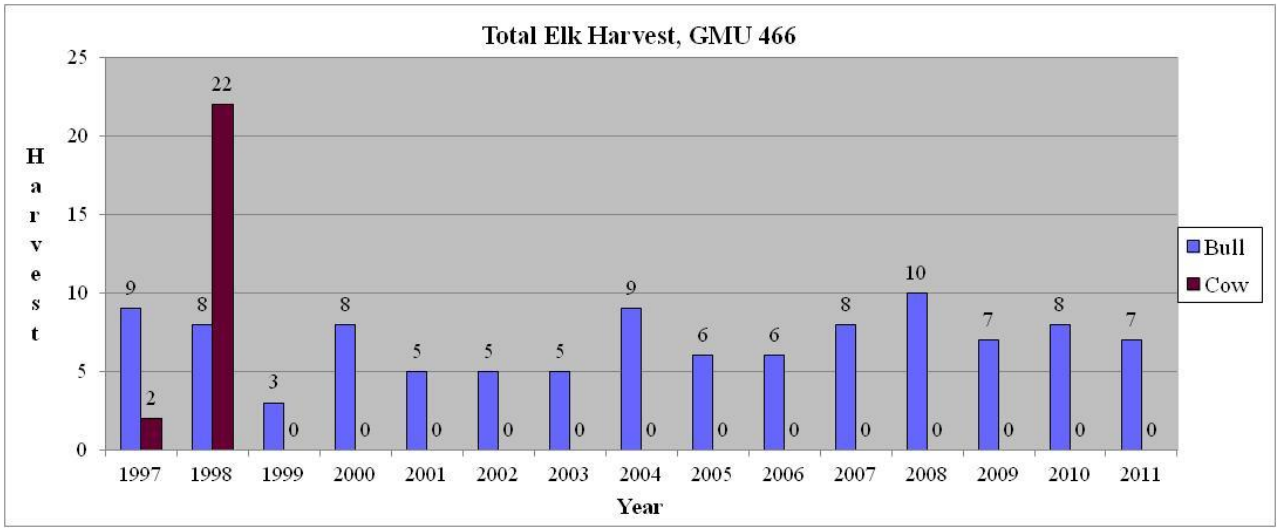

Figure 3. Annual elk harvest, GMU 466, 1997-2011 (all weapon types combined)
*2004 harvest reflects uncorrected raw data reported from hunter reports

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

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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. 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 on a list of plans to be reviewed soon. Specific goals of the South Rainier herd plan are to increase the estimated elk population in the eastern half of the herds 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 jointly with WDFW Region 6 and the management strategies will follow the same general goals as the other two plans and the Game Management Plan. Specific population objectives and monitoring techniques will be set to keep within habitat limitations and public tolerance.

General Hunting Seasons and Harvest Trends

In 2011 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 below. 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, 568, 572, 574, 578
3 pt. min. or antlerless	501, 504
Any elk	564, 388, 382
Permit only (limited entry, permit draw)	522, 524, 556

In Region 5, a total of 25,743 general season elk hunters spent 138,994 days afield in 2011 (Figure 1). Region 5 general season harvest was 1,782 elk and is broken down by user group as follows: 539/30% in archery, 306/17% in muzzleloader and 884/50% in the modern firearm season; the other 53 elk were killed by multi-season permit holders. Overall, hunter success during the general season was 6.9%, which is below the 10 year average of 9.0%. The 2011 general season elk harvest of 1,782 was down 30% from the most current 10 year average (2002-2011) and is down 18% from the 2010 harvest. Table 3 lists a summary of the 2011 general season elk harvest in all Region 5 GMUs.

Table 3. Summary of general season elk harvest, all weapons combined, for 2011 in Region 5.

GMU	Antlered Harvest	Antlerless Harvest	Total Harvest
388	4	0	4
501	19	35	54
503	22	21	43
504	18	31	49
505	45	19	64
506	184	28	212
510	10	0	10
513	51	0	51
516	77	0	77
520	178	88	266
530	182	47	229
550	180	22	202
554	15	0	15
560	207	34	241
564	40	47	87
568	28	0	28
572	63	15	78
574	27	1	28
578	41	0	41
TOTAL	**1391**	**391**	**1782**

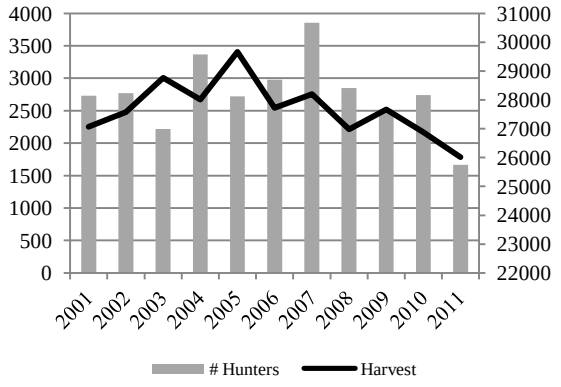

Figure 1: General season harvest and hunter numbers for all user groups from 2001-2011

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 bull 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 3,838 special permits were distributed within 94 hunts in the Region for the 2011 season. Of this total number of permits, 3,345 were antlerless only permits (937 more permits than in 2010). The total permit harvest in 2011 for the Region was 1,290. Some of these special permits were issued in designated elk areas and are designed to help minimize damage being caused by elk. WDFW entered into a MOU with the USFS to manage three elk areas within the Mount St. Helens National Volcanic Monument. In 2010, a large portion of the increase in antlerless elk tags stemmed from a change in GMUs 568, 574, and 578 where antlerless elk hunting opportunity was changed from a general season structure to permit-only.

Antlerless permits within the MSH herd GMUs have been substantially increased since 2007 for all seasons to assist with the population reduction goal. Table 4 and Figure 2 depict the number of antlerless only elk permits and antlerless harvest for all user groups combined in Region 5 during 2011. 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 2011 in Region 5

GMU	Antlerless Permits	Antlerless Harvest
503	0	0
504	75	10
505	85	14
506	50	30
520	680	255
524	300	87
522	61	18
530	400	129
550	590	278
554	75	10
556	220	166
560	150	33
572	50	15
578	309	30
574	175	22
568	125	5
TOTAL	**3345**	**1102**

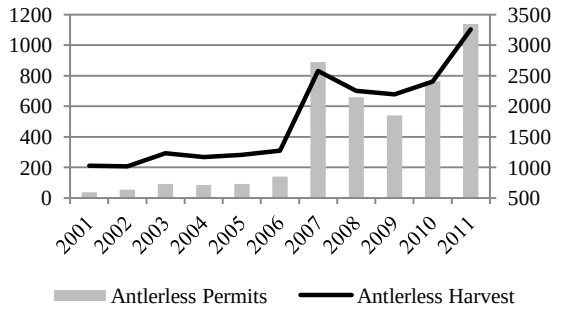

Figure 2: Antlerless elk harvest and permit numbers from 2001-2011

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) were designed to be quality hunt areas, though their quality hunt designation is being evaluated for the future. The status of these units as permit-entry only for bull harvest is unique within Region 5 and was implemented due to the negative impacts on habitat and loss of elk after the eruption of Mt. St. Helens. Bull permits in these units have slowly increased over time and now include all user groups (modern firearm, archery, and muzzleloader).

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

GMU	Number of Bull Elk Permits	Bull Elk Harvest	Success Rate
522	30	13	43%
524	90	45	50%
556	337	120	36%

Surveys

A new research project was 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 budget related, but has more to do with this new approach being refined within specific, representative GMUs before being extrapolated to other portions of the herd and Region.

GMUs surveyed by WDFW in the spring of 2012 include 522, 524, 556, 550, and 520. Under a new protocol using radio-marked animals in a mark-resight approach, two separate survey periods were conducted within these GMUs. A preliminary population estimate from early data analysis for these 5 GMUs was 6,820 elk.

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 counts and winter severity data are then used in determining whether an emergency winter feeding program for elk will be initiated on the Wildlife Area. Figure 2 shows the winter elk mortality for the past 14 years and the peak winter elk counts for the past seven years on the mudflow portion of the Wildlife Area. The number of mortalities (47) found in the 2012 survey was the highest since 2008, likely due to a late spring with above average precipitation.

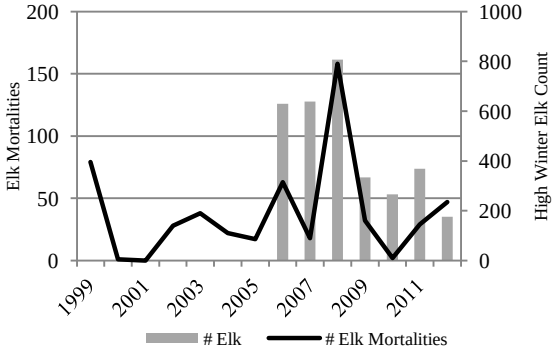

Figure 2: Elk mortality and high elk counts on the mudflow portion of the Mt. St. Helens Wildlife Area 1999-2012

Population Status and Trend

In the past, several sources of information were used to assess elk herd size and composition. Most of these data came 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 (Bender and Spencer 1999). 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 inherent to the method that were unrealistic. In the years following discontinuation of the use of the SAK model, different methods and levels of population monitoring attention have been applied to different segments of the regional elk population. These are discussed below.

Mount St. 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 2009 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, 35 in February 2010, 31 in February of 2011, and 30 in February of 2012 across a northwestern core area of the MSH elk herd (GMUs 520, 522, 524, 550, and 556). As of time of writing, there are approximately 81 elk on the air including 7 with GPS collars that are recording fine grain habitat data. In March and April 2009, 2010, 2011, and 2012 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 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 MSH elk herd. The current data collection phase of this effort was completed in the spring of 2012 and the analysis of 4 years worth of data is being conducted. 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, 2010, 2011 and 2012 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 7: Raw sex and age ratios for winter/spring elk flights in 2012 for Region 5

Flight	GMUs	Bull:Cow	Calf:Cow	% Mature Bulls
1	520, 522, 524, 556, 550	31:100	28:100	16%
2	520, 522, 524, 556, 550	34:100	32:100	21%

South Rainier Herd

The Puyallup Tribe of Indians developed a 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 is 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. It should be noted that WDFW did not participate in developing or reviewing this model or analyzing the data collected during survey efforts. The information provided by the Puyallup Tribe to supplement the South Rainier herd section of this

report provides estimates for wintering elk in the upper Cowlitz River basin within portions of GMUs 513, 516, 510, and 503.

Table 8: Spring population estimates for elk in portions of GMUs 513, 516, 510, and 503 , Puyallup Tribe of Indians, 2006-2012.

Year	Population Estimate
2006	938
2007	964
2008	815
2009	1084
2010	1282
2011	1618
2012	1495

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. Once the herd plan has been finalized in 2013, the Willapa Hills elk herd will become the next focus of the Region's updated monitoring techniques.

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), (3) intensive forest management that limits forage production on industrial forest land, and (4) 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 4 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 clear cuts, relatively open young regeneration stands, and low forage-potential closed canopy forests. Post-logging treatments on industrial timberland (*i.e*., herbicide application) often reduce/delay the forage values produced by logging relative to what would naturally occur (*e.g*., what occurred on the early post-eruption landscape). 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 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; much more acreage is now in early successional stages.

Habitat Enhancement

Mount. St. Helens Herd

The WDFW continues to take steps to enhance forage quality on the North Toutle mudflow through plantings and fertilization. Lime and/or fertilizer treatments were applied to over 160 acres to maintain and enhance forage production. Portions of these sites were also harrowed to break up and control moss and thatch that can inhibit the growth of forage plants. All of the enhancement sites that were rehabilitated over the past several years are beginning to make significant contributions to the forage base. WDFW will continue to collect clip plot samples to monitor and compare productivity between sites.

Volunteers mowed the St. Helens Loop pastures in the summer to maintain plant vigor and palatability until the winter period. Approximately 3,000 willow and cottonwood cuttings were added to the existing riparian bank stabilization planting over a reach of about 1 mile. These cuttings were placed in the sediment deposition areas along the riverbank where bank stabilization structures were constructed in previous years to slow erosion.

Scotch broom control efforts included hand spraying individual plants in approximately 250 acres, hand pulling an area to create trails allowing access into dense stands to be sprayed later in the year, and using a newly purchased tractor and implements to clear approximately 6 acres of the invasive plant.

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 13,000 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 between the USFS (Gifford Pinchot), the Puyallup Tribe of Indians, and the RMEF to pre-commercially thin summer and winter range areas to improve forage for the South Rainier elk herd. Since 2004, more than 1,366 acres of wide-spaced thinning projects have been completed on both summer and winter range areas. In 2012, 126 acres of elk habitat enhancement projects were completed on the Gifford Pinchot National Forest. Included were mechanical control of scotch broom, slash treatment, and wide-space pre-commercial thinning. Funding has been provided via U.S. Fish and Wildlife Service Tribal Wildlife Grants, the Puyallup Tribe of Indians, RMEF, and the USFS. These projects have and will continue to provide valuable 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 and WDFW law enforcement have created special late and early season damage hunts within specified elk areas as well as implemented a pool of Master Hunters for Region-wide response to damage. 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 and are located in areas where access for hunting is limited. 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, overwinter 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 and rigorous 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 needs to be answered and 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 the quality of habitat that these elk are occupying.

Another aspect of the body condition data being collected from the MSH elk herd was initiated in 2009. Antlerless elk permit holders in the MSH herd area were sent informational packets soliciting submittal of biological samples from their harvested cow elk. Requested samples included the heart (with pericardium), kidneys, incisors, reproductive tracts, and the animals' lactation status. Body condition in elk can be evaluated by the amount of fat surrounding the heart and kidneys. WDFW mailed out 2500+ packets to permit holders in 2011 and received 153 samples. This type of data collection over a broad geographic area is key to understanding the condition of this herd. Data are currently being analyzed.

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 sub-alpine zone of the Park. 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 general season elk harvest and success in the Region have both been on the decline recently. With recent harsh winters and increased antlerless permit levels within the MSH herd, we believe we are moving towards our management goals in this herd. New research efforts within this herd should give us a better estimate of the population.

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

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ELK STATUS AND TREND REPORT: REGION 6

PMU 61–GMUS 658, 660, 663, 672, 673, 681, 684, 699
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

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Population Objectives and Guidelines

Rocky Mountain (*Cervus elaphus nelsoni*) and Roosevelt (*C. e. roosevelti*) elk both occur in Washington, but only Roosevelt elk are present in Region 6. In general, the Department manages elk with the primary goal of promoting viable and productive elk populations. Secondary management goals include maximizing hunter opportunity while also providing for a variety of other recreational, aesthetic, and educational purposes. General guidelines outlined in the Department's Game Management Plan (WDFW 2008) that direct management decisions to ensure these goals are met include:

1. Maintaining populations with a pre-hunt bull:cow ratio of 15–35:100.
2. Maintaining populations with a post-hunt bull:cow ratio of 12–20:100.
3. Maintaining total bull mortality rate of less than or equal to 50%.

With exception to the Willapa Hills elk herd, the Department has developed management plans that outline objectives and strategies to address management issues specific to each of Washington's 10 elk herds. Region 6 contains all or portions of four elk herds; the Olympic herd, Willapa Hills herd, South Rainier herd, and North Rainier herd (Table 1). Consequently, specific population objectives and guidelines for each Population Management Unit (PMU) vary in accordance with the associated herd plan. Each plan is available for review and can be accessed through the Department's website (http://wdfw.wa.gov/conservation/game/).

Table 1. The elk herd with which each Region 6 Population (PMU) and Game (GMU) Management Unit is associated.

Herd	PMUs	GMUs*
Olympic	63	642, 648, 651
	64	621, 624, 627, 633
	65	607, 615, 618, 636, 638
	66	601, 602, 603, 612
Willapa Hills	61	658, 660, 663, 672, 673, 681, 684, 699
North Rainier	62	652
	67	653, 654
South Rainer	62	667

*GMU 666 is not listed because it is not identified as part of the elk herd area in any of the four elk herd plans.

There are a number of tribes in Region 6 that reserve off-reservation hunting rights within the boundaries of their ceded lands; every PMU in Region 6 contains at least one GMU that is within the boundary of those ceded lands. Therefore, effective management of elk herds in Region 6 is, in most instances, a cooperative effort between the Department and the tribes that have a vested interest in a particular herd. In several GMUs tribes have taken the lead on collecting information that is being used to better manage local elk herds (e.g. survey data, population estimates, research, etc.). In their commitment to a cooperative management approach they have shared that information with the Department and some of it has been provided in this report. Credit is given accordingly when that information is presented in this document.

Hunting Seasons and Harvest Trends

The Department implements a variety of harvest strategies to achieve its management goals for elk in Region 6 (Table 2). When (season timing and length) and where (GMU and/or Elk Area) these strategies are implemented depends on the population objectives for a specific area. For example, permit only antlerless opportunities are primarily restricted to areas that have experienced chronic elk damage issues and the population objective is to limit elk numbers.

Table 2. Region 6 Game Management Units (GMUs) that were open during the general modern firearm, archery, and muzzleloader seasons. Also included are the associated bag limits.

Season	Bag Limit	GMUs
Modern Firearm	3 pt. min	601, 602, 603, 607, 612, 615, 618, 624, 627, 633, 638, 642, 648, 651, 652, 654,658, 660, 663, 667, 672, 673, 681, 684
Early Archery	Any elk	652, 666
	3 pt. min. or antlerless	624, 654, 660, 667, 672, 673, 681, 684, 699, Elk Area 6061
	3 pt. min	601, 602, 603, 607, 612, 615, 618, 627, 633, 638, 642, 648, 651, 658, 663
Late Archery	Any elk	666
	3 pt. min. or antlerless	648, 667, 672, 681, 699
	3 pt. min	603, 612, 615, 638
Early Muzzleloader	Any elk	666, 684
	3 pt. min. or antlerless	652, 654, 667
	3 pt. min	602, 603, 607, 627, 633, 638, 642, 660, 663, 672
Late Muzzleloader	Any elk	666, 684
	3 pt. min. or antlerless	652
	3 pt. min	601, 618, 658, 667

PMU 61.—An estimated 471 bulls and 161 antlerless elk were harvested in PMU 61 during the 2011 season. Bull harvest increased by 18% from 2010 and cow harvest declined by 12%. Trends in total harvest have been increasing since 2006 (Figure 1).

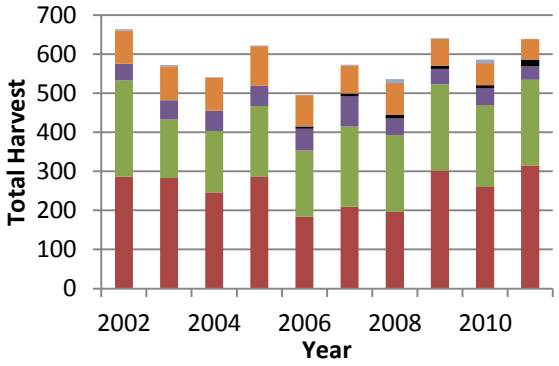

Figure 1. Proportion of the estimated total elk harvest in PMU 61 attributed to modern firearm (red), archery (green), muzzleloader (purple), multiple weapon (black), special permit (orange), and tribal harvest (blue), 2002–2011. Tribal harvest estimates are the same as those reported in NWIFC (2012).

There were 4,571 hunters who participated during the general modern firearm, archery, and muzzleloader seasons and spent a total of 25,766 days pursuing elk in PMU 61 during the 2011 season. Hunter numbers for all user groups have been stable to marginally decreasing since 2009 (Figure 2).

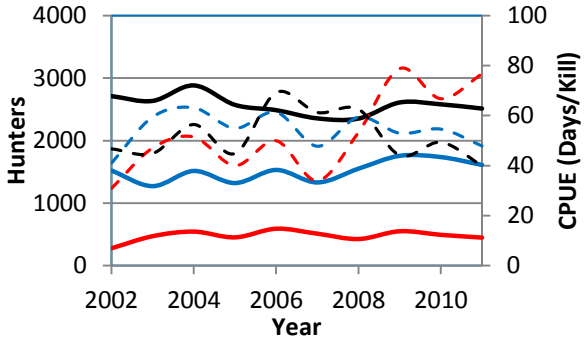

Figure 2. Trends in the estimated number of hunters that participated (—) during the general modern firearm (black), archery (blue), and muzzleloader (red) seasons in PMU 61, 2002–2011. Also included is the estimated catch-per-unit effort (---) for each user group.

Since 2002, hunters participating during the general modern firearm and archery seasons have accounted for the majority of elk harvested in PMU 61 (Figure 1). In 2011, modern firearm hunters accounted for 49% of the total harvest while archers accounted for 34%.

Hunter success rates were 13%, 14%, and 8% during the 2011 general modern firearm, archery, and muzzleloader seasons, respectively. Archers have historically experienced the greatest success among general season user groups, but hunter success during the modern firearm season has been increasing since 2006 (Figure 3). Trends in catch-per-unit effort (CPUE) were similar among user groups until 2007 (Figure 2).

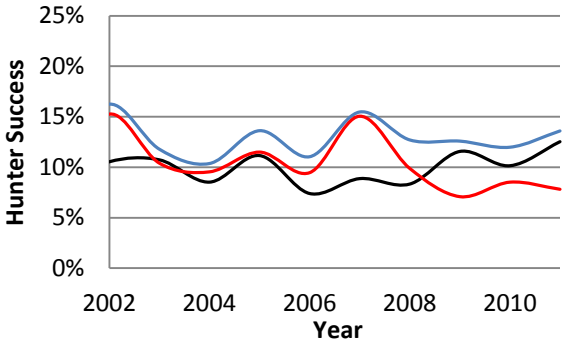

Figure 3. Trends in estimated hunter success rates in PMU 61 during the general modern firearm (black), archery (blue), and muzzleloader (red) seasons, 2002–2011.

PMU 62.—An estimated 133 bulls and 97 antlerless elk were harvested in PMU 62 during the 2011 season. Total harvest has been increasing since 2007 (Figure 4). Bull and antlerless harvest have increased by 80% and 43%, respectively, since 2007.

There were 1,927 hunters who participated during the general modern firearm, archery, and muzzleloader seasons and spent a total of 10,001 days pursuing elk in PMU 62 during the 2011 season. Hunter numbers for each user group were increasing during the mid-2000s, but have either stabilized or declined from 2009 to 2011 (Figure 5).

Since 2002, hunters participating during the general muzzleloader seasons have typically accounted for the greatest proportion of elk harvested in PMU 62 (Figure 4). In 2011, muzzleloader, modern firearm, and archery hunters accounted for 38%, 32%, and 20% of the total harvest, respectively.

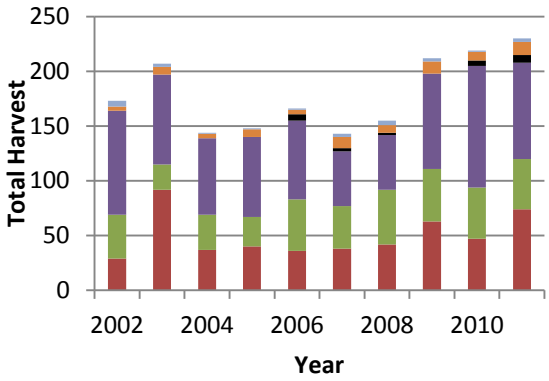

Figure 4. Proportion of the estimated total elk harvest in PMU 62 attributed to modern firearm (red), archery (green), muzzleloader (purple), multiple weapon (black), special permit (orange), and tribal harvest (blue), 2002–2011. Tribal harvest estimates are the same as those reported in NWIFC (2012).

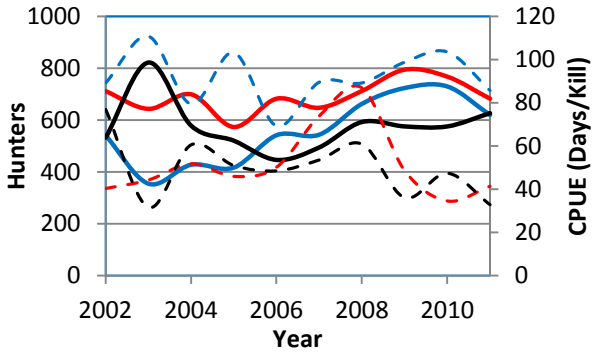

Figure 5. Trends in the estimated number of hunters that participated (—) during the general modern firearm (black), archery (blue), and muzzleloader (red) seasons in PMU 62, 2002–2011. Also included is the estimated catch-per-unit effort (---) for each user group.

Hunter success rates were 12%, 7%, and 13% during the 2011 general modern firearm, archery, and muzzleloader seasons, respectively. Hunters participating during the general muzzleloader season experienced the greatest success among general season user groups until 2007; since then success rates during the general modern firearm and muzzleloader seasons have been similar (Figure 6). Trends in CPUE declined in 2011 for both modern firearm and archery hunters, but since 2002 have been most similar between modern firearm and muzzleloader hunters (Figure 5).

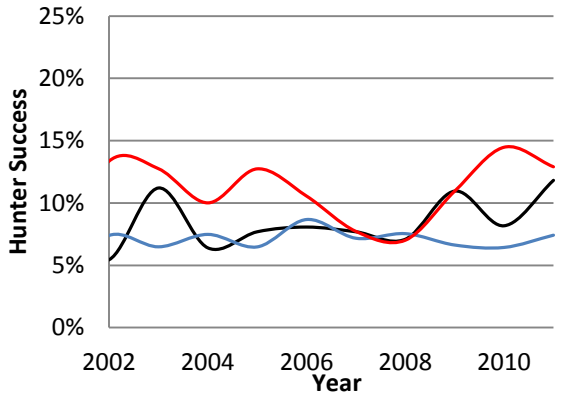

Figure 6. Trends in estimated hunter success rates in PMU 62 during the general modern firearm (black), archery (blue), and muzzleloader (red) seasons, 2002–2011.

PMU 63.—An estimated 70 bulls and 31 antlerless elk were harvested in PMU 63 during the 2011 season, which was similar to harvest levels in 2010 (72 bulls and 36 antlerless elk). Following a peak in harvest during the 2008 season total harvest declined sharply and has been stable to marginally decreasing since then (Figure 7).

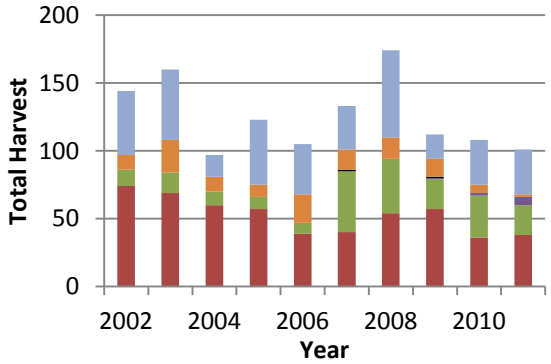

Figure 7. Proportion of the estimated total elk harvest in PMU 63 attributed to modern firearm (red), archery (green), muzzleloader (purple), multiple weapon (black), special permit (orange), and tribal harvest (blue), 2002–2011. Tribal harvest estimates are the same as those reported in NWIFC (2012).

There were 1,061 hunters who participated during the general modern firearm and archery seasons and spent a total of 5,675 days pursuing elk in PMU 63 during the 2011 season. Only 24 hunters participated during the general muzzleloader season. The number of hunters participating during the general modern firearm season has been declining since 2002, while the number of archery hunters has been stable since 2007 (Figure 8).

Since 2007, modern firearm, archery, and tribal hunters have accounted for >90% of the elk harvested in PMU 63 (Figure 7). In 2011, modern firearm, archery, and tribal hunters accounted for 38%, 22%, and 32% of the total harvest, respectively.

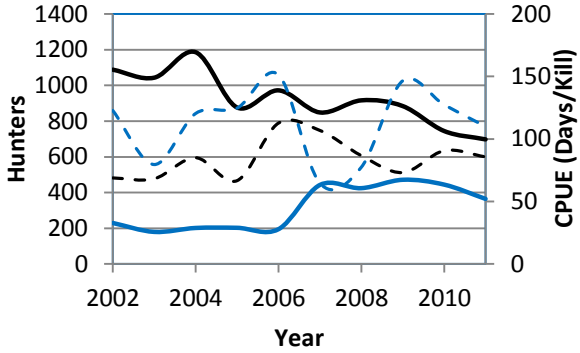

Figure 8. Trends in the estimated number of hunters that participated (—) during the general modern firearm (black), and archery (blue) seasons in PMU 63, 2002–2011. Also included is the estimated catch-per-unit effort (---) for each user group.

Hunter success rates were 5% and 6% during the 2011 general modern firearm and archery seasons, respectively. Success rates for modern firearm and archery hunters have, for the most part, been similar and followed similar trends since 2002 (Figure 9). Trends in CPUE have also been similar between modern firearm and archery hunters since 2002 and declined in 2011 for both user groups (Figure 8).

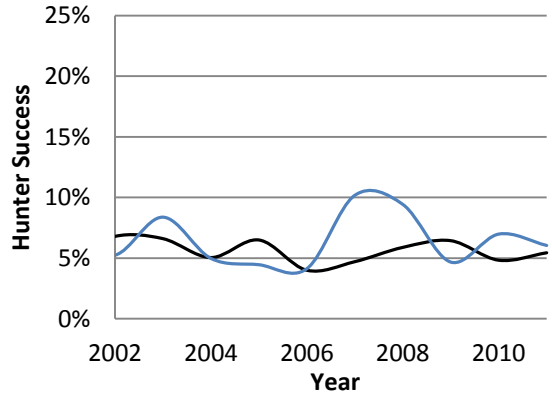

Figure 9. Trends in estimated hunter success rates in PMU 63 during the general modern firearm (black), archery (blue), and muzzleloader (red) seasons, 2002–2011.

PMU 64.—Elk occur at very low densities and harvest is mostly limited to permit only opportunities. In 2011, there were only 10 bulls and 5 antlerless elk harvested (Figure 10). Tribal harvest also occurs in PMU 64 and has, on average, accounted for 51% [Coefficient of variation (CV)=21%] of the total harvest since 2002 (NWIFC 2012).

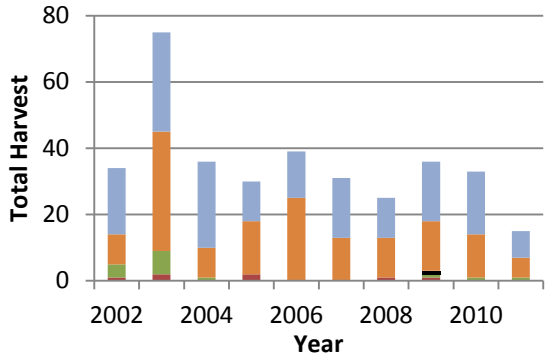

Figure 10. Proportion of the estimated total elk harvest in PMU 64 attributed to modern firearm (red), archery (green), muzzleloader (purple), multiple weapon (black), special permit (orange), and tribal harvest (blue), 2002–2011. Tribal harvest estimates are the same as those reported in NWIFC (2012).

PMU 65.—An estimated 186 bulls and 20 antlerless elk were harvested in PMU 65 during the 2011 season, which was similar to harvest estimates from 2010 (195 bulls and 13 antlerless). Estimated total harvest showed a marginally increasing trend from 2002 through 2009, but increased by 28% from 2009 to 2010 (Figure 11).

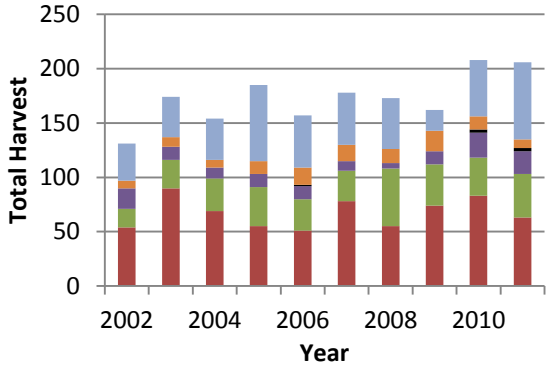

Figure 11. Proportion of the estimated total elk harvest in PMU 65 attributed to modern firearm (red), archery (green), muzzleloader (purple), multiple weapon (black), special permit (orange), and tribal harvest (blue), 2002–2011. Tribal harvest estimates are the same as those reported in NWIFC (2012).

There were 1,329 hunters who participated during the general modern firearm, archery, and muzzleloader seasons and spent a total of 7,157 days pursuing elk in PMU 65 during the 2011 season. Hunter numbers for all user groups have either been stable or increasing since 2002 (Figure 12).

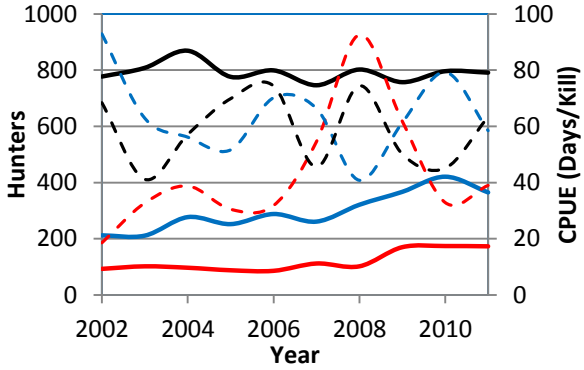

Figure 12. Trends in the estimated number of hunters that participated (—) during the general modern firearm (black), archery (blue), and muzzleloader (red) seasons in PMU 65, 2002–2011. Also included is the estimated catch-per-unit effort (---) for each user group.

Since 2002, modern firearm hunters have, in most years, accounted for the greatest proportion of elk harvested in PMU 65, while the proportion of harvest attributed to tribal hunters has varied (Figure 11). In 2011, modern firearm hunters accounted for 31% of the total harvest, while archery and tribal hunters accounted for 19% and 34%, respectively.

Hunter success rates were 8%, 11%, and 12% during the 2011 general modern firearm, archery, and muzzleloader seasons, respectively. Since 2002, hunter success rates have been the most consistent during the general modern firearm season (Figure 13). Trends in CPUE have been variable for all user groups and since 2007, most similar during modern firearm and muzzleloader seasons (Figure 12).

PMU 66.—There were an estimated 140 bulls and 9 antlerless elk harvested in PMU 66 during the 2011 season. Bull harvest declined by 10% compared to the 2010 season while antlerless harvest was nearly identical (9 antlerless elk in 2010). Trends in total harvest have been variable since 2002 and it is difficult to identify a long-term trend (Figure 14). However, the number of elk harvested during seasons established by the Department has shown an increasing trend from 2004 through 2011 (Figure 14).

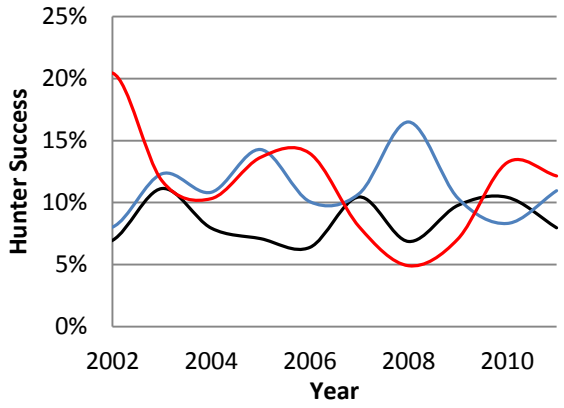

Figure 13. Trends in estimated hunter success rates in PMU 65 during the general modern firearm (black), archery (blue), and muzzleloader (red) seasons, 2002–2011.

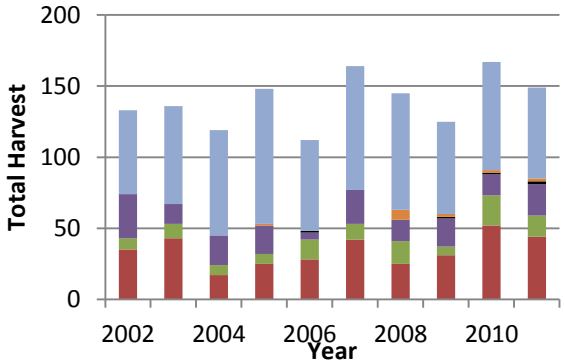

Figure 14. Proportion of the estimated total elk harvest in PMU 66 attributed to modern firearm (red), archery (green), muzzleloader (purple), multiple weapon (black), special permit (orange), and tribal harvest (blue), 2002–2011. Tribal harvest estimates are the same as those reported in NWIFC (2012).

There were 803 hunters who participated during the general modern firearm, archery, and muzzleloader seasons and spent a total of 4,009 days pursuing elk in PMU 66 during the 2011 season. Hunter numbers for all user groups have shown an increasing trend since 2007 (Figure 15).

Since 2002, tribal hunters have, on average, accounted for 53% (CV=14%) of the elk harvested in PMU 66. In 2011, tribal harvest accounted for 34% of the total harvest while modern firearm and archery hunters accounted for 31% and 19%, respectively. The proportion of total harvest attributed to archery hunters has increased in recent years (Figure 14).

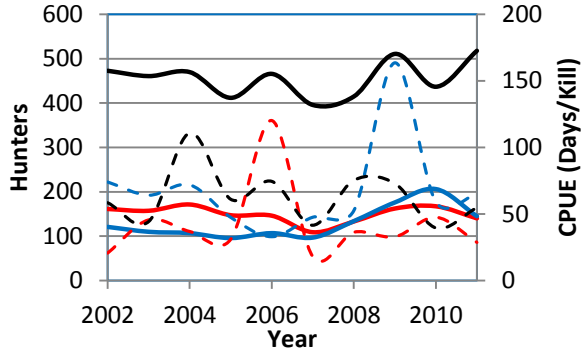

Figure 15. Trends in the estimated number of hunters that participated (—) during the general modern firearm (black), archery (blue), and muzzleloader (red) seasons in PMU 66, 2002–2011. Also included is the estimated catch-per-unit effort (---) for each user group.

Hunter success rates were 8%, 10%, and 16% during the 2011 general modern firearm, archery, and muzzleloader seasons, respectively. Since 2002, hunter success rates have varied substantially for all user groups with no discernable long-term trend (Figure 16). Trends in CPUE have also been variable, but increases in CPUE for all user groups seem to occur when there are increases in hunter numbers (Figure 15).

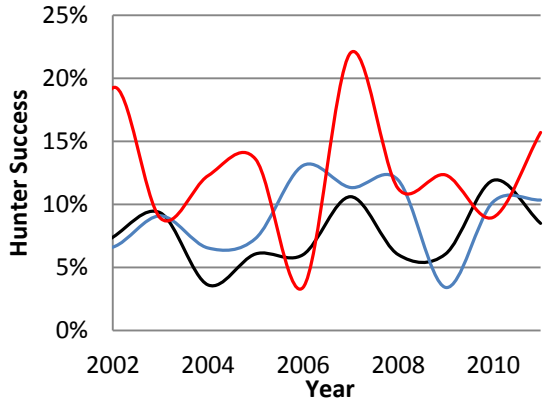

Figure 16. Trends in estimated hunter success rates in PMU 66 during the general modern firearm (black), archery (blue), and muzzleloader (red) seasons, 2002–2011.

PMU 67.—There were an estimated 126 bulls and 16 antlerless elk harvested in PMU 67 during the 2011 season. Bull harvest increased by 21% compared to the 2010 season (104 bulls), while antlerless harvest declined by 48% (31 antlerless elk in 2010). Total harvest has been stable since 2007 (Figure 17).

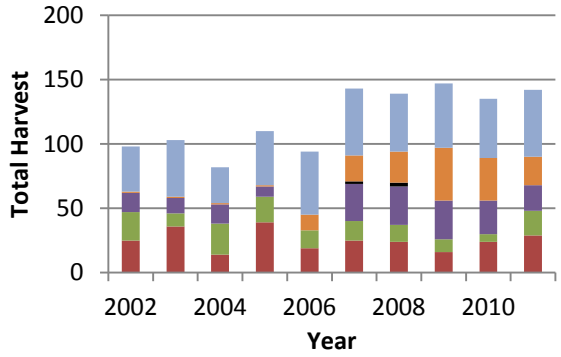

Figure 17. Proportion of the estimated total elk harvest in PMU 67 attributed to modern firearm (red), archery (green), muzzleloader (purple), multiple weapon (black), special permit (orange), and tribal harvest (blue), 2002–2011. Tribal harvest estimates are the same as those reported in NWIFC (2012).

There were 620 hunters who participated during the general modern firearm, archery, and muzzleloader seasons and spent a total of 3,006 days pursuing elk in PMU 63 during the 2011 season. Hunter numbers for all user groups have been stable since 2007 (Figure 18).

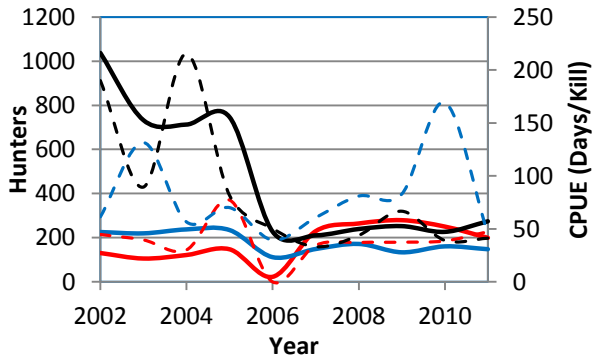

Figure 18. Trends in the estimated number of hunters that participated (—) during the general modern firearm (black), archery (blue), and muzzleloader (red) seasons in PMU 67, 2002–2011. Also included is the estimated catch-per-unit effort (---) for each user group.

Since general season opportunities were reduced in 2006, harvest has been somewhat evenly distributed among modern firearm, archery, muzzleloader, and permit hunters (Figure 17). Since 2002, tribal hunters have, on average, accounted for 38% (CV=19%) of the elk harvested in PMU 67 (NWIFC 2012). In 2011, tribal harvest accounted for 37% of the total harvest.

Hunter success rates were 11%, 13%, and 10% during the 2011 general modern firearm, archery, and muzzleloader seasons, respectively. Since 2006, hunter success rates have been the most consistent during the general muzzleloader season even though they have been declining slightly each year (Figure 19). With exception to the 2010 season, trends in CPUE have been similar among user groups (Figure 18).

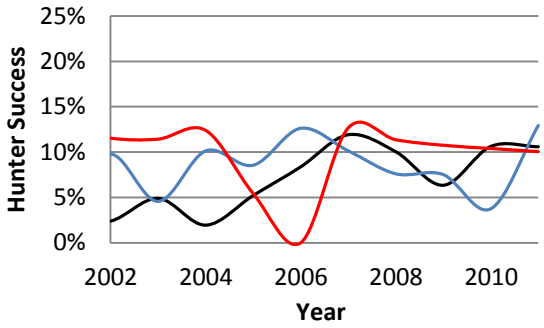

Figure 19. Trends in estimated hunter success rates in PMU 67 during the general modern firearm (black), archery (blue), and muzzleloader (red) seasons, 2002–2011.

Surveys

In general, the Department conducts pre-season (August–September) surveys to evaluate trends in productivity rates (calves:100 cows) and to estimate the pre-season bull:cow ratio. The Department also conducts post season (March–April) surveys to assess calf recruitment rates and the post season bull:cow ratio, which is used as an index of bull escapement. Due to logistical or financial constraints, timing of pre- and post season surveys has, on occasion, diverged from the typical survey months of August–September and March–April.

Bull:cow ratios estimated during both seasons are viewed as minimum, or conservative estimates because they are most likely biased low. This negative bias occurs because mature bulls tend to segregate themselves from cow:calf groups and occur in smaller bachelor groups which decreases the probability of observers detecting them during surveys. Although this bias is prevalent during post season surveys, it occurs during pre-season surveys as well, but assumedly to a lesser degree.

The majority of the survey data presented for Region 6 is the result of collaborative efforts between the Department and the tribes that have a vested interest in elk herds that reside within the boundaries of their ceded lands. Surveys were not conducted or data is not available for PMU 62 and PMU 67.

PMU 61.—The Department has conducted pre- and post hunt surveys in PMU 61 since 2000. However, surveys have not occurred on an annual basis and have not been consistent among GMUs. The majority of survey efforts have occurred in GMU 673. In 2011, Department biologists conducted pre-season aerial composition surveys in GMU 673 and observed 186 elk. Resulting bull:cow:calf ratios were 27:100:36 and 55% of the bulls observed were branch antlered.

PMU 63.—Pre- and post season composition surveys have been conducted in PMU 63 since 1995, but have not occurred on an annual basis and most survey effort has been concentrated in GMU 648. Through the years surveys have been conducted by Quinault tribal biologists, Point No Point Treaty Council biologists, Skokomish tribal biologists, and Department biologists. In 2011, Department biologists conducted a pre-season aerial composition survey in GMU 648 and only observed 49 elk which is lower than ideal for making a strong inference. Resulting bull:cow:calf ratios were 19:100:17 and 57% of the bulls observed were branch antlered.

PMU 64.—Elk occur in PMU 64 at very low densities and are surveyed from the ground by relocating marked groups in GMU 621 that are being monitored for other management purposes. Intensive monitoring of these groups has occurred since the early 1990s and resulting ratio estimates are the result of collaborative efforts among Point No Point Treaty Council, Skokomish tribal, and Department biologists. No survey results were available for the 2011 season.

PMU 65.—Pre- and post season composition surveys have been conducted in PMU 65 since the late-1980s, but since 2000 the majority of survey efforts have occurred in GMU 607. Surveys have been conducted by biologists from the Department, Point No Point Treaty Council, Makah tribe, Quinault tribe, Quileute tribe and Skokomish tribe. In 2011, pre- and post season composition surveys only occurred in GMU 607 and were completed by Quileute tribal biologists. During pre-season surveys biologists observed 251 elk with a resulting bull:cow:calf ratio of 18:100:46. During post season surveys they observed 325 elk with a resulting bull:cow:calf ratio of 10:100:20. Thirty-six percent and 4% of the bulls observed during pre- and post season surveys, respectively, were branch antlered.

PMU 66.—Pre- and post season composition surveys have been conducted in PMU 66 since the late-1980s and have been a collaborative effort among biologists from the Makah tribe, Quileute tribe, Lower Elwha Klallam tribe, Point No Point Treaty Council, and the Department. Surveys have been conducted consistently in GMUs 601, 602, and 612 since 2000. In 2011, Makah and Quileute tribal biologists conducted pre-season aerial composition surveys in GMUs 601, 602, and 612 and post season surveys in GMUs 602 and 612. Results are provided in Table 3.

Table 3. Total number of elk observed (n) and resulting bull:cow (B:C) and calf:cow (C:C) ratios in GMUs where pre- and post season surveys were conducted in PMU 66 during the 2011season. Also provided is the percentage of bulls that were branch antlered (%).

Season	GMU	n	B:C	C:C	%
Pre-season	601	166	18:100	34:100	55%
	602	167	17:100	43:100	50%
	612	132	35:100	41:100	42%
Post Season	602	409	7:100	26:100	5%
	612	300	9:100	15:100	24%

Population status and trend analysis

PMU 61.—Population estimates do not currently exist for that portion of the Willapa Hills elk herd that resides in PMU 61. Consequently, the Department relies on harvest and survey data as indices to population status and trend.

Trends in total harvest (increasing; Figure 1), CPUE (decreasing for modern firearm and archery hunters; Figure 2), and hunter success rates (increasing for modern firearm and archery hunters; Figure 3) all indicate the elk population in PMU 61 has been increasing since 2006.

Assuming adult cow survival rates of >85%, pre-season (Figure 20) and post season (Figure 21) calf:cow ratios indicate herd productivity and calf recruitment rates have been at levels necessary to promote stable to increasing elk populations. However, these inferences are made cautiously because post season surveys have not been conducted since 2008.

Pre- (Figure 22) and post season (Figure 23) bull:cow ratios indicate the Department is achieving its management objective of maintaining elk populations with a minimum of 15 bulls:100 cows in the pre-season population and a minimum of 12 bulls:100 cows in the post season population.

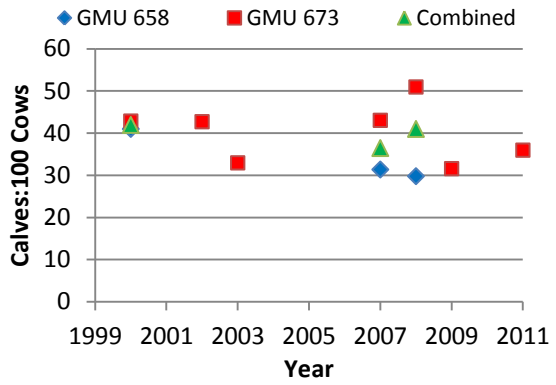

Figure 20. Long-term trends for pre-season calf:cow ratios in PMU 61 and associated GMUs where surveys were conducted, 2000–2011.

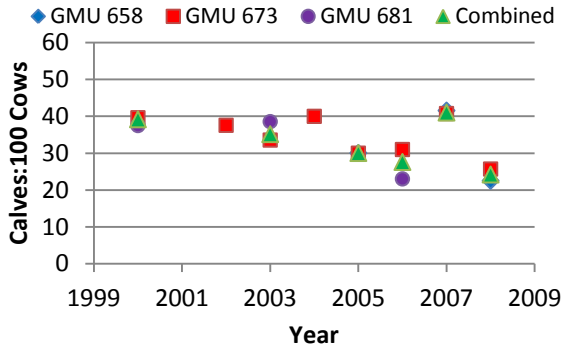

Figure 21. Long-term trends for post season calf:cow ratios in PMU 61 and associated GMUs where surveys were conducted, 2000–2011.

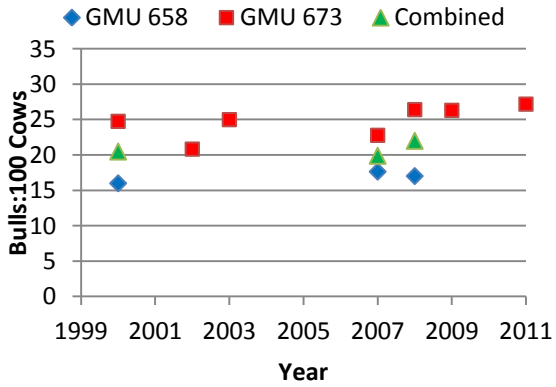

Figure 22. Long-term trends for pre-season bull:cow ratios in PMU 61 and associated GMUs where surveys were conducted, 2000–2011.

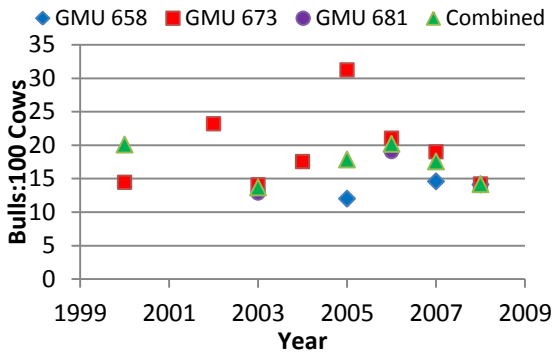

Figure 23. Long-term trends for post season bull:cow ratios in PMU 61 and associated GMUs where surveys were conducted, 2000–2011.

PMU 62.— Productivity and potential population growth rates cannot be assessed in PMU 62 because pre- and post season surveys are not conducted. Whether or not the Department is meeting its management objective of maintaining elk populations with a minimum bull:cow ratio of 15:100 in the pre-season population and 12:100 in the post season population is also unknown.

However, trends in total harvest (increasing; Figure 4), CPUE (decreasing for modern firearm and muzzleloader hunters; Figure 5), and hunter success rates (stable or increasing for all user groups; Figure 6) all indicate elk populations in PMU 62 have been increasing since 2007.

PMU 63.—Using mark-resight techniques, the post season elk population in GMU 651 was estimated at 313 elk [95% Confidence Interval (C.I.)=155–666] in 2010 and 344 elk (95% C.I. = 160–1,014) in 2011 (Bryan Murphie, WDFW, unpublished data). Post season population estimates in GMU 651 are the result of collaborative efforts among Department, Skokomish, and Northwest Indian Fisheries Commission (NWIFC) biologists. Population estimates do not exist for GMUs 642 and 648.

Inferences relating to trends in population size are somewhat limited because different inferences can be made depending on the harvest parameter that is analyzed. Trends in total harvest indicate a declining population since 2008 (Figure 7), trends in CPUE during the modern firearm season indicate an increasing population (Figure 8), and trends in hunter success rates indicate a stable population (Figure 9). Hunter numbers during the general modern firearm season have also been declining since 2008 (Figure 8). Presumably, if hunter numbers declined and the

population increased or remained stable then there should be a decrease in CPUE that is also accompanied by an increase in hunter success. Because the decrease in CPUE was not accompanied by a substantial increase in hunter success then it is more likely the elk population in PMU 63 is also declining.

Assuming adult cow survival rates of >85%, pre-season (Figure 24) and post season (Figure 25) calf:cow ratios indicate herd productivity and calf recruitment rates since 2008 have been at the minimum levels necessary to promote stable elk populations.

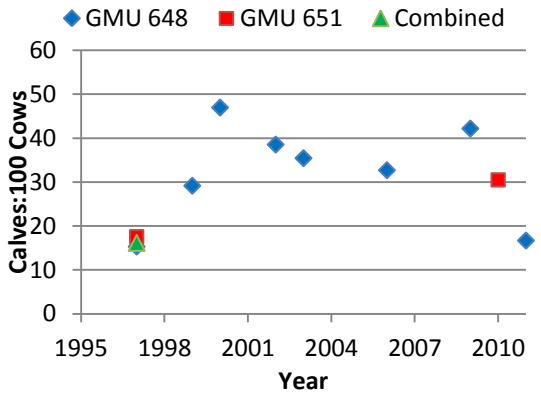

Figure 24. Long-term trends for pre-season calf:cow ratios in PMU 63 and associated GMUs where surveys were conducted, 2000–2011.

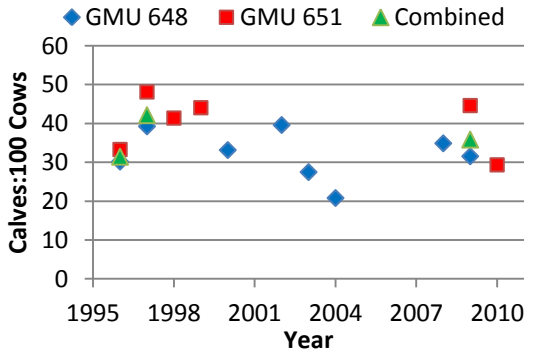

Figure 25. Long-term trends for post season calf:cow ratios in PMU 63 and associated GMUs where surveys were conducted, 2000–2011.

Pre-season bull:cow ratios (Figure 26) indicate the Department is achieving its management objective of maintaining elk populations with a minimum of 15 bulls:100 cows in the pre-season population. In contrast, post season bull:cow ratios (Figure 27) suggest bull:cow ratios are below the Department's management objective of maintaining 12 bulls:100 cows in the postseason population. However, because of the negative bias associated with bulls having lower detection probabilities during post season surveys that inference is made with a minimal degree of certainty.

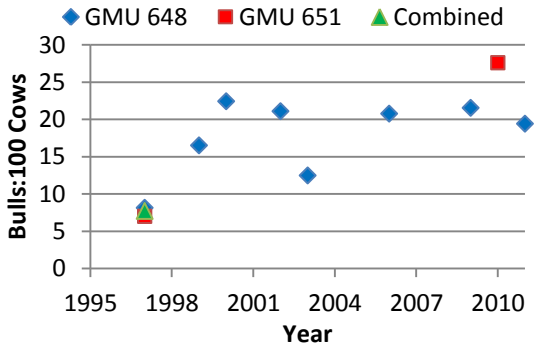

Figure 26. Long-term trends for pre-season bull:cow ratios in PMU 63 and associated GMUs where surveys were conducted, 2000–2011.

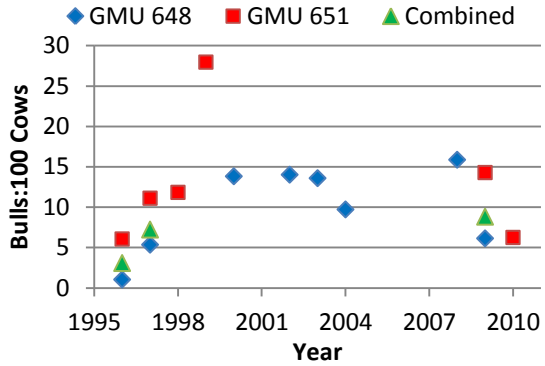

Figure 27. Long-term trends for post season bull:cow ratios in PMU 63 and associated GMUs where surveys were conducted, 2000–2011.

PMU 64.—Population estimates do not currently exist for that portion of the Olympic elk herd that resides in PMU 64. Inferences that can be made from harvest data trends are limited because almost all hunting opportunity is limited to permit only hunts. Therefore, survey data is the only indicator of population status.

Long-term trends in pre- and post season calf:cow ratios indicate productivity and recruitment rates have declined from levels observed during the late-1990s and early-2000s (Figure 28). Assuming adult cow survival rates of >85%, post season (Figure 28) calf:cow ratios indicate calf recruitment rates have been at or below the minimum levels necessary to maintain elk population size.

Pre- and post season bull:cow ratios (Figure 29) indicate the Department is achieving its management objective of maintaining elk populations with a minimum of 15 bulls:100 cows in the pre-season population and a minimum of 12 bulls:100 cows in the post season population.

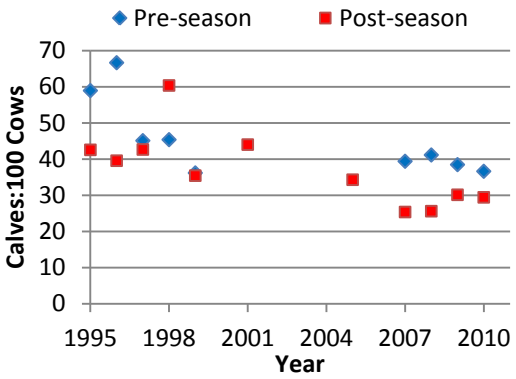

Figure 28. Long-term trends for pre- and post season calf:cow ratios in GMU 621, 1995–2011.

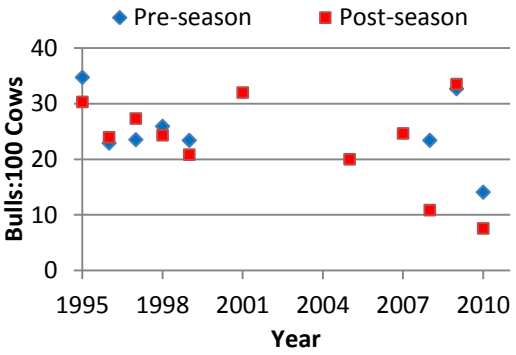

Figure 29. Long-term trends for pre- and post season bull:cow ratios in GMU 621, 1995–2011.

PMU 65.— Population estimates do not currently exist for that portion of the Olympic elk herd that resides in PMU 65. Consequently, the Department relies on harvest and survey data as indices to population status and trend.

Trends in total harvest indicate the elk population in PMU 65 has remained stable or increased slightly since 2003 (Figure 11). Trends in CPUE (Figure 12) and hunter success rates (Figure 13) have, in most years, varied accordingly with hunter numbers, which also indicates a stable population.

Estimated pre-season (Figure 30) and post season (Figure 31) calf:cow ratios indicate adult cow survival rates would have needed to be between 85% and 90% to promote a stable population.

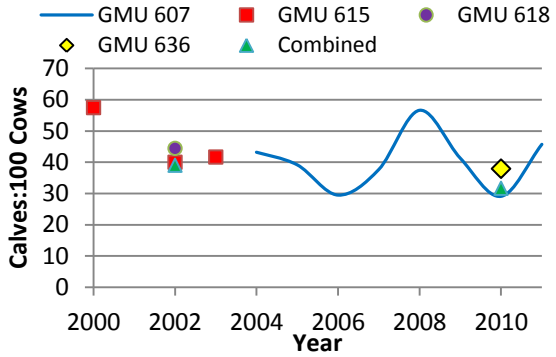

Figure 30. Long-term trends for pre-season calf:cow ratios in PMU 65 and associated GMUs where surveys were conducted, 2000–2011.

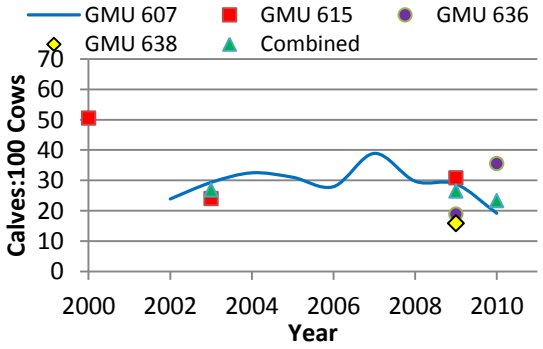

Figure 31. Long-term trends for post season calf:cow ratios in PMU 65 and associated GMUs where surveys were conducted, 2000–2011.

Pre- (Figure 32) and post season (Figure 33) bull:cow ratios indicate the Department is achieving its management objective of maintaining elk populations with a minimum of 15 bulls:100 cows in the pre-season population and a minimum of 12 bulls:100 cows in the post season population.

PMU 66.—In cooperation with biologists from the Makah and Quileute tribes, the Department implemented a mark-resight survey in GMU 602 during the 2010 season and estimated the pre-season population at 1,359 elk (95% C.I.=796–2,844). The post season population was estimated at 859 elk (95% C.I. 581–1,664). Population estimates were not generated during the 2011 season and do not exist for any other GMUs in PMU 66.

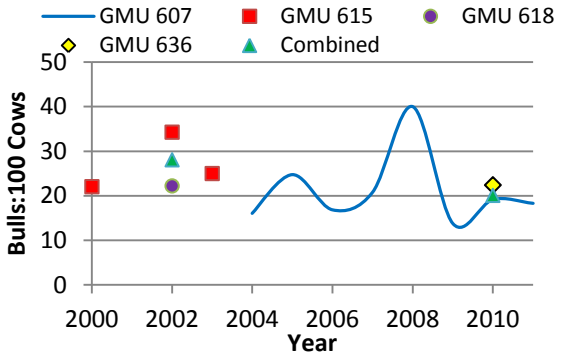

Figure 32. Long-term trends for pre-season bull:cow ratios in PMU 65 and associated GMUs where surveys were conducted, 2000–2011.

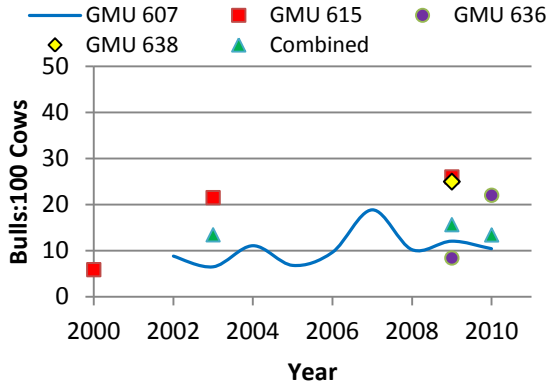

Figure 33. Long-term trends for post season bull:cow ratios in PMU 65 and associated GMUs where surveys were conducted, 2000–2011.

Trends in total harvest indicate the elk population in PMU 66 has remained stable since 2002 (Figure 14). Trends in CPUE (Figure 15) and hunter success rates (Figure 16) during the general modern firearm season have varied accordingly with hunter numbers, which also indicates a stable population.

Assuming adult cow survival rates of >85%, pre-season (Figure 34) and post season (Figure 35) calf:cow ratios indicate herd productivity and calf recruitment rates have varied little and have occurred at levels necessary to promote stable to increasing elk populations.

Pre- (Figure 36) and post season (Figure 37) bull:cow ratios indicate the Department is achieving its management objective of maintaining elk populations with a minimum of 15 bulls:100 cows in the pre-season population and a minimum of 12 bulls:100 cows in the post season population.

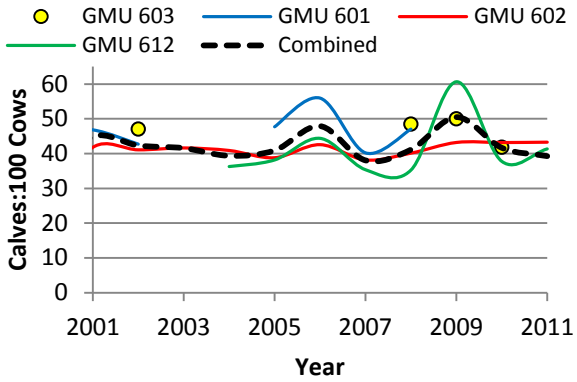

Figure 34. Long-term trends for pre-season calf:cow ratios in PMU 66 and associated GMUs where surveys were conducted, 2000–2011.

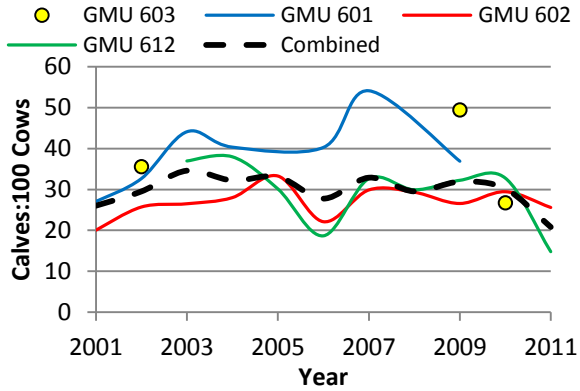

Figure 35. Long-term trends for post season calf:cow ratios in PMU 66 and associated GMUs where surveys were conducted, 2000–2011.

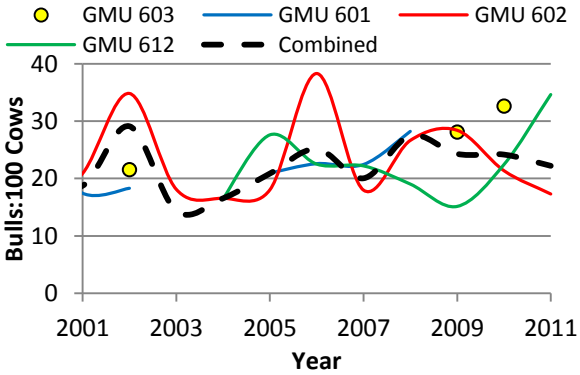

Figure 36. Long-term trends for pre-season bull:cow ratios in PMU 66 and associated GMUs where surveys were conducted, 2000–2011.

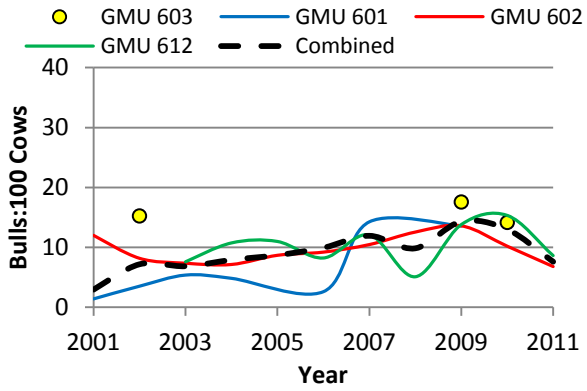

Figure 37. Long-term trends for post season bull:cow ratios in PMU 66 and associated GMUs where surveys were conducted, 2000–2011.

PMU 67.— Population estimates do not currently exist for that portion of the North Rainier elk herd that resides in PMU 67. Pre- and post season surveys are also not conducted. Therefore, harvest data is the only indicator of population status and trend in PMU 67.

Although harvest levels increased after general season opportunities were discontinued in GMU 653 following the 2005 season, total harvest was stable prior to and following the regulation change (Figure 17). This observed trend indicates the elk population has been stable for the past 10 years. Trends in hunter numbers (Figure 18), CPUE (Figure 18), and hunter success rates (Figure 19) have also been stable since the regulation change in 2006, which further indicates a stable population.

Research

The Department assessed bull survival rates in GMU 673 from 2005 through 2009. Average annual survival for branch antlered bulls was estimated at 37% (95% C.I. 27%–48%) and 93% of all mortalities were attributed to legal harvest. Average annual survival rates for yearling bulls were estimated at 87% and indicated substantial recruitment of yearling bulls into the 2-year old age class. Survival of 2.5 year old bulls during their first year at-risk (as a 3-point or better branched bull) was estimated to be only 27%, but increased to 53% during their second year.

The Makah Indian tribe is currently assessing survival rates for branch antlered bulls and calves in GMUs 601 and 602. The Department is an active partner in this effort supplying staff time and volunteers to assist in capture efforts. No preliminary results are available at this time.

Habitat condition and trend

Overall, habitat conditions are improving in the region. In recent years logging has increased in some GMUs resulting in improved conditions on state and private managed timber lands. This has resulted in more stands that are in early seral stages. This trend is likely to continue for the next several years. Also the U.S. forest service has begun variable density thinning projects and native forage seeding in several areas on the Olympic peninsula that should result in better forage conditions in some areas of the Olympic National Forest.

Habitat enhancement

The Department 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 waterfowl and other species that also benefit elk. The Department continues to work with private landowners on projects that benefit elk habitat.

Elk damage

Elk damage complaints continue to be a substantial management concern in Region 6. Elk damage occurs in tree farms and conifer plantations, hay and alfalfa fields, hay stacks, orchards, and other agricultural crops. Elk also have the ability to damage agriculture infrastructure by running through fences.

Although the Department receives elk damage complaints throughout Region 6, chronic damage issues have persisted in several GMUs. These GMUs include GMU 621 (Dosewallips, Duckabush, and Hamma Hamma river valleys), GMU 638 (Quinault river valley), GMU 660 (Chehalis river valley), and GMUs 672 and 673 (Willapa river valley).

In most circumstances, the Department addresses damage complaints by working with landowners to increase access to their property during hunting seasons so hunters can help resolve the problem. The Department has also established four Elk Areas in Region 6 to address chronic elk damage issues by providing antlerless permit opportunities with the intent of limiting population growth in these localized areas.

The number of damage complaints received in 2011, were similar to past years.

Management conclusions

Trends in harvest and survey data indicate elk populations in PMUs 61, 62, 65, 66, and 67 are stable or increasing with pre- and post season bull:cow ratios that satisfy management objectives. Consequently, current bag limits and season lengths appear to be appropriate for these populations and the Department does not plan to make any substantial changes to harvest regulations in the near future.

Harvest and survey data in PMU 63 indicate a slightly declining to stable population. In response to this observed trend, the bag limit in GMU 648 during the general archery season was changed from 3 pt. minimum or antlerless to 3 pt. minimum. The Department will continue to monitor this population and if necessary, make additional changes to harvest regulations in an effort to promote population stability.

In response to declining hunter success rates and a presumed decrease in population size, the Department decreased harvest opportunities in PMU 64 following 2010 season. Permit numbers will be similar during the 2012 season.

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Mountain Goat

MOUNTAIN GOAT STATUS AND TREND REPORT
STATEWIDE

RICHARD B. HARRIS, Special Species Section Manager

Population objectives and guidelines

The population monitoring objective for mountain goats is to be able to detect a decline in population size reliably within 3 years or less. The harvest objective is to provide recreational hunting opportunities in individual mountain goat herds where harvest success averages >50% over a 3-year period, while at the same time goat population size remains stable or increasing. Specific guidelines for managing harvest within sustainable limits are discussed in WDFW (2008). The harvest guidelines are to limit harvest opportunity to 4% or less of the total population, only allow harvest in goat populations meeting or exceeding 100 total animals, and limit harvest of nannies (females) 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) decreased substantially beginning in the late 1990s (Figure 1), and is currently considerably lower than during the 1980s (which, in turn, was a reduction from the peak years of permit availability during the 1960s and 1970s, Rice and Gay 2010). Fifteen permits (13 general permits, 1 raffle permits, and 1 auction permit) were available in 9 goat management units in 2011. The 2011 mountain goat season provided 47 days of mountain goat hunting (September 15 to October 31). Hunters were able to use any legal weapon and harvest any adult goat with horns greater than 4 inches (although hunters were encouraged to select billies (males).

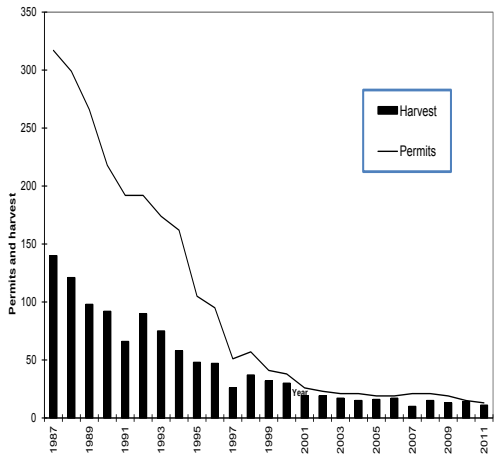

Figure 1. Special permits (line) and mountain goat harvests (vertical bars) in Washington, 1987-2011. Figures do not reflect mountain goat raffle or auction tags or harvest (1 each during 2011).

Of the 15 permits available in 2010, all were used by hunters, who killed a total of 13 goats. Overall success was thus 87% (85% excluding the raffle and auction hunts).

Given the sensitive nature of mountain goat populations and their generally small sizes (see **Population status and trend analysis**, below), only goat populations that are surveyed annually, and meet or exceed population guidelines described in WFDF 2008 are considered for recreational hunting.

Surveys

With one exception, surveys were conducted using a helicopter and generally occurred between July and September. (Surveys in the Lake Chelan area have recently been using winter-time boat-based surveys). For most surveys, the total number of goats on an area-wide basis were estimated using a sightability correction model (Rice et al. 2009) developed specifically for use in Washington state. Because the funding level was not sufficient to survey all goat units priority was given to hunted units.

Population status and trend analysis

Mountain goat populations have declined in Washington relative to estimated historical levels. Goat populations within the state were considered to have exceeded 10,000 animals (including those within federally-managed areas) as recently as 1961 (Johnson 1983). As of 2008, our best estimate is that a mountain goats within Washington number between 2,400 and 3,180. Of these, about 450 live primarily within National Parks (Rice 2008). Hunting opportunity has decreased accordingly, and current permit levels are conservative and represent 4% or less of estimated population in herds that are stable or increasing, and which have been surveyed routinely. 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, and some subpopulations may be increasing.

Habitat condition and trend

Fire suppression policies and natural forest succession continues to degrade critical mountain goat foraging habitat. Fire suppression allows conifers to invade these natural openings and decreases their foraging value for goats. The degradation and loss of alpine meadows, coupled with increasing recreational human use and disturbance of alpine habitat are likely the two greatest negative impacts to mountain goats. Climate change may pose challenges of an uncertain nature for mountain goat populations in the future.

Management conclusions

The largest obstacles to effective mountain goat management are i) a consistent funding base to assess the status of goats, ii) difficulty of estimating the size of individual herds, and iii) the existence of large 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 within the Cascade Mountains.

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Table 1. Goat harvest statistics, 2010, WDFW.

Hunt Name	Total Applicants	Permits Issued	Total Harvest	Males Killed	Females Killed	Hunter Days	Days/Kill	Hunter Success
Avalanche Gorge	946	1	0	0	0	0	-	-
Chowder Ridge	1,418	1	1	1	0	5	5	100%
Lincoln Peak	1,557	2	2	1	1	19	10	100%
Dillard Creek	693	1	1	1	0	9	9	100%
North Lake Chelan	2,406	2	2	0	2	28	14	100%
Naches Pass	4,483	1	1	1	0	8	8	100%
Bumping River	4,406	1	1	1	0	5	5	100%
Blazed Ridge	4,197	1	1	0	1	3	3	100%
Goat Rocks/Tieton	6,338	3	2	2	0	6	3	67%
Total	26,444	15	11	7	4	83		

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. Limited harvest compatible with this objective is also being offered. 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, for mountain goats to be hunted, statewide mountain goat strategies recommend surveys must indicate a population size of at least 100 goats in a population management unit. Limited resources have resulted in minimal survey data for the last few years and harvest activity was suspended in 2009 and 2010 (Table 1). More recently, anecdotal reports suggest a total Methow Unit population of over 100 animals, and possibly some limited range expansion. As a result, a single annual harvest permit is being offered for 2012 - 2014. The local population is roughly split between two sub-bands within the unit, consequently the harvest permit area will alternate between the two sub-bands each year to spread harvest pressure across the unit.

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	--	--	--	--	--
2010	--	--	--	--	--
2011	--	--	--	--	--

Table 2. Population composition counts from the Methow Unit, 1995-2010

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
2010	--	--	--	--	--
2011	--	--	--	--	--

*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.

Moving forward it is hoped that resources will allow for adequate aerial survey efforts to firm up population estimates and help 'fine-tune' harvest strategies.

Surveys

Historically, we conducted annual surveys to determine minimum population size and herd productivity. These data are 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 produced a small sample size. 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 survey

was likely a result of poor survey conditions rather than a real reduction in animals.

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. A large fire burned a significant portion of the unit several years ago. This resetting of successional conditions has likely improved forage conditions within the burn area and may also be improving herd productivity. A renewed survey effort is needed to explore any potentially noticeable population-wide demographic effects.

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 and trend are unknown for these animals.

Habitat condition and trend

Goats in the Okanogan District had a normal winter with an average snow pack this past year. Some degree of winter mortality is likely to have occurred.

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, unpredictable 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

Management objectives should continue to focus on population growth and distribution; however, recent incidental observations suggest some limited and spatially controlled harvest is sustainable. 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 fairly minimal interchange between the two herd segments, so a new sub-basin harvest rotation strategy is being implemented. In addition, the Handcock Ridge band spends significant time west of the Cascade Crest. As a result, redrawing the Unit boundary for the northwest portion of the area should be explored.

Suitable goat habitat adjacent to this unit is sparsely populated and could likely support many more animals than exist currently. Habitat enhancement from past fires may continue to boost productivity and promote dispersal. If the Methow herd grows but exhibits little dispersal, consideration should be given to translocating animals to other suitable areas within Okanogan 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 statewide management goals for mountain goats are to ensure healthy productive populations and native habitats, to provide opportunities for a wide range of non-consumptive uses, and to enhance populations to provide sustained 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 its population size and trend, and that the population number 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 local population, with harvest of females maintained at <30% of the total (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 was issued each year from 2002-2008, with permits again increased to 2 in 2009. Hunter success has increased recently with 6 goats taken in the last three years. Rugged terrain, remote wilderness areas, and very limited access limits hunting success. An overall success rate of 67% meets the threshold required to maintain a permit. Of the 10 goats harvested since 2001, 3 have been nannies (30%).

A limited entry permit for the harvest of one mountain goat will be issued for the newly designated management unit along the south shore of Lake Chelan. Lake based winter surveys conducted over the past three years indicate a minimum population of greater than 100 mountain goats.

Mountain goat populations within the East-central Cascades (Chiwawa, East Stevens Pass, North Wenatchee Mtns, and Stehekin) have not been surveyed intensively enough to effectively determine their population size, and are currently closed to hunting. Recent surveys conducted via driving routes suggest that goat numbers in some of these areas may be increasing.

Surveys

As part of a hydropower license agreement, the Chelan Public Utility District (PUD) annually completes 12 winter wildlife surveys by boat on Lake Chelan along both north and south shores. For Lake Chelan, the total number of known goats is the result of comparing results from all surveys completed during each winter. This is the only annually collected, long-term data for Chelan County mountain goats (Pope and Cordell-Stine, 2012). However, the varied and rugged terrain as viewed from the lake makes sighting and correctly classifying mountain goat age and sex difficult, and contributes to high variability in the composition data. Kid numbers and ratios might also be biased high due to the large number of unclassified mountain goats recorded in the surveys.

Recent observations of goats collected along driven survey routes in other mountain goat areas in Chelan County suggest goat numbers may be increasing. Priority should be given to acquiring population data using helicopter sightability protocols on goat populations within the East-central Cascades zone. (Table 2).

Population Status and Trend Analysis

Mountain goat populations in Chelan County are well below historic levels of the 1960s. Except for the minimum counts collected along Lake Chelan, mountain goats are not monitored closely enough in Chelan County to document population size and trend. Observational data suggests that numbers are increasing from historical low numbers of 20-30 years ago. The Lake Chelan populations (which the PUD has monitored for the last 30 years) appear to be stable or increasing (Table 3). Kid:adult ratios appear adequate for population growth, averaging 33 kids:100 adults over the last three years.

The North Shore population was estimated at 67 goats (range: 43-85), with 25 kids:100 adults (range: 19-30) over the last three years. Goat counts on the North Shore have decreased over the last 4 years, although it is unknown if this is a true population decline or a problem with lake-based visibility, which

causes high sighting variability. Future harvest may have to be adjusted to keep within management objectives and avoid impacting population growth.

The south shore population was estimated over the last three years to average 113 goats (range: 94-128), with 37 kids:100 adults (range: 27-53). This population has consistently had higher observed production than the North Shore over the last ten years. A minimum count of more than100 goats on the South Shore has been documented in three of the previous six years, and 94 observed in year 2010-2011. While herd productivity and habitat conditions are good, it is unknown if there are additional bands of goats from other populations utilizing the south shore as winter range, or whether they are all resident.

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, and one each on the North and South shores of Lake Chelan. 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 gene flow and interaction between populations. This was highlighted by two nannies 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 increased forage post-fire will be beneficial to mountain goats. Over the last decade, several major fires in the Lake Chelan Basin (both shores), and North Wenatchee Mountains (Icicle and Tumwater Canyons) have burned substantial mountain goat habitat and range. The subsequent increase in early seral stage vegetation and forage may have contributed to the increase in mountain goat counts during the same time period (both in terms of increased production and visibility).

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.

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Table 1: Summary of Mountain Goat Harvest for North Lake Chelan, 2001-2011

Year	Permits	Hunters	Harvest	Male	Female	Success	Goats Seen/Hunter	Days Hunted
2001	2	2	2	2	0	100	24	6
2002	1	1	0	0	0	0	0	20
2003	1	1	0	0	0	0	12	8
2004	1	1	1	1	0	100	3	3
2005	1	1	0	0	0	0	25	15
2006	1	1	0	0	0	0	0	1
2007	1	1	0	0	0	0	27	12
2008	1	1	1	0	1	100	25	8
2009	2	2	2	2	0	100	17	8
2010	2	2	2	2	0	100	35	5
2011	2	2	2	0	2	100	35	9

Table 2. Mountain goat counts in Chelan County, 1996-2011.

Area	N. Lake Chelan	S. Lake Chelan	Stehekin	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	0	15	23	20	219
2009-10	81	128	0	9	69	22	309
2010-11	78	94	0	8	38	10	228
2011-12	43	116	0	0	71	12	242

Table 3. Mountain goat population composition for Lake Chelan, Chelan County, 1996-2011.

Year	Adults	Kids	Total Count	Kids:100 adults
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
2010	92	39	131	42
2011	116	33	149	28
Average	99	26	125	25

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 2011, there were three permits spread over three units (Tables 1-3) and 3 goats were taken.

Surveys

Tables 1-4 show annual survey results for mountain goat units. The Kachess Ridge mountain goats unit is currently 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 2011, 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 about 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 with more liberal permit numbers and 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 17 and 103 (Table 1), with no obvious pattern. The unit is large, with extensive habitat and cover. It is easy to miss entire groups of mountain goats on a given 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 tribal harvest was also occurring in the area. 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 as well.

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 2011, the goat population based on aerial surveys was 46 goats. 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 the area was expanded, the population may exceed the 100 goat threshold.

Habitat condition and trend

The majority of goats in the Bumping, Tieton and Naches Pass spend 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 continues in both units. The north portion of the Blazed Ridge unit has been particularly heavily logged. 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 developments 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 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. If we followed the management standard of no hunting unless the population is over 100 animals for 3 years, a permit would only be issued in Naches/Corral Pass based on aerial surveys.

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 mountain 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
2010	1	1	1				
2011	1	1	1	28	75	103	37

*Includes raffle/auction

*Includes 21 unclassifed

Table 2. Harvest and surveys for Naches/Corral Pass (Mountain goat Units 3-6 and 4-38)

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
2010	1	1	1	29	74	103	39
2011	1	1	1	37	96	133	38

* Includes auction/raffle permit hunter

Table 3. Harvest and surveys for Blazed Ridge (Mountain goat Unit 3-10)

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
2010	1	1	1				
2011	1	1	1	14	32	46	44

* Includes auction/raffle

[a] Probable double count of ~15 animals

Table 4. Harvest and surveys for Kachess Ridge (Mountain goat Unit 3-11)

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
2006-11	0			No	Survey		

MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 4
GOAT UNITS 4-1 – 4-14

Chris Danilson, Wildlife Biologist
Paul M. DeBruyn, 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. Specific guidelines for managing harvest within sustainable limits are discussed in WDFW's Game Management Plan (2008). The harvest guidelines are to limit harvest 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
The twentieth century has seen mountain goat hunting in this area go from extended seasons, high population levels and harvest, to complete closure to protect the population 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 2011, the number of goat permits for Mount Baker remained the same as 2009 and 2010 at 5, 2 in Mt. Baker East and 3 in Mt. Baker West (Table 1). The permit holders were instructed to contact DFW headquarters in Olympia to receive a map of their hunt area boundary. In 2011, four out of 5 permit holders harvested goats, one being a female (Table 1). One male mountain goat was also harvested by a tribal hunter in this area in 2011.

Surveys
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 Stillaguamish Tribe and Western Washington University. Among the long-term objectives of this project were to assess the magnitude, extent, and causes for the reported declines in mountain goat populations in Washington. As part of this study, Global Positioning System (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. An important objective of this project was to assess sightability bias (i.e. whether or not an animal or group is seen) during population surveys and develop a sightability bias model was developed to calculate population estimates from survey data. Having completed this work, biologists are now able to use this model to provide improved estimates of mountain goats.

In July 2011, an aerial mountain goat survey was conducted in the Mt. Baker/Loomis Mountain areas of Whatcom and Skagit counties. This was a cooperative survey effort involving Swinomish Indian Tribe and Upper Skagit Indian Tribe. A Bell Jet Ranger helicopter was used to fly the survey area. The survey routes were the same as in previous years' surveys but varied slightly (as occurs in most years) in response to weather and habitat changes. A total of 236 goats were observed within the Mt. Baker, Mt. Shuksan (Lake Ann), and Loomis Mountain survey blocks (Table 2). The number of goats observed in just the Mt. Baker survey blocks was substantially lower than the average high count from 2005-2010, which was consistently in the low 300s (Table 3). When adjusted for sightability bias due to group size, terrain obstruction, and vegetative cover, the number of goats in all survey areas in 2011 is estimated at approximately 271 animals (Table 4).

Table 2. 2011 mountain goat survey results for the Mt. Baker/Loomis Mountain area.

Survey Block	Total	Adults	Yearlings	Kids	Unknown
Black Buttes	16	10	5	0	1
Heliotrope	32	20	12	0	0
Chowder Ridge	102	68	19	15	0
Sholes Glacier	0	0	0	0	0
Coleman Pinnacle	47	27	11	9	0
Lava Divide	9	9	0	0	0
Lake Ann	21	10	6	5	0
Loomis Mountain	9	5	1	3	0
Total	236	149	54	32	1

Table 3. Mt. Baker* mountain goat surveys 2003-2011

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
2010	71	39	195	7	312	29
2011	24	47	134	1	206	18

*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.

Dates: 07/20/2010,07/21/2010
Blocks: Black Buttes, Chowder Ridge, Coleman Pinnacle, Heliotrope, Lava Divide, Sholes Glacier, Lake Ann, Loomis Mt.

Population Status and Trend Analysis

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.

Table 4. Sightability estimates 2011

	Observed	Estimates	90%CI
Groups	48		
Total	236	270.8	243.1-298.5
Adults	149	167.9	155-180.8
Yearlings	54	59.6	50.9-68.2
Kids	32	42.2	34.4-50
Unknown	1	1.1	
Adults & Yearlings	203	227.5	205.9-249
Juveniles	86	101.8	85.3-118.2
Kids/Ad+Yl	0.16	0.19	0.17-.20
Juv/Adult	0.57	0.62	0.55-.65

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 when compared with the 1996 survey. After remaining stable or slightly increasing between 2002 and 2010, survey numbers declined in 2011. Numbers of kids observed in 2011 were particularly low suggesting high winter mortality and low fecundity. High snowpack in the summer of 2011 could have altered goat migration behavior and thus biased survey numbers, but subsequent observations suggest that there was a real drop in population numbers in 2011 potentially related to a winter kill event.

Habitat Condition and Trend

Graduate students at Western Washington University and the University of Idaho have recently developed resource selection models for mountain goat throughout the Cascade Range of Washington State, 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 remains uncertain at this time. Discussions on goat management between WDFW and the Tribes are ongoing and remain a high priority.

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Table 1. Summary of harvest information for mountain goats in north Puget Sound, 2007-2011

Hunt Name	Unit	Year	Permits	Hunters	Harvest	Success (%)	Goats seen	Kids seen	Days hunted
Mt. Baker West	Chowder Ridge	2011	1	1	1	100	85	12	5
		2010	1	1	1	100	92	35	3
		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	2011	2	2	2	100	100	31	19
		2010	2	2	2	100	56	8	5
		2009	1	1	1	100	47	14	8
		2008	0	-	-	-	-	-	-
		2007	0	-	-	-	-	-	-
Mt. Baker East	Avalanche Gorge	2011	1	0	0	0	0	0	0
		2010	1	1	1	100	27	7	4
		2009	1	1	1	100	9	1	1
		2008	1	1	0	0	40	2	0
		2007	1	1	1	100	57	17	5
	Dillard Creek	2011	1	1	1	100	6	2	9
		2010	1	1	1	100	40	20	12
		2009	1	0	0				0

2012 MOUNTAIN GOAT STATUS AND TREND REPORT: REGION 5

GOAT ROCKS, SMITH CREEK, TATOOSH

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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. The Goat Rocks/Tieton River Unit likely has the highest goat population of any goat unit in the state of Washington (Rice 2008). Hunting in all three units has historically been allowed by permit only. Current population goals for these three areas are to maintain or expand current population levels. Legal harvest levels are designed to remove 4% or less of the adult population (WDFW 2008).

Hunting Seasons and Harvest Trends

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 quotas were conservative in 2011: Smith Creek = 0; Tatoosh = 0; and Goat Rocks/Tieton River = 3.

Mountain 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 2011. These populations will be monitored periodically to determine if populations have improved to the point of allowing hunting again. In 2011, 3 mountain goat permits were authorized for the Goat Rocks/Tieton River Unit. Two of the 3 permits holders reported killing a goat, both billies (Table 1). Both the auction and raffle goat permits were used in the Goat Rocks/Tieton River Unit. Two males were harvested with those two permits.

In 2011, only the Goat Rocks unit was surveyed, yielding 253 animals observed (Table 2) and a population estimate of 259 (Table 3). Additional areas in Region 5 known to be occupied by mountain goats were not surveyed due to lack of funding and because no hunting permits are currently offered in association with these smaller populations. Unsurveyed goat areas in Region 5 include Smith Creek, Tatoosh, Dark Divide, Mt. St. Helens, Mt. Adams and the Mt. Margaret Backcountry.

Aerial surveys conducted in the past years by WDFW indicate that mountain goat populations in the Tatoosh and Smith units have been 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.

Population Status and Trend Analysis

Raw aerial survey data from 2004 through 2011 in the Goat Rocks unit indicate a declining 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 slight increase in the number of goats in the Goat Rocks/Tieton River unit was observed in 2011, although the kid:adult was the lowest ever observed and is below the productivity goal of 20-25:100. Both the Goat Rocks and Smith Creek units will be surveyed in 2012.

A mountain goat study that was conducted by WDFW provided new methods for estimating goat numbers via

a sightability technique. Based on this new method, population estimates are generated for Region 5 units (Table 3).

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 Adapative Management Area 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 years since the completion of this study, the loss of meadow has likely continued. 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. Habitat 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

Mountain goats 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.

Regional staff have become concerned with the long term decline of goat numbers in Goat Rocks. Permit harvest and auction and raffle harvest may be causing this decline. Raffle and auction hunters may hunt any unit that is open; however, Goat Rocks is often preferred. Based upon this information, permit numbers for the 2011 hunting season were reduced to 3. Surveys in this unit will continue to help clarify the population trend in this unit and should be conducted every year.

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.

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Table 1. Hunter survey summary statistics for Region 5 mountain goat harvests (1993-2011).

Unit	Year	Permits Issued	Harvest[b]	Success (%)	Avg. goats seen	Kid:Adult seen	Avg days to harvest
Smith Creek							
	2011	0					
	2010	0					
	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							
	2011	3[a]	2	67	60	27	3
	2010	5	4(4)	100	51	7.5	3
	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[c]	6[b]	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							
	2011	0					
	2010	0					
	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

[a] In addition, 2 male goats were taken in 2011, one using the statewide auction tag, one using the statewide raffle tag.

	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

[b]Numbers in ( ) indicate number of hunters, if less than permits issued.
[c] Permits for both Goat Rocks and Tieton River were combined.

Table 2. Survey results (raw data) of Mountain Goat flights Region 5 (1998 –2011).

Goat Unit	Year	Adult	Yearling	Kid	Unknown	Total	Kid:Adult
5-2 Tatoosh							
	2011[a]						
	2010[a]						
	2009						
	2008	0	0	0	0	0	
	2007	1		1	0	2	
	2006[b]	16		4	0	20	25:100
	2005	12	4	6	0	22	50:100
	2004	5	0	2	0	7	40:100
	2003	2	3	1	0	8	50:100
	2002	5	3	1	1	10	20:100
	2001	6	1	2		9	33:100
	2000	9	0	2		14	22:100
5-3 Smith Creek							
	2011[a]						
	2010	28	6	8	0	36	29:100
	2009[a]						
	2008	9	2	4	2	17	44:100
	2007	28	0	6		34	21:100
	2006	16	6	5		27	31:100
	2005	15	6	11		34	73:100
	2004	16	3	11		30	69:100
	2003	9		6		15	67:100
	2002	8	3	6		17	75:100
	2001[c]						
	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							
	2011	205	17	31	0	253	15:100
	2010	181	14	36	0	217	20:100
	2009	170	33	73	0	276	43:100
	2008	178	23	60	7	268	34:100
	2007[a]						
	2006	203	14	71		290	35:100
	2005[d]	188	47	66		303	35:100
	2004[d]	183	31	43		261	23:100
	2003[d]	130		36		166	28:100
	2002[d]	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

[a] No survey due to lack of funding
[b] Survey conducted by Mt Rainier National Park Staff.
[c] No survey in 2001 due to poor weather conditions.
[d] Survey combined Goat Rocks and Tieton River units..

Table 3. Mt. Goat Population Estimates Region 5

Area	Year	Unit	Mt. Goat Unit	Population Estimate (90% CI)
Goat Rocks	2004	Goat Rocks/Tieton R.	5-4	250 (237-263)
	2005			341 (322-359)
	2006			308 (291-326)
	2007			No survey
	2008			282 (no CI)
	2009			285 (274-297)
	2010			224 (213-236)
	2011			259 (250-268)
Smith Creek	2008	Smith Creek	5-3	32
	2009			N/A
	2010			41 (33-49)
	2011			N/A
Tatoosh	2008	Tatoosh	5-2	10
	2009			N/A
	2010			N/A
	2011			N/A

Bighorn Sheep

BIGHORN SHEEP STATUS AND TREND REPORT
STATEWIDE

RICHARD B. HARRIS, 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).

Washington Department of Fish and Wildlife continues 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.

Hunting seasons and harvest trends

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

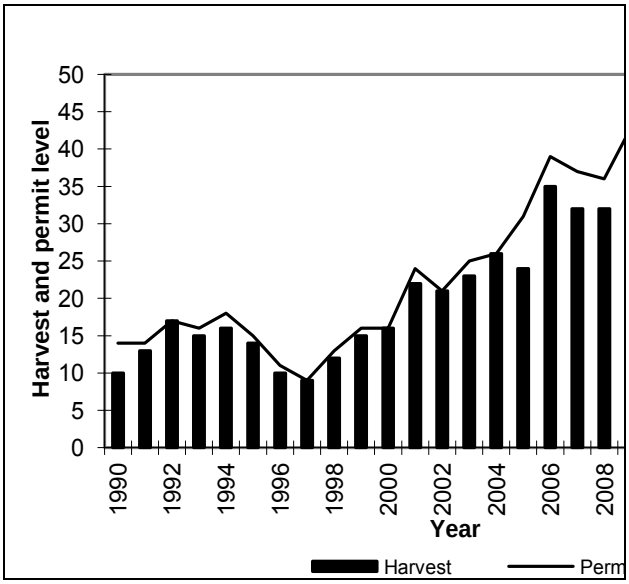
Herd	Population objective[b]
Hall Mountain[a]	40-70
Asotin Creek[a]	50-60
Black Butte[a]	300
Wenaha[a]	140
Cottonwood Creek[a]	50-60
Tucannon	60-70
Vulcan	80-110
Mt. Hull	55-80
Sinlahekin	50
Swakane	50-60
Quilomene	250-300
Umtanum(+Selah Butte)	250-300
Cleman Mountain	140-160
Lincoln Cliffs	90-100
Lake 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

Bighorn sheep hunting opportunity in Washington is limited to permit-only hunting. Permit availability, and therefore hunter opportunity, has steadily increased in Washington (Figure 1). In 2011, 41 special season permits, 1 auction permit, and 4 raffle permit were available (including the potential from multi-species raffles)in 13 different sheep management units. Most 2011 bighorn sheep seasons were September 15 to October 10, (except 4 areas; either October 1-10 or November 7-30). Hunters had the choice of any legal weapon to harvest any bighorn ram (no curl restrictions). Of the 46 permits available in 2011 (including the auction and raffles), reports were received from 42 hunters, who killed 40 sheep were killed for a hunter success rate of 95% (87% as a percentage of available permits).

Surveys

All bighorn sheep herds in Washington are surveyed annually. In 2011, both ground counts and aerial surveys were used to survey and classify sheep as lambs, ewes, or rams. In some herds, rams were further classified as yearling, less than 3/4 curl, or greater than 3/4 curl; in other herds, rams were classified according to the Class I-IV system. Surveys were conducted at differing times throughout the year, with a general pattern for most regions being to survey lamb production in early summer and total herd composition in winter.



Population status and trend analysis

Survey results indicate bighorn populations are stable in most areas (see regional reports), with many populations having increased since the 1990s. Notable exception s are the Hall Mountain bighorn herd, which has remained small (and is not currently hunted), and some of the Blue Mountain herds, most of which have recently experienced disease outbreaks.

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; however, the total sheep population has remained fairly stable, with a sizable mature ram component.

Mycoplasma ovipneumonia induced pneumonia continues to plague 4 of the 5 Blue Mountain bighorn populations; Asotin, Black Butte, Wenaha, and Mountain View. The Tucannon herd has not experienced pneumonia caused mortality, but do carry scabies (*Psoroptes ovis*). Bighorn populations in the Blue Mountains have not recovered from the 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 epizootic. 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 effects on the populations. The Tucannon herd suffered a major die-off caused by scabies when it was infected in 1999.

California bighorn populations remained stable in most herds (see individual herd reports). 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 found in the north portion of Umtanum and only 2 at the south end. No natural mortalities were found east of the river in Selah Butte. Recognizing the long-term effects of this disease in bighorn sheep, the Department initiated a culling action of bighorns with clinical signs of pneumonia in the Umtanum herd. Sixty-nine sheep were culled from the herd in an attempt to slow the spread of the disease, increase subsequent lamb recruitment, and better understand the disease distribution. All animals culled from west of the river tested positive for some degree of pneumonia or presence of *Mycoplasma ovipneumoniae*. 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. By August 2010, lamb survival was very low on both sides of the river. Observations of coughing sheep and samples from hunter harvested rams in September confirmed that the disease had spread to Selah Butte. Two of 4 sheep sampled in Umtanum during September were clear of pneumonia, possibly because the disease outbreak was waning. No significant adult mortality has been observed on either side of the river since early 2010, and both lamb and adult survival appears to be high in both 2011 and 2012. While there may have been some double counting of ewes and lambs during aerial surveys in 2012, the herd has now recovered and is within objectives.

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).

Table 1. Bighorn sheep hunting in Washington, 2011, showing number of applicants, permits, hunters, harvest, day/kill, hunter success, and sheep observed by hunters. Table does not include 4 bighorns harvested by raffle permit holders, and 1 harvested by the auction permit holder.

Hunt Name	Applicants	Permits Issued	Hunters	Harvest	Sheep Seen	Lambs Seen	Hunter Days	Days/Kill	Hunter Success
VULCAN MOUNTAIN A	1,189	1	1	1	40	3	8	8.0	100%
SELAH BUTTE	4,374	4	3	3	105	21	7	2.3	100%
UMTANUM	5,423	4	4	4	201	41	13	3.3	100%
CLEMAN MOUNTAIN A	4,605	3	2	2	73	7	3	1.5	100%
CLEMAN MOUNTAIN B	3,423	3	3	3	197	90	5	1.7	100%
MT. HULL A	1,135	1	1	1	65	25	1	1.0	100%
LINCOLN CLIFFS	1,488	1	1	1	50	5	7	7.0	100%
QUILOMENE	3,770	4	4	4	147	34	18	4.5	100%
SWAKANE	3,773	1	1	1	27	0	2	2.0	100%
TIETON A	4,015	5	5	5	161	47	15	3.0	100%
TIETON B	2,262	5	5	4	323	110	16	4.0	80%
MANSON	2,084	2	1	1	40	0	4	4.0	100%
ASOTIN	2,353	2	2	2	41	0	3	1.5	100%
CHELAN BUTTE	2,078	1	1	1	78	13	3	3.0	100%
SINLAHEKIN	1,212	1	1	1	49	12	10	10.0	100%
MT. HULL B	1,287	1	1	1	50	20	3	3.0	100%
MT. HULL C	610	1	0						-
VULCAN MOUNTAIN B	177	1	1	0	8	0	0		-
Total	45,258	41	37	35					95%

BIGHORN SHEEP STATUS AND TREND REPORT: REGION 1

HALL MOUNTAIN

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Population objectives and guidelines

Rocky Mountain bighorn sheep were introduced to Hall Mountain 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). In the past this population was used primarily as a source for Rocky Mountain bighorn sheep transplants into other areas of Washington State.

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. On December 2, 2010 the winner of the Rocky Mountain bighorn sheep raffle permit harvested a full horn curl ram which was the first hunter-harvested bighorn sheep ever from this herd.

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 discontinued. 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 have been replaced by their progeny, they have largely lost fidelity to the winter-feeding site.

Two incomplete ground-based surveys of the Hall Mountain bighorn sheep were accomplished in the winter of 2011-2012. No sheep were observed, however. Incidental detections by U.S. Forest Service personnel in the early summer of 2012 accounted for 12 bighorn sheep including 4 rams, 6 ewes, and 2 lambs (M. Borysewicz, pers. comm. 2012) (Table 1).

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 more recently, 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 is no domestic livestock grazing within the portion of national forest used by the bighorn sheep.

Table 1. Population composition counts of Hall Mountain bighorn sheep, 2001 - 2012. (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*
2011	5*	9*	1	15	*56 : 100 : 11 **
2012	2	6	4	12	*33 : 100 : 67*

** Estimated classification due to poor viewing conditions during surveys.*

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 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. WDFW has no further plans to trap sheep at Hall Mountain.

Management conclusions

The winter of 2011-12 was the ninth season since winter feeding operations were terminated. 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 protocols 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.

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BIGHORN SHEEP STATUS AND TREND REPORT: REGION 1
Vulcan Mountain

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Population objectives and guidelines

California Bighorn Sheep were introduced to the Vulcan Mountain area of northern Ferry County, Washington in 1971. Eight Bighorn Sheep, consisting of 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. Poor results were obtained from 2 ground-based counts in the fall of 2011; hence the 2011 survey also included a helicopter count of Vulcan bighorn sheep. Only 31 animals were observed: 15 rams, 9 ewes, and 7 lambs (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; no lambs were observed in 1998 or 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 was met and there was a need to actively manage its level so that numbers would 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) hunt 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 1 animal was harvested, a 4.5 year old ram by the State permit holder. 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 2 ewes were harvested by State permit holders and 1 ram by a CCT permit holder in the 2008 season. In each of the 2009 and 2010 seasons State permitees harvested 1 ram and 3 ewes (Table 2). CCT permit holders harvested 1 ram and 2 ewes in 2009 and only 1 ewe in 2010 (Krausz 2011). The state harvest in 2011 was only 1 ram (Table 2).

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.

Table 1. Annual fall population composite counts of the Vulcan Mountain Bighorn Sheep Herd from 2001 through 2011.

			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
2010	9	24	7	8	4	19	52	38 : 100 : 79
2011	7	9	-	-	-	15	31	78 : 100 :167

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). Although 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 brain worm (Murphy 2000). Additional fecal samples were collected. Further analyses completed by Dr. Alvin Gajadhar identified *Muellerius 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 *Muellerius capillaris* using slugs and snails as intermediate hosts, was able to "jump" from domestic goats to the bighorn sheep. Native bighorn sheep, having less natural resistance than domestic goats to *Muellerius capillaris*, likely succumbed to pneumonia that this parasite causes (Hall 2002).

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 (3 rams, 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 January 2012, the CCT trans-located 4 bighorn sheep including 3 rams and 1 ewe from Cleman Mountain in Yakima County, WA to the Vulcan area to help augment the population. One was outfitted with a Global Positioning System radio-collar to gain insights on bighorn sheep home range and movements. Subsequent monitoring revealed similar results to those obtained from 2003 in which there was little movement outside of the traditionally known bighorn sheep range (Doloughan 2004, Krausz 2012).

In the past 12 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 forage range seeding projects that was accomplished on private property 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 2004 fall census results indicated that the Vulcan bighorn sheep population had grown back sufficiently to sustain limited-entry hunting. The population parameters for establishing a permit were met: 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. The same permit quota was offered again in 2010 and for both years, all permits resulted in hunter-harvested bighorn sheep. As the observed population declined in the late fall of 2010, the permit quota was cut back for the 2011 hunting season to 1 ram and 1 ewe. That year only the ram permit was reportedly filled. In 2012, only 1 State permit has been allocated, for a ram only.

Table 2. Summary of State and Colville Confederated Tribes (CCT) hunter harvest of bighorn sheep from the Vulcan Mountain Unit from 2005 through 2011.

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	4	1 ram, 2 ewes
2010	State	4	1 ram, 3 ewes
2010	CCT	4	1 ewe
2011	State	2	1 ram, 0 ewe
2011	CCT	2	

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BIGHORN SHEEP STATUS AND TREND REPORT: REGION 1
Lincoln Cliffs

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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 2008).

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 2008-2010 into the Hells gate area of the Colville Indian Reservation, north side of Lake Roosevelt, an area just north of the Lincoln Cliffs area.

Hunting seasons and harvest trends

The first hunting permit for this herd was issued in the 1997 hunting season. Since then, one ram permit has been issued each year and harvest success has remained at 100%. The number of applicants for the Lincoln Cliffs hunt has averaged 1434 over the past five years. In addition to the annual permit the statewide 2003 and 2005 auction winners and the 2004 raffle winner all selected Lincoln Cliffs to harvest their rams. However due to concerns with the mature males, auction and raffle winners not currently allowed to hunt at Lincoln Cliffs.

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	1,375	40	12	4
2006	1,218	8	3	0
2007	1,326	7	1	2
2008	1,290	42	8	8
2009	1,608	58	16	9
2010	1,456	26	5	N/A
2011	1,488	50	5	N/A

Hunters have spent on average 5.4 days hunting per kill. However, days hunted ranges widely from 1 to 14 days. 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, 18 mature rams have been removed by hunting by either the regular permitees or the auction and raffle winners. The number of mature rams seen by hunters has been variable over the years (Table 1), 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.

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 2. 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
2011	34	11	32	18
2012	37	12	32	18

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 11 years (averaging 40 lambs per 100 ewes), but yearly 90% confidence intervals are large (Table 2). The ram to 100 ewe ratio has been variable over the past 11 years (average 66, range 39-178; Table 3). 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, making aerial surveys more challenging.

Table 3. 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
2010	41	16	39	19
2011	42	26	62	25

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. However, the hunter report in 2001 showed a drastic decline and ever since the hunter report has be highly variable. Lower number of sheep observed by hunters may also simply reflect the amount of time the individual spent hunting.

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 apparently was not able to recover 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, and the remaining 4 ewes appear to have outlived their radio collars. No radio signals have been picked up since May of 2008, although yellow ear tags on at least two ewes were again seen in 2011.

Since 1997, 35 known sheep mortalities have occurred -- 18 from hunting, 2 from vehicle collisions, 5 from cougar, and 10 unknowns -- a total of 27 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.

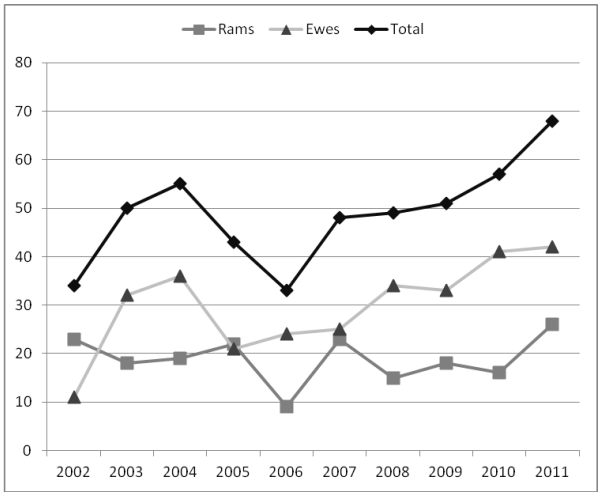

Figure 1. Lincoln Cliffs minimum population estimate by sex for 2002 – 2012. Estimated as the maximum count from all helicopter surveys conducted each year. Estimates are only shown from 2002 on because this is the year regular helicopter surveys were initiated.

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 interaction 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 2008). 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 2012 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.

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BIGHORN SHEEP STATUS AND TREND REPORT: REGION 1

BLUE MOUNTAINS

Paul Wik, District Wildlife Biologist
Mark Vekasy, Assistant District 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 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.

Population management objectives for each herd are based on habitat conditions, habitat availability, 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 (WDFW 2008). These herd objectives were identified in 1995, prior to large scale disease die-offs. Updating our herd plan should be prioritized for future management planning.

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 coordinates 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 pneumonia 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 2011, the Black Butte herd and Hall Mountain herd in NE Washington were 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 2010, the harvest occurred outside of the Blue Mountains in the Hall Mountain herd, and in 2011 the harvest occurred in the Black Butte herd. In 2011, two draw permits were available in the Asotin herd. Both permit holders were successful in harvesting 190+ B&C scoring rams.

General hunt permits will not be implemented in other herds until populations meet criteria established in the Bighorn Sheep 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 10 rams over the last 9 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. It is unknown the current status of this closure.

Surveys

Aerial surveys are conducted in February and March 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 helicopter surveys.

Aerial surveys were conducted for the Asotin and Black Butte herds in 2011 by WDFW. ODFW conducted aerial surveys for the Mountain View and Wenaha herds. The minimum population estimate for 2011 was 222 bighorn sheep, 113 ewes, 36 lambs, 73 rams for a ratio of 65 (90% CI: 49-81) rams and 32 (90% CI: 22-42) lambs per 100 ewes (Table 1.). A population estimate using the sightability correction has not been developed for 2012 at this time, but biologists estimate that there are approximately 222 - 240 bighorns in the 5 herds. The population has decreased in 2012 due to a new disease outbreak in the Asotin herd, resulting in a minimum of 30% mortality in that herd over the 2011-2012 winter.

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. In 2011, lamb recruitment was again very poor in the Black Butte (12 lambs:100 ewes), Tucannon (33:100), and Wenaha (26:100). The Asotin herd (46:100) and Mountain View (50:100) were slightly higher, but insufficient for population growth in the Blue Mountains. The Asotin and Tucannon herds are the only herds that have not had lambs die from pneumonia during the past 16 years of intensive monitoring, but it is suspected that lambs in the Asotin herd will die of pneumonia during the 2012 summer due to the recent adult die-off.

With the recent outbreak of *Mycoplasma ovipneumonia* induced pneumonia in the Asotin herd, it is predicted that the overall population of bighorn sheep in the Blue Mountains will continue to decline for the next 5 years.

The population suffered high mortality during the pneumonia die-off in 1995-96. Low lamb survival following the all age die-off resulted in poor recruitment into the population along the Grande Ronde River corridor. The number of mature rams in the population is currently declining or stable at a reduced level in all herds, and still remains substantially below the number that existed prior to the die-off (Table 1). Poor lamb recruitment due to disease, predation, and primarily pneumonia are all contributing to the poor fitness of the bighorn population in the Blue Mountains.

The Tucannon herd received a transplant of 5 young (1 – 3 years old) ewes from the Asotin herd during February 2011. All five were equipped with ARGOS/VHF collars that allow for remote downloading of locations. Three of the 5 collars are still functioning as of July 2012. All 5 collars are scheduled to fall off in approximately 1 year.

In October 2011, a yearling ram was captured for transplant into southern Hells Canyon, Oregon. This ram was placed with a herd that was made up exclusively of female sheep. The young ram contracted pneumonia within 3 months and died, but after breeding some of the ewes. A helicopter capture occurred in November 2011, 3 ewes and 3 rams were captured from the Black Butte herd. One of the rams was harvested in December by a Nez Perce tribal member. Four ewes and one ram were captured from the Asotin herd at the same time for relocation to Washington State University. These sheep were used in a disease trial.

Only one animal was removed during the last reporting session due to disease risk. A 3-year old ram was captured near the town of Asotin in the fall of 2011. The animal was incorporated into a WSU disease research trial.

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 ranges in the Blue Mountains. It is too early to determine the impact of the School Fire on the Tucannon herd 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

Mycoplasma ovipneumonia induced pneumonia continues to plague 4 of the 5 bighorn populations; Asotin, Black Butte, Wenaha, and Mountain View. The Tucannon herd has not experienced pneumonia caused mortality, but do carry scabies (*Psoroptes ovis*). Bighorn populations in the Blue Mountains have not recovered from the 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 epizootic. 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 effects 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.

Management conclusions

Four of the five bighorn sheep herds in the Blue Mountains are struggling with *Mycoplasma ovipneumonia* induced pneumonia. The Black Butte, Wenaha, and Mountain View herds still experience periodic pneumonia outbreaks, which result in high lamb mortality and sporadic adult mortalities. It is unclear what path the Asotin herd will take with the recent disease infection that occurred there. The Tucannon herd escaped the pneumonia out-break, but suffered a major die-off after being infected with scabies in 1999. This herd is unlikely to recover without an additional 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.

Domestic sheep and goats continue to be a major threat 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 a 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 pneumonia is too 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 continued pneumonia outbreaks in the bighorn populations are very high.

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Washington Department of Fish and Wildlife. 2008. 2009-2015 Game Management Plan. Washington Department of Fish and Wildlife, Olympia, 223 pp.

Table 1. Bighorn Sheep Population Trend and Herd Composition, Blue Mountains 2003-2012

			Rams						Population	Ratio (90% CI)	
Year	Lambs	Ewes	C I	C II	C III	CIIIB	C IV	Count Total	Total	Lambs (CI)	Rams (CI)
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	105	8	23	24	0	16	71	204	27 (17, 36)	68 (51, 85)
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	24	1	4	76	229	22 (15, 30)	61 (46, 75)
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)
2011	37	129	9	18	37	5	8	77	241	29 (20, 38)	60 (46, 74)
2012	36	113	14	14	29	1	15	73	222	32 (22, 42)	65 (49, 81)

*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
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	0	3	37	100	37 (20, 54)	80 (51, 110)
2011	23	40	6	12	16	0	4	38	101	57 (33, 82)	95 (60, 130)
2012	12	26	6	8	10	0	7	31	69	46 (20, 73)	119 (67, 171)

* 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
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	29	1	9	3		1	14	48	17 (4, 31)	48 (22, 74)
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	4	0	0	9	37	4 (0, 10)	33 (11, 55)
2009	0	25	1	10	7	2	1	21	47	0 (0,0)	84 (43, 125)
2010	1	19	0	2	2	1	0	5	25	5 (0, 14)	26 (5, 48)
2011	1	25	1	1	5	2	0	9	35	4 (0, 11)	36 (13, 59)
2012	3	24	0	2	4	0	1	7	34	12 (0, 25)	29 (9, 50)

Count excludes the Upper Joseph subherd that resides in Oregon

Table 4. Mountain View herd population trend and composition counts, 2003-2012, Blue Mtns., Washington.

			Rams						Population	Ratios (90% CI)	
Year	Lambs	Ewes	CI	CII	CIII	CIIIB	CIV	Total	Total	Lambs	Rams
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)
2011	2	21	1	1	3	0	3	8	31	10 (0, 21)	38 (12, 64)
2012	8	16	1	1	5	0	2	9	33	50 (14, 86)	56 (18, 95)

Table 5. Tucannon herd population trend and composition counts.

			Rams						Population	Ratios (90% CI)	
Year	Lambs	Ewes	CI	CII	CIII	CIIIB	CIV	Total	Total	Lambs	Rams
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)
2011	3	6	1	1	1	0	0	3	12	50 (0, 108)	50 (0, 108)
2012	4	12	3	1	1			5	21	33 (2, 65)	42 (5, 78)

* School Fire burned the entire Tucannon Sheep range in 2005. Unknown number of sheep were directly killed and displaced during this event.

Table 6. Wenaha Herd Population Trend and Composition Counts, Blue Mtns. Washington.

			Rams						Population	Ratios (90% CI)	
Year	Lambs	Ewes	CI	CII	CIII	CIIIB	CIV	Total	Total	Lambs	Rams
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)
2011	8	37	0	3	12	3	1	19	62	22 (8, 35)	51 (28, 75)
2012	9	35	4	2	9	1	5	21	65	26 (10, 42)	60 (33, 87)

( ) 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 is just above this level at an estimated 80-100 animals. The current management focus is to maintain current population levels while minimizing the risk of disease and agricultural damage. 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 at an estimated 70-90 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. Also in 2009, for the first time we issued two adult only ewe permits for this herd to help achieve herd reduction goals. Washington Department of Fish and Wildlife (WDFW) permit holders harvested one mature ram and one adult ewe in 2011. Similarly, Colville Confederated Tribe (CCT) permit holders harvested one ram and one adult ewe. 1 (Table 1). WDFW issued one any ram permit and two adult ewe only permits for 2012.

Sinlahekin herd. Surveys since 2009 indicate that this herd continues to meet the criteria needed to support one any ram permit. One mature ram was harvested in 2011 (Table 2).

Table 1. Summary of harvest information for bighorn sheep in the Mt. Hull Unit.

Year	WDFW Permits	WDFW 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 2 ewe	1 ram 1 ewe	1 any 2 ewe	1 ram 1 ewe
2010	1 ram 2 ewe	1 ram 2 ewe	1 any 2 ewe	0 ram 2 ewe
2011	1 ram 2 ewe	1 ram 1 ewe	1 any 2 ewe	1 ram 1 ewe

[a] CCT=Colville Confederated Tribes

Table 2. Summary of harvest information for bighorn sheep in the Sinlahekin Unit.

Year	WDFW Permits	WDFW Harvest
2010	1 ram	1 ram
2011	1 ram	1 ram

Surveys

Population surveys are generally conducted annually to determine composition and trend on both the Mt. Hull and Sinlahekin herds (Tables 3 & 4). The surveys are conducted in late fall or early winter and consist of helicopter or ground count efforts. 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. WDFW biologists conducted a ground survey of the Mt. Hull Unit in January 2012 and classified 77 sheep, including 31 rams, 18 of which were $\geq$ ¾ curl (Table 3). Observed lamb production declined from that in seen in 2010.

Sinlahekin herd. WDFW biologists also conducted a helicopter survey of the Sinlahekin Unit in late

November 2011 and classified 82 sheep, including 23 rams, 5 of which were ≥ ¾ curl (Table 4). Observed lamb production declined dramatically in 2011.

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 climbed gradually over the next 10 years until the Rocky Hull fire burned a significant portion of the range in 2000. Robust herd growth has prevailed since, likely due to fire's rejuvenating affect on the bighorn sheep habitat. The herd reached its highest observed population in 2008 at over 100 animals and remains above population objectives. The ram cohort fluctuated significantly in the early 2000s in response to fire activity in the US and Canada, but is now quite robust.

Table 3. 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	17	58	11	10	21	96	100+	36:100:29
2010	19	43	6	3	9	71	80-100	44:100:21
2011	8	38	13	18	31	77	80-100	21:100:82

In 2001 WDFW augmented the herd with 8 ewes and 3 rams from the Cleman Mountain area. Additional augmentation occurred in 2003 with 5 animals from John Day, 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 near or at carrying capacity.

Table 4. 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
2010	15	31	9	5	14	7	67	70-90	48:100:45
2011	4	55	18	5	23	0	82	90-95	7:100:42

The number of bighorn sheep crossing west of Highway 97 and being struck by vehicles has substantially decreased in the last few years. Four bighorn sheep perished each year in vehicle collisions during 2006 and 2007. Vehicles killed only one bighorn sheep in 2008, two in 2009, and none the last two years. Complaints from landowners due to large numbers of sheep foraging in irrigated agricultural fields adjacent to Mt. Hull has also substantially decreased in the past few years. This reduction in road kills and complaints may be due to herd reduction actions and adequate natural forage away from the highway and farmland. Changes in private land use have also led 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.

During two separate capture efforts (2009 and 2011), agency and CCT biologists captured and translocated 14 ewes and 4 rams from the Mt. Hull herd to the new Hells Gate Reserve herd on the Colville Confederated Tribal Reservation. In addition to the translocation efforts, we implemented ewe only permits starting in 2009 to help reduce herd size towards management objectives. Monitoring of the population to determine if these herd reduction efforts have achieved the desired results will continue over the next few years. If surveys indicate the Mt. Hull population remains high and vehicle collisions and agriculture damage increase, further herd reduction efforts may be implemented.

Sinlahekin herd. 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 WDFW and Washington State University initiated a research project to gather data on herd range expansion, seasonal animal movements, and to evaluate the effectiveness of prescribed fire as a sheep habitat enhancement tool in the Sinlahekin Wildlife Area. Biologists fitted a total of 21 bighorn sheep with radio collars in two separate captures, one in 2010 (10 ewes and 2 rams) and one in 2011 (4 ewes and 5 rams). These collared sheep are being monitored by a graduate student enrolled at Washington State University.

During the 2011 Sinlahekin bighorn sheep capture our on-site veterinarian discovered psoroptic mange within the herd. The reaction to this parasite in a bighorn herd can vary from no signs at all (a few mites in the ears) to fatal infections. We have speculated that psoroptic mange may have contributed to the low observed lamb production in 2011. Monitoring of the herd will continue to determine the effect on the Sinlahekin bighorn sheep population.

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 and noxious weed invasions may have reduced range quality.

Cheatgrass has flourished in portions of the burn and other new invasive species, including white-top and Dalmatian toadflax, are present. In the past, programs such as the Forest Service's aggressive weed control effort funded by the Foundation for North American Wild Sheep (now Wild Sheep Foundation), have been helpful, and similar efforts will likely be needed into the future. Recent radio collar data indicates that the current habitat still supports functional connectivity between the Mt. Hull herd and the small bighorn sheep herd at Omak Lake on the CCT. Radio collar data showed that a 7 year-old ram left the Omak Lake herd on November 14, 2010, traveling approximately 46 miles before reaching Mt. Hull. This ram returned via the same route to the Omak Lake herd by Christmas day. The Omak Lake herd has never been augmented, and DNA testing indicates all animals tested but one, are genetically linked to the Sinlahekin herd. The one remaining individual groups with the Mt. Hull herd. This connectivity may increase genetic mixing but may also increase the chances of disease transmission between these herds.

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 that continues to use the area from Aeneas Mountain south to Blue Lake within 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 forest succession.

Much of the sheep foraging habitat for the Sinlahekin herd is not under WDFW control. The WADNR and US BLM 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.

In 2005, an extensive timber thinning and prescribed fire program within the Sinlahekin Wildlife Area reduced tree encroachment and increased forage on 400 acres of sheep habitat. Continuing efforts have thinned an additional 360 acres of timber and burned an additional 780 acres since then. The project's ultimate goal is to thin and/or conduct prescribed fire on 2,700 acres overall. This effort, combined with an aggressive weed control program should also improve habitat conditions within the Sinlahekin Wildlife Area.

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.

An additional threat to both the Mt. Hull and Sinlahekin herds 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. This interaction may lead to the transfer of disease into these bighorn sheep herds, especially *Mycoplasma ovipneumoniae and Mannheimia haemolytica*, two bacterial pathogens that cause bighorn die-offs. Domestic dogs have also been documented chasing bighorn sheep in the Mt Hull herd and in one case causing injury to a lamb in this herd.

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. WDFW is continuing to work on improving habitat, reducing the factors associated with vehicle collisions, landowner conflicts, and separation of bighorn sheep from domestic sheep and goats.

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, as well as augmentation efforts. An extensive fuels treatment and prescribed fire program 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. Disease incidence in the herd should also 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 (SU 14), CHELAN BUTTE (SU 18), MANSON (SU 16)

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, the products of reintroductions into Swakane Canyon, the north shore of Lake Chelan and Chelan Butte. In addition, bighorn sheep from the Quilomene herd use areas along the Chelan-Kittitas County border near 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 130-140 bighorn sheep in the Swakane herd as of summer 2012. The population objective for Swakane is 50-60 adult sheep (WDFW 2008). The north shore of Lake Chelan (Manson) population was estimated at 113-130 as of June 2009, and the current population objective for the herd is 100-150 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 and 2010. The final construction phase of the wildlife fence will be completed during summer 2011. A drawing permit for the harvest of one bighorn ram was reinstated for the 2010 hunting season The ram harvested in 2010 is considered the new Washington State record and SCI World record California Bighorn Sheep.

Two permits have been offered in the Manson unit since the permit began in 2005; all were successful. The 2010 auction permit holder and the 2010 North Central Washington-Big Game raffle permit holder also harvested a ram from the Lake Chelan herd. There will be two drawing permits offered for the north shore of Lake Chelan for 2011.

The Chelan Butte herd was hunted for the first time in 2010, with the permit holder successfully harvesting a ram. The Chelan Butte herd met the 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 provide confirmation of herd size and composition. Another drawing permit for the herd was offered in 2011.

Surveys

In the past 10 years, all herd population data were 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 from 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. For over 30 years, no bighorn mortalities were attributed to vehicle collisions. However, 25 Swakane bighorns have been 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. Phase two, completed in 2010, extended the fence roughly two miles to the south. The remaining 3.3 mile section (Phase 3) was completed in 2011. Four vehicle collision mortalities have occurred since completion of Phase 1of 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 roughly 38%. This increase seems to have slowed, based on decreased observed lamb production. Evidence from recent telemetry data shows that several bands have moved westward uplake into steeper, rockier, unoccupied habitat. Observed 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 from 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, and in 2011, 93 sheep (Table 3). The Chelan Butte herd 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 indicate that sheep have not altered their seasonal use habitat patterns use in response to the newly constructed wildlife fence. The fence eliminated the bighorn's use of a narrow band of habitat between S.R 97A and the Columbia River. 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. Reports of bighorn sheep accessing habitat south of Chelan Butte have also increased in the past two years

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.

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Table 1. Observed population composition of the Swakane bighorn sheep herd, 1996-2011

			Rams							
Year	Lambs	Ewes	Yrl	<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
2011	13	63		14	16	23	107	110-120	22	48
2012	24	58	4	17	19	40	122	130-140	41	67

*12 rams classified from the observed 20.

Table 2. Observed population composition of the Lake Chelan bighorn sheep herd, 1999-2009.

Year	Lambs	Ewes	Rams				Total sheep	Lambs: 100 ewes	Rams: 100 ewes	Population estimate
			Yrl	<3/4 curl	≥3/4 curl	Total rams				
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
2011	10	51		6	21	25	86	20	49	101-122
2012	15	52	2	7	13	22	89	29	42	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.

Year	Lambs	Ewes	Rams				Total sheep	Lambs:100 ewes	Rams:100 ewes	Population estimate
			Yrl	<3/4 curl	≥3/4 curl	Total rams				
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
2011	19	46		15	13	28	93	41	61	101-120
2012	13	72	8	10	25	43	128	18	58	130-145

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 issues permits in all herds whereas the Muckleshoot Indian tribe hunts the Cleman Mountain and Tieton herds.

Surveys

Quilomene and Umtanum/ Selah Butte are typically surveyed via helicopter in July. Cleman Mountain is surveyed at the feeding station in December/January. Summer aerial surveys in the Tieton have not been productive. Tieton ground surveys have given a good index to recruitment, but not total population. In 2012, Tieton was aerial surveyed in February. . Umtanum and Selah Butte were aerial and ground surveyed numerous times from late 2009 through 2011 due to a disease outbreak. All available information is used to estimate the total population. Survey results are given in Tables 2- 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 but 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). Poor recruitment, observations of coughing sheep, and reports of mortalities indicated a disease problem around 2004-2006. Since 2007, aerial counts have been declining, but hunters are reporting more sheep than seen on aerial surveys. In 2012, total counts increased, mostly due to finding ram groups and high lamb production. Ewe numbers are still well below 2004 counts.

The Cleman Mountain population was established in 1967 with the release of eight animals. The herd remained relatively stagnant for over 20 years. . 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 the year 2000 (Table 2). Over 155 sheep have been captured and translocated since 2001. Another 95 have been harvested, during that period, but the population is still above objective. The Cleman Mountain herd is healthy, but there are concerns over nearby domestic sheep grazing and a very high ram: ewe ratio (106 rams per 100 ewes). The sudden increase in rams wintering on Clemans is believed to be due to immigration from the Tieton.

The Umtanum herd was established in 1970 with the release of eight bighorns, west of the Yakima River. 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 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 found 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 of the disease, increase subsequent lamb recruitment, and better understand the disease distribution. All animals culled from west of the river tested positive for some degree of pneumonia or presence of *Mycoplasma ovipneumoniae*. 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. By August 2010, lamb survival was very low on both sides of the river. Observations of coughing sheep and samples from hunter harvested rams in September confirmed that the disease had spread to Selah Butte. Two of 4 sheep sampled in Umtanum during September were clear of pneumonia, possibly because the disease outbreak was waning. No significant adult mortality has been observed on either side of the river since early 2010, and both lamb and adult survival appears to be high in both 2011 and 2012. While there may have been some double counting of ewes and lambs during aerial surveys in 2012, the herd has now recovered and is within objectives.

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 also 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. One problem has been that translocations focused on ewes, leaving a potentially large surplus of rams (Table 2). The rams were seen in fall 2009 and September 2010, but then adult rams could not be found later in 2010 by biologists, volunteers, or hunters. During the 2011 hunts, only 2 of the 8 harvested sheep were >3.5 years old and none were >6.5 years old. Additional sheep were first noticed on Cleman Mountain during the winter of 2010-2011 and a large increase in adult rams noted in 2011-2012. Harvest and translocation have removed 76 bighorns the last 3 in an attempt to keep the population near stated objectives.

Habitat condition and trend

Forage resources vary annually with moisture. Summer drought conditions ended in 2006. Moist spring and early summer 2010 and 2012 undoubtedly increased forage production. Small fires on Cleman Mountain and Tieton areas have regenerated new growth that benefited sheep, in the last 5 years.

Augmentation/habitat enhancement

Major augmentation efforts ended in 2002. Cleman Mountain and Tieton are healthy herds and are being used as sources for translocation efforts. Seven ewes and 1 young ram were moved from Cleman Mountain to Quilomene in early 2012. 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 outbreaks, similar to that documented in the Yakima River Canyon in 2009-2010.

Disease outbreak is not unexpected as domestic sheep and/or goats have been documented in close proximity to bighorns in every herd in the Region. In 2009 - 2011, a small but growing 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 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. Options are being explored to minimize the number of sheep on highways.

The current herd objectives were set based on "professional judgment". Bighorn sheep habitat models have recently been developed and run for all herds in Washington. Comparison of predicted habitat from the model vs. use from GPS collared sheep indicates the model is valid. Herd objectives should be set based on available habitat and productivity.

Table 1. Summary of bighorn sheep harvest in Region 3 since 2000.

Area	Year	Permits	Harvest	Comments
Cleman Mtn.	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
	2010	6	8	Harvest includes raffle hunter, tribal
	2011	6	13	Harvest includes raffle hunter, tribal
Umtanum/Selah Butte	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
	2010	10	15	Harvest includes raffle hunter, tribal
	2011	8	12	Harvest includes tribal
Quilomene	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
	2010	4	4	
	2011	4	5	Harvest includes auction hunter
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	
	2010	8	11	Harvest includes Tribal
	2011	10	25	Harvest includes Tribal (3 ewes, 12 rams)

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
2011	11	48	15	15	74	150	250-300
2012	41	65	43	37	149	160	250-300

Table 3. Cleman Mt. 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
2010	35	83	60	48	201	201	150-160
2011	34	83	88	65	205	205	150-160

Table 4. Umtanum/Selah Butte June Population Composition

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
2011	33	109	53	50	195	220	250-300
2012	65	155	68	57	*288	260	250-300

* Probable double count of 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	40	72	89	48		200	75-150
2011	33	66	24	16	125	150	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
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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 (Figure 1). In 2011, 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 2011, drawings were offered in GMU 117 and 121/124 West for 9 antlerless only permits for youth, senior, or disabled hunters. In 2010, there were also 68 permits available in 5 moose management units within the Colville District as well as 9 antlerless only permits for youth, senior, or disabled hunters.

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, the 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 60 moose, consisting of 53 bulls and 7 cows, were harvested within the Colville District units in 2011 (Table 1). The hunter success rate was 88 %, and hunters averaged 6.7 days of hunting per moose harvested. Permit hunts for Youth, Senior, and Hunters with Disabilities, which includes the 49 Degrees North B, C, and Youth Only and the Huckleberry Range B permits, harvested 6 antlerless moose from the 9 permits issued, for a success rate of 67%. Hunters averaged 4.8 days of hunting per moose harvested in those permit hunts.

Surveys

Winter helicopter surveys were conducted during the winter of 2011-2012 in the Sherman (GMU 101), Selkirk (GMU 113), 49 Degrees North (GMU 117), and Huckleberry (GMU 121) game management units. Surveys were conducted in portions of sub-watersheds referred to as "quadrats". This survey method allowed for a thorough counts and repeatable coverage of targeted survey areas using GPS and real time tracking of the helicopter. The overall sighting rate was 33.8 moose per flight hour. In 2011-2012, the overall bull and calf to cow ratio was 123 bulls and 42 calves per 100 cows, respectively (Table 2).

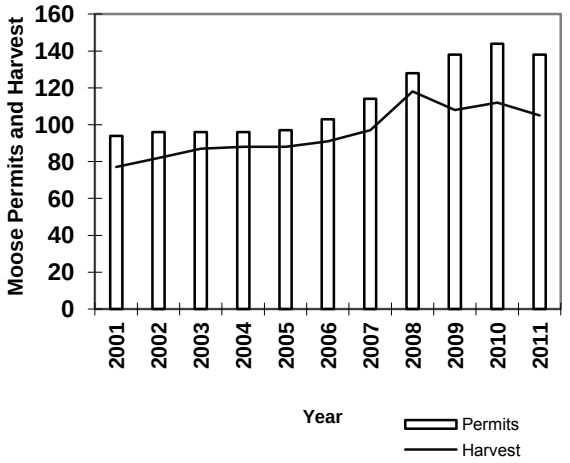

Figure 1. Statewide moose permit quota levels and harvest, 2001-2011.

Population status and trend analysis

Early winter composition survey flights have been accomplished every year for the last 18 years. Data from the past 11 years is presented in Table 4. The December 2011 survey yielded an overall ratio of 123 $\pm$ 25 bulls observed per 100 cows (90% C.I., Skalski et. al 2005), which represents a significant increase from 45 $\pm$ 21 bulls per 100 cows observed in 2010. The calf to cow ratio was 42 $\pm$ 11 calves per 100 cows in 2010, which also represents a significant increase from 26 $\pm$ 12 calves per 100 cows observed in 2010. For both bulls and calves, the 11-year trend indicates a decline relative to cows from 2002 to 2010 with an increase in both in 2011 (Figure 2).

Age and antler spread of harvested bull moose are monitored to detect trends in structure of the bull

population, which in turn provides information on the mortality rate of the bull population (Figure 3 and Table 5). For the Colville District in 2011, the mean antler spread of harvested bull moose was 40 inches. The average age of bull moose taken in 2011 was 5.9 years. In 2011, 46 adult bulls (age 5+ years), 23 sub-adult bulls (age 2-4), and 3 yearling bulls were harvested. More adult bulls than subadults or yearlings were harvested in 8 of the 11 years from 2001 through 2011 (Table 5).

Table 1. Colville District (GMUs # 101/105/204, 108/111, 113, 117, and 121/124 West) moose harvest and hunter effort, 2001 – 2011.

Year	Permit Quota	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
2010	68	96%	55	10	65	414	6.4
2011	68	85%	53	7	60	427	7.1

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 2011 was 88%.

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 substantial 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 several years Forest Practice Applications & Approvals were received for treating over 13,000 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 hazing 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 is 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 2011-2012 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 through 2010. In 2011, harvest success dropped again, to 88%. This is driven by complete lack of success in one hunt unit. At the same time habitat conditions are becoming less favorable to moose due to 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 2011-2012 winter.

Area	GMU	Bull	Cow	Calf	Unclassified	Total	Bulls :100 Cows : Calves	Hours	Moose/hour
Sherman	101	19	8	6	0	33	238 : 100 : 75	2.4	13.8
Selkirk Mountains	113	55	62	22	1	140	89 : 100 : 35	4.2	33.3
49 degrees North	117	56	56	20	0	132	100 : 100 : 36	2.1	62.9
Huckleberry	121	42	14	11	0	67	300 : 100 : 79	2.4	27.9
Overall :		172	140	59	1	372	123 bulls: 100 cows: 42 calves	11.0	33.8

Table 3. Moose quotas, harvest, and days per kill in the Colville District for the 2011 season.

Area	Permit quota	Total moose Harvested	Average number of days per kill
Kettle Range	8	5	12.8
Three forks	6	6	8.2
Selkirk Mtns.	17	15	10.1
49 Degrees N	29	26	5.6
Huckleberry Mtns.	8	8	2.3
Total :	68	60	Weighted mean = 7.1

Table 4. Summary of early winter survey effort by helicopter on moose within the Colville District from 2001 through 2011.

Year	GMUs Surveyed	Hours Flown	Total Moose Observed	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
2010	105, 111, 113, 117	8.1	131	16.1	45 : 100 : 26
2011	101, 113, 117, 121	11.0	372	33.8	123 : 100 : 42

Table 5. Tooth age and antler spread in inches for harvested bull moose in the Colville District from 2001 through 2011.

Year	Mean Spread (inches)	Sample Size for Antler Spread	Mean Age (years)	Sample Size for Aging	Yearling	2-4 years old	≥ 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	5.6	43	5%	33 %	63 %
2010	39	60	6.0	49	4 %	35 %	61 %
2011	40	56	5.9	72	4 %	32 %	64 %

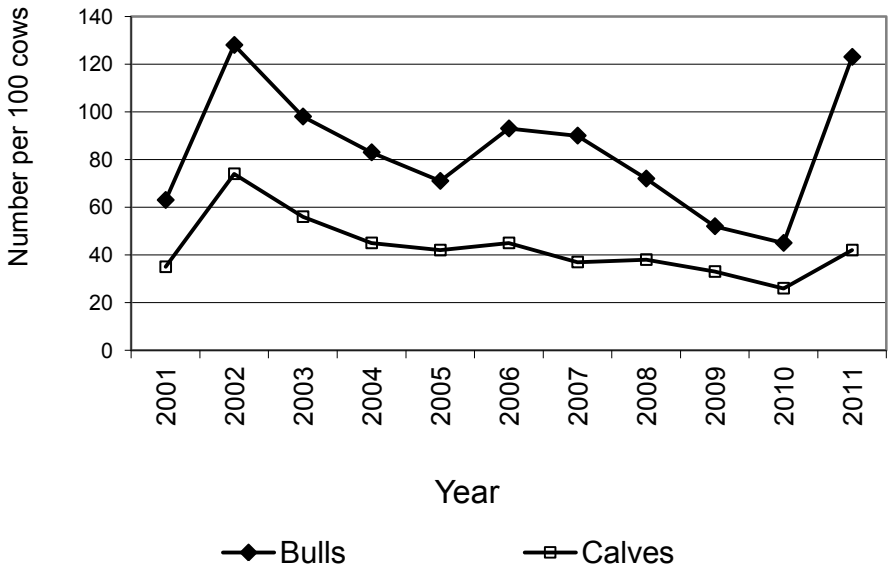

Figure 2. Age and sex ratios of moose observed during early winter helicopter surveys 2001-2011. Areas surveyed vary annually.

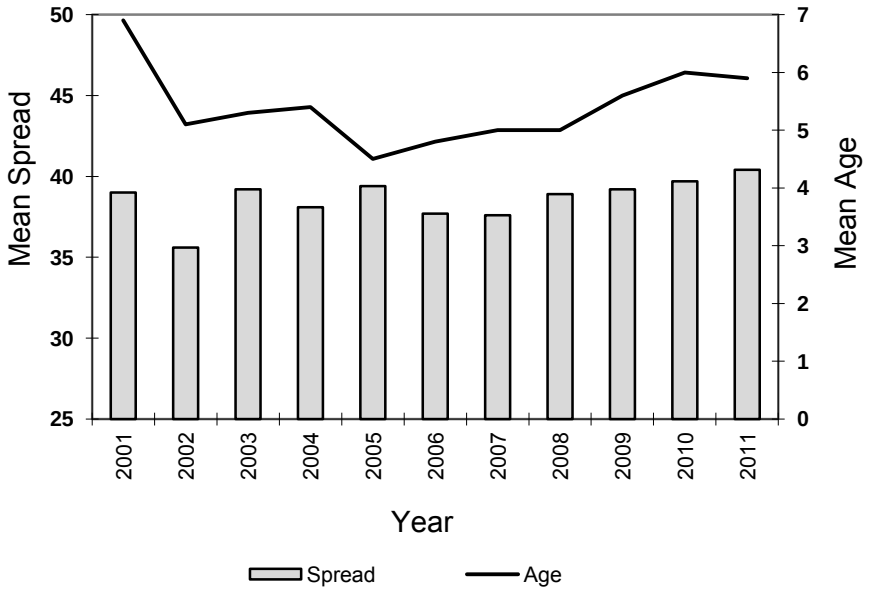

Figure 3. Mean age (years) and antler spread (inches) of bull moose harvested in the Colville District, 2001 - 2011.

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. However, one of the moose raffle permit hunters also hunted in GMU 124, successfully, bringing permits to 51 this year. The raffle hunter was successful, taking a moose with a 40.5 spread. The following data summaries will not include this raffle hunter since this can vary from year to year.

There has been a steady increase in the number of applications for these permits with 25,973 this year, 24,771 last year, 18,799 in 2009, 16,777 in 2008, and 14,811 in 2007 – an increase of 11,162 over five years. Both the Hangman and Mt. Spokane units had an either-sex moose hunt and an antlerless-only hunt. The Mt. Spokane unit also had a youth-only antlerless hunt with 10 permits.

Forty-eight permittees out of the 50 potential hunters reported in 2011, with 2 of those reporting they did not hunt. A total of 44 moose were killed this year, the same as the previous three years (Table 1). The mean numbers of days hunted per kill increased from an all-time low of 3.1 in 2009 to 4.4 days both this year and last (Table 1). The success rate for all hunts combined this year was 95.7% back up from 92% in 2010. The cumulative success rate since 2002 for all potential permits is 90% (this includes non-hunters). The "A" only – "once in a lifetime" hunts, have a 99% success rate over the last 10 years when hunted.

The mean antler spread for bulls harvested in the Mt. Spokane unit in 2011 was 32.3 inches, down from an all-time high of 39.4 in 2010. This is also below the ten year average of 34.4. The mean antler spread for the Hangman unit was 38.9 this year, again down from the all-time high of 42.9 from last year, but still above the ten-year average of 36.4 (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 northern end of the Mt. Spokane unit and also in the Hangman unit around Tekoa Mtn. See Tables 3 and 4 for a comparison of moose observed from aerial survey data.

Population status and trend analysis
The number of moose observed during aerial surveys varies from year to year depending on survey conditions; however, the data suggest increasing or at least, stable populations in both the Hangman Unit and the Mt. Spokane Unit (Tables 3 and 4). The variability in survey results year to year (Table 4) can be primarily attributed to the movement of moose back and forth across state lines (both GMUs border Idaho). Another consideration is that snow depths have a strong influence not only on the distribution of moose across survey quadrants, but also on the ability of the surveyors to detect moose. Heavy snowfalls tend to

push moose down into the lowlands, while in low snow years they remain at higher elevations.

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 continues.

While moose are apparently expanding their distribution in the district, the greatest increases appear to be occurring on private lands and at 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.

Habitat condition and trend

Moose prefer 10-20 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 higher elevation portion of the Mt. Spokane unit is primarily composed of large private timberlands in some stage of succession that is of benefit to moose, especially winter range. Clearcut logged habitats with abundant high quality forage and good hiding cover are thought to be important to moose in all seasons Lands owned by Washington State Parks provide ample security habitat, but little forage in the Mt Spokane unit. However, forested cover is important during summer heat and deep winter snow (Costain 1989).

Other than the lands immediately surrounding Mica Peak, Dishman Hills, and Turnbull National Wildlife Refuge, the Hangman Unit is mostly agricultural land, with moose concentrations highest in the northeast portion 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 16 in 2009. A moose damage/nuisance hunt was initiated in 2009 and has been continued through 2011 but only one permit has been issued. The minimal use of these permits is due primarily to the mild winters allowing moose to remain at higher elevations, thus reducing moose nuisance complaints. This hunt is a limited entry hunt (20 master hunters only) and runs from Dec 1 through Mar 31. 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, moose populations appear to be expanding their distribution. Although both units are prone to fluctuation because of proximity to the Idaho border allowing movement in and out of aerial survey boundaries, variable winter weather conditions, and flight time year to year, populations are at least stable and the trend appears to be slightly increasing.

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.

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 come 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. Another example of the expanding range was a 40+ bull moose being harvested this year around Tower Mountain, south of downtown Spokane.

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 effort for GMUs 124, 127 and 130.

						Days/
Year	**Permits**	**Success**	**Bulls**	**Cows**	**Total**	**Kill**
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
2010*	50	92%	19	25	44	4.4
2011*	50	97%	15	29	44	4.4

*Does not include MH Hunt, Auction, or Raffle Hunts

Table 2. Antler average spread for moose units.

Year	Mt. Spokane	Hangman
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
2010	39.4	42.9
2011	32.3	38.9
10 Yr. Average	**34.4**	**36.4**

Table 3. Total number of moose observed on aerial surveys for each unit (2002-2011).

Unit	Number of Moose Observed										10 Yr. Avg.
	2002	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	
Mt. Spokane	35	45	56	20	66	77	79	80	122	71	65
Hangman	46	14	58	54	28	35	37	44	46	46	41

Table 4. Moose observations and herd composition during aerial surveys from 2002-2011 (unidentified animals not included).

Mt Spokane Unit					
Year	**Bull**	**Cow**	**Calf**	**Total**	**Bull:Cows:Calf**
2002	5	24	16	45	20:100:66
2003	11	25	13	49	44:100:52
2004	46	68	37	151	67:100:54
2005	4	12	6	22	33:100:50
2006	22	30	13	65	73:100:43
2007	26	33	18	77	78:100:54
2008	19	46	15	80	41:100:32
2009	18	41	21	80	43:100:51
2010	21	68	33	122	30:100:48
2011	22	35	13	70	62:100:37
Avg. 2002-11	**19**	**38**	**18**	**76**	**49:100:48**
Hangman Unit					
2002	11	23	8	42	47:100:34
2003	4	9	4	17	44:100:44
2004	18	20	20	58	90:100:100
2005	13	30	11	54	43:100:36
2006	7	14	6	27	50:100:42
2007	7	19	9	35	36:100:47
2008	2	21	14	37	9:100:66
2009	6	27	11	44	22:100:40
2010	6	25	15	46	24:100:60
2011	20	19	7	46	105:100:36
Avg. 2002-11	**14**	**29**	**14**	**59**	**47:100:50**

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 about half of the State (Fig. 1). There is no reliable estimate of statewide cougar abundance. However, cougar population size has been estimated in three project areas in eastern Washington; extrapolation from those projects corresponds to roughly about 1,900 to 2,100 animals (excluding yearlings and kittens) statewide. Population objectives and status

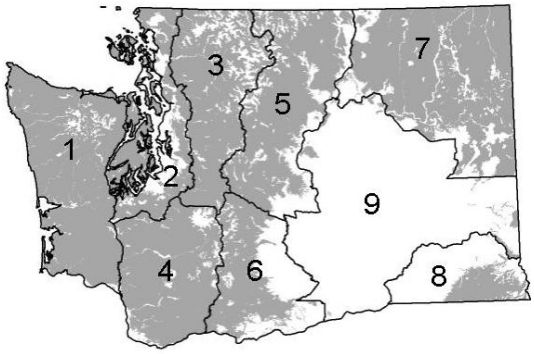

Figure 1. Distribution of cougars (gray) and cougar management units in Washington.

The statewide cougar management goal is to maintain healthy, self-sustaining cougar populations within each cougar management unit (CMU; except CMUs 2 & 9; see 2009 Game Management Plan), while minimizing the number of negative human-cougar interactions.

The methods for assessing cougar populations are improving in Washington, largely due to better scientific data becoming available. The status of cougar populations in Washington are assessed using cougar demographic data from living cougar populations in five study sites. 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 male survival are collected on an opportunistic basis. Washington State University and University of Washington also have provided valuable data on population growth rates from cougar research projects in Washington. These data suggest that cougar populations appear to be stable throughout most of Washington.

Hunting seasons and harvest trends

Hunting seasons have been fairly dynamic in Washington over the past decade. Most of the major changes in hunting seasons have been due to experimental seasons evaluating the use of cougar hunting with the aid of dogs. Since 2000, four separate pieces of legislation allowed for the use of dogs to hunt cougar for potential benefits to public safety and protection of personal property. The issue is very contentions and continues to be debated in the public, legislative, and scientific arenas.

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.

Statewide cougar harvest was 124 animals in 2011, which is below the 10-year average of about 186 (Table 2). The Game Management Plan identifies allowable female harvest guidelines that results in a stable cougar population based on the research findings in Washington. In general, reductions in cougar seasons coincide with areas where harvest trends exceed the female harvest guidelines.

Recent work has demonstrated that heavy hunting can change the age structure of the cougar population, which can then impact the territoriality among adult males. The Department is currently evaluating the need for an adult male harvest guideline for managing hunting seasons.

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 2. Cougar harvest by CMU, WDFW.

CMU	2002	2003	2004	2005	2006	2007	2008	2009	2010
1	15	24	14	18	26	7	18	17	9
2	8	2	13	11	11	12	12	11	6
3	15	3	4	3	7	9	7	6	2
4	12	19	28	25	23	11	16	12	20
5	42	46	52	45	42	64	49	21	41
6	14	20	13	10	13	14	21	16	17
7	90	86	65	75	54	65	41	41	48
8	13	18	14	11	14	9	14	7	15
9	1	4	5	4	10	10	10	11	7
	210	222	208	202	200	201	188	142	165

Table 3. Cougar harvest 2011-2012, WDFW.

		2011-2012																			
CMU	Name	General Hunt				Special Permit				Depredation				Other				Total			
		M	F	U	T	M	F	U	T	M	F	U	T	M	F	U	T	M	F	U	T
1	Coastal	15	2	0	17	0	0	0	0	1	0	0	1	0	1	0	1	16	3	0	19
2	Puget Sound	2	6	0	8	0	0	0	0	0	0	0	0	0	0	0	0	2	6	0	8
3	North Cascades	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	South Cascades	3	6	1	10	2	0	0	2	1	0	1	2	0	0	0	0	6	6	2	14
5	East Cascades North	5	6	1	12	1	0	0	1	1	0	0	1	0	1	0	1	7	7	1	15
6	East Cascades South	5	4	0	9	0	0	0	0	0	0	0	0	0	0	0	0	5	4	0	9
7	Northeastern	11	14	0	25	0	0	0	0	3	0	1	4	1	1	1	3	15	15	2	32
8	Blue Mountains	6	2	1	9	0	0	0	0	0	0	0	0	0	0	0	0	6	2	1	9
9	Columbia Basin	5	7	3	15	0	0	0	0	0	1	0	1	0	0	0	0	5	8	3	16
	TOTALS	52	47	6	105	3	0	0	3	6	1	2	9	1	3	1	5	62	51	9	122

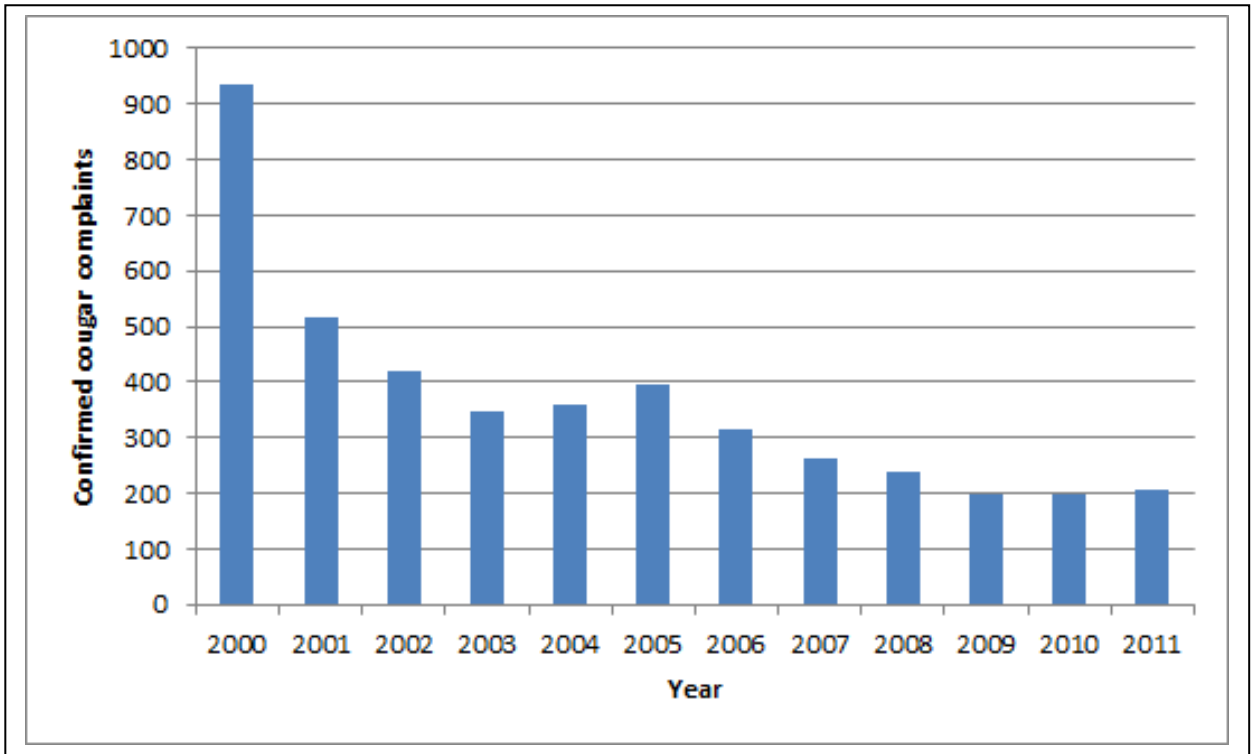

Figure 2. Statewide confirmed cougar complaints, 2000-2011, WDFW.

Black Bear

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 ordinarily 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 4,096 hunters hunted these units in 2011, which was about an 11% increase from 2010. The 2011 spring permit and fall general combined hunter harvest was 324 black bears. This was a decrease from the 353 bears harvested in 2010, and substantially below the seven-year (2001-2007) annual average harvest of 398 black bears. Hunter success in 2011 was 8% (Table 1, Figure 1).

Population status and trend analysis

A programming error in the hunter harvest reporting system resulted in the inability to quantify the number of male versus female black bears in the general fall season for 2011. Within GMUs 101-121 of the Northeastern BBMU, the median age of harvested female black bears in 2011 was only 2.5 years (Table 1, Figure 2). This median age is short of the acceptable limit for female black bears, however, the sample size is low, as only 23 female black bears had tooth samples taken for laboratory aging. The median male age in 2011 was 3.5 years, which is within the acceptable limit for male black bears (Table 1, Figure 2).

Nuisance and damage activity

Black bear incidents (including sightings, nuisance complaints, and depredations) are common in the Northeastern BBMU. Agency staff 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 2011; 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 five years Forest Practice Applications & Approvals were received for treating over 13,000 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 2011 hunting season was the fifth year for a spring permit season on black bears. Permit levels were increased to 145 spring permits, and the permit season was lengthened to run from April 1 through June 15, 2011. The spring harvest was reported to be 16 black bears taken for a success rate of 11%. The percentage of female black bears in the harvest cannot be determined for 2011. The median age of hunter-harvested female black bears is not within management guidelines.

Hunters have unlawfully killed at least 3 grizzly bears by mistaken bear identity within the last 14 years. A voluntary bear identification and certification program has recently been developed to help reduce the possibility of incidental take while black bear hunting. The WDFW and U.S. Forest Service also continues 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.

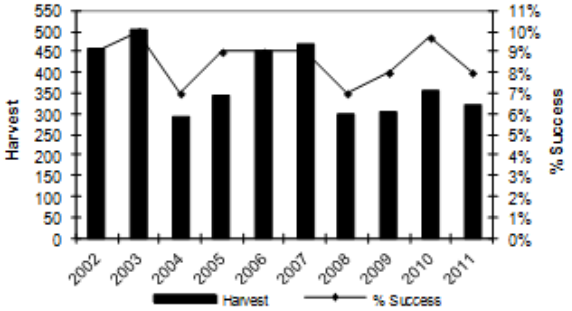

Figure 1. Total harvest and % hunter success within GMUs 101-121, BBMU 7.

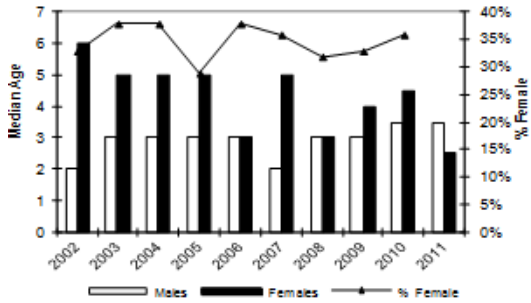

Figure 2. Median ages of harvested bears and % females in the harvest. BBMU 7.

Table 1. Black bear harvest, hunter effort, and median age, Northeastern Black Bear Management Unit, GMUs 101-121, 2001-2011.

						General Season		Median Age		
Year	Male	Female	Total	# of Hunters	Success	Hunter Days	Days per kill	Males	Females	% Females
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	9%	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	285	3,786	8%	23,133	86	3.0	4.0	33%
2010	227	126	353	3,643	10%	21,331	63	3.5	4.5	36%
2011	na*	na	324	4,096	8%	25,949	80	3.5	2.5	na

*na = information unavailable

BLACK BEAR STATUS AND TREND REPORT: REGION 1
BLUE MOUNTAINS BLACK BEAR MANAGEMENT UNIT (BBMU 8)

Paul Wik, District Wildlife Biologist
Mark Vekasy, Assistant District Wildlife Biologist

Population objectives and guidelines
The black bear population in the Blue Mountains BBMU is managed to provide maximum recreational opportunity, while maintaining a healthy bear population and minimizing conflicts with the public and other resource management objectives. 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%. Currently, the black bear population in the Blue Mountains appears 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 the Black Bear Management Unit 8 (BBMU-8). The general season runs from 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 115 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 2002-2011, 1225 permits have been issued with 701 hunters participating in the hunt. Hunters averaged 31% success, harvesting 207 bears; 124 males, and 67 females (2011 excluded due to data errors). Hunters during the spring of 2011 had a success rate of 15%, harvesting of 16 bears; sexes unknown (Table 2).

Harvest data from 2011 does not include the sex of harvested animals due to a data collection error. Hunter success during the 2011 fall general season was 5%, with a harvest of 66 bears (sexes unknown). The 2010 general season bear harvest decreased slightly over the 2010 harvest, but is still very close to the 2002-2011 average harvest of 78 bears/year. The combined harvest for the 2011 spring/fall seasons was 82 bears.

The bear harvest in the Blue Mountains has remained fairly stable over the last 10 years, ranging from 74 - 165 bears during this period, with an average of 105 bears/year (Table 3.). The percentage of females in the harvest varies from year to year, averaging 35% over the 10 year period.

Nuisance and damage
The number of bear complaints received has remained relatively low during 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. It is unknown whether this activity will have a measurable effect on the bear populations.

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 2002-2011, Blue Mountains Washington

GENERAL SEASON HARVEST								Days/	Median Age	
YEAR	Male	Female	Total	% Female	Htrs	Htr Succ	Htr Days	Kill	Male	Female
2002	86	49	135	0.36	1,478	0.09	9,026	67	5.0	5.5
2003	57	41	98	0.42	1,312	0.07	8,582	88	5.5	4.5
2004	49	29	78	0.37	1,292	0.06	7,989	102	5.5	8.5
2005	43	18	61	0.30	1,128	0.05	7,108	117	3.5	4.5
2006	65	26	91	0.29	1,175	0.08	6,793	75	4.0	3.5
2007	53	20	73	0.27	1,386	0.05	8,066	110	4.0	6.0
2008	52	24	76	0.32	1,502	0.05	9,017	119	3.8	8.6
2009	51	29	80	0.36	1,419	0.06	8,828	110	6.2	6.4
2010	53	36	89	0.40	1,473	0.06	9,191	103	5.0	6.9
2011	NA	NA	66	NA	1,322	0.05	8,103	123	NA	NA
10-yr Avg	**50.9**	**27.2**	**78.1**	**0.35**	**1217**	**0.06**	**7,460**	**96**	**4.7**	**6.0**

Table 2. Spring bear hunt summary 2002-2011, Blue Mountains, Washington

PERMIT HISTORY								App's Rec	% Htrs.	Median Age	
Year	Permits	Htrs.	Male	Females	Total	Htr. Succ.	% Females		Hunted	Male	Female
2002	106	72	18	12	30	42%	40%	562	68%		
2003	105	57	13	2	15	26%	13%	626	54%		
2004	105	72	9	5	14	19%	36%	825	69%		
2005	105	57	10	3	13	23%	23%		56%		
2006	105	33	13	4	17	52%	24%				
2007	155	69	17	12	29	42%	41%				
2008	155	81	16	12	28	35%	43%			4.8	3.0
2009	155	81	17	11	28	35%	39%	2586	63%	4.5	9.7
2010	115	75	11	6	17	23%	35%		65%	3.7	4.0
2011	119	104	NA	NA	16	15%	NA		87%	NA	NA
10-yr Avg			13.8	7.4	20.7	31%	33%				

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
Management goals for black bears in the East Cascades Black Bear Management Unit (BBMU 6) are to ensure healthy populations, provide for multiple use and hunting opportunity under sustained yield management, minimize human-bear conflicts and better understand the role of black bears in predator prey systems. Recreational hunting is the major source of mortality within hunted populations. Current guidelines direct management based on parameters of the harvest. Under an acceptable harvest management condition, the female portion of the total harvest ranges between 35% and 39%, a median age of the female harvest $\geq$6 years old, and median age of the male harvest $\geq$5 years old.

Hunting seasons and harvest trends
The East Cascades BBMU offers a general hunting season, with any legal weapon (modern firearm, archery, muzzleloader), from August through mid-November. There are no permit hunts and the use of hounds remains prohibited.

Harvest and hunter parameters have remained stable over the last decade. Hunter success has ranged from 3.3 to 5.8%, and averaged 4.5% over the last decade. In 2011, hunter success was 4.7%, about the 10-year average (Table 1). Hunter numbers and hunter days have been stable to slightly decreasing over the last 10 years. In 2011, 4,318 hunters spend 29,230 days hunting, both are below the 10-year average.

The harvest of black bears in BBMU 6 ranged between 146 and 277, from 2001 to 2011, averaging 208 (Table 1). In 2011, 205 black bears were harvested, approximating the 10-year average. Over the same time period, median age of harvested females was 7 years old, compared to only 4 years old for harvested males. The average female harvest over the last decade has been 34%, well within the desirable harvest guidelines. Both sex and age composition of the harvest is within the acceptable and desirable harvest objectives. Due to problems with the harvest reporting, there is no sex data for the 2011 harvest; however, BBMU 6 has consistently been within guidelines on female harvest. There is no information that suggests a deviation from this pattern.

Fluctuations in the harvest record and hunter success can be attributed to variations in the berry production. Poor berry and other mast crops force bears to travel more and into lower elevations for food, thereby making them more vulnerable to harvest.

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 34% 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 have increased over historical levels. Most of the bear nuisance complaints involve garbage, bird feeders and/or pet food at residences in the Leavenworth and Lake Wenatchee areas. Much of the recent development is of summer or weekend residences where garbage, bird feeders, and pet food are left unattended for extended time periods. Complaints have resulted in numerous bears being relocated or euthanized, however, the cause lies with people providing attractants, not with an increasing black bear population. Efforts to increase the public's awareness of garbage, pet food and bird feeders as attractants to bears are being expanded and ongoing.

Habitat condition and trend
Large sections of BBMU 6 are in remote wilderness areas where little human habitat alterations occur. Forest management has not changed significantly in recent years and provides abundant quality habitat. Black bears rely on berries and other soft mast production as a staple food source, but the quality and quantity of these food sources varies yearly with climate conditions. Mast production is not surveyed in BBMU 6.

Development and recreation in the suburban-wildland interface continues to expand, and reducing the availability of lower elevation black bear habitat.

This expansion also increases opportunities for bear-human conflicts.

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 1. Black bear harvest statistics and hunter information for BBMU 6, 2001-2011.

GMU's 244-247, 249-251, 328-368, 382, 388, 578.

Year	No. males	No. females	Total	No. hunters	% success	Hunter days	Median Age		% females in harvest
							Males	Females	
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	2.5	4.5	35
2009	102	58	160	4,842	3.3	31,794	4.5	4.5	36
2010	176	99	275	4,669	5.8	30,686	4	5	36
2011	N/A	N/A	205	4,318	4.7	29,230	N/A	N/A	N/A
Avg.	**136**	**72**	**208**	**4,869**	**4.5**	**34,906**	**3.9**	**6.8**	**34**

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 2011 black bear season in the Okanogan BBMU occurred between August 13-November 15. Hunters had variable conditions during the general season due to spotty and delayed berry production. Both hunter success and hunter numbers decreased in 2011 to 7% and 1,385 respectfully. Hunter numbers are below the 10-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.

An ongoing research project is currently using bear hair-snag techniques to investigate black bear movement and distribution in relation to highways in the North Cascades. This DNA sample collection approach holds promise as a long-term population monitoring tool for this species. An effort to test this methodology in select areas of the state including the Okanogan Unit may begin next year.

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. We did not receive information on the sex of individuals harvested in 2011 due to an error in the harvest reporting system; however for 2010, the female percentage of the total harvest decreased to 30%, which is within acceptable harvest guidelines. After 2007, no data on the median age of harvested animals has been available; 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 stayed this low in the following 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 decreased in 2011 due to a higher abundance of natural forage compared to 2010.

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.

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 has remained fairly stable for several years and bear populations appear to be fairly stable as well, although data to support this assumption is limited. Harvest decreased in 2011, falling below the average for the past 10-years. Population parameter declines of harvested animals in the past suggest obtaining age data from harvested animals is important to assess the effects of hunting pressure, particularly in the absence of survey information; however, for this data to be meaningful, hunter compliance with tooth submittal for aging must be improved to generate larger samples.

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%
2010	93	40	133	1,574	8%	9,569	72	n/a	n/a	30%
2011	n/a	n/a	92	1,385	7%	8,160	89	n/a	n/a	n/a

BEAR STATUS AND TREND REPORT: REGION 4
BMU 3, NORTH CASCADES BLACK BEAR MANAGEMENT UNIT

RUTH L. MILNER, District 13 Wildlife Biologist

Population objectives and guidelines

Black Bear Management Unit (BMU) 3 is comprised of Game Management Units 418, 426, 437, 448, 450, and 460. The population objective for Black Bear in the North Cascades BMU is to maintain healthy bear populations, which are capable of sustaining a recreational hunt, while minimizing damage complaints from timber owners and nuisance complaints from suburban homeowners.

Hunting seasons and harvest trends

The 2011 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. Unusually wet and cool spring weather likely favorably influenced the availability of plant foods for bears late in the season; however a very late snow pack might have kept bears at lower elevations early in the season.

The number of general season bear hunters hunting in BMU 3 remained about the same in 2011 compared to 2010. However harvest was lower in 2011 compared to the previous year. The total 2011 general season harvest was 213 bears, with a 10% hunter success rate compared to 276 bears in 2010 and a 12% success rate (Table 1). The 2011 harvest equalled the 10 year average of 212 bears.

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. Sex and age data for bears taken during the 2011 general season harvest are not available.

To help alleviate bear damage in some locations, a spring permit hunt was initiated in 2008 in BMU3. In spring 2011, 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). Thirteen hunters reported hunting the Monroe unit and harvested one male bear. Fourteen hunters reported hunting the North Skagit unit and harvested one male bear.

The 2010-2011 big Game harvest Report for the Western Washington Treaty Tribes indicates three males, one female and one bear of unknown sex were harvested.

Nuisance and damage activity

Sixty-one depredation permits were issued to industrial timberland owners concerned about tree damage in 2011, with a total of 13 bears taken of which 7 were male, 4 were female.

The number of problem bears seen along the urban-rural interface continued in all three counties contained within BMU 3. WDFW staff engaged in ongoing efforts to educate the people living along the suburban/rural landscape interface, advising them to secure garbage, bird feeders, 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. Despite these efforts, enforcement personnel continue to capture and relocate, or euthanize problem bears in BMU 3.

Habitat condition and trend

Human populations in BMU 3 are expected to increase in the coming years and continued habitat loss is the expected result. Although the push for development along the rural/suburban interface has slowed in recent years, conversion of wildlands to housing still continues. 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 BMU 3 decreased in 2011 over the previous year. The combined total of bears killed in damage hunts, permit hunts and the general

season was 226 animals. Median age data are not available for 2011.

Table 1. General Season Harvest Data for BMU 3, North Cascades, 2001-2011

Year	male	female	total harvest	# hunters	% hunter success	% female
2001	102	47	149	2147	7	46
2002	119	68	187	2083	9	57
2003	105	64	169	1660	10	38
2004	176	70	246	1626	15	28
2005	87	34	121	1465	8	28
2006	110	63	173	1662	10	36
2007	153	44	197	1922	10	29
2008	254	162	416	2443	17	39
2009	100	32	132	1897	7	24
2010	169	98	267	2224	12	37
2011	NA	NA	213	2217	10	NA

2012 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 human/black bear 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 2011, hunter success for the general black bear season in the BBMU 4 was 0.04% and follows the typical harves rate for hunters in this BMU. Hunter success in BBMU 4 is typically lower than the majority of other bear management units in Washington. The 2011 general season black bear harvest in BBMU 4 was 182 animals, a decrease from 2010 levels and lower than the 10 year average (206) (Table 1).

Depredation Season

In addition to general season hunting, black bear depredation permits continued to be issued to commercial forest landowners during the spring of 2012 to mitigate timber damage. Final results from hunter harvest on private forest lands have not been summarized at this time. The 2012 Spring season resulted in approximately 217 permits, which is down from 281 in 2011 (the lowest since 2004). Early reports indicate that there was a larger female harvest this year than normal.

A spring black bear special permit hunt was conducted in the Lincoln Unit of Lewis County in 2011 and 2012. For spring 2011, a total of 10 bears were harvested with a 0.24 hunter success rate. This was an increase from the 2010 harvest of 6 bears. This hunt was created as an alternative to depredation permits.

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 is being monitored. Continued effort should be made to document the sex for all harvested bears associated with depredation. Further consideration is being made to address these issues with special permit spring hunts in select areas. This will assist in our efforts to evaluate management goals and objectives for bear management in this bear management unit.

Population Status and Trend Analysis

There was a decrease in the 2011 general season bear harvest (182) from the previous year (238). The 2011 harvest was lower than the 10 year average in the South Cascades Bear Management Unit. In 2011, the median ages of the female harvest was 3.5 which does not meet management goals for BBMU 4 (>5). Harvest of male black bears (3.5) did meet median age objectives in 2011 (>2). No information was available for male/female harvest percentages.

Surveys

No bear surveys were conducted in BBMU 4 in 2011. Bear surveys are generally not conducted each year as they are difficult and costly.

Nuisance and Damage

WDFW Enforcement Program responded to bear nuisance and damage complaints made by the general public in 2011. A totalof 56 public contacts were made (Clark: 37, Cowlitz: 24, and Lewis: 32) and 2 bears were relocated (Clark: 1, Lewis: 1). No kill permits were issued in 2011 in Region 5. All bear issues, outside of the commercial forest program, were resolved by WDFW Enforcement Agents by working with landowners to reduce bear attractants (i.e. garbage).

In BBMU 4, the majority of human/bear interactions are reported in Clark, Cowlitz, and Lewis counties. Many reports from the public are of bear sightings in forest habitats on state and federal lands. These do not typically require a follow-up investigation.

Industrial and private timberland owners continue to address bear damage through the issuance of

depredation permits. There is a need to further evaluate the issuing of bear depredation permits where timber damage is either not verified and/or where harvest of bears is not effective. In addition, many of these industrial timber companies continue to administer feeding programs to reduce spring bear damage to young trees. This practice continues in BBMU 4, but has been reduced recently due to the cost of the program to private landowners. Little information exists on the impact of bear feeding and local bear populations.

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 has declined over the past 20 years and will remain moderate on the Gifford Pinchot National Forest for the foreseeable future. Timber harvest on Washington State Department of Natural Resources (DNR) lands in this unit has been steady, while industrial timber harvest over the past year has been heavy due to high timber prices. Bear damage continues to be an issue on industrial timberlands and reports of seed orchard damage was reported on USFS lands. 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 human/bear interactions will likely continue. Public education continues to be an important tool for reducing human/bear interactions, especially in suburban and rural residential areas.

Management Conclusions

The primary concern in black bear harvest at this time for BBMU 4 continues to be the median harvest age of female bears (>5.0) in the population. Management objectives for female harvest has been a concern for several years and changes in the season length were made to attempt to improve this issue.

Male harvest objectives, as determined by age class data, were met as per the current bear population 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 hunts. 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, 2001-2011.

Year	Male	Female	Total	Success	Hunters	Days Hunted	Days/Kill
2011	n/a	n/a	182	0.04	4104	30650	168
2010	143	95	238	0.05	4734	35008	147
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

Table 2. Median age of black bear harvested in the South Cascades Black Bear Management Unit, 2001-2011.

Year	Male	Sample	Female	Sample	Sexes Combined	Sample
2011	3.5	20	3.5	12	3.5	32
2010	3.0	47	3.0	25	3.0	72
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

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 (general season hunts), reduce timber damage (permit season dog hunts), and black bear/human interactions. Black bear population levels are monitored using hunter harvest data such as median harvest age by 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. Median age of males harvested from 2001 through 2011 was 3.5. Median age data collected from females was 4.5 years (Table 1).

Table1. Median age of harvested bears by sex and percent of females in harvest from 2001-2011.

	Median Age		
Year	Male	Female	% Females
2001	3.5	5.5	35
2002	3.5	4.5	34
2003	3.5	4.5	34
2004	3.5	5.5	32
2005	3.0	4.0	29
2006	3.0	4.0	32
2007	4.0	4.0	30
2008	5.0	4.0	32
2009	3.0	5.0	34
2010	4.0	*	33
2011	4.0	*	N/A

* Data not available.

Percent females in harvest average was 32.5 during ten years (2001- 2010). No formal statewide bear surveys are conducted in Washington. However, in Region 6, a demographic research project has been conducted in Capitol Forest since 2004 (see below).

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 recreational black bear harvest from general season for the coastal region in 2011 was 277, 17% lower than 2010 (Table 2).

Table 2. Coastal BBMU1 bear harvest summary 2001-2011.

Year	Male	Female	Total	Days/ Kill	Hunter Success
2011	Unk.	Unk.	277	120	7%
2010	223	109	332	113	8%
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%

For 2011 harvest data by sex was not available. Hunter success remained relatively the same during the 2011 season from 8% to 7% (Table 1). How tribal harvest from the 9 tribes within BBMU 1 influences these statistics is unknown.

The 2011 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 8 bears (5 male and 3 female) were taken. Information on spring bear harvest on the Quinault Indian Nation is not given.

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. At the time of this report, no harvest information on the number of bears taken during damage hunts from 2011 was available.

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 3). On average 95 trap nights per bear visit was recorded.

Table 3. Summary of black bear trap effort in Capitol Forest, Washington, 2004-2011, WDFW.

Year	# Traps	Total Trap Nights	# Bear Captures	# Trap Nights/ Bear Capture
2004	12	33	1[a]	33
2005	21	164	0	NA
2006	67	562	2 (2F)	281
2007	66	669	8 (3F, 5M)b	84
2008	46	477	4 (2F, 2M)b	119
2009	47	443	8 (5F, 3M)	55
2010	30	277	5 (3F,2M)	55
2011	69	617	6 (3F, 3M)b	103

Total
[a] Bear was poached in trap
b includes 1 recapture

We captured and radio-equipped a total of 31 individual bears (17 female, 13 male, 1 unknown) 34 times using 358 trapsets and accumulating 3,166 trap nights. Approximately 57% of the females captured were adults and 43% were subadults. 62% of males captured were adults (>3yrs) and 38% were subadults (1-4yrs).

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 4). This trend continued into 2011.

Table 4. Black bear harvest, by sex, in GMU 663, Capitol Forest, 2000-2011, WDFW.

	Spring Hunt Season		Fall Hunt Season		
Year	Male	Female	Male	Female	Total
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
2010	0	0	9	9	18
2011	0	0	Unk.	Unk.	9

All documented mortality has been attributed to hunting season (5 female and 6 male). A total of 18 bears have been censored (dropped radio or lost contact); 4 bears (3 females and 1 male) dropped radiocollars as designed (rotted spacers), 5 bears pulled their collars off, and 9 collars stopped transmitting with unknown fates.

We calculated mean annual survival rates of 0.56 (SE =0.01) for females and 0.59 (SE=0.02) for males in the Capitol Forest. These survival estimates are lower than those reported in 3 other areas in Washington

(Koehler and Pierce 2005). Spring permit seasons were absent during this study.

Black bear home ranges in Capitol Forest using 95% fixed kernel method was 37.2km^2 (± 45.6) for females and 112.6 (±72.7) for males, respectively. Home ranges documented from this study were similar to those found by Koehler and Pierce (2003). We did not document any collared bears dispersing and had no home ranges completely span the highway or valley bottoms surrounding the forest.

Management conclusions

The coastal BBMU has ample secure habitat for bears and a defacto bear reserve (Olympic 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 database that takes into account harvest from all sources (i.e., general seasons, permit seasons, and spring tree damage depredation take).

Washington hunters are required to provide a hunting report at the end of the season to document hours spent hunting, GMU hunted, and success. Submission of a tooth for age analysis is voluntary and averages 56%. Because age information is the primary criteria used to indicate population status, monitoring of age could be more effective with a mandatory reporting system similar to that of cougar.

Research to assess the impacts of changes in harvest on a population should begin with several years of baseline information on density and population status before the change is implemented. Our capture success was directly impacted by the amount of harvest of bears in the forest. Our survival rates in the Capitol Forest were lower than others documented in the state and could be a result of the additional harvest from spring permit seasons during the study.

Future black bear research should also address bear densities and how they differ across Washington and under changing habitat conditions. Our research in the Capitol Forest highlights the need to reassess statewide bear density estimates and resist using standardized densities that may not be realistic.

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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 in 1994 established a population objective for band-tailed pigeons in Washington based on the WDFW call-count survey (PFC 1994). Since that time, PFC has revised the population objective and established closure thresholds based on a new mineral site survey (PFC 2010). Population objectives for mourning doves are being developed as part of the national mourning dove harvest strategy.

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). The WDFW call-count survey was discontinued after 2003, but is presented in this report for comparison to the mineral site survey.

Band-tailed pigeon mineral site survey

In 2001, USGS-BRD (California Science Center) received a grant from USFWS to design a population index survey for use throughout the range of the Pacific Coast population of band-tailed pigeons. USGS conducted mineral site surveys at 8 western Washington locations in 2001-03 (Overton and Casazza 2004). These included two in Region 4 (Oyster Creek - 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). 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. 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). Since 2004, the site list has been modified due to access restrictions or other changes in status. Cooperators from WDFW and USFWS completed 16 surveys during the July 10-20, 2012 survey period.

Mourning dove call-count survey

The mourning dove survey was completed between May 20-31, 2012 following USFWS (2011) 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 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 reminders are sent out following the deadline. Responses from the reminders 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, 2011.

Mourning dove harvest estimation

Mourning dove harvest was estimated as part of the statewide hunter survey conducted by WDFW (WDFW 2012).

Results

Band-tailed pigeon call-count survey

Past call-count survey results are presented in Table 1 and Figure 1.

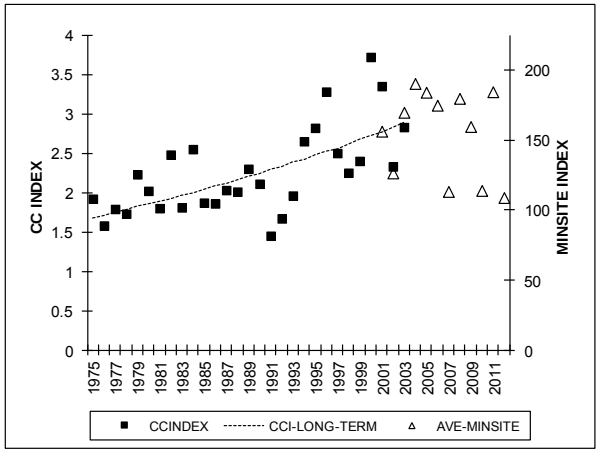

Figure 1. Band-tailed pigeon call-count results and mineral site raw data summaries.

Band-tailed pigeon mineral site survey

Mineral site survey raw data summaries are presented in Table 2 and Figure 1. Complete 2011 survey results are available through USFWS (2012), but the 2012 analysis will not be available until 2013.

Mourning dove call-count survey

Mourning dove survey results are presented in the USFWS mourning dove report (USFWS 2012).

Band-tailed pigeon harvest

Harvest and hunter activity for the 2002-2011 seasons are summarized in Figures 2-3 and Table 3.

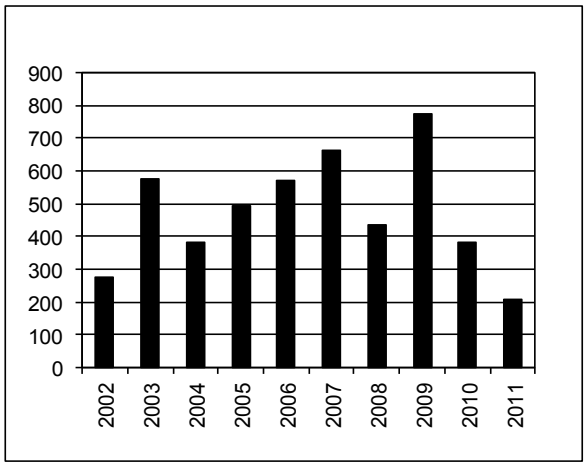

Figure 2. Band-tailed pigeon harvest.

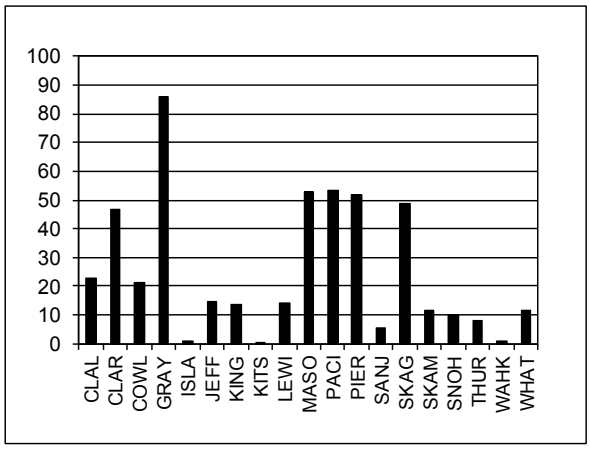

Figure 3. Band-tailed pigeon 2002-2010 average annual harvest by county.

Mourning dove harvest

As measured by WDFW surveys, harvest in 2011 was estimated at 53,264 doves, up 1% from 2010 (Figure 4). Hunter numbers were estimated at 4,115, down 2% from 2010. Number of days hunted was 12,681, down 7% from 2010.

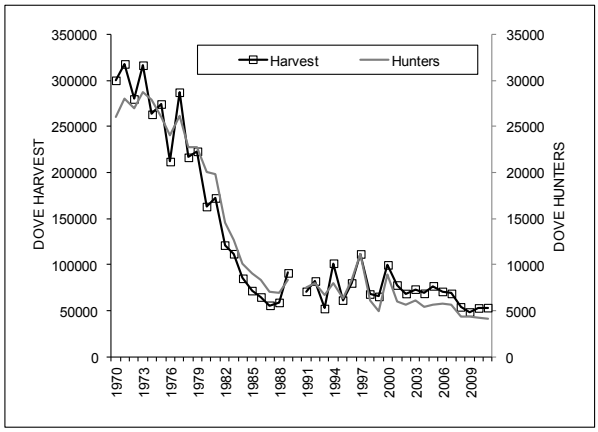

Figure 4. Mourning dove harvest and hunter numbers.

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 for WA consistent with the PFC management plan (PFC 2010). The mineral site survey raw data summary indicated that 2012 was the lowest average index since the mineral site survey was initiated in 2004.

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

Start Year	End Year	Change	Lower 90% CI	Upper 90% CI	Routes Used	Sig. level
1975	1992	-7.8%	-14.0%	-2.0%	63	p<0.05
1991	1992	10.1%	-50.0%	75.0%	11	n.s.
1975	1993	-6.0%	-11.0%	-1.0%	65	p<0.05
1992	1993	44.0%	-49.0%	152.0%	13	n.s.
1975	1994	-3.4%	-8.2%	1.4%	69	n.s.
1993	1994	71.0%	1.4%	141.0%	24	p<0.05
1975	1995	-2.7%	-9.8%	4.5%	70	n.s.
1994	1995	12.1%	-31.3%	55.3%	12	n.s.
1975	1996	-0.8%	-6.5%	4.9%	59	n.s.
1992	1996	24.3%	10.4%	38.2%	30	p<0.01
1995	1996	36.4%	-35.9%	108.7%	18	n.s.
1975	1997	-0.8%	-6.0%	4.3%	62	n.s
1993	1997	8.9%	0.2%	17.6%	32	p<0.10
1996	1997	-14.3%	-35.4%	6.7%	18	n.s.
1975	1998	-1.5%	-5.5%	2.4%	65	n.s.
1994	1998	2.1%	-8.7%	13.0%	34	n.s.
1997	1998	-11.0%	-45.8%	23.9%	11	n.s.
1975	1999	-0.1%	-4.1%	3.8%	67	n.s.
1995	1999	-3.3%	-11.5%	4.9%	38	n.s.
1998	1999	26.7%	-19.7%	73.1%	14	n.s.
1975	2000	-0.3%	-6.2%	5.5%	70	n.s.
1996	2000	5.9%	-2.3%	14.1%	41	n.s.
1999	2000	21.1%	-12.5%	54.8%	24	n.s.
1975	2001	1.7%	-2.3%	5.7%	70	n.s.
1997	2001	15.8%	8.0%	23.6%	44	p<0.01
2000	2001	1.8%	-16.6%	20.2%	36	n.s.
1975	2002	0.7%	-3.7%	5.0%	71	n.s.
1998	2002	9.4%	2.6%	16.2%	45	P<0.05
2001	2002	0.9%	-27.5%	25.8%	32	n.s.
1975	2003	1.8%	-1.7%	5.4%	71	n.s.
1999	2003	0.6%	-4.8%	5.9%	48	n.s.
2002	2003	5.2%	-30.5%	40.8%	25	n.s.

Table 2. WDFW band-tail pigeon mineral site survey – raw data summary.

SITE	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Altoona				64	0	5	0					
Cedar Cr.	328	215	157	215	185	231	191	312	163	154		142
L. Cavenaugh - Pefley				108	172	76	71	117	70	89	113	146
Lilliwaup	60	77	108	199	143	273	141	89	110	123	167	74
McAllister	82	118	174	124	174	87	25	136	46	134	107	102
Mud Bay	164	154	222	134	371	294	95	203	130	70	175	87
Oyster Cr. – Pigeon Pt.	362		455	474	542	293	157	331	314	190	344	121
Newaukum				634	167	335	309	219				
Potlatch	135	147	90	297	285	306	168	295	480	129	297	288
Red Salmon	52	103	121	179	103	64	33	107	41		0	47
Soda Springs												58
St. Martins				220	128	191	189	141	210	214	439	180
Sumas	67	71	31	46		68					78	17
U. Kalama				110	225	327	120	350	317	111	368	258
Totten -Oyster Bay										119	53	101
Warm Beach				48	58	62	83	36	29	29	72	10
Willapa				3	24	10	3	0	5	5		2
Mean	156	126	170	190	184	175	113	180	159	114	184	109

Table 3: WDFW band-tailed pigeon harvest report summary.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2002-11 AVE.
# PERMITS ISSUED	522	657	766	809	909	894	917	567	632	178	685
TOTAL DAYS (SUCCESSFUL)	357	337	209	382	315	364	247	548	362	151	327
TOTAL HARVEST	273	574	383	492	569	661	434	776	381	205	475
HARVEST BY COUNTY											
CLAL	37	35	14	25	35	37	5	0	39	0	23
CLAR	29	45	29	35	60	51	56	94	18	48	47
COWL	28	54	4	2	3	32	24	39	12	18	22
GRAY	47	53	104	76	71	145	103	129	83	47	86
ISLA	0	0	0	0	9	0	0	0	0	0	1
JEFF	10	16	31	26	14	29	6	4	6	3	14
KING	4	23	13	6	11	14	9	43	12	0	14
KITS	0	1	0	0	0	0	0	0	0	1	0
LEWI	7	13	11	34	5	22	13	19	15	0	14
MASO	26	38	48	62	63	84	59	126	19	2	53
PACI	13	21	37	35	73	80	82	136	56	1	53
PIER	20	82	30	62	85	63	32	85	43	14	52
SANJ	0	0	12	0	0	0	0	0	0	45	6
SKAG	33	99	15	97	74	65	31	30	42	3	49
SKAM	5	16	0	10	16	21	11	27	7	3	12
SNOH	15	29	3	12	11	3	4	4	10	13	10
THUR	0	13	8	2	24	10	0	5	13	7	8
WAHK	0	0	0	0	0	0	0	7	0	0	1
WHAT	0	34	24	6	14	4	0	28	6	0	12

Waterfowl

WATERFOWL STATUS AND TREND REPORT: STATEWIDE
Breeding Populations and Production

DON KRAEGE, Waterfowl Section Manager

Introduction

This report summarizes waterfowl productivity data collected during 2012 in Washington State, including information on breeding waterfowl populations, duck broods, and goose nest surveys. Washington Department of Fish and Wildlife (WDFW), U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service (USFWS), Yakama Indian Nation, Colville Confederated Tribes, Washington Waterfowl Association, and Chelan County Public Utility District contributed data.

Duck Breeding Population Survey

Methods

Past surveys to estimate breeding duck populations in eastern Washington were conducted annually within seven strata in eastern Washington: West Okanogan Potholes, Omak-Douglas Potholes, Far East Potholes, Northeast, and Palouse Streams, Columbia Basin Irrigated, and Yakima Valley Irrigated (Fig. 1). Surveys were conducted by ground counts of transects or sections, except helicopter counts were used for the 1/4-sections in the Desert Wildlife Area (Frenchman and Winchester Wasteways) within the Columbia Basin Irrigated strata (Fig. 1). Samples were multiplied by weighting factors to provide an index to the total number of breeding ducks and coots within the defined areas (Tables 1-3). Weighting factors were determined from the proportion of areas within the strata that were sampled. Observations were treated as complete counts within sampling units (transects or quadrats) with no corrections for visibility bias.

Due to concerns about design of past surveys (lack of random sample selection and variance estimates), WDFW began the process of redesigning the eastern Washington waterfowl breeding population survey in 2008, in conjunction with staff from the Pacific Flyway office in Portland, OR and the USFWS Branch of Population and Habitat Assessment in Laurel, MD. The new design consists of randomly selected ¼ mile helicopter transects to replace the past survey design. 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. The new and old survey designs were run concurrently for three years (2009-11), and the old design was discontinued after the 2011 survey. The new survey design includes the Irrigated, Potholes, and Northeast Highlands strata, and was modified in 2012 to address continued safety and efficiency concerns for the Northeast Highlands stratum (Fig. 2). In 2012, transects in this stratum were placed at 10 mile intervals on an east-west orientation across major river valleys. In addition, minor boundary adjustments were made to other stratum boundaries, including elimination of Saddle Mountain from the Irrigated stratum. Overall, in eastern Washington, observers surveyed approximately 1,089 transect miles over a 6 day period between May 7 – 14, 2012.

Beginning in 2010, line-transect surveys, similar to the new eastern Washington survey, were developed and flown for the new western Washington breeding waterfowl population survey (Fig. 3). Observers surveyed approximately 638 transect miles between April 26 – May 1, 2012, similar to the 2011 effort.

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

Total breeding duck counts numbered 109,418 (SE 10,336) within 3 eastern Washington strata (Table 4). Total mallards numbered 56,724 (SE 7,018). Gadwall was the second most numerous species on the survey (13,902), followed by redhead (7,240), ruddy duck (5,709), and cinnamon teal (5,306) (Fig. 4).

The Potholes stratum comprised 51% of the total duck count in 2012, followed by the Irrigated stratum (35%) and the Highlands stratum (14%). Compared to the 2011 survey, 2012 total breeding duck counts increased 54% in eastern Washington (Fig. 5, Table 4).

The revised survey design for western Washington estimated the total duck breeding population at 63,302 SE 6,547). Mallards numbered 34,464 (SE 5,373),

followed by ring-necked duck (7,325, SE 2,093) (Fig. 6, Table 5). The South Puget Lowlands stratum held the majority of breeding ducks in 2012 (39%), followed by the North Puget Lowlands (26%), Chehalis River Valley (16%), Hood Canal (11%), and Dungeness (7%) (Fig. 7, Table 5).

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. 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.

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 2012 duck brood production survey index for the Potholes, Palouse, and Northeast strata was up 4% from 2011 and 37% below the long-term for all combined duck species (Fig. 8, Table 6). Brood production increased in the Northeast and Palouse strata over the previous year. Other strata were lower than last year. (Table 7).

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 8). Surveys are conducted annually, biennially, or periodically. Total number of goose nest attempts is used as an index of the goose breeding population. Goose nest surveys are focused on areas with high densities of nesting geese. Some areas with relatively recent goose population expansions are not surveyed. Total geese observed during historic and new aerial breeding duck surveys also provide an index to the goose population in these areas not surveyed by the nest searches.

Results

The 2012 goose nest index was unchanged statewide compared to last year and the 1974-11 average. The eastern Washington index was also unchanged compared to last year, but was up 11% from the 1974-11 average (Fig. 9, Table 9). The lower Columbia stratum was down 1% from 2011 but up 2% over the long-term average (Fig. 10, Table 9). Nine out of 21 surveys were conducted according to the variable survey schedule. All strata in the state are above their long-term averages (1974-11), with the exception of the Upper Columbia stratum, which began a steep decline starting in 2003 (Fig. 11, Table 9).

The number of geese observed during the breeding duck surveys is presented in Fig. 12, Table 9). This index provides information about the expansion of Canada geese into areas of Washington outside of our traditional goose nest index areas, and shows an increasing trend over the long term.

Potential Improvements to Waterfowl Breeding and Production Surveys

- Compare new duck survey results with traditional survey results during concurrent years to project long-term trends.
- Evaluate the duck productivity and goose nest surveys for accuracy, frequency, and completeness of surveys.
- Evaluate ways to combine goose nest surveys and aerial surveys into a more representative goose breeding population index survey.

Fig. 1. Breeding duck surveys in eastern Washington.

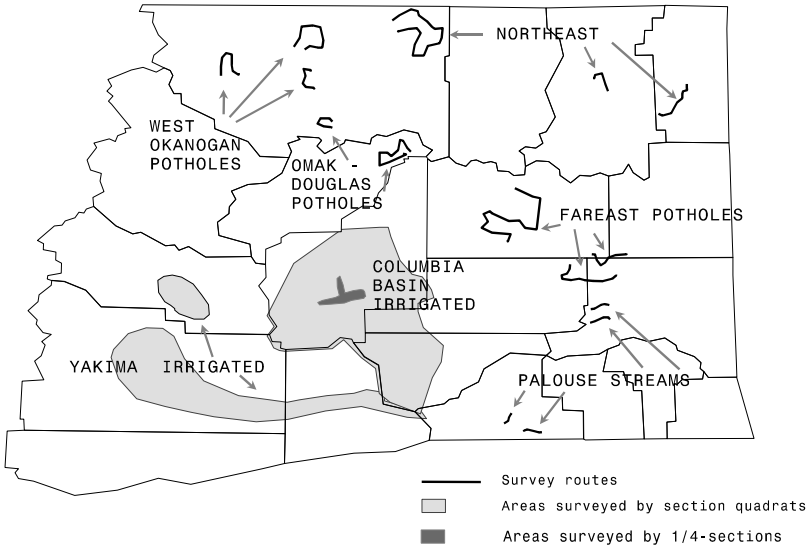


Figure 2. Eastern Washington aerial breeding waterfowl survey transects flown in 2012.

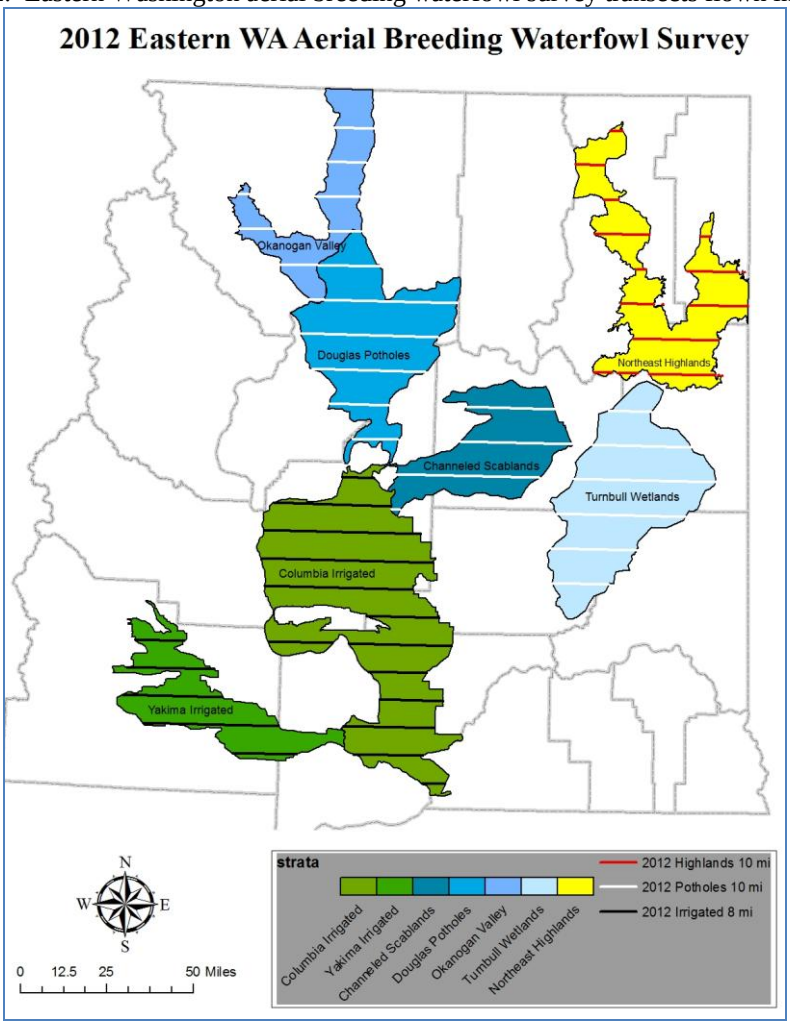


Figure 3. Western Washington aerial breeding waterfowl survey transects flown in 2012.

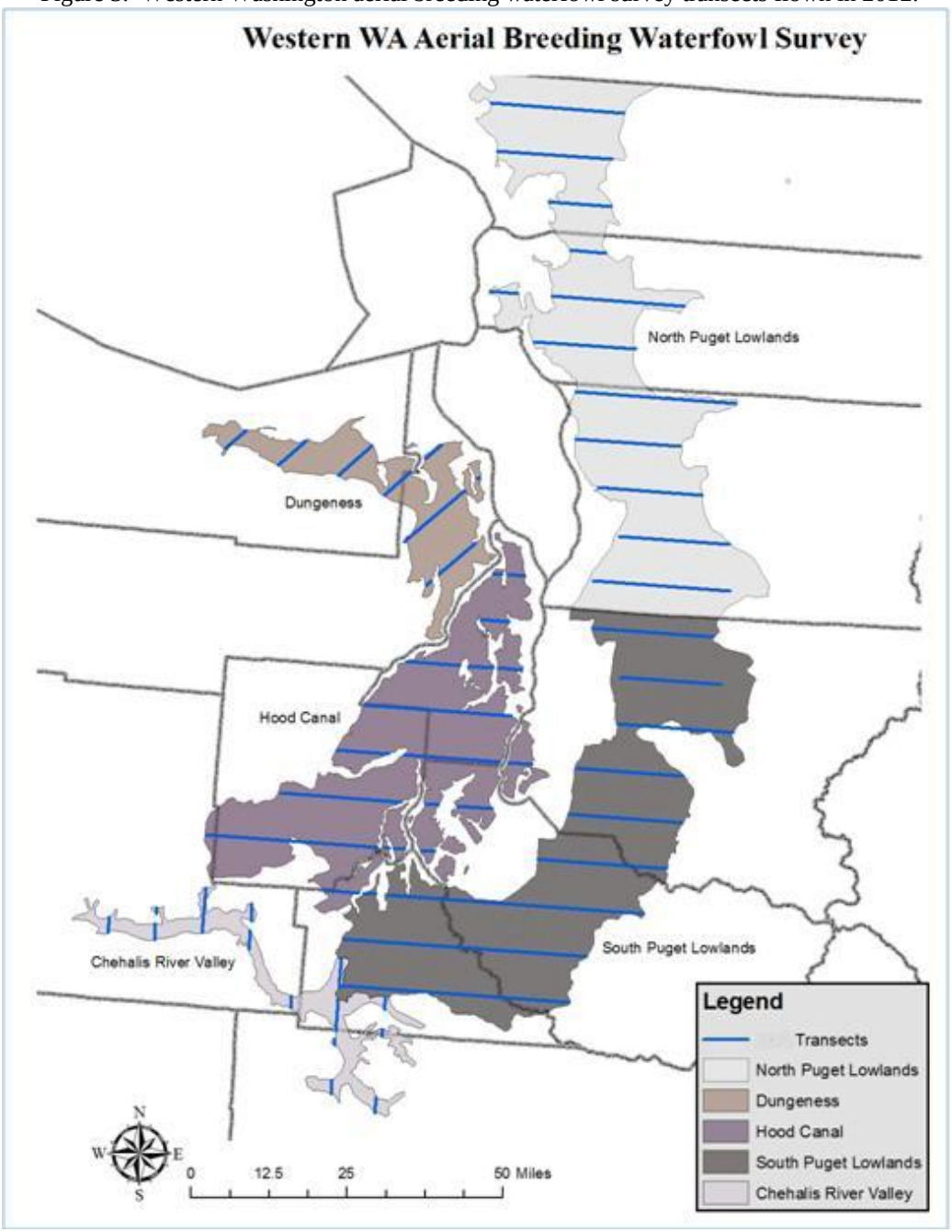


Figure 4. E. Washington duck breeding population survey results by species, 2009-12.

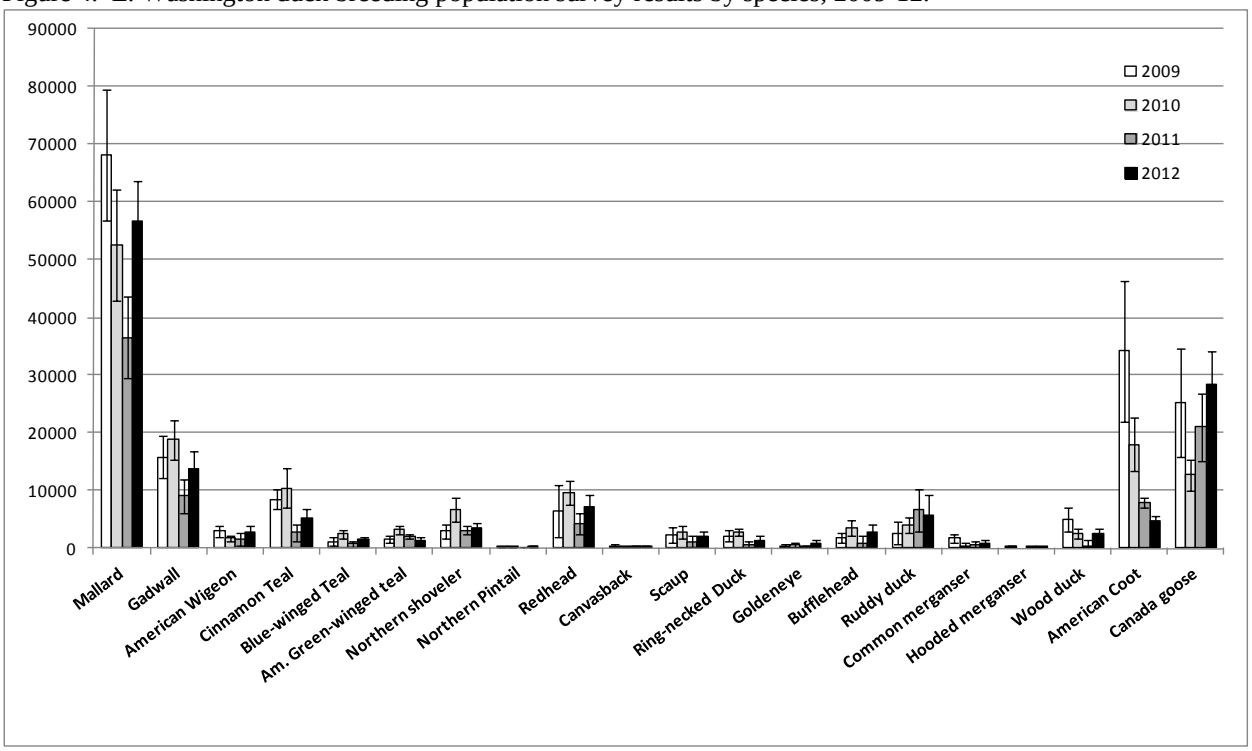


Figure 5. E. Washington duck breeding population survey results by species and strata, 2012.

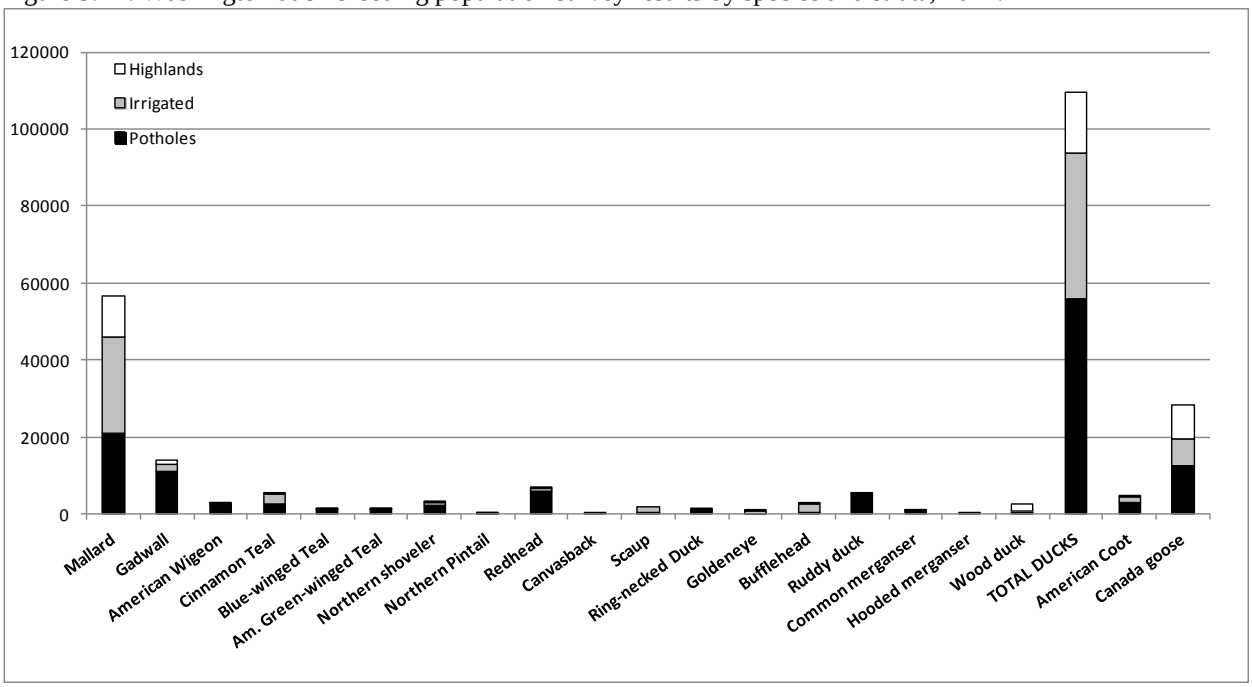


Figure 6. W. Washington duck breeding population survey results by species, 2009-12.

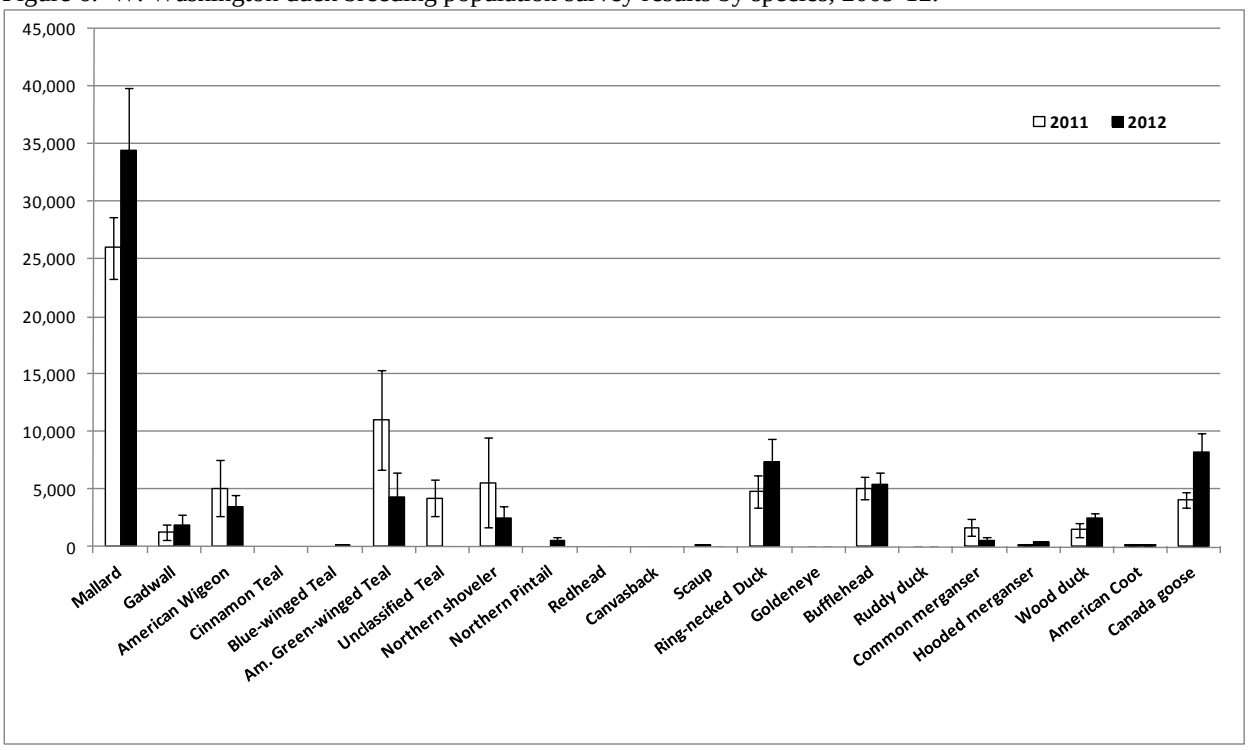


Figure 7. W. Washington duck breeding population survey results by species and strata, 2012.

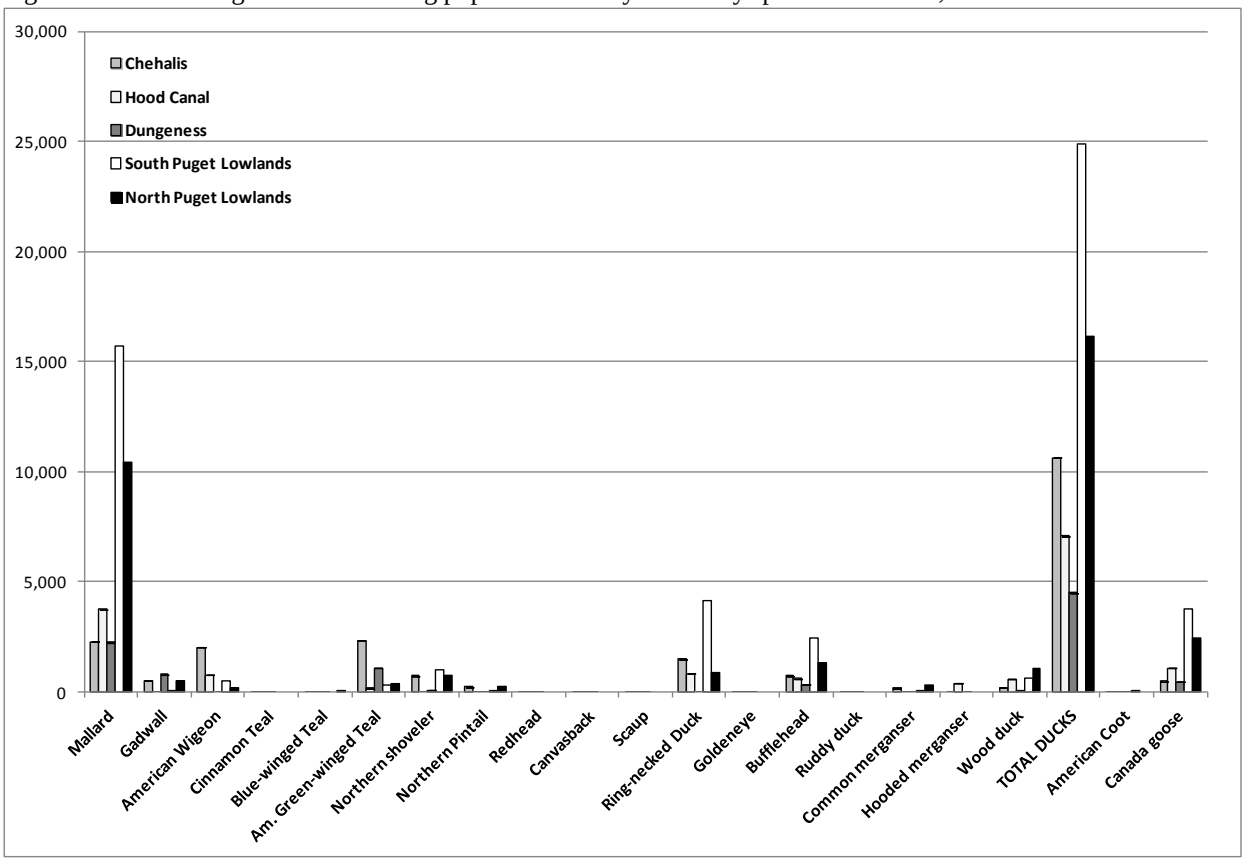


Figure 8. Brood index: Potholes, Palouse, Northeast Strata

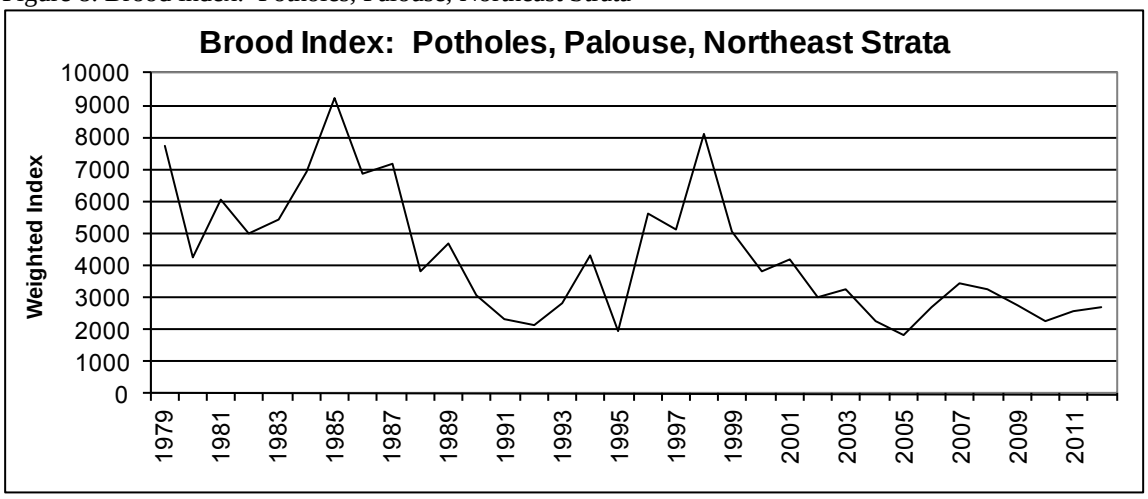


Figure 9. Total Canada goose nests in eastern Washington, 1982-2012.

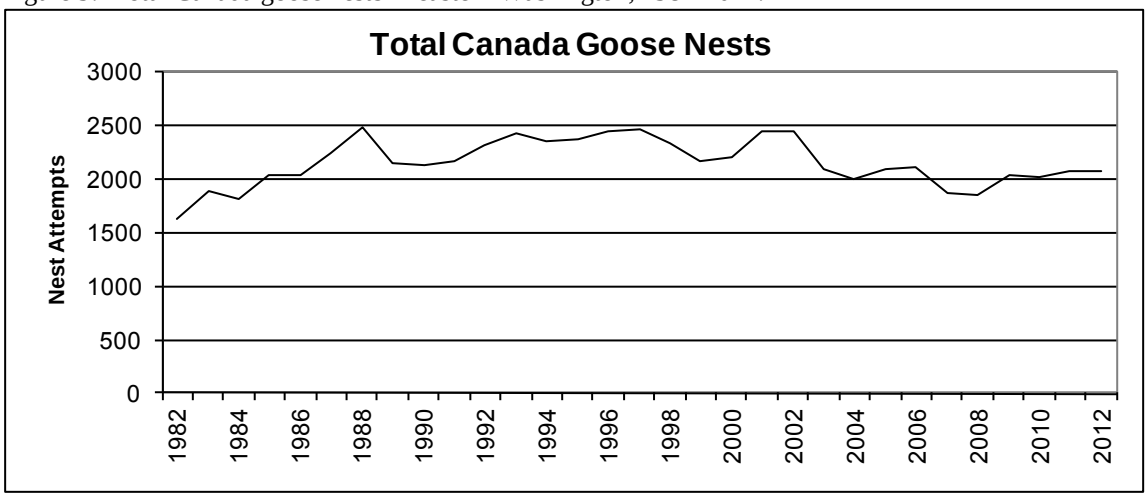


Figure 10. Total Canada goose nests in the lower Columbia River stratum, 1987-2012.

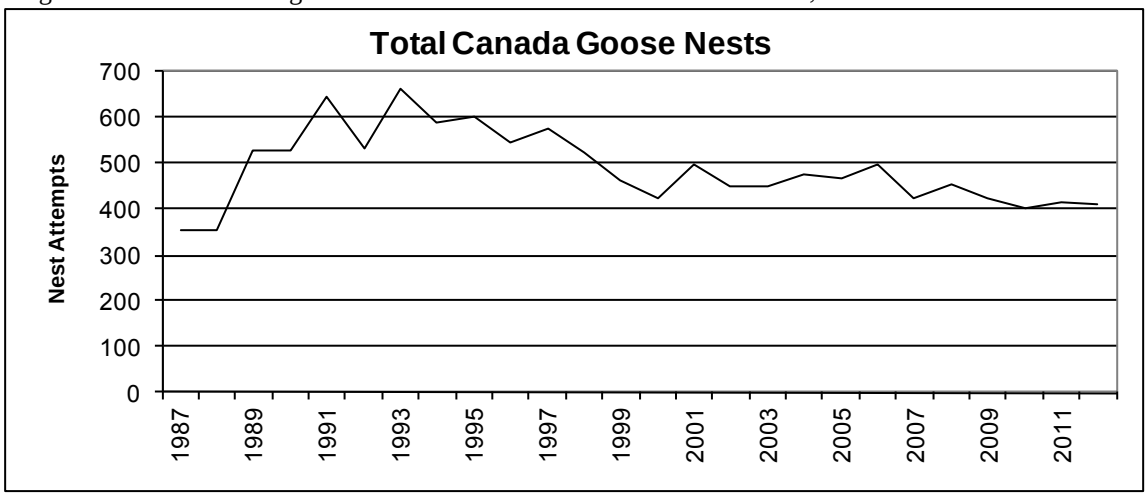


Figure 11. Canada goose nest survey trends in eastern Washington, 1982-2011.

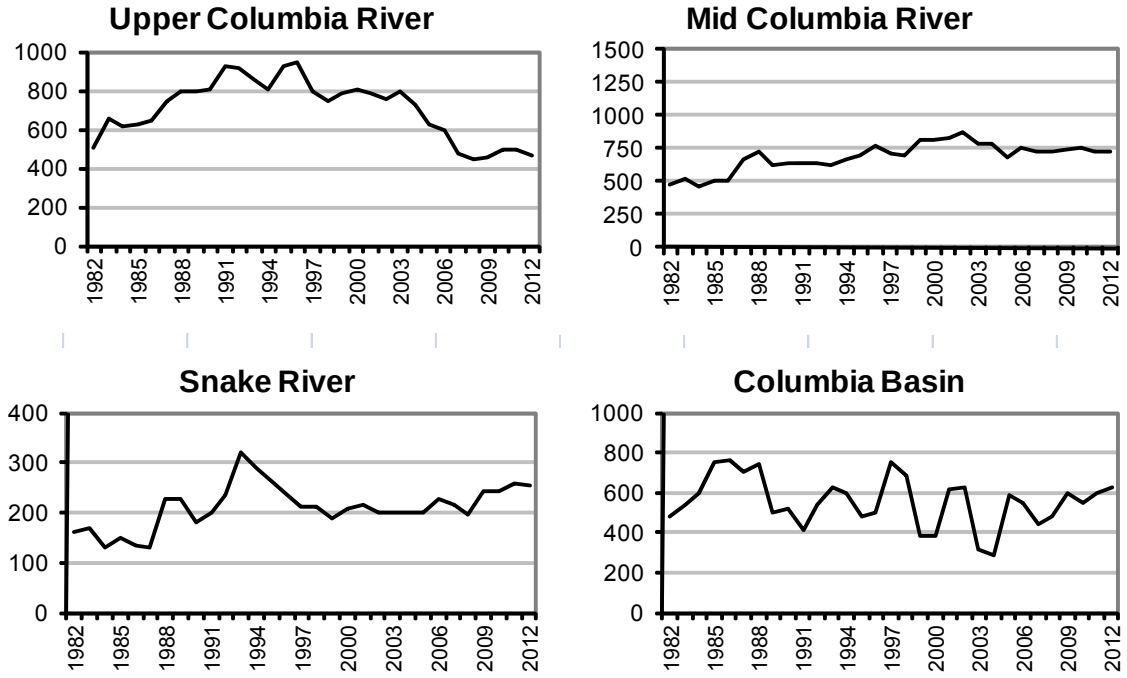


Figure 12. Breeding Canada goose index from breeding duck surveys

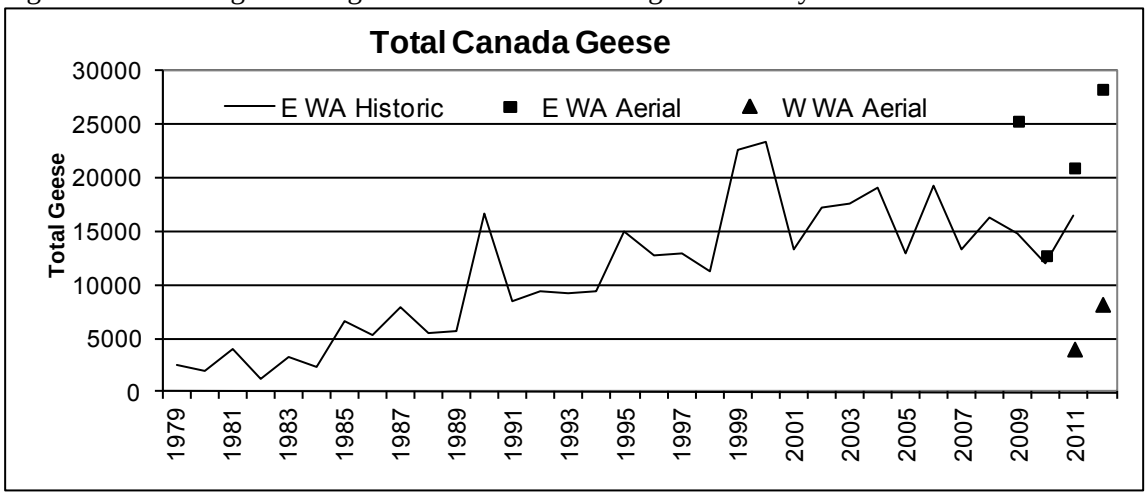


Table 1. Areas and subareas historically surveyed and weighting factors for pond indices, and duck and goose breeding surveys.

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 historic survey areas (2002-2011).

Species	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2002-2011 average
Mallard	44676	39843	39958	40794	45485	46053	50647	47977	49160	54940	45953
Gadwall	18527	15353	15185	15665	17995	17165	14065	10277	10277	11735	14624
Am. Wigeon	6501	5028	5442	3439	6012	6240	2618	4283	2844	3248	4566
Am .green-winged teal	2673	1749	1477	2406	4095	4060	1590	1612	1844	1905	2341
Blue +cinnamon teal	13717	11274	14619	12404	9544	11999	11921	9282	8657	6645	11006
Northern shoveler	5968	7794	6293	4477	6581	5409	4898	5555	4199	6249	5742
Northern pintail	395	608	1096	644	1089	723	450	1198	542	2489	923
Wood duck	1863	616	1553	1375	1549	1870	1781	1327	2409	1527	1587
Redhead	11831	8117	8365	4978	8492	8265	7757	7156	6466	6072	7750
Canvasback	1507	919	618	610	1460	756	1132	873	385	765	903
Scaup spp.	9289	12722	4807	5741	9709	6530	4244	5982	2484	3429	6494
Ring-necked duck	1405	3063	850	2525	3640	2732	2995	2521	2381	2136	2425
Goldeneye spp.	4036	4713	3255	3567	2847	2837	3841	3686	3495	3121	3540
Bufflehead	1606	3034	1280	2425	6361	2809	3728	949	2701	6838	3173
Ruddy duck	9023	12175	9624	10150	10464	9538	8262	8378	6400	9306	9332
Merganser spp.	327	757	463	304	121	1279	969	1095	794	1848	796
Total ducks	**133343**	**127764**	**114883**	**111503**	**135442**	**128265**	**120897**	**115663**	**105036**	**122254**	**121505**
American coot	18171	19328	19085	12346	22151	33763	22069	25521	20511	16834	20978
Canada goose	17179	17596	19137	13022	19253	13244	16342	16023	12014	16511	16032

Table 3. Weighted breeding duck population indices by area for eastern Washington historic surveys (1979-2011).

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
2011	71399	36352	1048	13454	122254
1979-2011 ave.	**67204**	**58730**	**2812**	**21133**	**149834**

Table 4. Summary of eastern Washington helicopter surveys for breeding waterfowl (2009-2012).

STRATA	YEAR		Mallard	Gadwall	American Wigeon	Cinnamon Teal	Blue-winged Teal	Am. Green-winged teal	Northern shoveler	Northern Pintail	Redhead	Canvasback	Scaup	Ring-necked Duck	Goldeneye	Bufflehead	Ruddy duck	Common merganser	Hooded merganser	Wood duck	**TOTAL DUCKS**	American Coot	Canada goose
IRRIGATED	**2009**		39995	6575	1522	3273	230	459	2010	0	2096	57	2354	172	0	574	144	287	0	2067	**62217**	11370	7752
		+/-SE	*7464*	*2111*	*704*	*861*	*127*	*189*	*636*	*0*	*802*	*58*	*1206*	*90*	*0*	*249*	*93*	*129*	*0*	*760*	***8041***	*5112*	*1780*
	2010		27448	3294	213	5171	283	602	4250	0	1523	71	1417	567	0	2479	248	272	0	1204	**49053**	7544	4569
		+/-SE	*8066*	*986*	*103*	*3071*	*177*	*410*	*1980*	*0*	*741*	*72*	*805*	*199*	*0*	*1267*	*176*	*157*	*0*	*602*	***9102***	*3926*	*1660*
	2011		20611	1723	574	638	255	447	574	0	638	0	734	0	0	255	191	255	0	191	**27087**	1723	8487
		+/-SE	*2985*	*628*	*206*	*307*	*142*	*108*	*425*	*0*	*524*	*0*	*398*	*0*	*0*	*153*	*107*	*164*	*0*	*193*	***3191***	*1228*	*2816*
	2012		25197	2007	96	2230	127	287	956	64	956	0	1656	287	605	2294	573	64	0	510	**37907**	1370	6912
		+/-SE	5255	552	93	1368	124	231	583	65	499	0	835	150	477	1182	343	61	0	436	**5754**	539	1774
POTHOLES	**2009**		14231	7906	1285	3953	791	288	765	135	3781	196	0	177	0	405	1465	162	0	510	**38057**	11958	8647
		+/-SE	*3648*	*2050*	*444*	*1146*	*639*	*288*	*765*	*135*	*3781*	*196*	*0*	*177*	*0*	*405*	*1465*	*162*	*0*	*510*	***6089***	*8056*	*3021*
	2010		19563	14754	1223	4891	2038	2445	2119	82	7784	0	489	1304	82	652	3383	166	0	408	**61379**	7010	7540
		+/-SE	*4841*	*3186*	*412*	*1547*	*728*	*643*	*503*	*82*	*1971*	*0*	*253*	*521*	*84*	*353*	*1318*	*122*	*0*	*266*	***6597***	*2327*	*2071*
	2011		15433	7349	992	2058	514	1507	2572	0	3601	220	478	367	73	661	6430	147	0	220	**42623**	6210	11979
		+/-SE	*2974*	*1625*	*401*	*711*	*351*	*585*	*720*	*0*	*1284*	*219*	*278*	*189*	*76*	*314*	*4112*	*105*	*0*	*127*	***5655***	*1872*	*4214*
	2012		20875	11064	2547	2839	1169	1044	2171	167	5928	209	417	960	83	334	5135	751	0	334	**56028**	3048	12525
		+/-SE	*3840*	*2828*	*1034*	*677*	*435*	*370*	*491*	*167*	*1831*	*170*	*248*	*584*	*82*	*255*	*3651*	*655*	*0*	*241*	***6522***	*643*	*3084*
HIGHLANDS	**2009**		13892	1292	162	1292	162	808	162	0	646	162	0	1777	323	808	1050	1292	323	2423	**26572**	10823	8965
		+/-SE	*6044*	*1244*	*155*	*633*	*147*	*556*	*155*	*0*	*453*	*155*	*0*	*916*	*326*	*647*	*1011*	*690*	*209*	*1792*	***6723***	*5066*	*8452*
	2010		5499	745	380	380	127	174	428	0	246	0	943	975	507	317	452	0	0	887	**12392**	3439	673
		+/-SE	*2276*	*473*	*214*	*121*	*85*	*90*	*231*	*0*	*113*	*0*	*576*	*335*	*306*	*168*	*242*	*0*	*0*	*469*	***2538***	*1006*	*414*
	2011		510	54	43	0	0	82	14	0	0	0	2	202	9	59	36	161	2	14	**1187**	5	528
		+/-SE	*128*	*34*	*18*	*0*	*0*	*41*	*10*	*0*	*0*	*0*	*2*	*149*	*6*	*23*	*36*	*90*	*5*	*15*	***558***	*4*	*123*
	2012		10652	832	238	238	238	79	396	0	356	0	0	198	158	238	0	79	79	1703	**15483**	436	8910
		+/-SE	2628	415	133	187	235	72	258	0	191	0	0	204	171	114	0	75	72	830	**5584**	206	4546
TOTAL	**2009**		68117	15773	2968	8518	1182	1555	2936	135	6523	415	2354	2126	323	1787	2658	1742	323	5000	**126846**	34150	25364
		+/-SE	*10274*	*3195*	*846*	*1567*	*668*	*654*	*1007*	*135*	*3891*	*257*	*1206*	*938*	*326*	*803*	*1782*	*720*	*209*	*2013*	***12122***	*10803*	*9150*
	2010		52510	18792	1816	10442	2448	3222	6797	82	9553	71	2849	2845	589	3448	4082	438	0	2499	**122823**	17993	12782
		+/-SE	*9678*	*3369*	*475*	*3441*	*754*	*768*	*2056*	*82*	*2109*	*72*	*1022*	*651*	*317*	*1326*	*1351*	*198*	*0*	*808*	***11525***	*4674*	*2686*
	2011		36553	9126	1609	2696	770	2035	3160	0	4239	220	1214	569	83	976	6658	563	2	426	**70898**	7938	20993
		+/-SE	*4215*	*1742*	*451*	*774*	*378*	*596*	*836*	*0*	*1387*	*219*	*485*	*241*	*76*	*350*	*4113*	*215*	*5*	*231*	***6517***	*2239*	*5070*
	2012		56724	13902	2880	5306	1534	1410	3523	231	7240	209	2074	1445	847	2865	5709	894	79	2546	**109418**	4853	28347
		+/-SE	7018	2911	1046	1538	510	442	805	179	1907	170	871	637	514	1215	3668	662	72	968	**10336**	864	5772

Table 5. Summary of western Washington breeding waterfowl population survey, 2011-2012

Western Washington	Chehalis Valley*				Hood Canal				Dungeness				South Puget Lowlands				North Puget Lowlands				Total			
Species	**2011**	***SE***	**2012**	***SE***	**2011**	***SE***	**2012**	***SE***	**2011**	***SE***	**2012**	**SE**	**2011**	***SE***	**2012**	**SE**	**2011**	***SE***	**2012**	**SE**	**2011**	***SE***	**2012**	***SE***
Mallard	1,618	*797*	2,274	*1,419*	2,594	*625*	3,757	*1,301*	1,880	*604*	2,256	926	10,368	*1,684*	15,718	4,690	9,525	*1,788*	10,459	1,517	25,985	*2,725*	34,464	*5,373*
Gadwall	120	*96*	499	*492*	0	*0*	0	*0*	188	*193*	783	770	598	*620*	66	68	374	*211*	498	307	1,280	*689*	1,847	*967*
American Wigeon	300	*319*	2,024	*772*	0	*0*	775	*508*	63	*64*	0	0	2,359	*1,817*	498	317	2,397	*1,614*	187	185	5,119	*2,452*	3,485	*994*
Cinnamon Teal	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	0	0	*0*	0	0	0	*0*	0	0	0	*0*	0	*0*
Blue-winged Teal	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	0	0	*0*	0	0	0	*0*	62	63	0	*0*	62	*63*
Am. Green-winged Teal	1,138	*442*	2,329	*1,991*	0	*0*	179	*168*	2,037	*1,932*	1,065	875	1,595	*712*	332	240	6,257	*3,793*	374	235	11,027	*4,338*	4,279	*2,207*
Unclassified Teal	509	*321*	0	*0*	179	*113*	0	*0*	0	*0*	0	0	864	*695*	0	0	2,677	*1,384*	0	0	4,229	*1,586*	0	*0*
Northern shoveler	60	*64*	721	*539*	0	*0*	0	*0*	0	*0*	63	66	3,523	*3,556*	997	665	1,992	*1,555*	747	616	5,575	*3,882*	2,528	*1,057*
Northern Pintail	0	*0*	222	*219*	0	*0*	0	*0*	0	*0*	0	0	0	0	66	68	0	*0*	249	187	0	*0*	537	*296*
Redhead	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	0	0	0	0	0	0	*0*	0	0	0	*0*	0	*0*
Canvasback	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	0	0	0	0	0	0	*0*	0	0	0	*0*	0	*0*
Scaup	30	*32*	0	*0*	0	*0*	0	*0*	0	*0*	0	0	0	0	0	0	31	*31*	0	0	61	*45*	0	*0*
Ring-necked Duck	1,558	*1,149*	1,497	*1,411*	477	*162*	835	*440*	470	*318*	0	0	1,296	*484*	4,121	1,412	1,027	*560*	872	451	4,828	*1,413*	7,325	*2,093*
Goldeneye	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	0	0	*0*	0	0	0	*0*	0	0	0	*0*	0	*0*
Bufflehead	359	*191*	721	*405*	417	*162*	596	*413*	470	*434*	313	93	2,659	*726*	2,426	888	1,214	*514*	1,339	326	5,119	*1,020*	5,395	*1,112*
Ruddy duck	0	*0*	0	*0*	0	*0*	0	*0*	0	*0*	0	0	0	*0*	0	0	0	*0*	0	0	0	*0*	0	*0*
Common merganser	359	*352*	166	*165*	60	*55*	0	*0*	63	*68*	0	0	0	*0*	66	64	1,214	*581*	311	187	1,696	*685*	544	*257*
Hooded merganser	0	*0*	0	*0*	0	*0*	388	*149*	0	*0*	0	0	133	*85*	0	0	62	*63*	0	0	195	*106*	388	*149*
Wood duck	60	*46*	194	*155*	119	*109*	567	*115*	0	*0*	31	33	731	*531*	598	258	560	*202*	1,058	424	1,471	*580*	2,448	*534*
TOTAL DUCKS	**6,111**	***1,592***	**10,648**	***3,059***	**3,846**	***686***	**7,096**	***1,542***	**5,170**	***2,105***	**4,512**	***1,494***	**24,126**	***4,605***	**24,890**	***5,046***	**27,331**	***5,053***	**16,156**	***1,852***	**66,584**	***7,360***	**63,302**	***6,547***
American Coot	0	*0*	0	*0*	0	*0*	0	*0*	31	*32*	0	0	166	*102*	33	31	0	*0*	0	0	197	*107*	33	*31*
Canada goose	180	*149*	471	*275*	477	*240*	1,073	*379*	282	*198*	439	315	1,861	*470*	3,788	1,408	1,245	*364*	2,459	519	4,045	*687*	8,231	*1,603*

Table 6. Weighted duck brood indices by species for the Potholes, Palouse, and Northeast strata, 2002-2012.

Species	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	79-11 Avg	% change from 2011	% change from Average
Mallard	1183	1260	1284	1221	1200	1786	1419	1416	1035	1042	1010	1641	-3%	-38%
Gadwall	353	299	116	15	107	132	292	87	87	379	314	363	-17%	-14%
Wigeon	126	170	95	146	54	54	48	43	10	35	26	238	-27%	-89%
Green-winged teal	143	158	14	26	118	94	151	183	176	233	272	149	17%	83%
Blue-winged teal	228	212	92	26	15	0	42	48	0	30	47	504	56%	-91%
Cinnamon teal	66	48	24	40	14	103	91	14	138	30	82	92	174%	-11%
Northern shoveler	207	238	63	0	29	15	59	44	49	19	19	153	0%	-88%
Northern pintail	199	158	20	0	0	0	0	0	0	0	14	111		-87%
Wood duck	0	14	42	33	82	107	28	28	42	33	112	43	243%	164%
Redhead	238	267	40	0	121	211	252	154	94	184	210	401	14%	-48%
Canvasback	77	128	26	15	65	26	90	0	32	0	77	33		130%
Scaup	0	82	0	0	20	14	21	94	17	34	0	46	-100%	-100%
Ring-necked duck	0	26	85	0	108	26	50	14	86	23	14	48	-40%	-71%
Goldeneye	26	26	266	163	438	444	412	331	275	391	221	181	-44%	22%
Bufflehead	179	26	0	26	0	40	14	24	43	14	26	11	82%	123%
Ruddy duck	0	167	86	110	201	222	219	183	104	86	208	218	142%	-5%
Merganser	0	14	15	0	128	204	77	77	65	56	40	50	-29%	-21%
TOTAL BROODS	**2757**	**3089**	**3166**	**1819**	**4085**	**3477**	**3265**	**2741**	**2253**	**2588**	**2689**	**4290**	4%	-37%

Table 7. Weighted duck brood indices for E. Washington strata and total unweighted brood counts for the 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
2011	1155	890	511	33	2588	61
2012	1018	731	842	98	2689	78
LTA	2376	883	896	183	4339	149
2012 vs. 2011	-12%	-18%	65%	201%	4%	28%
2012 vs. LTA	-57%	-17%	-6%	-47%	-37%	-48%

Table 8. Goose nest survey areas in Washington

Survey Area	Year Survey Initiated	Agency Conducting Survey	Frequency of Survey
UPPER COLUMBIA			
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			
Snake River	1975	Army Corps	Annual
Snake River Cliff	1979	Army Corps	Discontinued
MID COLUMBIA			
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
COLUMBIA BASIN			
Moses Lake	1981	WDFW	Biennial
Potholes Res.	1981	WDFW	Biennial
Lenore, Alkali, Park	1981	WDFW	Periodic
LOWER COLUMBIA			
I-5 to Bonneville	1981	Army Corps	Periodic
I-5 to Puget Island	1981	WDFW	Annual

Table 9. Canada goose nest survey results

	Active Goose Nests Observed							Total Geese Observed on Duck Surveys		
Year	Upper Columbia	Snake River	Mid Columbia	Columbia Basin	E WA Total	Lower Columbia	TOTAL	E WA Ground	E WA Aerial	W WA Aerial
1974	279		363		642		642			
1975	297	50	344		691		691			
1976	310	51	345		706		706			
1977	358	51	384		793		793			
1978	329	51	330		710		710			
1979	303	87	292		682		682	2570		
1980	393	112	339		844		844	1925		
1981	500	145	318	249	1212		1226	4053		
1982	509	160	480	484	1633		1648	1203		
1983	656	171	520	541	1888		1902	3225		
1984	618	132	466	601	1816		1831	2305		
1985	630	150	500	757	2037		2168	6674		
1986	641	136	507	765	2049		2122	5225		
1987	745	130	670	702	2247	354	2601	7938		
1988	794	229	723	742	2488	353	2841	5426		
1989	799	227	627	500	2153	527	2680	5605		
1990	808	180	634	518	2140	527	2667	16695		
1991	923	199	637	414	2173	645	2818	8483		
1992	916	236	633	538	2323	531	2854	9483		
1993	858	319	629	628	2434	664	3098	9190		
1994	806	290	662	595	2353	589	2942	9396		
1995	929	261	702	477	2369	600	2969	15017		
1996	944	236	777	501	2458	544	3002	12758		
1997	798	210	711	676	2468	575	2970	13019		
1998	744	210	693	610	2330	522	2779	11199		
1999	783	187	811	315	2169	462	2558	22598		
2000	797	207	816	313	2214	424	2565	23449		
2001	790	214	835	539	2451	496	2874	13307		
2002	751	199	872	629	2451	449	2915	17179		
2003	793	199	782	374	2087	450	2598	17596		
2004	728	199	782	350	1998	478	2537	19137		
2005	626	199	689	584	2098	468	2566	13022		
2006	593	248	753	544	2116	499	2627	19253		
2007	479	217	734	442	1872	422	2277	13244		
2008	441	197	727	485	1850	454	2290	16342		
2009	460	243	749	594	2046	422	2468	14858	25364	
2010	493	241	750	544	2028	403	2408	12014	12782	
2011	499	259	725	599	2082	415	2497	16511	20993	4045
2012	**466**	**255**	**728**	**628**	**2077**	**412**	**2489**		**28347**	**8231**
12 vs. 11	-7%	-2%	0%	+5%	0%	-1%	0%			
LTA	635	184	656	544	1871	404	2465			
12 vs LTA	-27%	39%	11%	16%	11%	2%	0%			

WATERFOWL STATUS AND TREND REPORT: STATEWIDE
Winter Waterfowl Populations and Harvest

DON KRAEGE, Waterfowl Section Manager

Introduction

This report summarizes the 2011-12 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 MWS in January 2012. Washington's midwinter index for total waterfowl was estimated at 728,108 a decrease of 4% from the previous year and 18% below the 10-year average (2002-2011; Table 1).

The 2012 Pacific Flyway midwinter index for total waterfowl was 6.8 million. This represents a 19% increase from 2011 (5.7 million), and was 2% above the long-term average (1955-2011).

Ducks--The 2012 midwinter indices for total ducks in the 11 Pacific Flyway states was 5.0 million (Fig. 1), up 13% from the 2011 count (4.4 million), but 12% below the long-term average (1955-2011).

In Washington, the 2012 total wintering duck population was 386,900, down 42% from 2011 levels and 49% below the 10-year average (Fig. 2). The Washington total duck count represents 7.8% of the Pacific Flyway wintering population, well below above the state's 10-year average of 15.1% (Fig. 3). The highest ratio of Washington ducks to total Pacific Flyway ducks in the MWS was in 1991 (28.6%).

The 2012 mallard total for the Pacific Flyway was 643,069, down 10% from 2011 and 59% below the long-term average (1955-2011). The total number of mallards counted in Washington in 2012 was 282,601, a 19% decrease from the previous year, and 25% 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 39% (Fig. 4). In 2012, Washington held 44% 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 2012 MWS for Canada geese in the Pacific Flyway was 387,683. The count increased 36% from 2011, and was 10% above the LTA.

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 2012 total of 45,641 was up 69% from 2011 but was 8% below the 10-year average (Table 1, Fig. 5).

Snow geese--The northern population of snow geese from that over-winter in Skagit, Snohomish, and Island counties of NW Washington and the Fraser River Delta, B.C. nest primarily on Wrangel Island, Russia. The 2011 spring population was estimated at

155,000 adults. Juvenile snow geese comprised 21% of the wintering population in the Fraser and Skagit River Deltas in December 2011. During 2001-2010, juveniles comprised 20% of the population. Midwinter snow goose aerial photo counts by Canadian Wildlife Service in January 2012 numbered 69,964. This represents an 11% increase over the January 2011 count of 63,259, but 2% below the 10-year average. (Table 1, Fig. 6). There was no report this year regarding nesting conditions at Wrangel Island's Tundra River colony.

Brant--The number of brant counted in Washington during the 2012 midwinter survey was 17,502, an 18% decrease from 2011, and 4% above the 10-year average (Table 1, Fig. 7). The number of brant counted during the northern Puget Sound midwinter aerial survey on January 6, 2012 was 15,396, down 56% from the previous year. The largest concentrations of brant were in Samish, Lummi, and Padilla bays.

All brant counted in Skagit County are considered to be Western High Arctic (WHA) brant. Breast color measurements were taken from brant at Skagit County check stations. In 2011-12, 75% of harvested birds (*n* = 136) were gray-bellied (WHA) brant (Munsell 4-8). Since 2006, the WHA harvest composition has ranged from 21-75%. These results call into question the assumption that all brant counted in Skagit County during the MWS are WHA brant.

Swans--The 2012 northern Puget Sound (Skagit, Whatcom, Snohomish, and San Juan counties) trumpeter swan MWS totaled 7,209 (Table 2), down 32% from the 2011 count of 10,529. Juveniles accounted for 14.3% of the trumpeters observed (Table 2).

The 2012 northern Puget Sound tundra swan midwinter index was 2,285, down 49% from the 2011 index (2,285). Juveniles represented 9.7% of the population (Table 2).

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 2,332 carcasses collected from 2000-2011, the majority of deaths were lead-related (66%). An average of 18 lead and 7 steel pellets were recovered per gizzard of lead-exposed swans (n=1,736 gizzards, 43,767 pellets). 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, active 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). Starting in 2009 hazing at Judson Lake focused on 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. The barrier system was successful in excluding swans without an appreciable increase in lead related swan mortality or any swan injuries due to the barrier system. Necropsy results 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 North Puget Sound January 2012 aerial survey totaled 194,544 dabbling ducks. The record high count for this area took place in December 2006 (*n* = 974,180). Waterfowl frequently move between the Fraser River Delta and Boundary Bay, B.C. depending on weather conditions, resulting in high variability in the North Puget Sound survey.

Eastern Washington—MWS results for eastern Washington totaled 244,617 waterfowl. Results of other periodic surveys in the Columbia and Yakima basins are presented in Table 2.

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. Population trends of Washington's small Canada geese have not been well documented because they forage in widespread agricultural areas and are mixed with other subspecies, making them difficult to survey from the air. October staging surveys were originally

aerial counts but switched to ground counts in 2006. Observers counted a combined total of 24,775 small Canada geese on the two lakes in October 2011. This count was 4% above the long-term average (1976-2010) of 23,713 (Fig. 8). The highest historical count was 80,050 in 1984. This population is of concern due to past high harvest return rates of geese in the Columbia Basin that were banded in Alaska. Biologists in Region 2 have made an effort in recent years to capture and band staging small Canada geese using rocket nets. Additionally, the staging area at Stratford Lake is likely to be impacted by a new alternate feed route for irrigation water through Stratford 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 2013.

Hunting Season Regulations

The 2011-12 waterfowl harvest was regulated under Washington State regulations (Table 3). The federal framework allowed the maximum (107 days) number of days under the Migratory Bird Treaty Act. Washington's season length was 105 days statewide with two additional days for the statewide Youth Hunt on Sept. 24-25. The reduced scaup season ran from Nov. 5 - Jan. 29. The daily bag-limit was 7 ducks, to include not more than with 2 hen mallard, 2 pintail, 3 scaup, 2 redhead, 1 canvasback, 1 harlequin (season limit), 2 scoter, 2 long-tailed duck, and 2 goldeneye (Table 3).

Substantial waterfowl populations in the Pacific Flyway over the last 15 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. Before the 2002-03 hunting season, the cost of a migratory bird validation increased from $6.00 to $10.00 (excluding transaction and dealer fees). A 10% surcharge was added to all WDFW licenses in 2009-10 and 2010-11. The validation was replaced with a migratory bird permit in 2011, and the cost was raised to $15.00. For the first time in 2011-12, hunters of brant, snow geese in Goose Management Area 1, sea ducks in western Washington, and all geese in SW Washington were required to purchase a special $13 migratory bird authorization, which allowed them to obtain harvest record cards for these species. The federal migratory bird stamp remained at $15.00 (Table 4).

Goose hunting regulations are structured 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 2011-12 (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 damage control hunt initiated in 1995-96 was continued in Area 2A during 2011-12. The season was open Saturdays and Wednesdays during February 4 – March 7, 2012 with a season quota of 5 duskys for the area. The season was open to WDFW Master Hunters and youth hunters.

For the 2011-12 season, the Aleutian goose daily bag limit remained 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 strong population growth in recent years and have caused crop and pasture depredation complaints in coastal agricultural areas, mainly in Oregon and California.

Agricultural depredation by snow geese in Skagit County led to the development of the Snow Goose Quality Hunt Program on Fir Island. Thousands of acres were available as Feel Free to Hunt or Register to Hunt. Numerous complaints of public safety concerns due to unethical snow goose hunting led to special restrictions in Skagit County. Hunters were restricted from discharging a firearm within 100 feet of any paved public road for the purpose of hunting snow geese anywhere in Skagit County. Violation of these rules, trespass, exceeding the snow goose bag limit, or shooting across a paved road resulted in invalidation of the hunter's snow goose authorization for 2011-12 and the subsequent season.

The January-only brant season took place in 2012, 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 2012, the Skagit County survey estimated 6,704 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 bagged. 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. 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. Reminder notices are sent out to hunters with email addresses available, reminding them to return reports. Responses received after the reminders are included as the 'second wave', and then the harvest estimates are computed accounting for the non-response bias. Hunters were required to report harvest by species and county with mandatory harvest report cards by February 15, 2012.

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. 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 to view a training videotape. The study materials, including the video, are available from the WDFW website. The workbook is also available through regular mail from WDFW and the video can also be purchased from a vendor. 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 tests online, and by appointment 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.

Waterfowl Harvest Survey Results

The 2011-12 Washington duck harvest of 436,120 increased 12% from the 2010-11 harvest of 388,716. 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 416,000 birds annually.

Mallards made up 54% of Washington's 2011-12 harvest, followed by American wigeon (16%), American green-winged teal (9%), and northern pintail (6%) (Table 6).

The total Canada goose harvest for 2011-12 was 57,385, up significantly (+40%) from the 2010-11 harvest of 41,018. 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 has increased in Washington, which has contributed to increased harvest (Fig. 10). The 2011-12 large Canada goose harvest (40,507) was up 68% from the previous year and 59% above the long-term average.

The harvest of small Canada geese in 2011-12 (16,878) decreased 1% from the previous year, and was 35% below 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 (8,880) took place in 2003-04. The reasons for the dynamic small goose harvest are uncertain.

Waterfowl harvest is summarized by WDFW administrative regions in Table 7 and Fig. 12. Region 2 has traditionally represented the highest percentage of the state's waterfowl harvest. For the 2011-12 season, Region 4 accounted for 25% of the harvest followed by Regions 2 (23%) and 3 (19%). The proportion of duck harvest was highest in Region 4 (26%), followed by Regions 2 (22%) and 3 (19%). Region 2 accounted for the highest proportion of goose harvest (31%), followed by Regions 3 (20%), and 4 (19%).

Mandatory Harvest Reporting Results

Restrictive bag limits for most sea ducks were maintained for western Washington in 2011-. Concerns about low recruitment rates in sea ducks, increasing interest in sea duck hunting, and the unknown impact of reduced sea duck bag limits on compensatory species, particularly Barrow's goldeneyes, led to the measure. The harvest survey indicated a total harvest of 1,287 scoters, 153 long-tailed ducks, 137 harlequin ducks and 353 goldeneyes (Fig. 13, Table 8). The reported goldeneye harvest included 67% common goldeneye. From a total of 1,757 authorizations, an estimated 577 hunters were successful and hunted a total of 1,450 days. Primary harvest areas included Island, Mason, Skagit, and Whatcom counties.

The 2011-12 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 718, 89% above the 2010-11 estimate of 378 (Fig. 14, Table 9).

The 2011-12 snow goose harvest was estimated at 11,003, up 149% from the 2010-11 harvest of 4,420. Snow goose harvest in Washington is historically variable depending on several factors (Table 10, Fig. 15). The Wrangel Island snow goose flock had a good production year, resulting in more young birds that were susceptible to harvest. In addition, 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). These geese have recently expanded their wintering range in northeastern Washington to portions of Snohomish and King counties.

In the SW Washington goose season, hunters who passed the identification test in 1996-2011 and didn't take a dusky in 2010-11 were authorized to hunt in 2011-12. New hunters and those harvesting duskys in 2010-11 were required to take a new test to obtain an authorization. A total of 1,443 permits were issued in 2011-12. Zone 1 (Ridgefield NWR) was closed after December 29, 2011, completing 16 hunt days before exceeding the 5 dusky quota. The regular season ran to completion in Zones 2-5. The percentage of duskys in the harvest was 1%, unchanged from 2009-11. A total of 2,114 geese were checked during the regular season, a decrease of 11% from 2010-11 and 25% below the 3-year average of 2,823 (Table 11, Fig. 16). A total of 403 individuals (down 9% from the 2010-11 season) checked birds at check stations. The 2012 late season had 75 Advanced Hunter Education (AHE) program participants, of which 44 checked geese at check stations, the same number as the 2011 season. Total late season harvest was 227 geese, which was 48% above the 2010-11 late season estimate and 25% above the 5-year average. 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 2011-12 season, an estimated 24,866 hunters participated in the Washington waterfowl season, up 2% from 2010-11 (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 (23,078) is the lowest on record.

The estimated average number of ducks harvested per hunter in 2011-12 was 17.5, the highest on record. 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, WDFW has developed initiatives to address public hunting opportunities on public and private lands. In 2011-12 there were 5 regulated access areas (RAA) on WDFW lands, including Winchester Ponds and Frenchman Ponds in Region 2, and Bailie Youth Ranch, Mesa Lake, and Windmill Ranch in Region 3. WDFW also continued the Fir Island Snow Goose Quality Hunt in Region 4 and maintained an expanded a private lands access program for waterfowl hunting in Regions 2 and 4. Some of these programs featured 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.

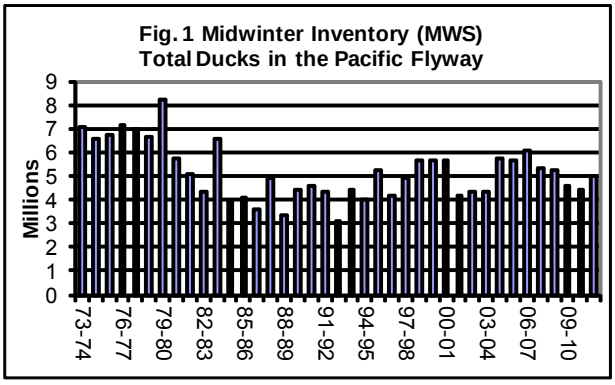


Fig. 1 Midwinter Inventory (MWS)
Total Ducks in the Pacific Flyway
Millions
0
1
2
3
4
5
6
7
8
9
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04
06-07
09-10

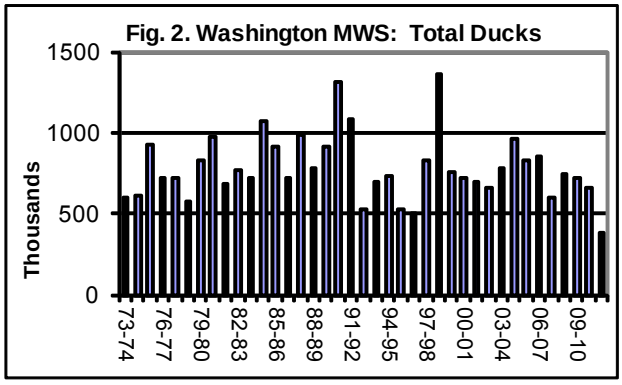


Fig. 2. Washington MWS: Total Ducks
Thousands
0
500
1000
1500
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04
06-07
09-10

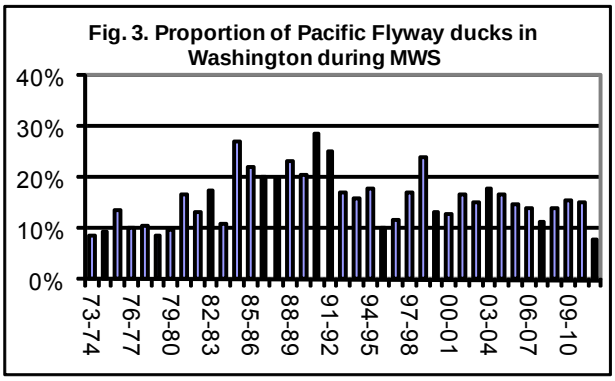


Fig. 3. Proportion of Pacific Flyway ducks in
Washington during MWS
0%
10%
20%
30%
40%
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04
06-07
09-10

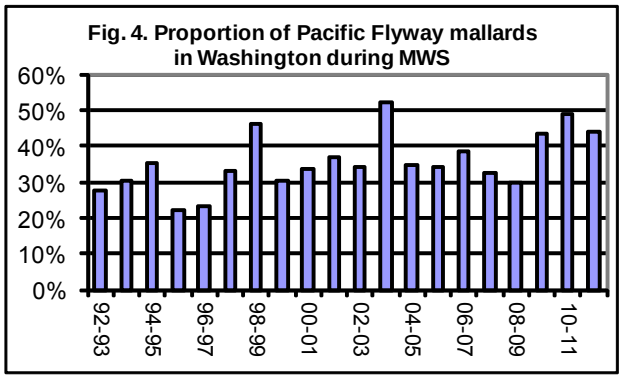


Fig. 4. Proportion of Pacific Flyway mallards
in Washington during MWS
0%
10%
20%
30%
40%
50%
60%
92-93
94-95
96-97
98-99
00-01
02-03
04-05
06-07
08-09
10-11

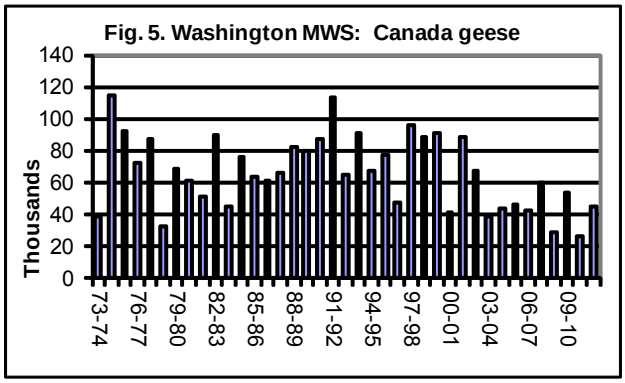


Fig. 5. Washington MWS: Canada geese
Thousands
0
20
40
60
80
100
120
140
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04
06-07
09-10

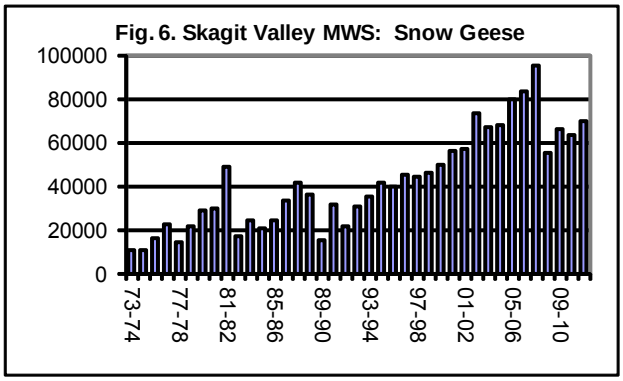


Fig. 6. Skagit Valley MWS: Snow Geese
0
20000
40000
60000
80000
100000
73-74
77-78
81-82
85-86
89-90
93-94
97-98
01-02
05-06
09-10

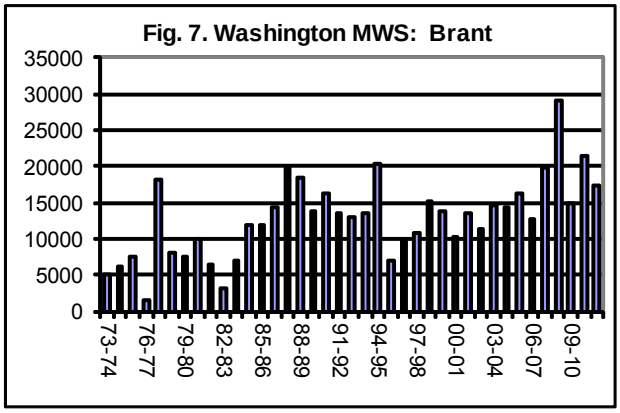


Fig. 7. Washington MWS: Brant
0
5000
10000
15000
20000
25000
30000
35000
73-74
76-77
79-80
82-83
85-86
88-89
91-92
94-95
97-98
00-01
03-04
06-07
09-10

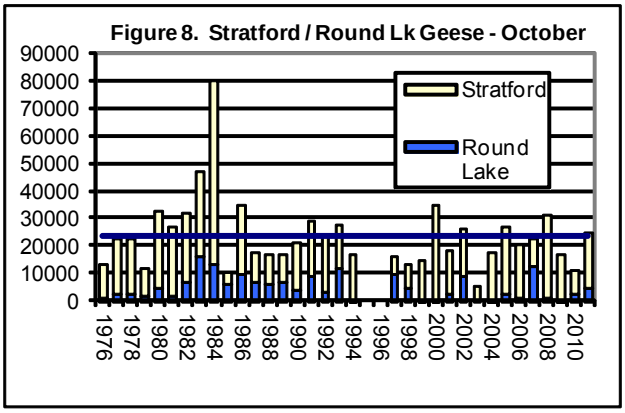
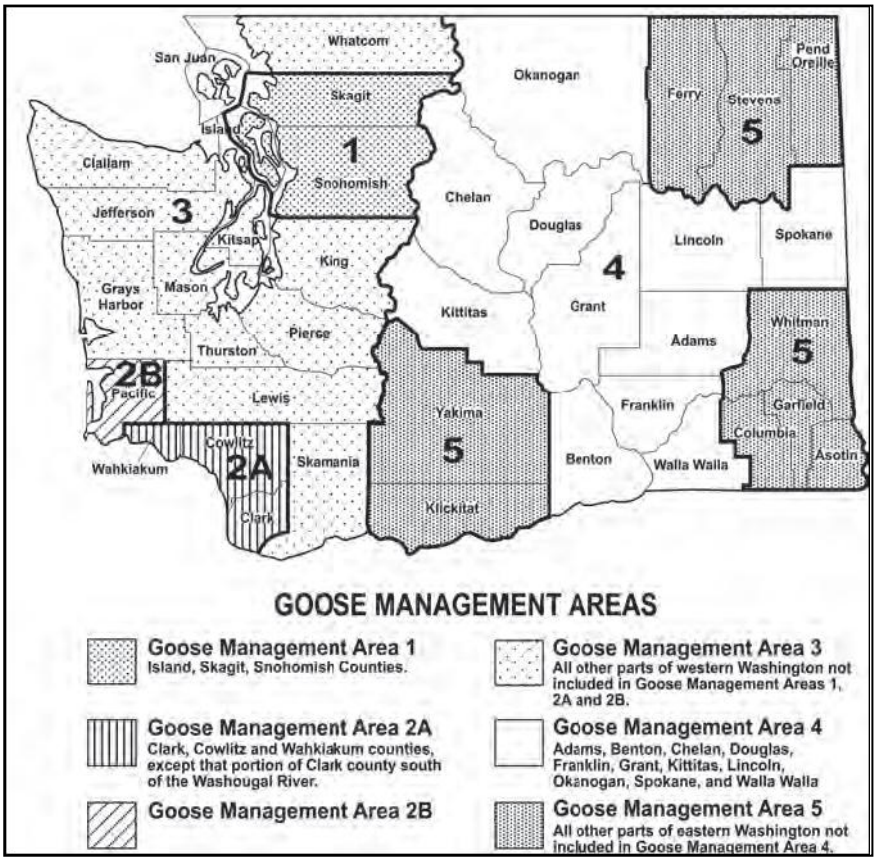


Figure 8. Stratford / Round Lk Geese - October
0
10000
20000
30000
40000
50000
60000
70000
80000
90000
Stratford
Round Lake
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010

Figure 9. Washington Goose Management Areas



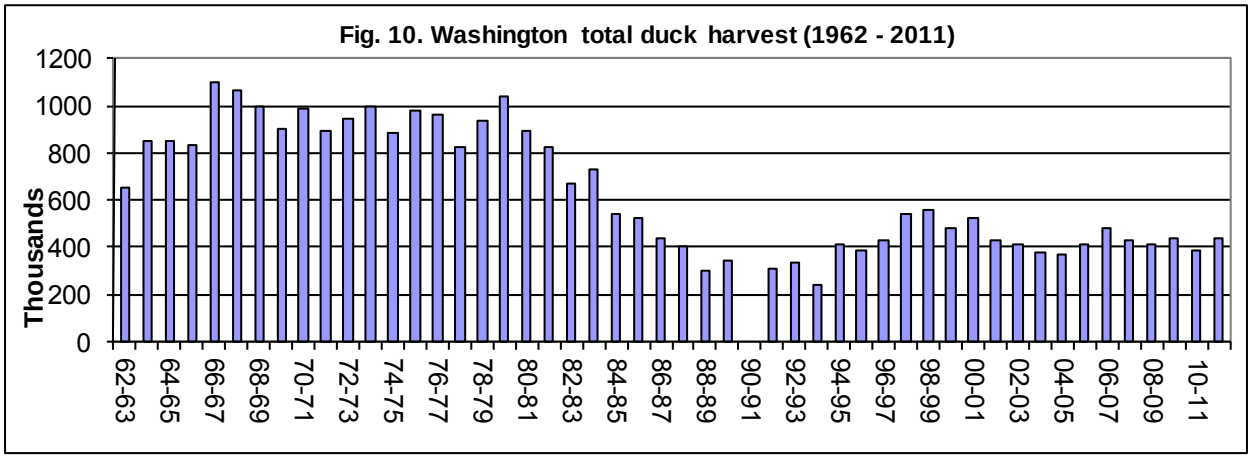
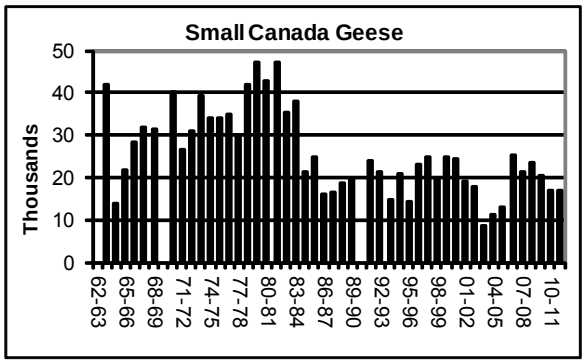


Fig. 11. Washington Canada Goose Harvest



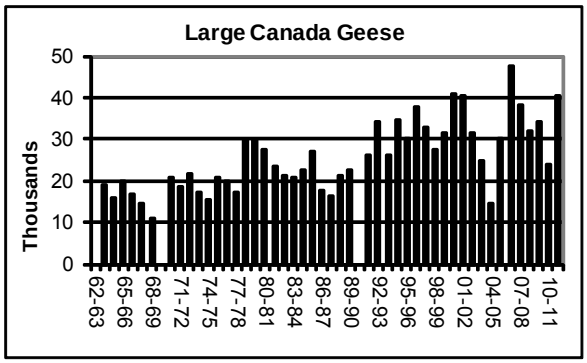


Fig. 12. Waterfowl Harvest by Region

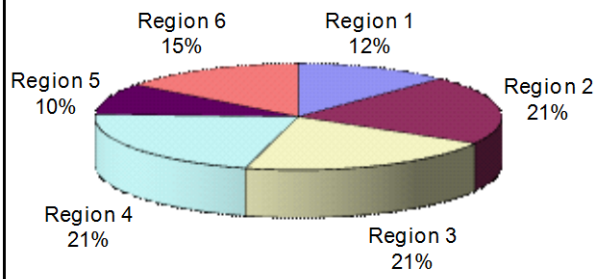


Fig. 13 Sea Duck Harvest (2011-12)

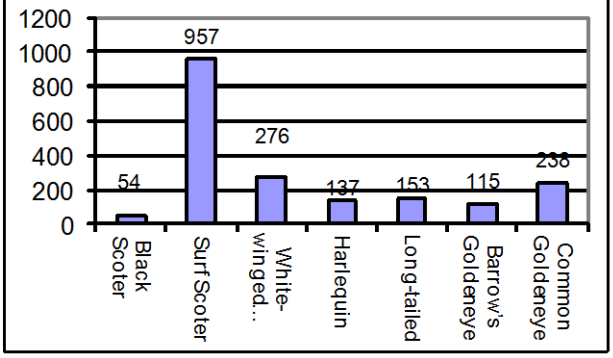


Fig. 14. Washington brant harvest

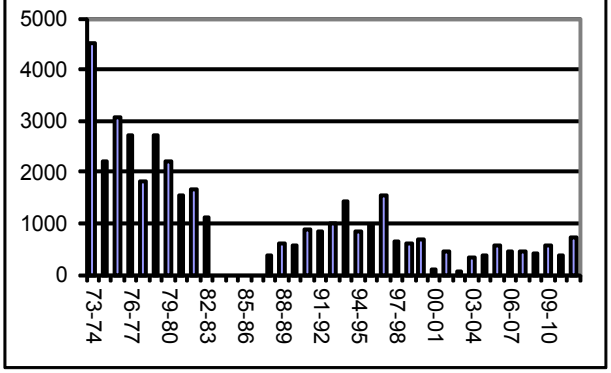


Fig. 15. Skagit snow goose harvest

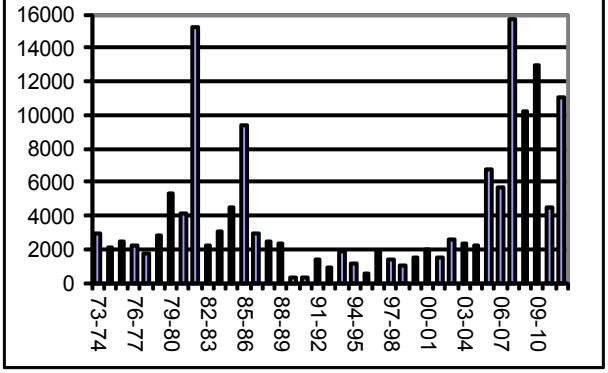
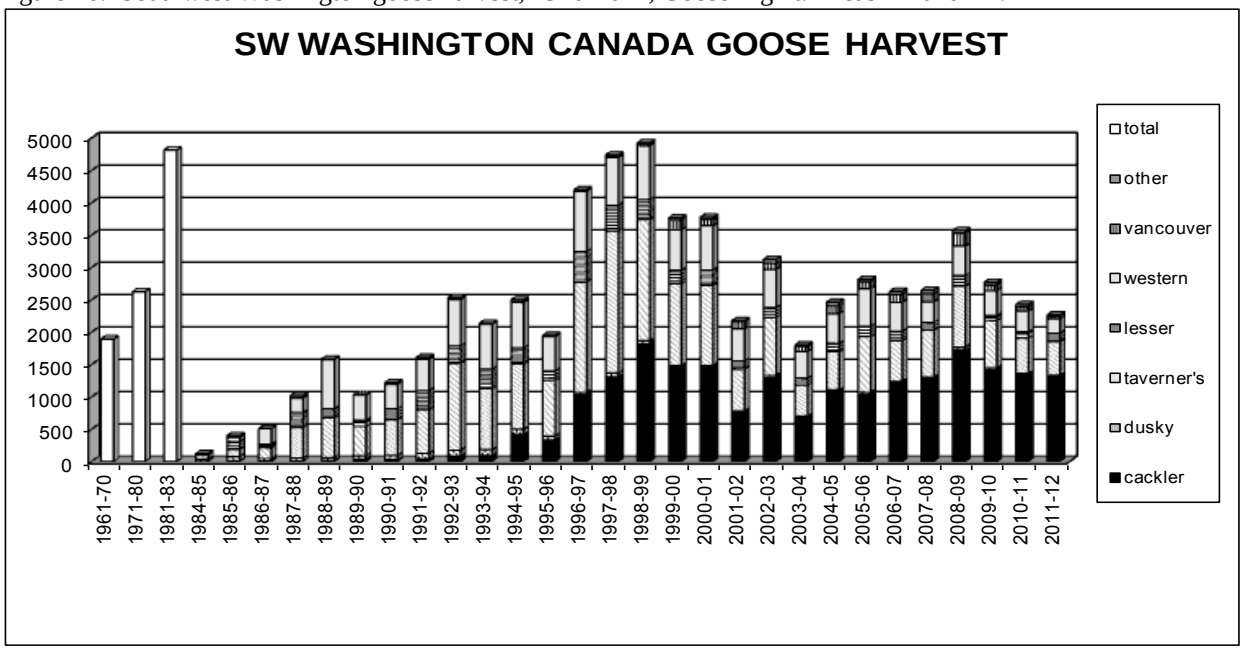
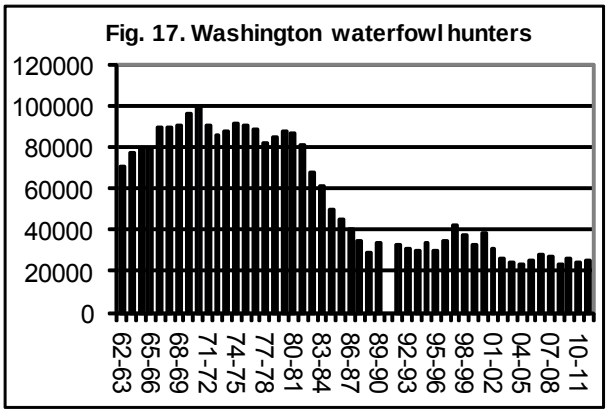


Figure 16. Southwest Washington goose harvest, 1970-2011, Goose Mgmt. Areas 2A and 2B.





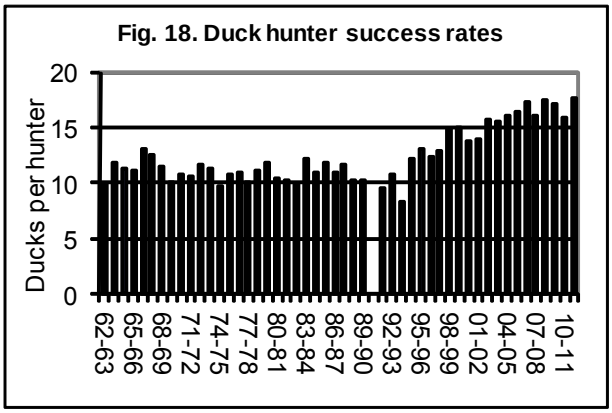


Figure 19. The regulated access program promotes quality hunting opportunities by reducing hunting pressure.

TABLE 1. WASHINGTON DEPARTMENT OF FISH AND WILDLIFE ANNUAL WATERFOWL SURVEY - JANUARY 2012

SPECIES	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	12 vs. 11	02-11 ave.	12 vs. ave.
Mallard	348841	325459	432570	470186	374881	494597	313871	254655	405604	349790	282601	-19%	377045	-25%
Gadwall	10595	11391	9252	10904	5780	5314	5854	5324	6877	4149	3790	-9%	7544	-50%
Wigeon	124301	113838	151981	195798	170491	90734	89614	207236	126059	106149	101072	-5%	137620	-27%
Green-winged Teal	13695	8083	14565	33358	29492	30947	15506	15175	11554	18795	16225	-14%	19117	-15%
B.W. & Cinn. Teal	484	57	11	4	5	272	2	12	20	335	9	-97%	120	-93%
Shoveler	1852	5801	3445	2553	4130	8763	2210	2671	2474	919	5419	490%	3482	56%
Pintail	72106	57465	49567	117296	94327	113949	45848	117235	40787	71083	73635	4%	77966	-6%
Wood Duck	356	59	132	472	173	99	378	309	1406	501	380	-24%	389	-2%
Redhead	11353	6867	2621	4795	13026	3645	2443	4668	3550	4015	2501	-38%	5698	-56%
Canvasback	3272	2131	3350	2929	2504	1501	3790	3239	3789	3148	2157	-31%	2965	-27%
Scaup	31970	41832	40744	34884	52519	29711	35052	40306	43003	31118	49304	58%	38114	29%
Ringneck	7306	6457	4583	8358	8507	12642	16568	19740	8763	5192	5415	4%	9812	-45%
Goldeneye	15711	20098	14035	15941	19184	13973	15106	15976	14578	14457	11599	-20%	15906	-27%
Bufflehead	20266	26426	20009	23293	21857	17511	21230	25510	21609	19451	24019	23%	21716	11%
Ruddy Duck	3457	4966	2936	1937	1718	2179	3096	1508	1428	1180	2026	72%	2441	-17%
Eider	0	0	0	0	0	0	0	0	0	0	0	0%	0	0%
Scoter	16597	14125	15876	16753	18265	15307	16742	12585	10445	11944	13432	12%	14864	-10%
Long-tailed Duck	423	573	478	654	927	804	504	547	439	663	652	-2%	601	8%
Harlequin	653	797	963	793	1015	733	902	670	839	692	1067	54%	806	32%
Merganser	10564	12325	10495	10202	8355	7443	6377	6523	7894	8775	8302	-5%	8895	-7%
Unidentified Ducks	1606	3552	2660	5869	7458	4731	2515	9981	13440	5507	0	-100%	5732	-100%
Snow Goose*	55480	73363	66801	47111	80060	75141	82583	55016	66176	38976	49699	28%	64071	-22%
White-fronted Goose	21	2	5	27	17	82	42	119	22	113	36	-68%	45	-20%
Canada Goose	88092	67941	39301	43908	45857	42759	60131	28629	53259	26999	45641	69%	49688	-8%
Brant	13478	11455	14544	14286	16305	12712	19775	29243	14895	21457	17502	-18%	16815	4%
Tundra Swan**	2521	6393	1447	2778	3422	3548	3570	3380	3211	2544	2247	-12%	3281	-32%
Trumpeter Swan**	4562	4263	3996	5508	7904	9104	7747	9852	9457	9984	7603	-24%	7238	5%
Unknown Swan**	254	168	2432	2381	232	842	292	1100	540	221	1775	703%	846	110%
Coot	80631	91284	91387	105522	119856	72265	69305	101951	84543	54017	48978	-9%	87076	-44%
TOTAL	940447	917171	1000186	1178500	1108267	1071308	841053	973160	956661	812174	777086	-4%	979893	-21%
*B.C. Snow Geese	8675	1770	0	21030	0	8007	12276	2495	7788	24285	22265	-8%	8633	158%

**Comprehensive western Washington swan surveys in 1989, 1991, 1996, 2001, 2006, 2011

Table 2. 2011-12 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.**	**Dec. 5-6**	**Jan. 4, 6**
Mallards			152,624	80,305
Total Ducks			240,006	118,089
Total Geese			19,388	12,606
Total Swans			148	113
Total Coots			39,032	21,354
SURVEY TOTAL			298,574	150,415
	No survey	No survey		
South Columbia Basin	**Oct.**	**Nov. 28**	**Dec.**	**Jan. 4**
Mallards		47,718		76,859
Total Ducks		58,350		87,869
Total Geese		9,123		9,178
Total Swans		99		52
Total Coots		14,335		8,891
SURVEY TOTAL		81,907		106,042
	No survey		No survey	
Yakima Basin	**Oct.**	**Nov.**	**Dec. 26**	**Jan.**
Mallards			22,298	
Total Ducks			31,635	
Total Geese			1,887	
Total Swans			27	
Total Coots			54	
SURVEY TOTAL			33,549	
	No survey	No survey		No survey
Northern Puget Sound	**Oct.**	**Nov.**	**Dec.**	**Jan. 11**
Mallards				85,383
Northern pintail				57,397
American wigeon				43,443
Green-winged teal				8,321
Brant				
TOTAL DABBLERS				194,544
	No survey	No survey	No survey	

Snow Goose Aerial Photo Counts	**Date**	**Skagit/ Snohomish**	**Fraser**	**Total**	**% Young**
	12/22/12	49,699	22,265	69,964	20.6%

Brant Aerial Surveys	**Date**	**Skagit Co.**	**Whatcom Co.**	**Total**
	1/6/12	6,704	5,040	11,704

Age-ratios obtained from field observations – Northern Puget Sound MWS			
Species	**Sample size**	**Juveniles**	**% Young**
Trumpeter Swan	7,209	1,031	14.3%
Tundra Swan	1,157	112	9.7%

Table 3. 2011-12 Washington Migratory Bird Season Regulations

Species	Area	Season Dates (inclusive)/Restrictions	Daily Bag	Possession Limit
Duck	Statewide	Sept. 22-23 (Youth Hunting Only[a])	7[b]	14[b]
		Oct. 13-17 & Oct. 20 - Jan. 27	7[b]	14[b]
Coot	Statewide	Sept. 22-23 (Youth Hunting Only[a])	25	25
		Oct. 13-17 & Oct. 20 - Jan. 27	25	25
Snipe	Statewide	Oct. 13-17 & Oct. 20 - Jan. 27	8	16
Canada Goose Early Seasons	Goose Mgmt Areas 1 & 3	Sept. 10-15	5	10
	Goose Mgmt Area 2A	Sept. 10-15	3	6
	Goose Mgmt Area 2B	Sept. 1-15	5	10
	Goose Mgmt Areas 4 & 5	Sept. 14-15	3	6
	Statewide (except Goose Mgmt Areas 2A & 2B)	Sept. 22-23 (Youth Hunting Only[a])	4	8
Goose (except Brant)	Goose Mgmt Area 1	Snow, Ross', or Blue Goose : Oct. 13 - Jan. 27[c]	4	8
		Other geese: Oct. 13-25 & Nov. 3 - Jan. 27		
	Goose Mgmt Area 2A	All areas except Ridgefield National Wildlife Refuge: 8 a.m. to 4 p.m., Saturdays, Sundays, & Wednesdays only Nov. 10-25 & Dec. 5 - Jan. 27	4[d]	8[d]
		Ridgefield National Wildlife Refuge: 8 a.m. to 4 p.m. Tuesdays, Thursdays, & Saturdays only Nov. 10-24 & Dec. 6 - Jan. 26 except closed Nov. 22, Dec. 25 & Jan. 1	4[d]	8[d]
	Goose Mgmt Area 2B	8:00 a.m. to 4:00 p.m., Saturdays, & Wednesdays only Oct. 13-24 and Nov. 3 - Jan. 19	4[d]	8[d]
	Goose Mgmt Area 3	Oct. 13-25 & Nov. 3 - Jan. 27	4	8
	Goose Mgmt Area 4	Saturdays, Sundays, & Wednesdays only: Oct. 13 - Jan. 20 ; Nov. 22, 23 ; Dec. 25, 27, 28, 31; Jan. 1, & every day Jan. 21-27	4	8
	Goose Mgmt Area 5	Oct. 13-15 & Oct. 20 - Jan. 27	4	8
Brant	Skagit County	Jan. 12, 13, 16, 19, 20, 23, 26, 27 **Note:** If Skagit Co. brant population below 6,000 (determined by early January survey), this season will be canceled.	2	4
	Pacific County	Jan. 5, 6, 8, 10, 12, 13, 15, 17, 19, 20	2	4

a. Special youth hunting season open to hunters under 16 years of age (must be accompanied by an adult at least 18 years old who is not hunting).
b. Daily bag limit: to include not more than 2 hen mallard, 2 pintail, , 1 canvasback, and 2 redhead statewide; and to include not more than 1 harlequin, 2 scoter, 2 long-tailed duck, & 2 goldeneye in western Washington. Possession limit:to include not more than 4 hen mallard, 4 pintail, 2 canvasback, and 4 redhead statewide; and to include not more than 1 harlequin, 4 scoter, 4 long-tailed duck, and 4 goldeneye in western Washington. Season limit: 1 harlequin in western Washington
c. Skagit County Special Restrictions: While hunting snow geese, if a hunter is convicted of 1) trespass, 2) shooting from across or along the maintained part of any public highway, 3) discharging a firearm for the purpose of hunting waterfowl within 100 feet of any paved public road on Fir Island or discharging a firearm for the purpose of hunting snow geese within 100 feet of any paved public road in other areas of Skagit County, or 4) exceeding the daily bag limit for snow geese, written authorization will be invalidated for the remainder of the current snow goose season and an authorization will not be issued for the subsequent snow goose season.
d. Daily bag limit:to include not more than 1 dusky Canada goose and 3cackling geese in Areas 2A & 2B; and to include not more than 1 Aleutian goose in Area 2B. Possession limit:to include not more than 1 dusky Canada goose and 6 cackling geese in Areas 2A & 2B; and to include not more than 2 Aleutian geese in Area 2B. Season limit: 1 dusky Canada goose. A dusky Canada goose is defined 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 defined as a goose with a culmen (bill) length of 32 mm or less.

Table 4. Significant historical changes in duck hunting regulations.

	Season		Bag Limit		Special Limits		Stamp Fees		Hunting License	Steel shot Regulation
Year(s)	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	-
77-79	100	93	7	7	-	-	-	5.00	7.50	3 zones[1]
79-80	100	93	7	7	-	-	-	7.50	7.50	" "
80-82	100	93	7	7	-	-	-	7.50	7.50	1 zone[2]
82-84	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	" "
88-91	66	59	4	4	3 (1 ♀)	1	5.00	12.00	12.00	" "
91-94	66	59	4	4	3 (1 ♀)	1	6.00	15.00	15.00	Steel statewide
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	11.00	15.00	36.00	
10-11	105[6]	105[6]	7	7	7 (2 ♀)	2	11.00	15.00	36.00	
11-12	105[6]	105[6]	7	7	7 (2 ♀)	2	15.00	15.00	38.00	

[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	40	2A: Nov. 14-20, Dec. 9-Jan. 31 (31, RF 28) P: Oct. 17–Jan. 16 (27)	2A: No (31/31, RF 28/28) P: No (27/27)
	Late	New	5	Feb. 6 – Mar. 10 (10)	No (10/10)
2010-11	Regular	New	40	2A: Nov. 13-28, Dec. 8-Jan.30 (30, RF 27) P: Oct. 16–Jan 15 (26)	2A: Yes (30/30, RF 5/27) P: No (26/26)
	Late	New	5	2A: Feb. 5 – Mar. 9 (10)	No (10/10)
2011-12	Regular	New	40	2A: Nov. 12-27, Dec. 7-Jan.29 (30, RF 29) P: Oct. 15–26 and Nov. 5-Jan 21 (26)	2A: Yes (30/30, RF 16/29) P: No (26/26)
	Late	New	5	2A: Feb. 4 – Mar. 7 (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 (2011-12)[1]

Species	Harvested	Composition (%)
Mallard	235,506	54
Northern pintail	26,167	6
American wigeon	69,779	16
Green-winged teal	39,251	9
Total ducks	436,120	
Large Canada	40,507	60
Small Canada	16,878	25
Total geese	67,513	
Total waterfowl	503,633	

[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 (2011-12)

Regions	Ducks Harvested	% of State Total Ducks Harvested	Geese Harvested	% of State Total Geese Harvested
Region 1	41,667	10%	9,260	14%
Region 2	97,159	22%	19,764	31%
Region 3	84,165	19%	12,888	20%
Region 4	113,940	26%	12,494	19%
Region 5	39,242	9%	5,095	8%
Region 6	59,947	14%	5,065	8%

Table 8. Sea duck harvest, 2011-12[1].

Species	Harvested
Black Scoter	54
Surf Scoter	957
White-winged Scoter	276
All Scoters	1,287
Harlequin	137
Long-tailed	153
Barrow's Goldeneye	115
Common Goldeneye	238
TOTAL	1,930

[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.	WHATCOM CO.	PACIFIC CO.	TOTAL
YEAR	MONTH	PERMITS ISSUED	SUCCESSFUL HUNTERS	HUNTER DAYS	SEASON DAYS	HARVEST	HARVEST	HARVEST	HARVEST
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	7S/10P	328	0	81	409
2009	JAN	1681	232	510	8S/10P	545	0	31	576
2010	JAN	1030	200	387	8S/10P	253	0	125	378
2011	JAN	1232	214	502	8S/10P	638	0	80	718

*Skagit closed

[1] Figures are based on mandatory report returns, corrected for non-response bias. [2] Days hunted estimate from 1990-2008 included successful hunters only

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*	HARVEST**	HARVEST**	HARVEST**	HARVEST**
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
2010	4830	770	5078	0	3388	1032	4420
2011	2776	1113	6011	0	6924	4079	11003

*days hunted estimate from 1993-2008 included successful hunters only

**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	Snow	Whitefront	Total
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	88	27	3481
	Late Season		87	2	4	59	3	52	0	207			207
2008-09	Season Total	4	1723	45	158	946	198	458	41	3573	88	27	3688
2009-10	Regular Season	13	1301	28	73	706	75	358	41	2595	8	19	2622
	Late Season		111	4	3	30	12	25	1	186			186
2009-10	Season Total	13	1412	32	76	736	87	383	42	2781	8	19	2808
2010-11	Regular Season	4	1245	17	94	525	57	297	37	2276	26	65	2367
	Late Season	1	100	3		22	2	25		153			153
2010-11	Season Total	5	1345	20	94	547	59	322	37	2429	26	65	2520
2011-12	Regular Season	1	1150	25	121	505	35	180	21	2038	16	60	2114
	Late Season		154	3	4	20	3	43		227			227
2011-12	Season Total	1	1304	28	125	525	38	223	21	2265	16	60	2341

Wild Turkey

WILD TURKEY STATUS AND TREND REPORT:

STATEWIDE

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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 opportunities.

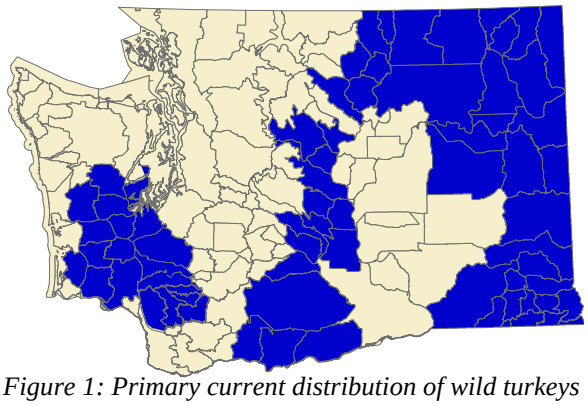

Figure 1: Primary current distribution of wild turkeys in Washington based on Game Management Units

Very few translocation activities have occurred in recent years. The WDFW management plans identify, trapping and translocation as a potential response to damage and nuisance complaints, however, none occurred during the 2011 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 required 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 made prior to the reporting requirement.

Hunting seasons for wild turkeys have varied from a 2-day, fall season in 1965 to the current 47-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 permitted. 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 2011, a total of 13,704 people hunted turkeys during the spring general season, taking an estimated 5,551 turkeys. The harvest above was a 3% increase from 2010 levels and 21% above the ten year average (Figure 2). An error within the hunter reporting system precluded estimation of fall harvest statistics in 2011.

Game Management Units have been 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 2011, spring turkey harvest increased in PMUs 10 and 15 by 31 and 13% respectively. Harvest was near average in PMU 40 and declined in the other PMUs (Figure 3). PMU 10 posted a record harvest of 3,734 birds taken after three down years and the harvest of 827 turkeys in PMU 15 was also a new high harvest. Although harvest dropped in PMU 30, the harvest of 272 birds was 44% above the prior ten year average and the remaining PMU's were near their average harvest levels.

Surveys

Between 2004 and 2010 the Colville District carried out an annual winter survey of wild turkeys in northeastern Washington (PMU 10). 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. The results of the surveys combined with an evaluation of Christmas bird count data in the vicinity indicated a population decline from 2006-2010 (Base and Shepherd, 2011)

The survey protocol above was modified in 2011 which included standardized route lengths, a higher number of routes, and each transect is now run once rather than multiple times. Because of the change the data collected in 2011 may not be directly comparable to previous surveys but in the future should be more reliable in detecting trends in distribution and abundance.

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 tend to suggest a recent increase in population.

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, but appear to have since recovered (Table 2, Figure 3). 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

PMU	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
P10	3418	3333	3401	3445	3571	3660	2677	2845	2861	3734
P15	533	443	471	480	730	605	578	761	731	827
P20	119	176	209	215	220	258	232	228	412	194
P30	105	123	178	182	169	221	172	245	417	272
P35	300	329	301	345	362	487	370	447	863	464
P40	7	9	15	10	8	9	3	5	13	8
P50	54	52	54	53	77	62	50	65	68	52
Total	4536	4465	4629	4730	5137	5302	4082	4596	5365	5551

Table 2: Estimated spring turkey harvest in each turkey Population Management Unit (PMU) 2002-2011

over decreasing populations. Harvest in PMU P20 and 30 increased substantially in 2010 but was back near previous levels in 2011 (Table 2).

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.

Region 3 turkey harvest increased in 2010 but was back near the previous levels in 2011 suggesting a stable to increasing population. PMU P30 harvest was the second highest on record (Table 2, Figure 3).

Turkey harvest in PMU P35 peaked in 2007 with an all-time high spring harvest of 487 turkeys. Turkey harvest in 2009 returned to an above average level at 447, and increased in 2010 to 148% above the average harvest of 348. The 2011 harvest of 464 turkeys was back near the previous levels possibly indicating a stabilizing population (Table 2, Figure 3). These units provide the best habitat in Southwest Washington and make up the majority of turkey harvest in Region 5.

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 the original release sites. In addition, turkeys continue to be harvested throughout the season. The 2011 harvest was below, but 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 increased the turkey population and hunting has improved to current levels.

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 2011. The 2005-2009 Wild

Turkey Management Plan identified a potential introduction area in Skagit and Whatcom counties. Potential release sites were identified in 2009 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 a turkey population in Whatcom County would ever reach the levels as those found in northeastern Washington, the concerns raised were substantial enough that moving ahead with an introduction was determined to not be an appropriate action.

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

Turkey populations across the state appear to be stable to increasing with the largest concentrations in Region 1. PMU 10 and 15 had the highest harvest and success rates. Management decisions will focus on retaining good hunter success, 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 and 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 during spring seasons. Harvest and hunter participation estimates 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. There are no plans for further translocations in the near future.

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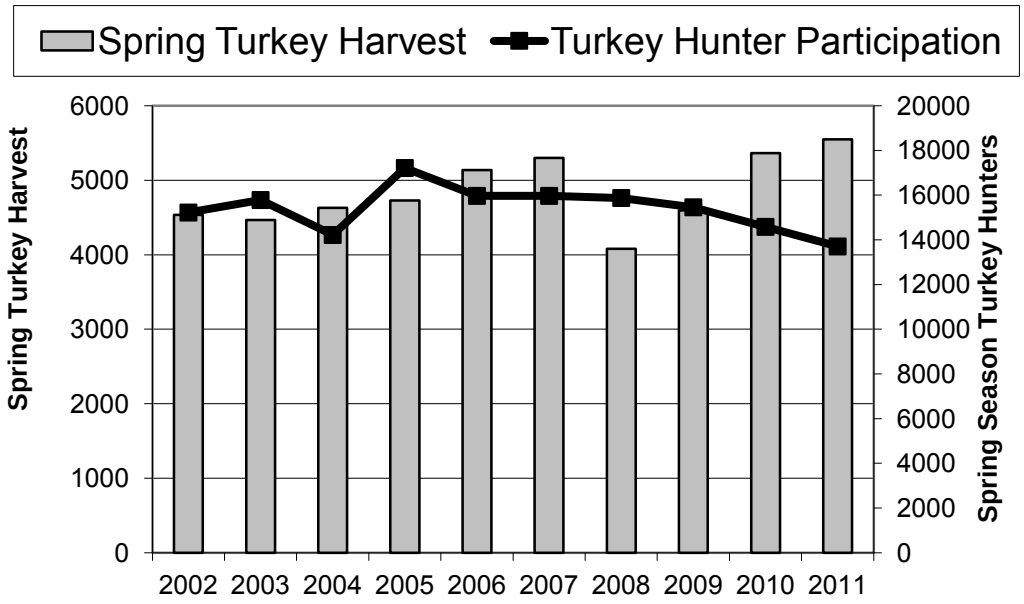

Figure 2: Estimated statewide spring turkey harvest and hunter participation 2002-2011.

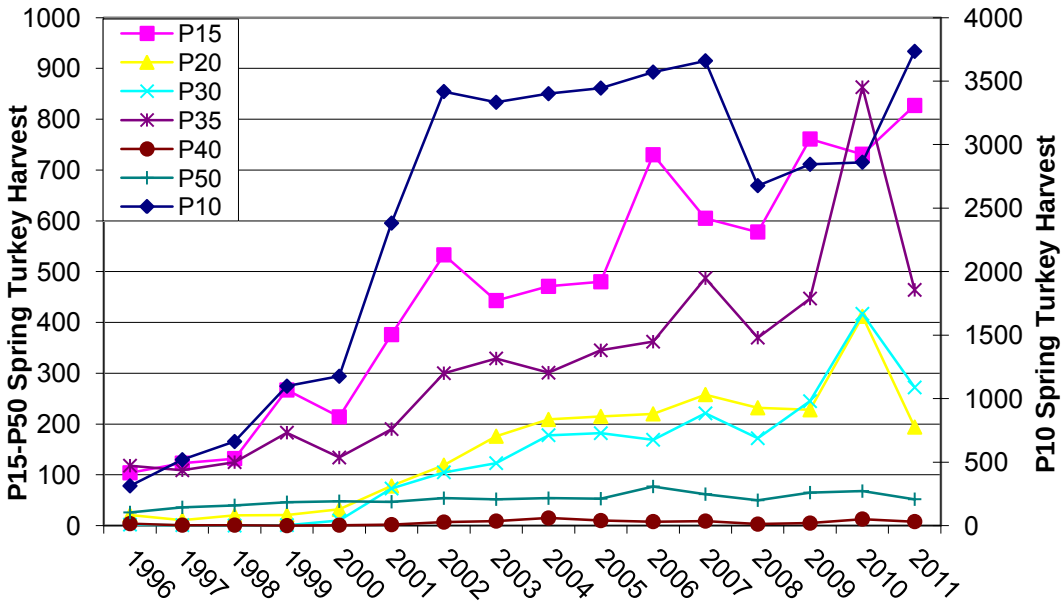

Figure 3: Estimated spring turkey harvest in each turkey Population Management Unit (PMU), 1996-2011

Pheasant

PHEASANT STATUS AND TREND REPORT
STATEWIDE

JOEY J. MCCANNA, Upland Game Bird Specialist
BRIAN M. CALKINS, Small Game/Furbearer Section Manager

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 indicated a decrease in pheasant numbers in eastern Washington (Rice 2003).

Harvest estimation between 1984 and 2011 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. Within this primary zone, WDFW has delineated a southeast Washington pheasant focus area that includes portions of Columbia, Garfield, Walla Walla, and Whitman Counties to focus pheasant management efforts where adequate rainfall (i. e., 14 inches and over) is conducive to supporting desirable, appropriate plant communities (Figure 2).

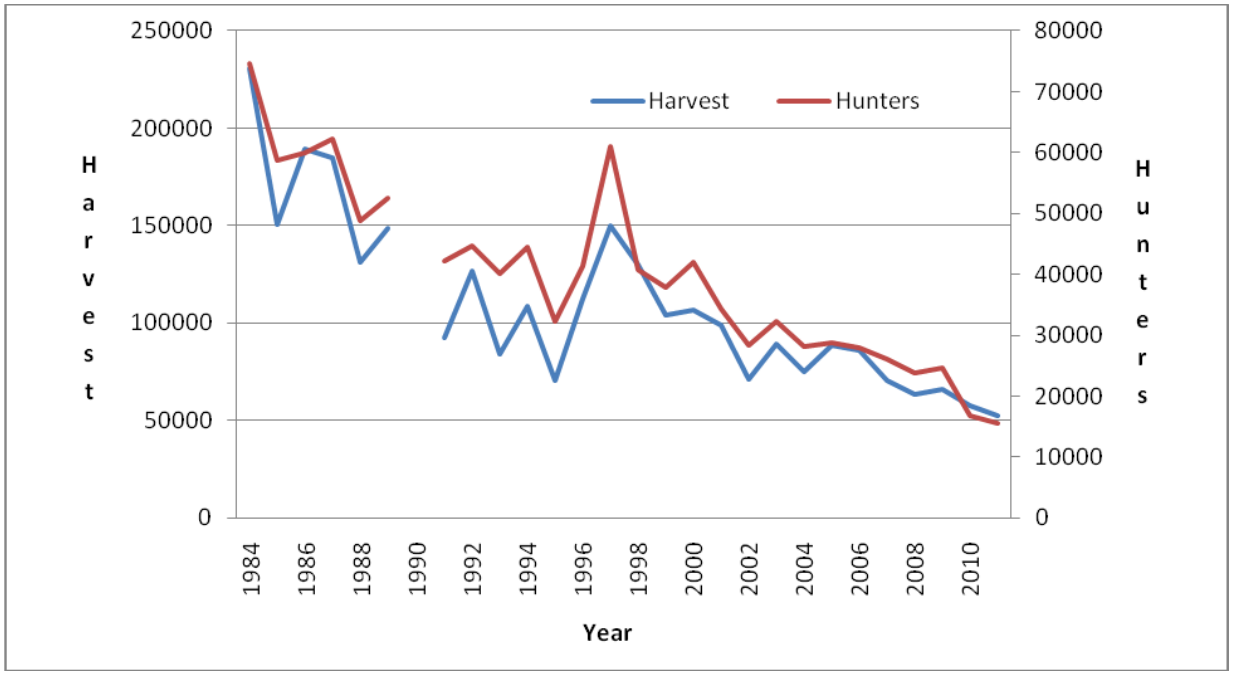

Figure1 :. Estimated annual pheasant harvest and annual hunter participation in Washington 1984-2010

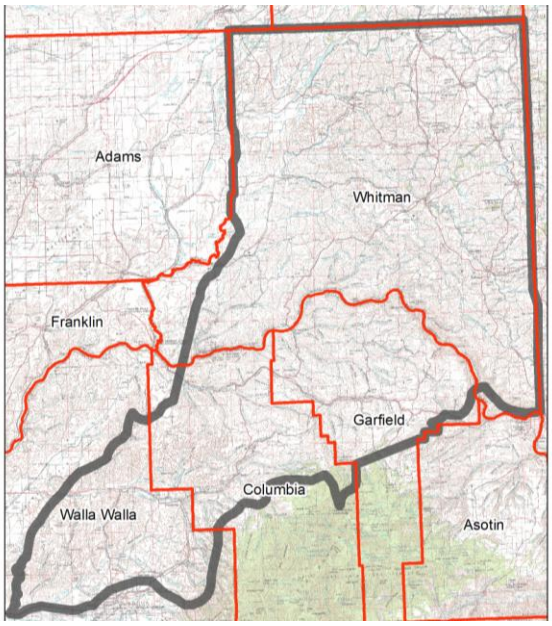

Figure 2: Washington State ringed neck pheasant primary management zone (left) and the southeast Washington Pheasant Focus Area (right)

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 2011 the department released 13,900 pheasants which is a reduction from the 2010 releases of 16,292 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.

Harvest estimates for the Columbia, Snake River, and Yakima Basins reflect decreasing trends in populations from 2002 to 2011 (Figure 3), similar to the statewide harvest trend (Figure 1). While this data has not been statistically tested at this time, differences in pheasant harvest are apparent. For this report, the "Yakima

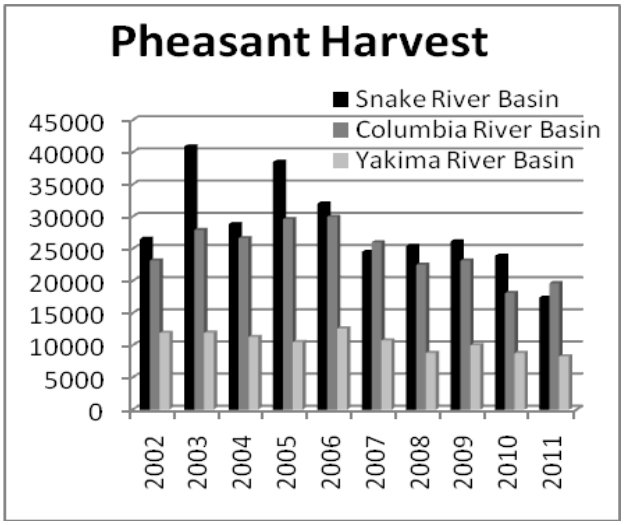

Figure 3. Estimated annual pheasant harvest for eastern Washington river basins between 2002-2011.

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 2011 estimated harvest in the Snake River Basin of 17,406 was a 27% decrease from 2010, and still 44% below the previous ten year average of 31,208. An 8% increase in harvest was estimated in the Columbia River Basin with 19,650 pheasants bagged, but still 24% below the ten year average of 25,745.

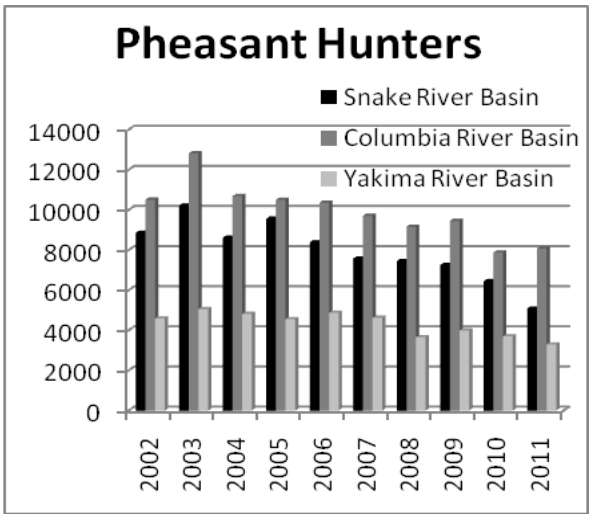

Figure 4: Estimated annual pheasant hunters for eastern Washington river basins during the period 2002-2011

The Yakima River Basin harvest decreased by 6% to 8,286 pheasants which was 25% below the ten year average of 11,096 (Figure 3).

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 2010 decreased by 21% and is 41% below the prior ten year average of 8,600. Columbia River Basin pheasant hunter numbers increased by 2% and were 22% below the ten year average of 10,338. The Yakima River Basin hunter participation dropped by 6% and remains 11% below the ten year average of 4,554 (Figure 4).

Habitat Trend

According to Farm Service Agency (FSA), a large percentage of Eastern Washington Conservation Reserve Program (CRP) acreage is expiring (USDA 2011). If not retained in permanent cover, conversion of CRP back to agricultural use could create further losses of pheasant nesting and brood rearing habitat. 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 provide technical assistance to landowners consulting about wildlife habitat and review exceptions from FSA for the nesting season management of CRP. Private lands staff also plant or coordinate planting of high-diversity mixes of grasses and forbs, shrub cover plots, and food plots across eastern Washington to benefit upland birds and other wildlife.

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 has experienced a cold wet springs in some recent years 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 et al. 2004).

Two different pheasant surveys were established in the pheasant focus area with nine survey routes in 2010. The spring pheasant crowing survey has been conducted twice each spring for the past three years between April 15 and May 25 to develop a spring male pheasant breeding population index and track land use changes over time. Analysis of the data for all three years did not produce strong evidence of a change in the population of male pheasants in the survey area. However, as the surveys continue in the future, trends may become more evident. The fall pheasant brood survey was discontinued in 2011 due to lack of survey days to meet the survey protocol. The Game Bird Specialist is working with Montana Fish, Wildlife and Parks to use climate models to evaluate brood production. This data will be provided to pheasant hunters with an annual forecast for the upcoming hunting season. The spring pheasant crowing surveys are expected to continue in the pheasant focus area and may 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.

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 trending downward. Causes of the decline are not known definitively, but habitat loss and alteration is thought to be the primary cause. Further, habitats are increasingly fragmented and isolated. In order to address this situation, the following action items have been developed to guide WDFW's efforts to improve habitats for more productive pheasant populations.

1) Continued support for an Upland Game Bird Specialist within the pheasant focus area.

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 surveys in the pheasant focus area to monitor trends and relationships to habitat conditions.

4) Continue working relationships with Pheasants Forever and Quail Forever.

5) Complete the 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 to improve habitat conditions.

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 numbers of CRP contracts expire.

12) Continue efforts with Washington State University and the Pacific Northwest Direct Seed Association to retain stubble height.

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Chukar

CHUKAR AND GRAY PARTRIDGE STATUS AND TREND REPORT: STATEWIDE

JOEY J. MCCANNA, Upland Game Bird Specialist
BRIAN M. CALKINS, Small Game/Furbearer Section Manager

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 2011-12 season was October 1st through January 16th. The opportunity to harvest partridge was also included in the September 24-25 youth hunting weekend. Daily bag limits are 6 chukar and 6 gray partridge with 18 of each in possession during the general season.

The 2011 Chukar harvest of 11,756 was a 34% increase from 2010 but 35% below the ten year average of 18,114 birds (Figure 1). Gray partridge harvest continued to increase. The harvest of 6924 was 7% increase from the prior year but 11% below the previous ten year average. Chukar hunter numbers have been on a steady decline and dropped to 3,246 which was 24% below the ten year average of 4,983 (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. Estimated chukar harvest data for the past ten years in regions 1, 2, and 3 can be found in Figure 2. Chukar hunter numbers decreased in Region 1and 2 by 12% and 14% respectively. However, participation increased in Region 3 by 22%. Harvest increased 55% in Region 1, 11% in Region 2, and 41% in Region 3. Region 1 harvest was 13% below the prior ten year average (3539), Region 2 56% below the average (8,873) and Region 3 13% below average (4,757).

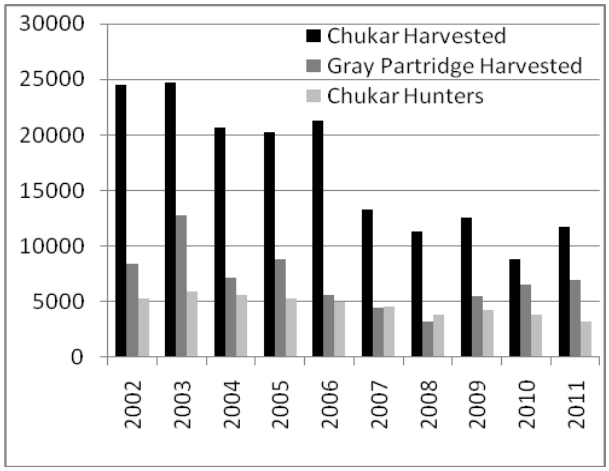

Figure 1. Chukar hunters, chukar and gray partridge harvest statewide for the period 2002 – 2011.

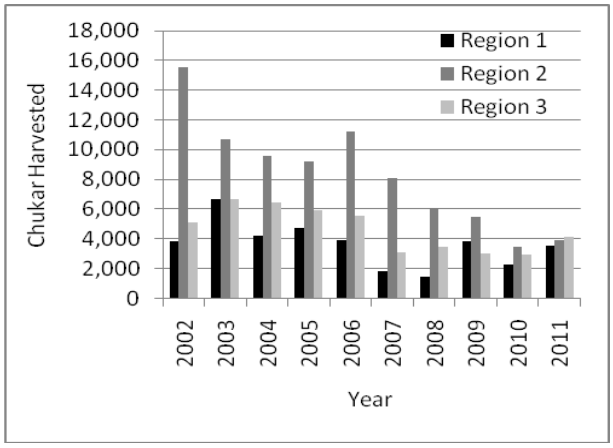

Figure 2. Estimated chukar harvest for Regions 1, 2 and 3 for the period 2002 – 2011.

Hunter participation peaked in the late 1970s and early 1980s, but has declined dramatically since then. Today, less than 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. An average of 2.7 chukars was observed on one of the survey routes in 2011. In the prior four years, no chukars were observed during the driving routes. The lower incidence of chukars observed in recent years might be attributed to the reduced mileage of the driven routes from road closure occurring in 2007. Averages of 5.6 chukars were observed on each route from 1998-2008. 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 trends suggest that the chukar population remains well below long term averages. However, reduced harvest may also be, at least partially, a function of lower hunter participation, which was at its lowest level in decades in 2011. Gray Partridge harvest increased in each of the last three seasons and was at its highest level in six years.

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 spring drought conditions in some recent years has 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

The continued decline in the chukar population may be due to diminishing habitat quality or potentially a population health problem. For example, 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 concurrent 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 an 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 further 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 weather variability and other factors which influence habitat and reproduction. Improving chukar populations will likely require extensive research into currently suppressed population.

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Quail

QUAIL STATUS AND TREND REPORT

STATEWIDE

JOEY J. MCCANNA, Upland Game Bird Specialist
BRIAN M. CALKINS, Small Game/Furbearer Section Manager

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 October 1st 2011 through January 16th 2011. A special youth only hunting weekend occurred on September 24-25. 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 October 1st through November 30th with a daily bag limit of 2 and a possession limit of 4. Mountain quail hunting was closed throughout eastern Washington.

Quail harvest has been on a declining trend since a peak of 190,062 in 2003 but shows signs of leveling off over the past several years (Figure 1). The estimated 2011 harvest of 88,678 represents a 4% decline from the 2010 harvest of 92,631 birds. Quail harvest in eastern Washington accounts for approximately 98% of the statewide quail harvest.

The 2011 harvest of 15,634 quail in Region 1 was almost identical to the 2010 harvest but 45% below the ten year average of 28,636 (Figure 2). Harvest in Region 2 declined by 6% with 36,628 quail harvested, which was 33% below their ten year average of 54,694 birds per year. The harvest of 35,078 quail was a decrease of 4% from 2010 for Region 3 and is still 26% below their ten year average of 47,642. The combined total harvest for Regions 4, 5 and 6 was up 18% at 1338 quail, with 63% of that harvest occurring in Klickitat County.

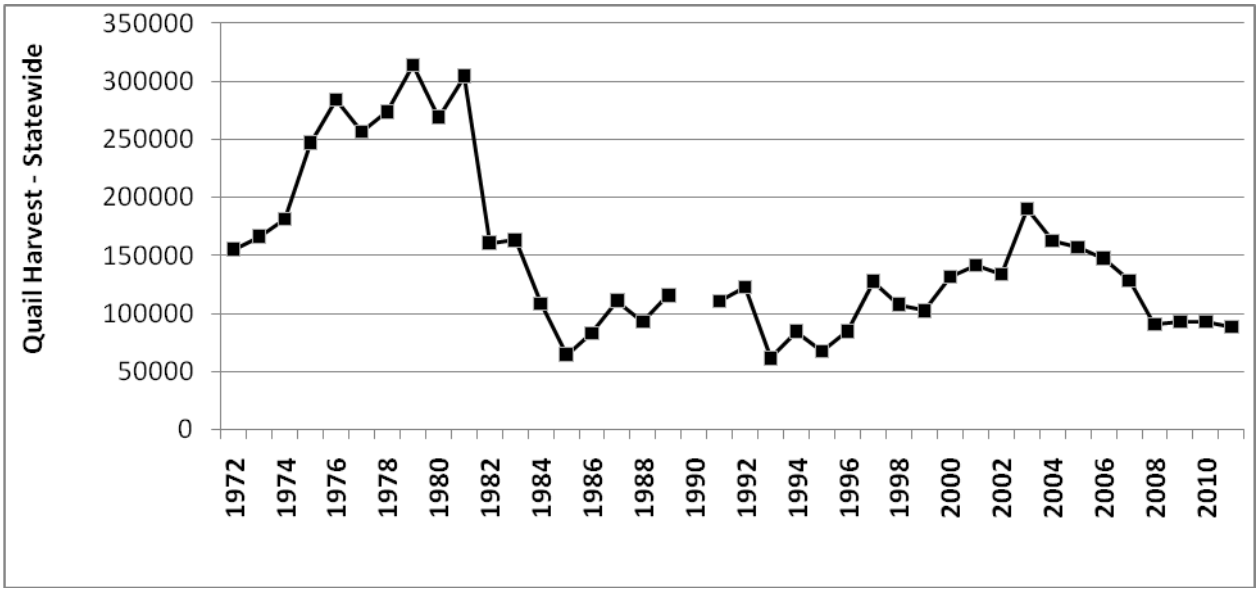

Figure 1: Washington State quail harvest data for the period of 1972 - 2011.

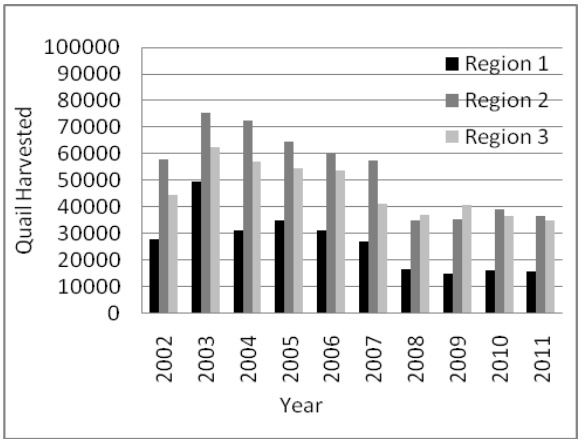

Figure 2: Quail harvest for regions 1, 2, and 3 for the period of 2002 - 2011.

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 reduced and fragmented suitable habitat for upland game birds.

A food habit study conducted in southeastern Washington performed an analysis on 157 California 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 the Farm Service Agency announced a new CRP program named State Acres for Wildlife Enhancement (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 them 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 may be lower.

Augmentation and habitat enhancement

Occasionally, Private Lands Biologists and Wildlife Area staff trap California quail from urban populations to augment populations that appear to be reduced. A small number of quail were relocated within Region 2 this year.

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.

In 2012, the Mountain Quail augmentation effort was reinitiated which included the construction of a new holding facility and the release of 94 Mountain Quail from western Oregon. However, the survival of the birds from this release was not monitored closely as was done with the initial earlier releases. A subsequent release is planned for 2013.

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. Mountain quail were either heard or observed on 2 of the 5 survey routes that year. 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).

Management conclusions

Washington Quail are major upland game bird species and of significant interest to wildlife viewers as well. Habitat improvements, including the various Farm Bill programs will be key to WDFW's ongoing efforts to enhance upland game bird populations including Quail. Riparian programs that include a mixture of shrubs, grasses, and forbs will be particularly beneficial.

The Mountain Quail augmentation project for southeastern Washington is planned to continue in the spring of 2013. Monitoring of the released birds is also planned but will be dependent upon staff availability.

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Forest Grouse

FOREST GROUSE STATUS AND TREND REPORT: STATEWIDE

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Population objectives and guidelines

Forest grouse in Washington include dusky grouse (*Dendragapus obscures)*, sooty grouse (*Dendragapus fuliginosus respectively)*, and ruffed grouse (*Bonasa umbellus*), which occur throughout the forested lands in Washington, as well as spruce grouse (*Falcipennis canadensis*), which are closely tied to higher elevation spruce/fir habitats. Forest grouse management objectives are:

1. Preserve, protect, perpetuate, and manage forest grouse and their habitats to ensure healthy, productive populations.

2. Manage for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, wildlife viewing, cultural and ceremonial uses by tribes, and photography.

3. Manage statewide populations for sustained harvest.

Brewer (1980) stated that ruffed grouse could sustain harvest of up to 50% of the fall population without threat of decline and our objective is to avoid a take that exceeds that number. Present harvest is thought to be well below 50% although exact population and harvest levels are not known.

Hunting seasons and harvest trends

A statewide harvest estimate (determined by using a mailed hunter questionnaire) is the main indicator for long-term population trends. Developing estimates of forest grouse hunter numbers and harvest is challenging because of a licensing structure that allows harvest with a big game license as well as a small game license. Forest grouse harvest survey methods were modified in 1998 and 1999 because of 1) difficulty in separating effort among the 3 grouse species, 2) inaccuracy in species identification by some hunters, and 3) changes in hunting license structure that impacted hunter sample stratification. Because of this change in survey technique, comparison of forest grouse harvest information before and after this time

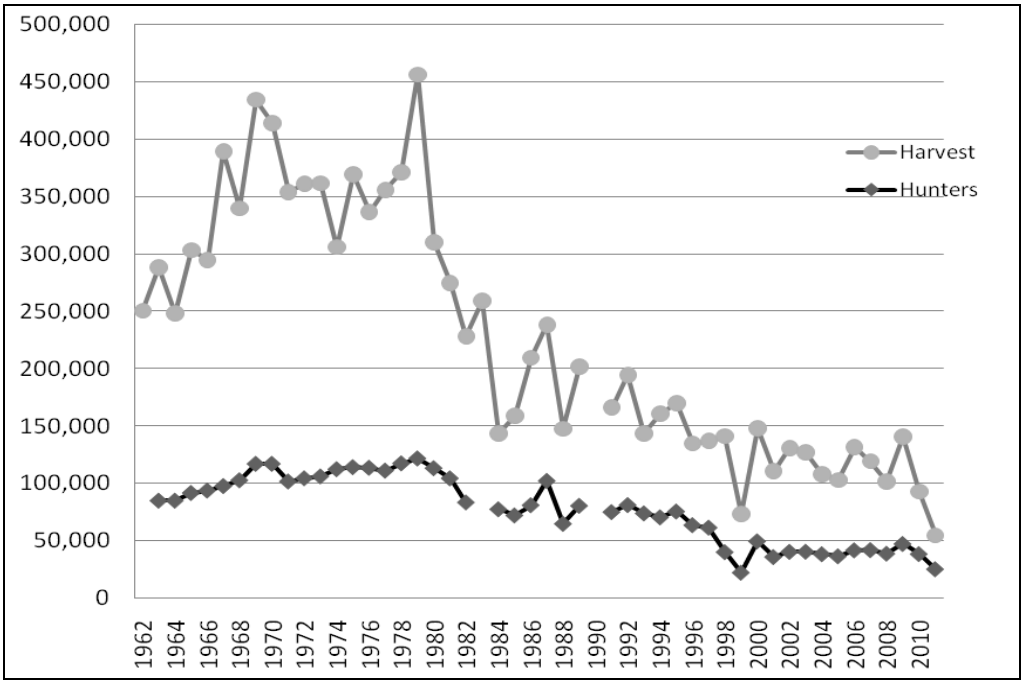

Figure 1. Long-term trend in grouse harvest and hunter numbers, 1963-2011.

should be done with some caution.

The current Sep. 1 to Dec. 31 hunting season structure has been in place since 1987. A daily bag limit of 3 of any of the three species was in place from 1952 to 2009 when the bag limit was raised to four. This increase in the bag limit was not made in response to increasing populations, but rather in response to increasing opportunity. Since hunters average had been taking approximately 0.4 grouse per day hunted, which had been the case for over 50 years, increasing the bag limit should not impact overall populations.

Estimated hunter numbers and harvest have declined from the historic highs of the 1970's and dropped sharply over the past two seasons (Figure 1). The statewide hunter harvest in 2011 was down 41% from 2010 and was 53% below the ten year average. Harvest estimates continue to be closely tied to hunter participation which dropped by 34% (Figure 1). Increased restrictions in motorized travel, particularly within industrial timberlands, may influence hunter participation as well as grouse harvest and contribute to the downward trends. Harvest monitoring since 1999 should provide comparable data. In addition, improvements in data collection and analysis should provide a better understanding of harvest both regionally and statewide.

Although grouse hunter and harvest estimates have varied substantially over time, annual estimates of harvest per hunter (an indicator of hunter success) have not declined as dramatically. Estimates of hunter success since 2000 have been higher than, or similar to, the 1980s and 1990s (Figure 2).

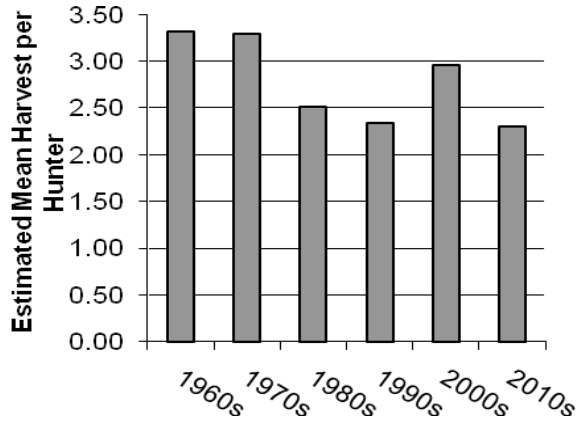

Figure 2. Estimated grouse harvested per hunter in Washington 1963-2011.

The estimated harvest and hunter numbers by region in 2011 are depicted in Figure 3. The estimated harvest for each region declined from 2010 levels (Table 1).

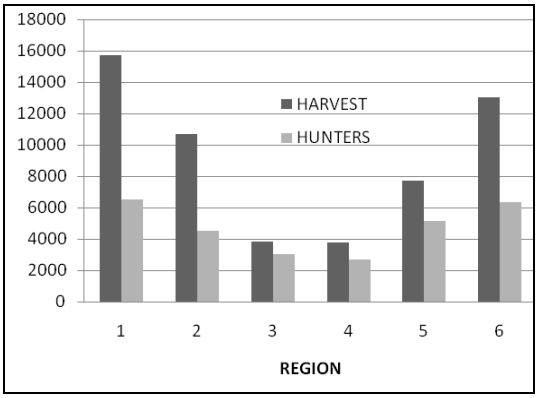

Figure 3: Forest grouse harvest and hunters by WDFW region

Region	2011 Harvest	Change
1	15697	-46%
2	10698	-43%
3	3851	-55%
4	3796	-54%
5	7727	-11%
6	13011	-33%

Table 1: 2011 regional grouse harvest and 1 year change

The cause of the long term and recent harvest declines are not definitively known, but reductions in hunter participation is a likely contributor. Changes in forest management and vehicular access restrictions may also be affecting populations and harvest opportunities.

Region 1 typically has the highest number of both forest grouse hunters and birds harvested and in 2011 29% of the grouse harvested came from this easternmost part of the state. Okanogan and Stevens Counties produced the highest numbers of Grouse in eastern Washington and Grays Harbor and Lewis Counties were the top producers west of the Cascades.

Surveys

Statewide population surveys for forest grouse are not conducted; however, some surveys continue in north-central Washington. Forest grouse wings are collected in the same areas as previous years by placing barrels in strategic locations where hunters voluntarily deposit one wing from each grouse killed. Wings are classified as to species, sex, and age. Analysis of this north-central Washington data shows harvest to be split between the three forest grouse species. In 2008, 63.4%

of the harvest was blue grouse, 16.6% spruce grouse, and 20% ruffed grouse.

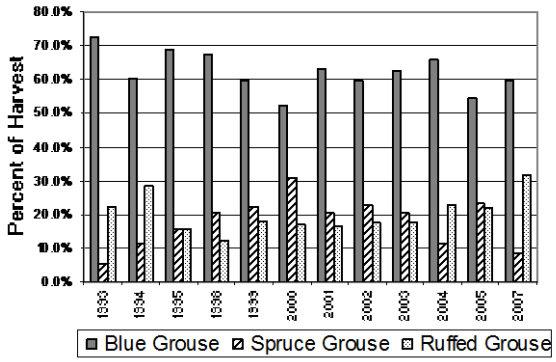

Figure 4: Forest grouse harvest distribution by species in north-central Washington 1993-2008 (Schroeder, 2007)

Statewide wing collections from 1993-95 provided several pieces of important information, such as, more than 70% of forest grouse harvest occurs in September and early October, before modern firearm deer seasons. Therefore, current seasons that extend through December probably have very little impact on grouse populations. In addition, there is a tendency for hunters to misidentify grouse species, which has resulted in forest grouse species being combined for current harvest estimation purposes.

Population status and trend analysis

Based on long-term harvest trends, it appears that forest grouse populations may be declining. However, it is difficult to draw concrete conclusions due to the fact that harvest estimating methods have changed over time. The fact that harvest per hunter has not varied much over time (Figure 2) may indicate that the number of grouse available to hunters has not changed dramatically. Since hunters are not able to consistently identify the species of forest grouse harvested, evaluating population trends for individual species is even more difficult.

Annual production is greatly influenced by weather conditions during the peak of hatching (late May early June). Wet and windy weather reduces chick survival due to over-exposure as well as reducing insect populations at the time when young grouse need a high protein diet. Weather patterns in the spring are often a good predictor of fall harvest and population.

Habitat condition and trend

Timber harvest and wildfire are the most significant factors statewide for influencing habitat condition and forest grouse population trends. In general, timber harvest activities are beneficial for most species of forest grouse. Silvicultural techniques play a significant role in the degree to which timber harvest provides benefits.

Future benefits from timber harvest will depend on the manner in which regenerating forests are managed. Regeneration techniques that include extensive broad leaf tree and shrub control, reduced stocking rates and cover density through thinning and pruning, and replanting with tree species that provide fewer habitat benefits may negatively impact grouse populations.

Conditions are similar in eastern Washington, however recent timber market changes have resulted in some timber stands becoming more valuable than they were ten or twenty years ago. Specifically, lodgepole pine forests have increased in value so there is increased interest in harvesting the timber. In addition, mature lodgepole pine forests have become infested by pine beetles, killing the trees. Forest managers want to harvest those trees before they decay or burn in wild fires.

Wild fires are an important factor influencing grouse habitat in eastern Washington. Several large fires have occurred in forested areas of Region 2 since the late-1980s. These areas are currently in early successional shrub communities, which should be beneficial to grouse for several years to come.

There is significant potential to reduce spruce grouse habitat if regeneration techniques are intensive. From a habitat standpoint the better lodgepole and spruce/fir sites may be converted to more merchantable species of trees and harvested stands may end up at much lower stocking rates than are currently present. Both of these outcomes could reduce value of the habitat for spruce grouse.

Augmentation and habitat enhancement

Supplementation of forest grouse populations is generally considered unnecessary in Washington State. No large-scale efforts have been made to enhance habitat for forest grouse. WDFW Habitat Program staff, however, frequently responds to Forest Practice Applications with recommendations to mitigate forest management impacts on grouse. These recommendations commonly include the following: leaving large down logs in timber harvest areas as drumming logs for ruffed grouse; retaining large, “wolf-tree” Douglas-fir trees on ridge tops for blue grouse winter foraging and roosting, and seeding skid roads and log landings with clover and other grouse forage plants.

Management conclusions

Management direction for forest grouse will include the following:

- Improving harvest estimation, especially on lands managed for wildlife.
- Development of population monitoring techniques for each species of grouse.
- Developing forest grouse habitat guidelines for public distribution.
- Evaluating harvest strategies

Private Lands Access

PRIVATE LANDS ACCESS

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Purpose:

The Private Lands Access Program develops and maintains public access to private property for the purposes of outdoor recreation with an emphasis on hunting. This program is a cooperative effort between the Washington Department of Fish and Wildlife (WDFW), U.S. Fish and Wildlife Service, private landowners, sportsman's groups and volunteers. Currently, the program has over 600 private landowners and over 1.2 million acres of private land under cooperative agreement in eastern and western Washington (Table 1). The program's emphasis is to continue to maintain a base of cooperative private landowner agreements and strive to increase hunting and other outdoor recreational opportunities through new initiatives and increased landowner outreach.

This program provides public access to private lands through negotiated agreements between WDFW and willing landowners statewide. To date, it has included four basic access agreement types:

- Feel Free to Hunt – All private lands where WDFW has a management agreement with the owner to provide public access for hunting in exchange for cash payments or services and materials (signs) for the posting and enforcement of regulations on these lands on an open and less restrictive basis.

- Register to Hunt – All private lands in which WDFW has a management agreement with the owner or organization where hunting is regulated by registration. Typical work includes: the annual sign-up of farmers, posting and changing signs as crops are harvested, continual monitoring of hunter use and pick up and analysis of registration forms. This is typically used on large circle-irrigation corporate farms and in some cases includes payments to landowners.

- Written Permission Program – This includes all private lands where WDFW provides information signs to those property owners who voluntarily open their land to public hunting on a contact-for-permission basis. Typical signs provided to cooperating farmers are: Hunting by Written Permission, Watch for Livestock, Close the Gate, and Don't Litter. Typical work in this sub-program is continual personal communication with farmers and farm groups explaining the availability and variety of signs offered. Permission slips for access are provided by WDFW and are collected at the end of the year.

- Landowner Hunting Permit Program – This program includes private lands where WDFW negotiates public hunting access to unique and/or high quality hunting opportunities. Landowners are allowed to work with the Department to set special hunting season dates on their property and have hunting opportunities on their lands be customized.

During the reporting period, WDFW began development of a fifth type of access management program. This new program, called "Hunt by Reservation" involves an automated on-line reservation tool which is under development and is considered a hybrid of the Feel Free to Hunt and Hunt by Written Permission programs. Even though it was not fully functional by the end of the reporting period, WDFW biologists had already enrolled 4 landowners including 1779 acres in the Reservation Program during the 2012 fiscal year. These contracts are not included in Table 1.

Regional Information:

Private lands access efforts and emphasis areas, within each WDFW region, are described below. The number of contracts and acres under contract are summarized by region in Table 2. Changes in contract numbers and acreage within each region since the last reporting period are tabulated in Table 3.

There are currently 238 cooperators and 420,712 acres enrolled in the various access programs within Region 1. There was a net loss of one cooperator but an acreage increase of 87,080 acres due in large part to the addition of two large corporate ownerships in the Feel Free to Hunt Program in Spokane, Stevens and Pend Oreille Counties. Private lands access in

Table 2: Regional totals of private lands enrolled in access contracts- 2011-2012

	Cooperators	Acres
Region 1	238	420,712
Region 2	234	451,231
Region 3	83	272,341
Region 4	31	4,077
Region 5	13	108,986
Region 6	11	1,893
Total	610	1,259,240

Region 1 is focused on pheasant and deer hunting, with some elk and turkey hunting also provided.

For this reporting period there were 451,231 acres including 234 landowners enrolled in access agreements within Region 2. This represents a net loss of 15 cooperators and 7,211 acres. Hunters access these lands primarily for deer hunting, although a substantial amount of upland bird and waterfowl hunting also takes place.

Currently there are 83 cooperators in the access program in Region 3 with a total of 272,341 acres available to the public. The large acreage drop in the region was due primarily to expiring contracts and limited staff time available to reach out to these landowners. A new staff biologist has been hired and is working to contact and reenroll landowners with expired contracts. A large portion of the acres available are signed up through the Feel Free to Hunt and the Landowner Hunting Permit programs, primarily for deer and elk hunting opportunity.

Region 4 efforts continued to focus on waterfowl, snow goose, and pheasant hunting access but a new initiative to provide deer hunting access is under way. During this reporting period there were 31 cooperators 4077 acres under a variety of contracts. Although a reported reduction of 20 cooperators since the last report seems large, acreage was only reduced by 293 acres. Quality hunting opportunities in the northern part of the region also help landowners address crop damage problems posed by large numbers of snow geese.

Private lands access programs in Region 5 have long focused on Klickitat County which has over 100,000 acres enrolled in the Feel Free to Hunt Program. Region wide there was a reduction of 2 cooperators but an increase of 2,333 acres under contract.

Table 3: Changes in cooperators and access acres from 2010-11 to 2011-12

	Cooperators	Acres
Region 1	-1	87,080
Region 2	-15	-7,211
Region 3	-13	-43,097
Region 4	-20	-293
Region 5	-2	2,333
Region 6	1	48
Total	-49	38,860

Program lands primarily provide deer hunting opportunities, with a substantial amount of wild turkey hunting in the spring and fall.

In addition, Region 5 staff worked with Weyerhaeuser Timber Company to continue their interim agreement to improve elk hunting opportunities on their ownership in Cowlitz County. Up to 12 volunteers per day, coordinated by WDFW staff, assisted with implementing the program that provides motorized access on the Weyerhaeuser St. Helens Tree Farm. Eighty percent of the Margaret Game Management Unit and 100% of the Toutle and Coweeman Game Management Units GMU were made available for motorized access. These acres are available to the public, but are not currently included in the Table 1 acreages as a formal agreement has not been reached.

In Region 6 there were 11 contracts encompassing 1,893 acres of public access opportunities during the reporting period. These opportunities included waterfowl hunting opportunities in Grays Harbor and Thurston Counties and pheasant hunting on private lands in Mason and Kitsap counties.

As in Region 5, a great deal of the effort in Region 6 is devoted to working with large industrial timber companies that are not necessarily included in formal contracts. These relationships help to facilitate public access and assist landowners in managing public recreation and providing information to the hunting public. One component of this effort was the production of a summary of access information for each game management unit in the region directed primarily to inform deer and elk hunters of access opportunities and restrictions which was well received and something we plan to build upon in the future.

Table 1: 2011-12 Private Lands Access Cooperators and Acreage by County

	FEEL FREE TO HUNT		HUNT BY WRITTEN PERMISSION		REGISTER TO HUNT		LANDOWNER HUNTING PERMIT	
County	Cooperators	Acres	Cooperators	Acres	Cooperators	Acres	Cooperators	Acres
Adams	35	38,511	63	131,014	0	0	0	0
Asotin	4	3,327	21	33,130	1	1,617	1	12,635
Benton	16	62,434	2	20,425	2	8,320	1	66,985
Chelan	0	0	1	3,280	0	0	0	0
Clallam	1	216	0	0	0	0	0	0
Columbia	5	19,156	11	20,896	0	0	0	0
Cowlitz	1	1	0	0	0	0	0	0
Douglas	29	21,534	43	100,633	2	4,040	0	0
Ferry	0	0	2	570	0	0	0	0
Franklin	33	58,103	9	12,990	0	0	0	0
Garfield	23	19,194	30	49,593	3	5,511	0	0
Grant	29	37,342	29	72,271	0	0	1	41,870
Grays Harbor	2	624	2	130	0	0	0	0
Island	1	120	0	0	0	0	0	0
Jefferson	2	126	0	0	0	0	0	0
King	1	288	0	0	0	0	0	0
Kitsap	1	200	0	0	0	0	0	0
Kittitas	0	0	2	9,120	0	0	1	410
Klickitat	8	106,226	4	2,759	0	0	0	0
Lincoln	6	7,515	33	54,708	0	0	0	0
Mason	2	288	0	0	0	0	0	0
Okanogan	1	175	1	560	0	0	0	0
Pend Oreille	1	7,757	0	0	0	0	0	0
Skagit	17	2,042	0	0	0	0	0	0
Snohomish	5	432	1	181	0	0	0	0
Spokane	1	4,890	1	2,852	0	0	0	0
Stevens	1	62,225	11	4,173	0	0	0	0
Thurston	0	0	0	0	1	310	0	0
Walla Walla	36	64,965	2	1,246	0	0	1	7,280
Whatcom	6	1,014	0	0	0	0	0	0
Whitman	14	9,713	28	27,437	2	321	0	0
Yakima	11	10,692	4	10,200	0	0	2	12,662
Total	292	539,109	300	558,169	11	20,119	7	141,842
Total Cooperators		610						
Total Acres		1,259,240						rev 6-30-12