RANGE-WIDE STATUS OF BLACK-TAILED AND MULE DEER - 2015.

Mule Deer Working Group. Western Association of Fish and Wildlife Agencies

Abstract: The purpose of this paper is to provide a general overview of the current status of black-tailed and mule deer (*Odocoileus hemionus*) population status and general abundance trends throughout their range in North America. The Mule Deer Working Group (MDWG) consists of representatives from the 23 state and provincial agencies that comprise the Western Association of Fish and Wildlife Agencies (WAFWA). The purpose of the MDWG is to provide a collaborative approach to finding solutions to improve black-tailed and mule deer conservation and management. One of the most common types of information requested of the MDWG is regarding the general population status and trajectory of black-tailed and mule deer populations. Stakeholders are interested in whether mule deer are still declining or in the process of recovering. To provide a quick snapshot of the status of this species, we assembled this information by having each agency MDWG representative provide a current population status, as well as general survey and harvest information for their respective jurisdiction. All states and provinces use very different methods to survey and estimate populations parameters and harvest. Some have more scientifically rigorous processes than others, based on their resources and management needs. Black-tailed and mule deer populations are below agency goals in all but a couple jurisdictions, however, only a few are currently declining. Most states and provinces report their populations are stable or recently recovering from previous declines. The last year has been favorable with several state and provincial mule deer populations showing noticeable improvement.

Black-tailed and
Mule Deer Distribution

Mule Deer
Working Group

WAFWA
Western Association of Fish & Wildlife Agencies

Table 1. Range-wide estimation of population size, harvest, and hunter numbers of mule deer provided by member agencies of WAFWA, 2015.

	Estimated Population[1]	Total Harvest	% males in Harvest	Hunter Numbers
Alberta	125,000	12,435	46%	35,967
Arizona	90,000 - 100,000	7,576	99%	61,680
British Columbia	100,000 - 168,000	14,301	87%	52,036
California[3]	450,000 - 550,000	38,755	98%	175,381
Colorado[4]	424,000	33,018	75%	75,818
Idaho	281,500	31,835	76%	87,403
Kansas	51,000	2,408	81%	18,678
Montana	264,546	34,481	97%	No Estimate
Nebraska[5]	77,000	9,239	81%	15,000
Nevada	99,000	8,978	80%	22,643
New Mexico[4]	80,000 - 100,000	9,809	99%	39,314
North Dakota[6]	13,260 (Badlands)	2,729	75%	7,787
Oklahoma[5]	1,500 - 2,000	167	96%	730
Oregon	225,000 - 235,000	20,127	99%	64,657
Saskatchewan	30,000-60,000	7,000	47%	10,500
South Dakota[7]	66,000- 142,000	5,400	82%	58,400
Texas	209,732	8,565	90%	24,838
Utah	355,600	30,790	92%	83,007
Washington[8]	90,000 - 110,000	10,097	90%	120,488
Wyoming	353,000	26,086	84%	48,426
Yukon	1,000	12	100%	12

[1]Estimated populations may be presented as ranges to denote the difficulty and levels of uncertainty in gathering an estimate over a large spatial scale.
[2]All data presented are from the most recent year available.
[3]Black-tailed and mule deer numbers combined. "Hunter Numbers" is actually "number of tags issued" so the actual number of hunters will be less.
[4]Population estimate, harvest, and hunters include white-tailed deer (which are approximately 5% [CO]) of the estimates and cannot be easily removed
[5] numbers are difficult to estimate as many permits allow the take of mule deer or whitetail deer.
[6] Population estimate only for the Badlands, which is the primary range.
[7] Hunter number includes whitetail hunters.
[8]Total deer hunters. Do not estimate hunters by species/subspecies.

Table 2. Range-wide estimation of population size, harvest and hunter numbers of black-tailed deer provided by WAFWA member agencies, 2015.

	Estimated Population[1]	Total Harvest	% males in Harvest	Hunter Numbers
Alaska[3]	333,000-346,000	14, 237	81%	11,361
British Columbia	98,000 - 157,000	5228	87%	10644
Hawaii[4]	1,000-1,200	36	100%	
Oregon	300,000 - 320,000	21,965	90%	98,281
Washington[8]	90,000 - 110,000	11,336	88%	120,488

[1]Estimated populations may be presented as ranges to denote the difficulty and levels of uncertainty in gathering an estimate over a large spatial scale.
[2]All data presented are from the most recent year available.
[3]Alaska estimated population estimate is provided from our population objectives, rounded up to the closest thousand. These objectives were derived based on a combination of habitat capability modeling and expert opinion panels.
[4]Population estimate includes only public hunting areas, not private land.

Alaska

Sitka black-tailed (SBT) deer are native to the wet coastal rainforests of Southeast Alaska, which comprises Alaska Fish and Game (ADFG) Region 1. Due to historic transplant efforts, SBT deer also now have established populations in parts of South Central Alaska (ADFG's Region 2), including Prince William Sound and on Kodiak and Afognak islands. Deer density on the mainland has historically appeared lower than on the islands, presumably due to lower habitat quality. Because of the island geography, varying weather patterns, different predator guilds, and differences in the extent and pattern of forest logging, deer densities can vary greatly from one game management unit (GMU) to another, and even within GMU's. Population size or density has been a challenge to calculate throughout Alaska, due to the difficulties of employing various techniques in the remote and densely forested habitats that characterize deer range in Alaska. As a result, population objectives were set for each GMU based on expert opinion and analyses of habitat capability. These objectives constitute our best guess of what populations levels may be in each GMU, but they are imprecise, and cannot be used to monitor changes in abundance. Based on these objectives, deer populations in Alaska as a whole would ideally range from 333,000-346,000. Due to the difficulty of measuring actual population size or density, since the early 1980's ADFG has attempted to index changes in deer abundance by using pellet count surveys to look at multi-year trends within various watersheds. More recently, ADFG has used fecal DNA to conduct mark-recapture population and/or density estimation, and is evaluating the efficacy of this technique for long-term use. Lastly, yearly harvest and hunter effort data provides information across multiple geographic scales. Prior to 2011, information was collected

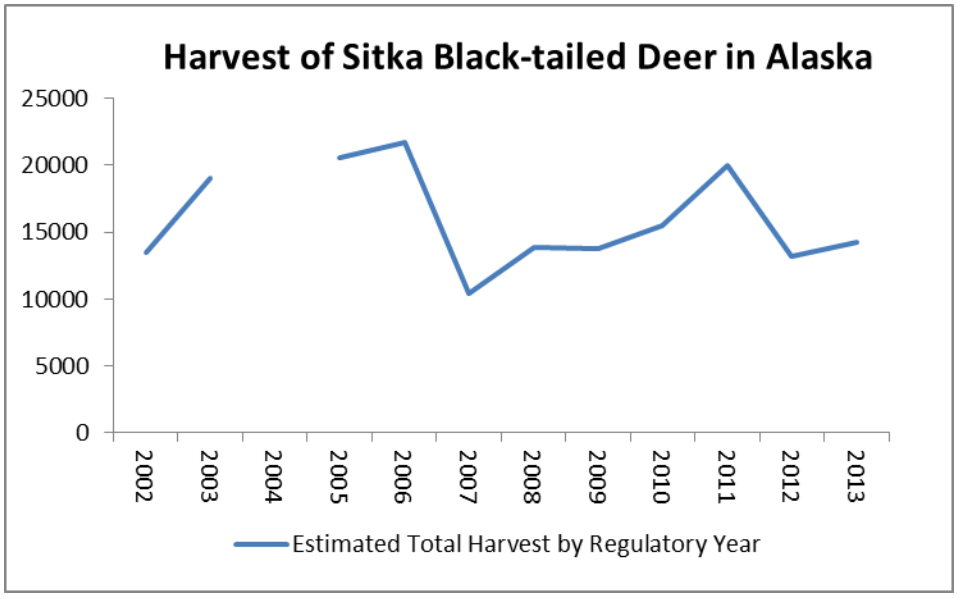
through a voluntary mail-out survey of ~30% of deer hunters, with an expansion factor applied to estimate total harvest. Approximately 65% of those surveyed responded each year. Since 2011, a deer harvest ticket system with mandatory reporting has been in place, but response rates have remained similar.

In Alaska, populations fluctuate predominately with the severity of winters - increasing during a series of mild winters and sometimes declining dramatically after one or more severe winters. Habitat change resulting from timber harvest affects deer by increasing summer browse (and browse available in mild winters with little snow) for about 30 years, before forests enter a stem-exclusion phase. Where deer become overpopulated with regard to the remaining primary winter range available to them, populations can plummet quickly when deep snow returns, and may stay at low levels if winter range is damaged from over-browsing. Predation by bears and wolves can also slow recovery of deer after these events. Harvest by deer hunters is believed to be compensatory in Alaska as a whole, due to the remoteness of most areas and lack of extensive road networks. However, where logging roads exist adjacent to communities, low snowfall in the fall or early winter may allow hunters prolonged access to deer range, and can lead to site-specific higher hunter harvest. In contrast, heavy snowfall can concentrate deer at low elevations or on beaches, and can lead to higher harvests in areas easily accessible by boat. When conditions seem to warrant, management have included closing specific areas to hunting, lowering bag limits, and temporary restrictions of "any deer" hunts to "buck only" hunts.

In Southeast Alaska, Sitka black-tailed deer are fairly ubiquitous, and the most frequently pursued big game species. Southeast Alaska experienced 2 severe and 1 above average winter between 2006 and 2009, which led to substantial declines in the deer population and management actions such as doe harvest closures were taken in parts of the region. Subsequent to the high harvest in 2006-2007, pellet-group counts went down, and much lower harvest levels were experienced. Some of this lower harvest was a result of lower effort on the part of hunters, who indicated they wanted to allow populations time to recover. From 2010-2015 we have experienced average to below average winter severity across most of the region. Overall hunter harvest and effort trends appear to be rebounding from those previously mentioned lows. Similarly, pellet group counts and populations estimates (in the limited areas where they have been conducted) indicate an increasing or stable trend in most areas. However, deer densities remain a concern in GMUs 1A and 3Z. The reduced number of deer in these areas from historical highs is thought to involve the effects of periodic severe winters, reduced habitat quality, and predation slowing deer population recovery. Intensive management (predator control) proposals were reviewed and approved by the Board of Game in 2013. In 2013, research commenced to assess deer population status and habitat conditions in certain watersheds to better evaluate the potential causes of the decline of deer in these areas. Initial DNA mark-recapture efforts failed to produce population density estimates due to a low recapture rates in this area, where the number of pellet groups seen was approximately 70% lower, and the number of fresh pellet groups collected was 90% lower, than in areas where the technique was successfully employed and deer numbers are believed to be higher. Research efforts continue to evaluate whether a higher effort in a smaller geographic area could produce a density estimate. Efforts to evaluate changes in habitat

as well as habitat quality also continue. At this time there is no plan to initiate predator control until preliminary research indicates it is warranted.

In South Central Alaska, the weather patterns can differ substantially from what is occurring in Region 1. During the winter of 2011-2012, the effects of winter severity in GMU 6 was the worst in 30 years with over 27 feet of snowfall recorded in Cordova. Winter mortality was estimated at >50% overall, and was likely as high as 70% in areas of western Prince William Sound. Deer congregating on beaches due to early and heavy snowfall increased hunter success in winter 2011-2012 to a record high, but subsequent effects of this harvest combined with high winter mortality caused a decrease in harvest numbers of approximately 80% after the winter of 2012-2013. Hunting seasons were modified in regulatory years 2012 and 2013 to reduce harvest while the population was recovering. Deer numbers are still lower than prior to 2011, but signs of recovery are noted with improvements in winter survival and body condition. GMU 6 researchers are planning to implement DNA mark-recapture to obtain density estimates in some areas. In GMU 8, the deer population of the Kodiak archipelago also declined due to the same severe weather winter of 2011-2012. For reasons similar to those stated for GMU 6, harvest for the winter of 2012-2013 was down by over 40% from the previous year. Deer mortality was greatest on the northern portion of Kodiak and the western side of Afognak Island. Since then deer populations have been rebounding with mild winters during 2013-2015. No regulatory action is anticipated for either GMU 6 or GMU 8 in the upcoming years.



-Karin McCoy, Alaska Department of Fish and Game

Alberta

The current provincial population estimate is 125,000 mule deer. For the 2015 hunting season the provincial population will support close to 25,000 hunting opportunities for residents, with antlered mule deer licenses making up 35% of that opportunity.

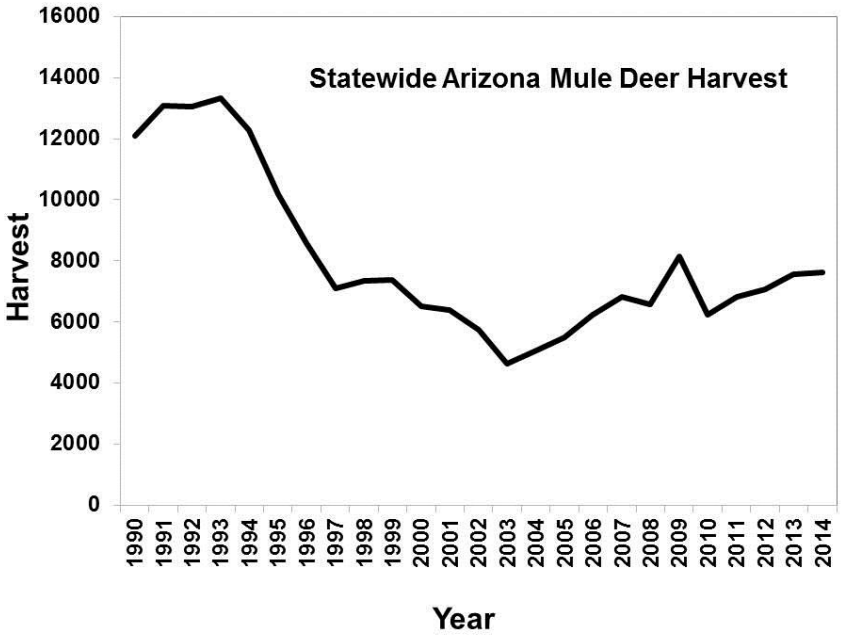
Interest for mule deer hunting opportunity continues to increase in the province, with the number of applicants last year up approximately 4% from the previous year. In the 2014 license draw, 99, 819 resident hunters applied for antlered and antlerless mule deer licenses. Over two-thirds of those applicants were interested in antlered mule deer licenses. Alberta also supports a healthy commercial hunting industry, with approximately 1,500 antlered mule deer licenses available for non-residents through outfitter-guide allocations.

Chronic Wasting Disease is present along the eastern border of the province. Disease surveillance remains in place to determine prevalence and spread, but there are no effects to populations detected at this time.

-Kim Morton, Alberta Environment and Parks

Arizona

Mule deer populations reached the most recent peak in the mid-1980s. Mule deer declined through 2000 and since then have increased gradually. Total mule deer harvest reached the most recent low in 2003, with a harvest of only 4,638 (all weapon types). In 2014, 7,567 mule deer were harvested, representing a 63% increase in harvest from that historic low point, but still only 43% of the 1986 peak harvest of 17,413. Population parameters indicate the statewide population has increased by about 30% in the last 10-15 years. Most deer populations within the state were surveyed annually using fixed-wing aircraft or helicopter with supplemental ground surveys used as well. Mule deer were surveyed during the breeding season to estimate buck:doe and fawn:doe ratios.



Hunter harvest was estimated using a voluntary post card questionnaire that may be returned with postage prepaid or responses may be entered online. Currently, we receive about 35–55% response rate, with about 15–20% of all responses online. Buck:doe ratios for mule deer were managed at 20–30:100 and currently the statewide average is 32. Alternative management units were managed at higher buck:doe ratios with added guidelines regarding the age structure of the harvest or hunter density. These units approximate about 5% of the opportunity offered annually. The statewide number of fawns per 100 does is 48 which is within management guidelines (40-50).

Recent wildfires created situations that were favorable to improved growth of deer populations, yet limited land management actions (e.g., prescribed fire, thinning) benefitting forage production are implemented annually. The Department has initiated a wildlife habitat enhancement initiative targeting habitat improvements in Units 16A and 21. During fiscal year 2015, about $800,000 will be spent in these units ($400,000 each), with an additional $1,000,000 in fiscal years 2016 and 2017. The goal of this initiative to effect a population-level change due to the habitat improvements implemented on the ground.

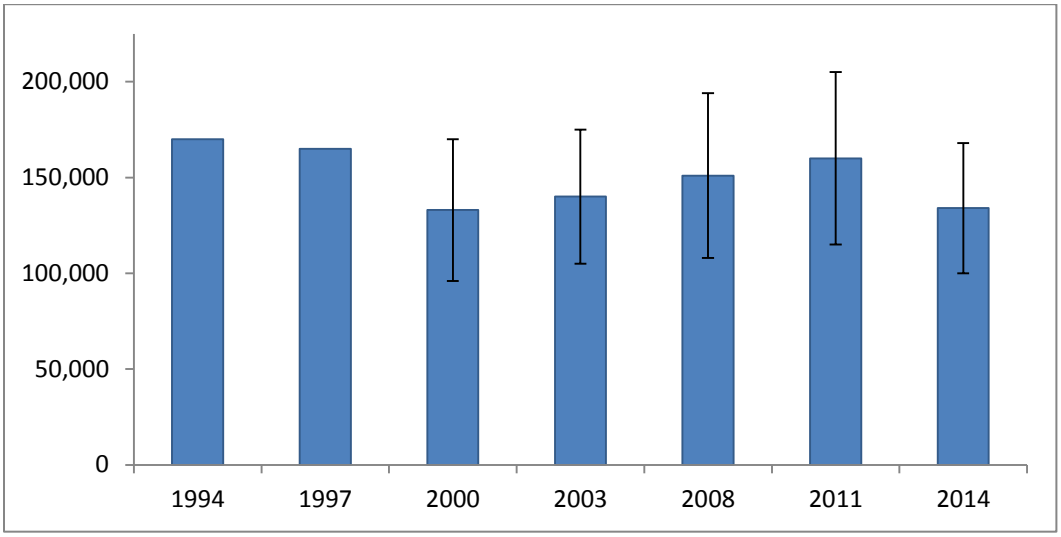
-Amber Munig, Arizona Game and Fish Department

British Columbia

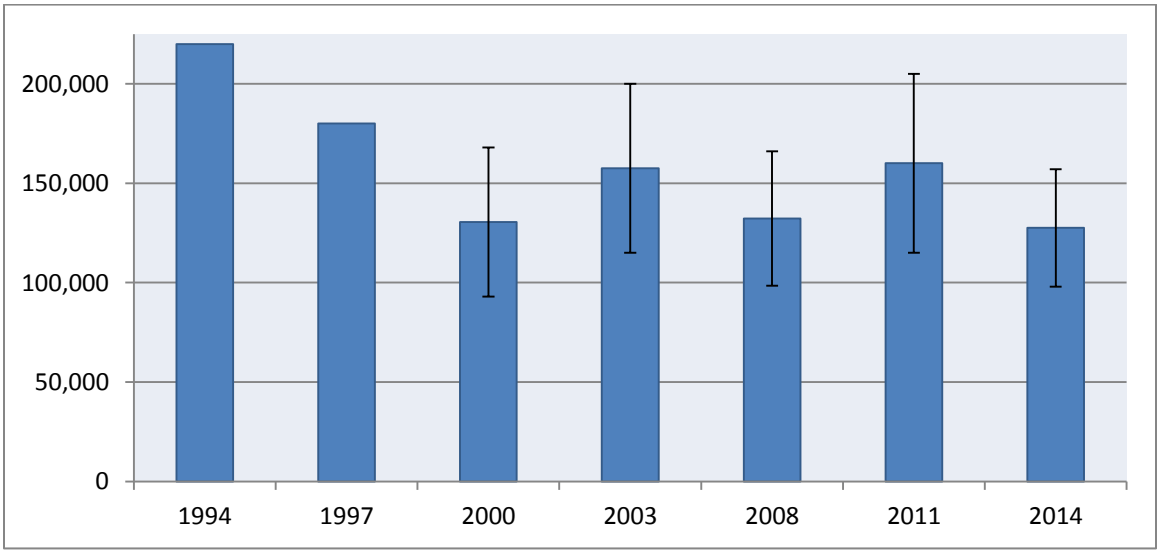
Mule deer abundance in British Columbia remained relatively stable from 1994-2011 with slightly lower numbers in 2014 than 2011 but similar to previous years. This may be representative of lower mule deer numbers in localized areas in south-central, southeast, and northeast parts of the province. Lower deer numbers may be attributed to increased predation by wolves, cougars and bears, declining quality and quantity of forage and severe winter conditions in some areas. Stable to increasing mule deer populations in other parts of the province may be due to frequent mild winters and increased forage availability resulting from large wildfires and other disturbances. Mule deer harvest is managed with a general open season for bucks and some opportunity for antlerless harvest through limited entry hunts. Buck harvest has ranged from about 10,000 to 19,000 from 1987-2013 and remained relatively stable in the last five years. The recent large-scale mountain pine beetle outbreak with associated pine-tree mortality and salvage logging in central and southern portions of the province has resulted in increased density of roads and thus increased hunter access to deer habitat. Continued increases in hunter numbers and access, combined with reduced habitat quality, could challenge future management objectives under a general open season.

Provincial black-tailed deer numbers had a similar trend to mule deer numbers in that they also declined slightly from 2011 to 2014 but were similar to previous estimates. There continues to be concerns of increased predation from wolves and cougars on black-tailed deer and some need for effective measures to conserve high quality habitat. Estimated annual black-tailed deer buck harvest was about 10,000 in the early 1990s and has dropped to 4,000 to 6,000 from 1996-2013. There are limited opportunities for antlerless harvest, most of which occur in agricultural areas. Overall, increased predation combined with hunter access to remote areas and extensive second growth logging activities in much of the black-tailed deer range has negatively impacted deer numbers. This has resulted in challenges for maintaining the current hunter harvest especially if

adequate winter ranges are not present. In areas of intensive forestry activity, increased road density was assumed to result in increased predation rates and hunter success.



Mule deer population trends in British Columbia

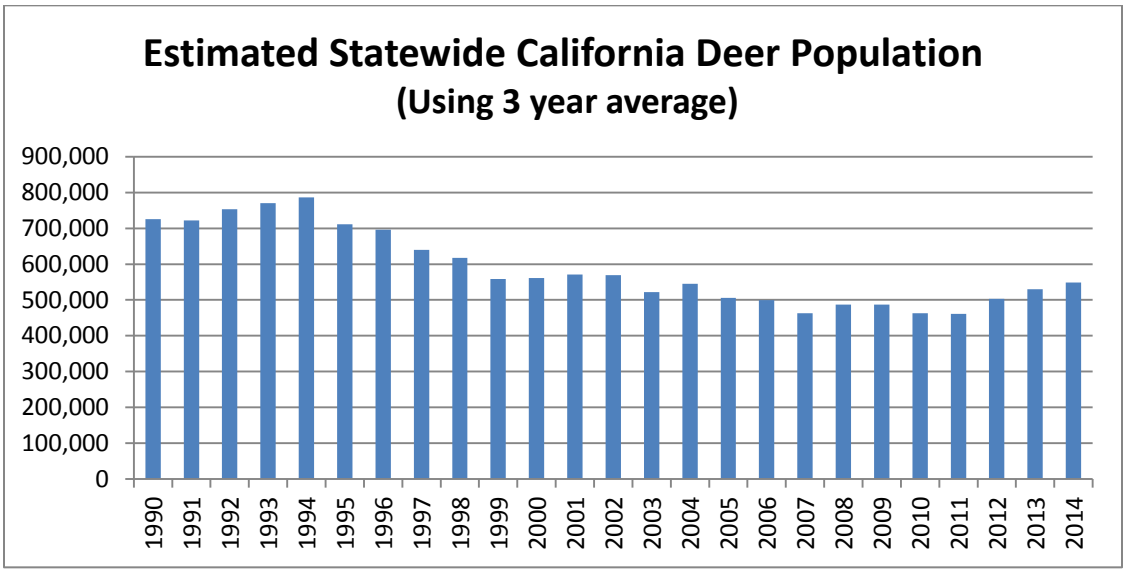


Black-tailed deer population trends in British Columbia.

-Gerry Kuzyk, British Columbia Ministry of Forestry, Lands and Nat. Res.

California

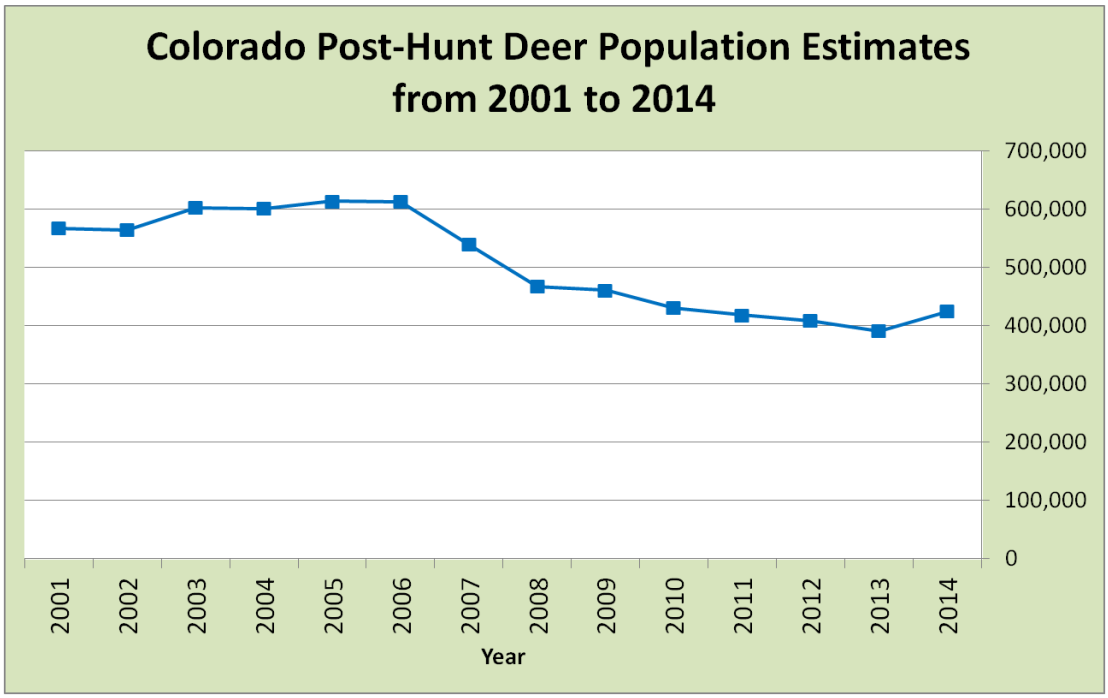
California's deer population estimates are showing an overall stabilization of deer numbers following the recent decline that began in the early 1990's. Individual deer populations may not conform to this generalized trend due to the diversity of habitats and factors impacting deer and their ranges. Populations are estimated by hunt zone using a predictive population model that estimates post-harvest adult deer population levels. Deer population performance is measured using hunter success, buck ratio data, and over-winter fawn survival (where appropriate - mainly in migratory herds in areas that annually receive snow). Harvest is conservative in California, with 98% of deer taken being bucks. Hunter success statewide averaged about 21.6% in 2014.



-Mary Sommer, California Department of Fish and Wildlife

Colorado

The statewide post-hunt 2014 deer population estimate is 424,000, compared to 391,000 in 2013 (Figure 1). This is the first increase in the statewide total population estimate since 2005. Population estimates are still far below the sum of statewide population objective ranges of 500,000 - 556,000 spanning 55 deer herds. Annual population and sex ratio estimates are compared to long-term population and sex ratio objectives for each herd to establish harvest quota recommendations for the next hunting season.



Population estimates are produced with spreadsheet models using data from age and sex classification, harvest surveys, and survival monitoring. Colorado Parks and Wildlife (CPW) has a desire to stabilize, sustain, and increase deer herds which have experienced recent declines. CPW is in the process of implementing the West Slope Mule Deer Strategy which consists of seven Strategic Priorities.

While there's reason for concern in many western herds, others are performing well. The diversity of deer habitat types and environmental conditions around the state create considerable geographic variability in population performance. Most deer herds in the central and northern mountains are performing well, and population sizes and license numbers are increasing. Many plains deer populations remain relatively stable and are providing good hunting opportunity.

CPW intensively monitors annual adult doe survival and winter fawn survival in five mule deer herds. Additionally, we monitor buck survival in two of those herds. Survival rates from these herds are used in deer population models. Survival rates in all five monitoring areas were high during the winter of 2013-2014, and remained high this past winter. Many records for high survival have been broken the last few years. The combined long-term averages for annual doe and winter fawn survival rates are 83% and 70%, respectively. Buck survival has averaged 84%.

CPW conducts post-hunt herd inventories with helicopters to estimate the sex ratios of males/100 females and the age ratios of young/100 females. In addition to survival rates, these ratios are needed to estimate population size using population models. The average of sex ratio objectives for deer herds statewide is 30 bucks/100 does. During the post-hunt herd inventories in 2014, biologists classified 69,000 deer and observed an average sex ratio of 35 bucks/100 does compared to 33 bucks/100 does in 2013. The statewide average observed age ratio from helicopter inventory was 60 fawns/100 does.

All mule deer hunting in Colorado is by limited license. In 2014 we issued 83,000 deer licenses, 97% of which could be drawn with 0 to 3 preference points. High fawn/doe ratios and high over-winter fawn survival the last few winters have had the combined effect of increasing populations and buck/doe ratios in many herds. Based on these high observed post-hunt sex ratios and high hunter success, which averaged 48% for all rifle seasons in 2014, overall buck hunting continues to be good. Barring a difficult winter, high buck/doe ratios should translate into increased hunter opportunity in the future.

-Andy Holland, Colorado Parks and Wildlife

Hawaii (Kauai Island: Introduced Black-tailed Deer)

Since the introduction of the Oregon black-tailed deer to west Kauai in 1961, its range has expanded to south and east sections of the island. The deer population on Kauai's public hunting areas is estimated to be between 1000 to 1200 animals. Population estimates on private lands are not known at this time. Kauai uses the Aldous (1944) browse survey method which was modified to better fit Hawaiian environments. Kauai experienced 2 major wildfires in 2012, the Kokee forest fires consumed just over 1000 acres of State Forest Reserves and severely impacted much of the deer hunting range. The 2013 deer hunting season was again restricted to portions of the range that recovered from the wildfires. All black-tailed deer hunting units were re-opened in 2014 due to adequate habitat and population recovery to justify full open season. The average body weights improved slightly from the previous season and the overall health of the herd appeared to be very good. Starting this year, there will be changes in 2 of the 8 deer hunting units. The changes include year-round hunting and increased bag limits. The increased hunting pressure is needed to reduce the ungulate numbers including feral pig and feral goat to protect the native forest watershed from damage. These hunting units contain a large number of threatened and endangered plants and forest birds. The other 6 hunting units remain seasonal hunts during the fall.

Trends in harvest of black-tailed deer from 2003 to 2014 on Kauai public hunting areas.

Year	Buck	Doe	Total
2003	45	19	64
2004	39	12	51
2005	32	8	40
2006	32	2	34
2007	32	4	36
2008	51	2	53
2009	29	0	29
2010	26	0	26
2011	30	0	30
2012[1]	4	0	4
2013[1]	5	0	5
2014	36	0	36

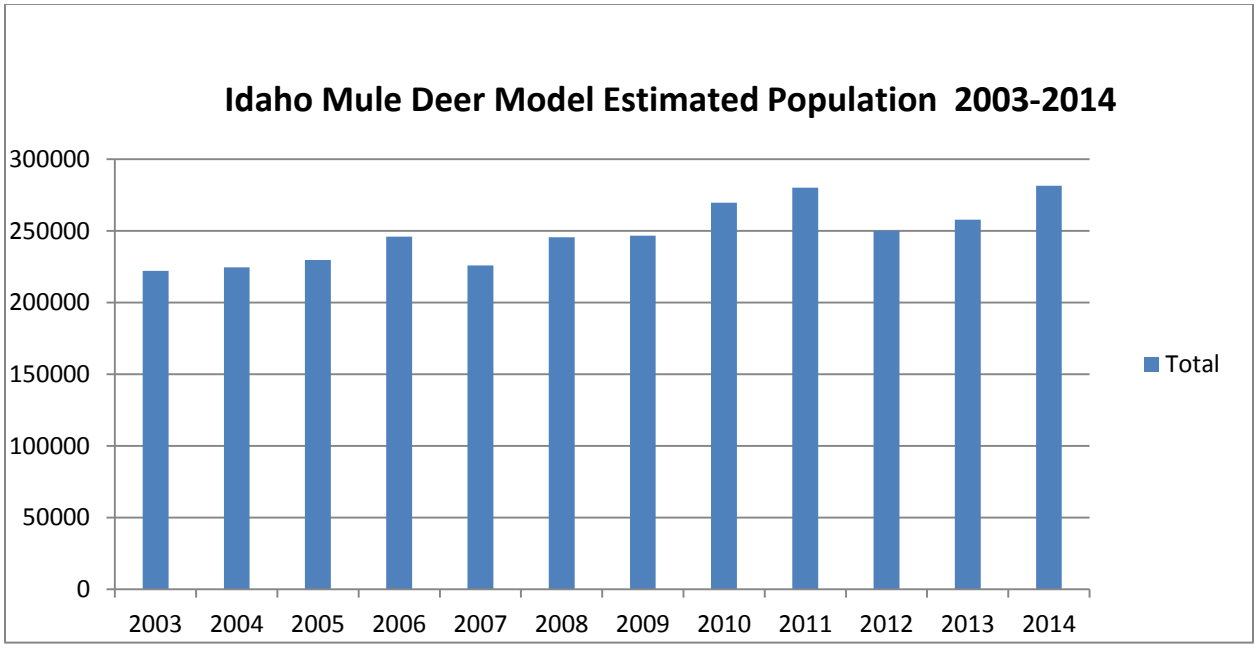
-Thomas Kaiakapu, Hawaii Division of Forestry and Wildlife

Idaho

Idaho's mule deer population appears to be increasing over the last four years (2011-2014). The state is in the process of converting population monitoring to allow total population estimates through a combination of sightability, survival estimates, composition surveys and modeling. Although not all areas have yet been assessed, recent winter population levels have likely been between 246,400 and 328,500 (281,502 midpoint). Short- and long-term objectives are to increase mule deer numbers. Post-season buck ratios exceed the statewide minimum objective of 15:100 does. December fawn: doe ratios have shown increases over the typical (mid 50s to mid 60s), and fawn survival have been high from 70% to 78%.

Mule deer harvest in Idaho has been stable to increasing since the mid-1990s (average = 26,404 bucks) following a steep decline in harvest in the early 1990s. Recent years' license and tag sales data indicate an increase in nonresident hunters in Idaho. Percent bucks with 4-point or better antlers in the harvest has remained at or above 40% since 2010.

The next step of implementing our 2008 mule deer plan is to set population objectives by population management unit statewide and to do a statewide mule deer hunter attitude and opinion survey similar to the 2007 effort to be completed in 2015.



Mule deer population estimate from the Salmon River drainage south. Estimates are midpoint of Confidence Limits based on Integrated Population Model.

Population Parameters from Idaho mule deer surveys, 2003-2014.

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Fawn:Doe[1]	56	63	61	56	60	61	61	55	63	67	67
Buck:Doe[2]	19	21	22	16	15	17	21	15	21	26	26
Fawn Survival[3]	0.54	0.76	0.31	0.69	0.30	0.52	0.68	0.32	0.61	0.72	0.78
Adult Doe Survival[4]	ND	ND	0.87	0.89	0.90	0.90	0.95	0.82	0.95	0.97	0.98

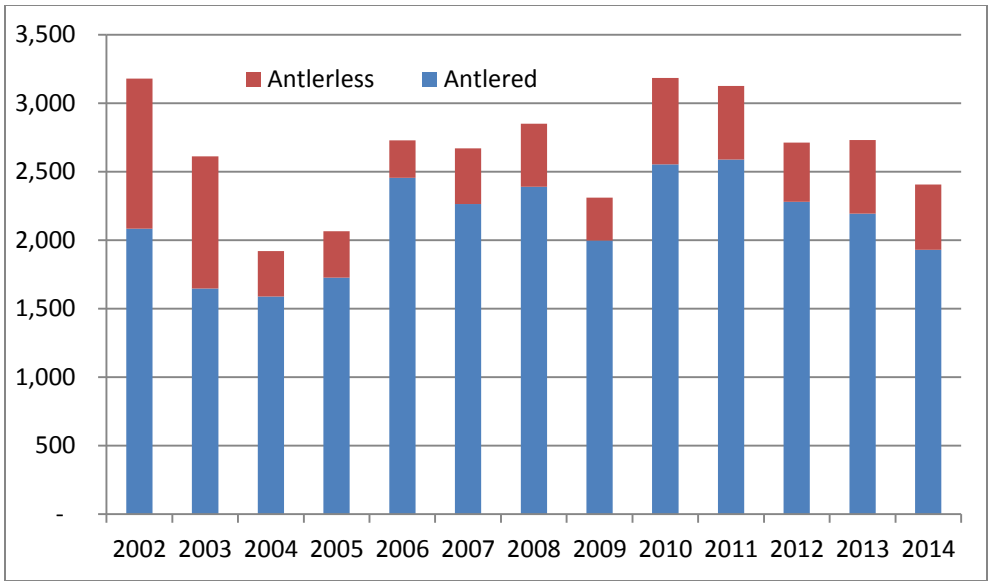
[3] Fawn Survival = overwinter fawn survival (December - May),
[4] Adult Doe Survival = annual survival (June - May)

-Toby Boudreau, Idaho Department of Fish and Game

Kansas

The mule deer population in the west zone of Kansas in 2014 was estimated to be 1.9 mule deer/mile^2 (95% CI: 1.1 - 3.2) using distance sample surveys while the density in the eastern zone was estimated to be only 0.1/mile^2 resulting in a pre-firearm season population estimate of 51,000 mule deer. Hunters have taken an average of 2,654 mule deer/year during the last 13 years.

Management for mule deer receives enthusiastic support from deer hunters. However, no research estimates of survival, reproductive rates, or movement patterns of mule deer have been made in Kansas. Hunting regulations in Kansas have been liberal for white-tailed deer while being restrictive for mule deer. Mule deer could be taken on 15.5% of the either sex deer permits issued in Kansas last year. Landowners received 52% of those permits. Each of those permits allowed only one deer to be taken and all permits that allowed the hunter to take a mule deer were valid for a white-tailed deer. This practice generally takes hunters out of the field earlier in the season compared to a mule deer only permit system and takes pressure off mule deer while allowing approximately 19,000 people to have the potential to pursue mule deer. In an effort to expand and increase the mule deer population, reductions in the permit quotas will occur for 2015.



Trends in the number of mule deer harvested in Kansas, 2002 to 2014.

-Lloyd Fox, Kansas Department of Wildlife, Parks and Tourism

Montana

Montana Fish, Wildlife and Parks (FWP) provides an estimate of mule deer numbers on our public website because of a statutory requirement that we do so. However, that estimate is based on a crude model that uses harvest, fawn:doe and buck:doe ratios as inputs and we have little confidence in it. For management purposes FWP relies on population indices from aerial surveys of 102 trend areas across the state that represent different habitats and populations and on harvest information.

Mule deer in many of the trend areas across Montana have experienced significant declines in observed numbers since 2003. In Montana the most recent peak in antlered harvest was in 2003 when 44,528 antlered bucks were harvested. Between 2003 and 2011 that harvest dropped 34.2% to 28,985 bucks. Since 2011 we have seen a slight improvement in harvest to 33,509 antlered bucks taken, although this number is still well below the long-term (1960-2012) average of 46,010. Mule deer populations in western Montana continue to perform poorly and declines there have generally been more noticeable than in eastern Montana. Harvest management responses have included conservative adjustments to general license harvest opportunity (fewer either- sex season types) and dramatic reductions in antlerless licenses. Harvest of antlerless mule deer declined from 23,241 in 2003 to only 965 in 2014. With mule deer populations recovering in many parts of the state FWP is offering more opportunity for antlerless harvest in 2015 with either sex season types or antlerless-only licenses in some parts of the state.

-Jay Newell and John Vore, Montana Fish, Wildlife and Parks

Nebraska

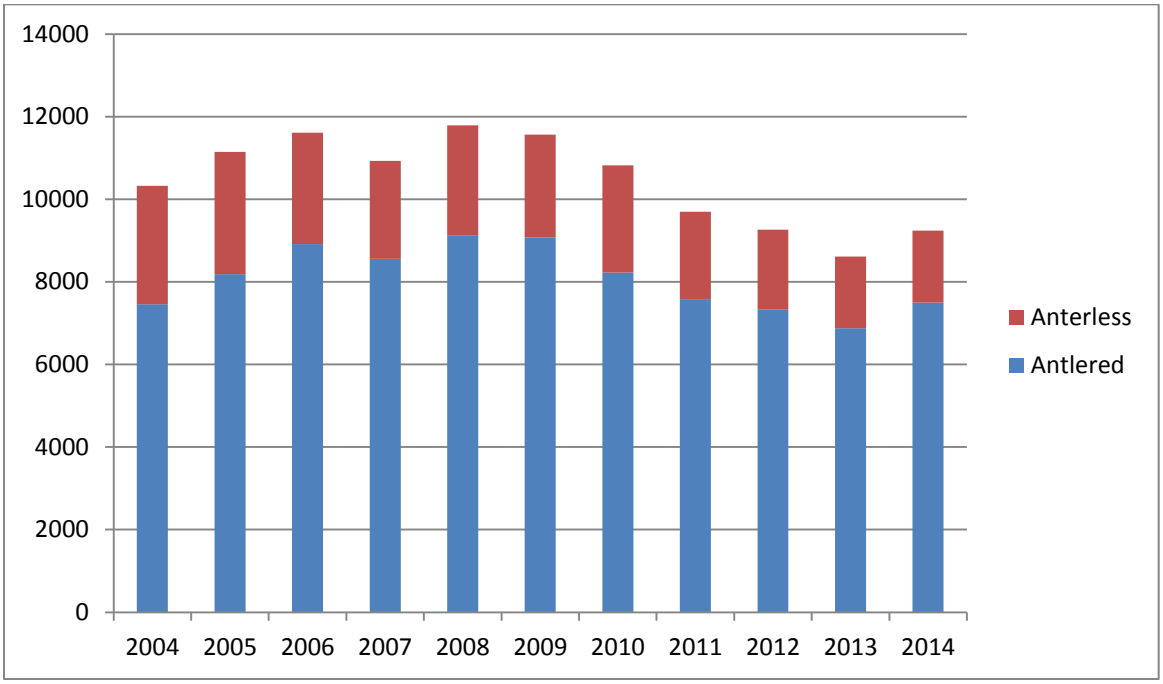
Mule deer population trends are based on total adult buck harvest at Deer Management Unit (DMU) level. Mandatory check of all harvested deer is required. More than 4,000 mule deer are examined and aged by staff biologists annually. Barring

significant change in buck permit allocations this provides a consistent indicator of annual population and age structure change at DMU level.

Management objectives for each DMU are based on: population trends; agricultural damage complaints; age of harvested bucks; permit demand; deer vehicle collisions and public input.

Harvest of mule deer buck harvest was 7,497 in 2014, up 9% from 2013 and down 16% from the record high of 9,115 in 2008. Populations in most units appear to be increasing in response to harvest restrictions on females and improved habitat conditions due to increased moisture. Antlerless harvest of the past two years is the lowest recorded since 1980-81. Additional antlerless mule deer restrictions in 2015 will result in further reductions in antlerless harvest.

Trends in mule deer harvested in Nebraska 2004-2014.



-Kit Hams, Nebraska Game and Parks Commission.

Nevada

Nevada hunters purchased 22,643 mule deer tags in 2014 which was slightly lower than the 22,992 sold in 2013. The decrease in tag sales was reflective of a decrease in the 2014 quota and resulted in a total deer harvest of about 9,000 compared to the 9,400 deer harvested in 2013. Of the 8,978 deer reported by hunt questionnaires in 2014, 7,413 were bucks and 1,434 were does. The 2014 statewide hunter success for all deer hunters was 44%, which was nearly identical to the hunter success observed during 2013.

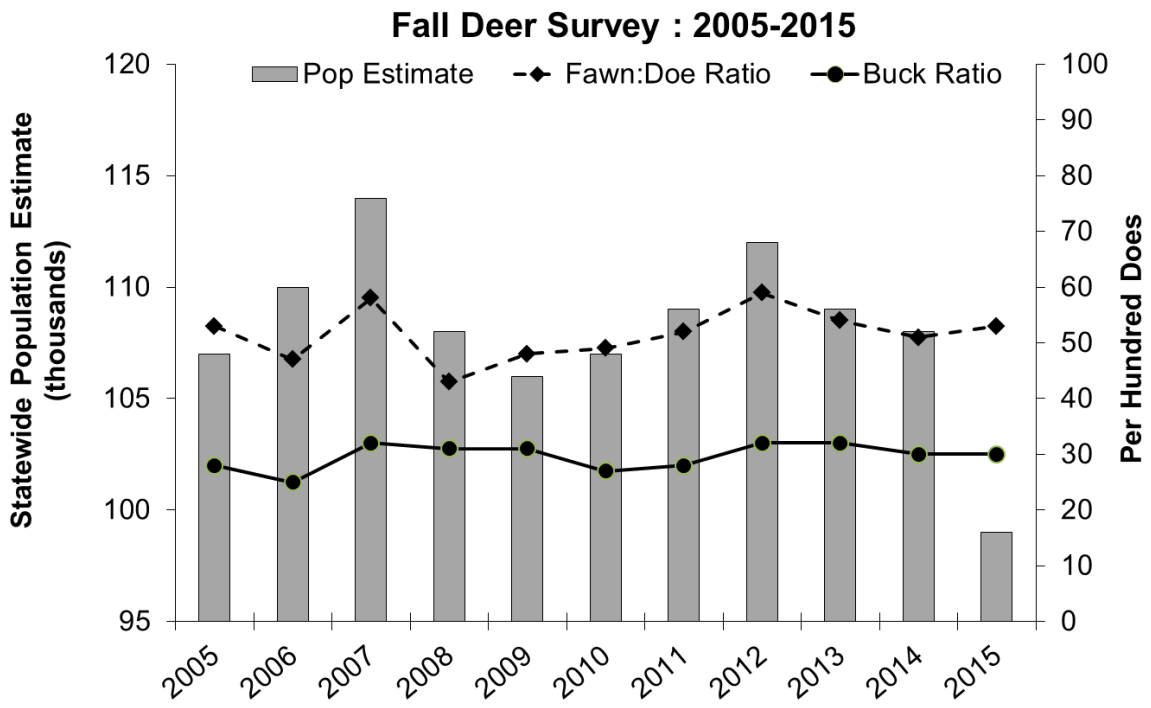
The 2014 post-season aerial survey observations were down from the 2013 survey with about 19,500 mule deer classified statewide compared to 21,400 in 2013, and 34,000 deer classified in 2012. Statewide fawn production was slightly higher during 2014 with 53 fawns:100 does counted for the fall post-season surveys. The post-season buck ratio was measured at 30 bucks:100 does. This buck ratio meets the statewide management objective and continues to provide a good balance of hunter opportunity and quality

experience. The 2013 spring deer surveys classified 16,460 deer compared to 27,888 during spring 2013. The survey results showed a slight improvement over the 2013 survey with 38 fawns:100 adults observed, likely due to extremely mild winter conditions.

Nevada's mule deer populations have been declining over the past several years. The 2015 population is estimated to be about 99,000 mule deer, down from the estimated 108,000 in 2014. The drop in the model-generated estimate for the deer population may not necessarily indicate the precise magnitude of the decline. Models were adjusted to better incorporate recent trends in harvest data, survey results, and radio telemetry information from several mule deer studies throughout the state. Nonetheless, the 2015 population estimate of 99,000 mule deer marks the first time since the 1970s that the population has dropped below 100,000 animals. Tag quota recommendations have been lowered in many areas of the state in response to this population change.

To address declining mule deer populations and concerns from sportsmen about hunting opportunities across the state, NDOW has been working with our partners and federal land management agencies to implement habitat enhancement projects throughout the state and incorporate predation management actions where appropriate. To date, more than 750,000 acres have been slated for restoration efforts and habitat improvement projects over the next 5-10 years. Many of these projects are already being applied on the ground. However, challenges remain with funding large scale habitat projects, and complying with NEPA requirements can be challenging and time consuming. Additionally, persistent drought conditions and lack of a significant snow pack in 2015 has exacerbated some of the stressors of rangeland conditions and mule deer including competition for resources with other grazing animals.

The Game Division continues to conduct a large-scale research and monitoring study that was initiated in 2011. The results of this study have provided valuable information with regards to survival rates, body condition, and migration corridors. To date over 800 radio-telemetry collars have been deployed on mule deer throughout the state since the study began. During January 2015, NDOW deployed an additional 35 GPS satellite radio-telemetry collars in the Eastern Region and 25 GPS satellite radio-telemetry collars in the Western Region to gather baseline information on survival, migration patterns, and habitat use. The data gathered will enhance our understanding the relationship between habitat conditions, predator populations, and population performance, especially given the challenges that mule deer herds face in the coming decade.



Trends in statewide mule deer survey data and population estimate for Nevada, 2005 to 2015. Population estimates are generated using a deterministic spreadsheet model.
-Cody Schroeder, Nevada Department of Wildlife

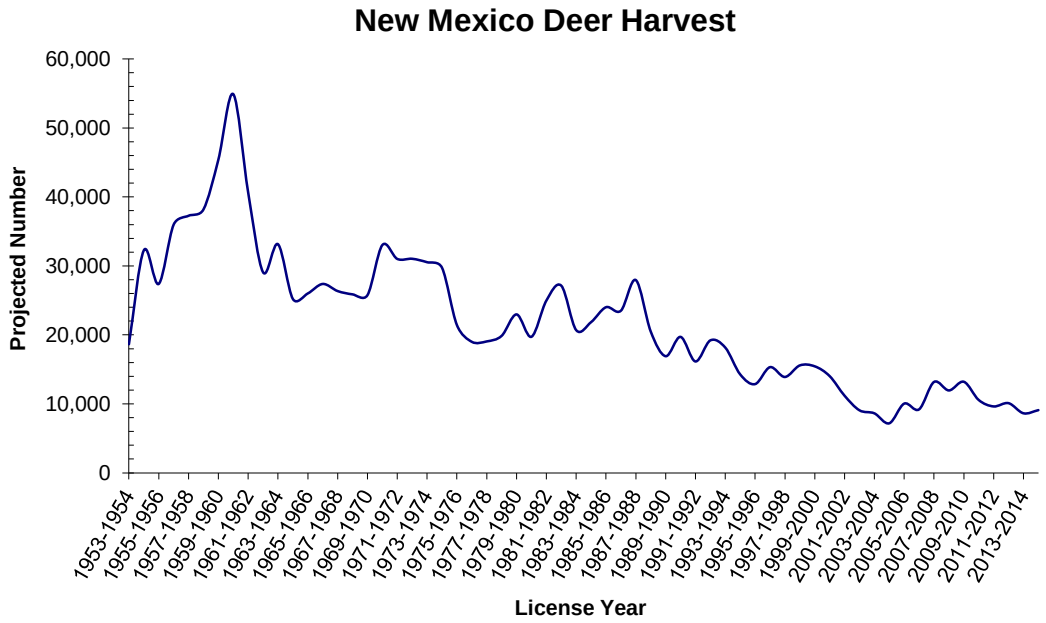
New Mexico

Statewide surveys in New Mexico suggest long-term declines in mule deer populations throughout most of the state, as illustrated in the deer harvest graph below. Total harvest during the 2014-2015 season was estimated at 9,089 deer. Approximately 23% of hunters going afield during the 2014-2015 season successfully harvested a deer. The 2014-2015 harvest appears slightly higher than the previous year primarily due to a change in harvest reporting methods. Harvest reporting has been mandatory since 2006 in New Mexico; however, white-tailed deer and mule deer harvest are not reported separately.

Annual winter surveys are conducted post-season to track sex ratios and fawn survival throughout the state. During winter 2014 surveys the proportion of bucks in the population increased to 31 bucks:100 does reversing a declining trend that ended in 2013 at 25 bucks:100 does. Yearling buck numbers were higher than normal likely resulting largely from high fawn survival the prior year. Fawn survival to approximately 6 months of age has followed an increasing trend over the last 2 years reaching a long-term high of 69 fawns:100 does. Increases in precipitation totals in many portions of the state from 2013 through 2014 has been the likely driver behind increased fawn survival.

Recent increases in precipitation may provide a temporary reprieve from falling deer populations. However, many actions are being taken in New Mexico to address long-term declines. These actions include over 100,000 acres of habitat management projects, translocations, and research into predator impacts on deer populations. The

state is also testing new deer survey techniques that will allow populations to be more closely monitored and permit establishment of focus areas for intensive deer management. License numbers have also been reduced statewide by over 11%. With a buck-only bag limit for the vast majority of the state, this reduction serves to more closely match the number of hunters with the number of deer available for harvest with the goal of increasing hunter success rates. Major impacts to the population are not anticipated from this license reduction.



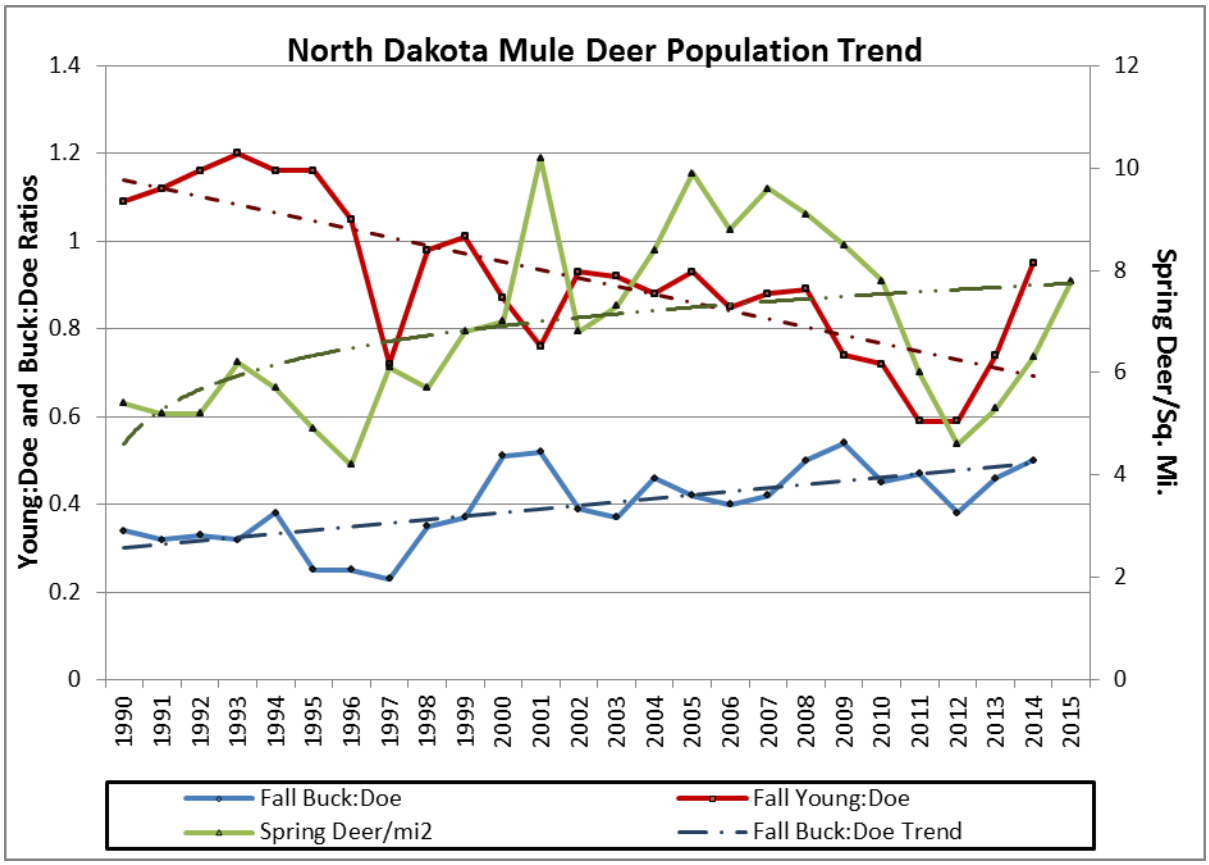
-Ryan Darr, New Mexico Department of Game and Fish

North Dakota

North Dakota's badlands mule deer population showed an increasing trend with high fawn production from 1990-2007. Mule deer fawn production was typically greater than 90 fawns per 100 does during these years. Winter weather conditions were mild during this time period except in 1996. Mule deer numbers peaked in 2005-2007. Following this population peak, North Dakota experienced three of the most severe winters on record from 2008-2010. Consequently, mule deer abundance in the badlands decreased by 50% and reached a population low in 2012. Record low fawn to doe ratios were recorded in 2009-2012 following these winters. Winter weather conditions moderated in 2011-2014 and mule deer population has increased since 2013. The 2015 spring index was 24% higher than the 2014 index, and 16% higher than the long-term average. This is the third year in a row that mule deer have increased in the badlands. Fawn production in 2014 was the highest since 1999.

The combination of eliminating antlerless harvest and milder winter weather conditions in 2011-2014 is responsible for mule deer population growth in the badlands. North Dakota has a limited quota license system and a goal of maintaining at least 30 bucks per 100 does prior to the gun season.

Mule deer buck to doe ratio has remained stable and above objective since 1999. Mule deer are currently above the objective of maintaining at least six deer per square mile in the badlands. A conservative harvest strategy without antlerless mule deer licenses in 2015 will be used to encourage additional population growth of mule deer in the badlands.



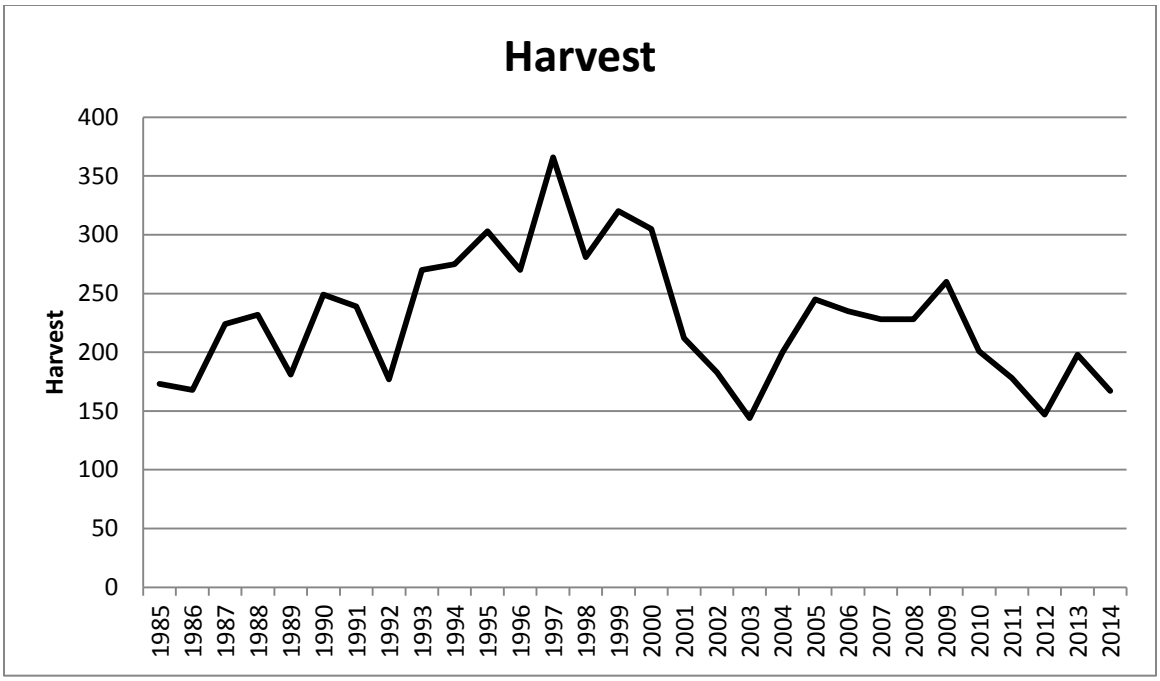
- Bruce Stillings, North Dakota Game and Fish Department

Oklahoma

Mule deer in Oklahoma inhabit a very small portion of the state, primarily in the three counties in the panhandle with scattered pockets in the main body of the state. The mule deer that are here are mostly found on private land. The result is that very little opportunity exists to hunt mule deer.

Mule deer populations have fluctuated with drought conditions. At this time we do not survey populations, however biologists and hunters have reported seeing fewer animals in recent years. The only data we have to corroborate this anecdotal information is harvest data. Regional harvest data for white-tailed deer has shown a decline the last several years as well.

Harvest was fairly high, for Oklahoma, from 1993 to 2000 and then fell off sharply. Harvest rebounded in 2004 to pre-1993 levels and fell off again in 2009. The most recent decline is likely attributed to severe drought conditions in the panhandle.



In 2014, 167 mule deer were harvested. Oklahoma does not have a separate mule deer license. They are considered as part of the season bag limit for the general deer season. However, we do provide some protection for mule deer by not allowing antlerless deer to be harvested during any firearms season. As a result, we have a very low doe harvest rate, with bucks making up 96% of the harvest in the 2014 season.

-Erik Bartholomew, Oklahoma Department of Wildlife Conservation

Oregon

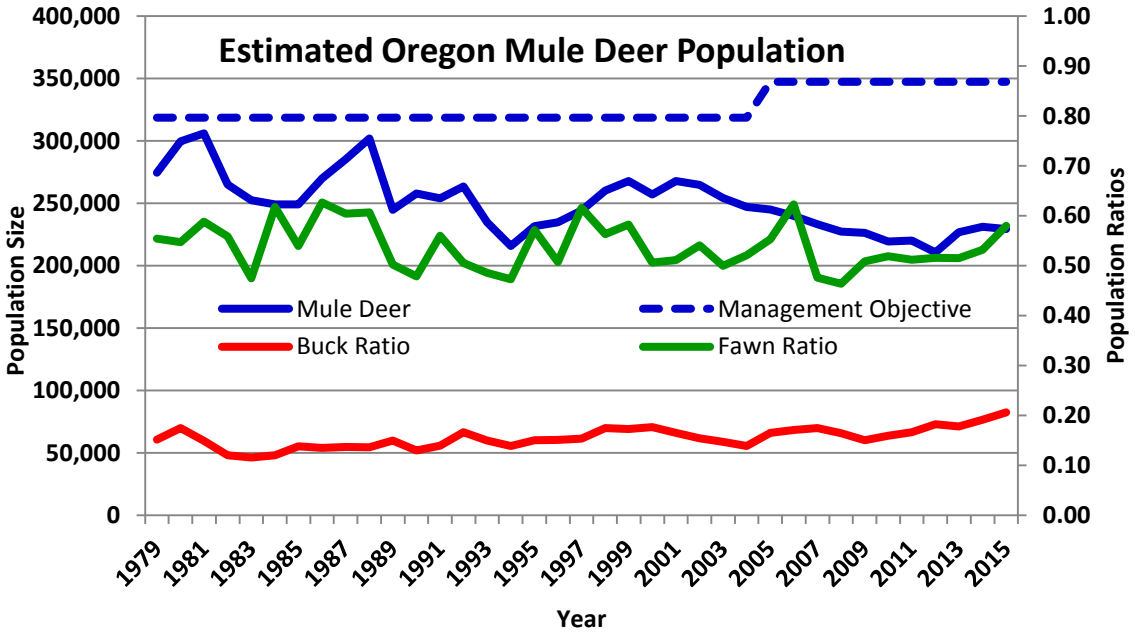
Both mule deer and black-tailed deer are substantially below the long-term statewide management objectives and benchmarks. Oregon's estimated mule deer population continues to hover around 225,000–235,000. Because of the difficulties with surveying black-tailed deer we have been unable to develop annual population estimates. However, in 1998 the black-tailed deer population was estimated at 387,000, declining to 320,000 in 2004; the population seems to have been relatively stable since that time.

Efforts to more rigorously estimate deer populations in Oregon continue. The Oregon Department of Fish and Wildlife is attempting to implement the mark-resight estimator developed by Brinkman et al. (2010) to estimate black-tailed deer populations at a unit-wide scale. Nearly 8,000 samples have been collected in 4 management units. Lab analyses are currently being finalized. Black-tailed deer density estimates by land management strategy will be available by late June 2015. Additionally, 227 black-tailed deer have been radio-collared in an effort to better understand habit use and movement patterns.

During a 12 day period in March 2015, Oregon radio-collared 499 mule deer across much of their eastern Oregon distribution to refine herd range boundaries for data collection and monitoring. Using results of the recently completed south-central mule deer study, and pending information from the new collaring effort, the Department is also

developing a rotation for application of sampling based population estimators (quadrat surveys, sightability surveys, distance surveys) coupled with a new modeling approach to better track populations.

Initial activities for Oregon's Mule Deer Initiative activities are complete. In total, 266,139 acres of habitat were treated at a cost of $18,326. The Department is currently selecting new areas of emphasis for continued efforts to improve mule deer population in the state based on results of the first five years.



Trends in Oregon's mule deer population size and structure, 1979 – 2015.
-Don Whittaker, Oregon Department of Fish and Wildlife

Saskatchewan

Saskatchewan mule deer populations continued to show some impact from the severe winters of 2010/2011 and 2012/13, particularly in the core prairie (WMZs 1-30) region of the province. In Saskatchewan, snow depth plays a key factor in determining winter severity on mule deer annual mortality, especially in prairie and farmland regions where winter forage can quickly be made unavailable by a major snow event. Recent survey data suggests some sign of population recovery relative to 2013 however, likely through improved fawn recruitment following consecutive mild winters. In 2014, mule deer draw harvest quotas were reduced from previous years in many wildlife management zones and the open mule deer archery season was shortened in response to concern over mule deer population decline. Antlerless mule deer hunting opportunities remained, although bag limits were reduced to one antlerless mule deer in zones with quotas of 50 or fewer. As a result of reduced mule deer hunting opportunity, harvest estimates were below long term averages, although draw-either sex mule deer harvest success rates were high, estimated at 71%.

Despite a reduction in harvest and some evidence of increasing deer density compared to recent years, it may yet take a series of mild winters before mule deer populations will rebound to satisfactory population levels in Saskatchewan.

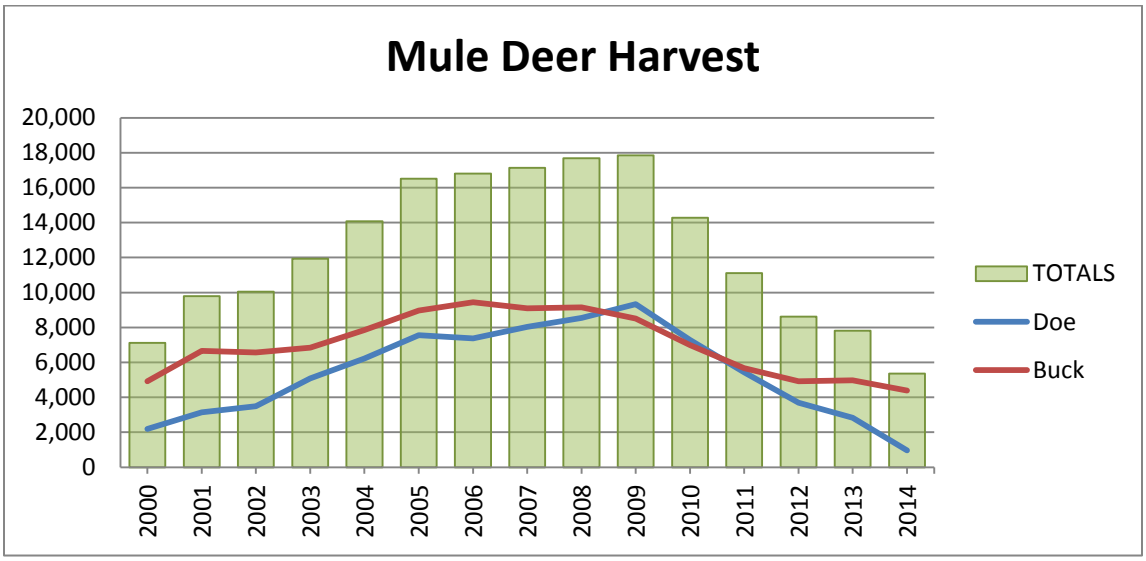
-Tom Perry, Saskatchewan Ministry of Environment

South Dakota

Record high deer harvest rates in the early to mid-2000s followed by 3 consecutive, severe winters in 2009-11 decreased mule deer populations throughout their range in South Dakota. Current population models estimate 9,400 (6,000-12,700) mule deer in the Black Hills and 94,800 (60,200-129,500) on the prairie. Pre-season recruitment estimates have shown declining trends over the past 5 years, but increased slightly in 2014 in both prairie and black hills areas to a statewide average of 69 mule deer fawns:100 does. Pre-season sex ratios were 38 bucks per 100 does.

Annual survival in 2014 for radio collared adults and fawns in the Cheyenne River breaks was estimated at 95% and 42%, respectively, and annual fawn survival in the Fort Pierre National Grasslands was estimated at 47%. In 2015, approximately 150 adults and 150 neonates will be radio collared and monitored to determine annual survival rates, over-winter mortality, and harvest mortality. These vital rates will be valuable for the current development of an Integrated Population Model and Data Analysis Units.

Hunter survey cards are mailed to selected license holders in order to estimate hunter success, deer harvest, and related information for each season. Hunters may also report harvest information through an internet response. Approximately 5,400 mule deer were harvested in 2014 (4,400 males, 1,000 females; Figure 1). Substantial hunting season changes occurred in 2014 to address low deer densities, including further reductions of prairie hunting deer tags (56% reduction) and no mule deer antlerless firearm or archery/muzzleloader licenses were available. These restrictions were successful and will continue in 2015. Loss of land enrolled in the Conservation Reserve Program and other grassland/rangeland-to-agriculture conversion continues to be a concern for mule deer management.



Mule deer harvest from all hunting seasons in South Dakota, 2000-2014.

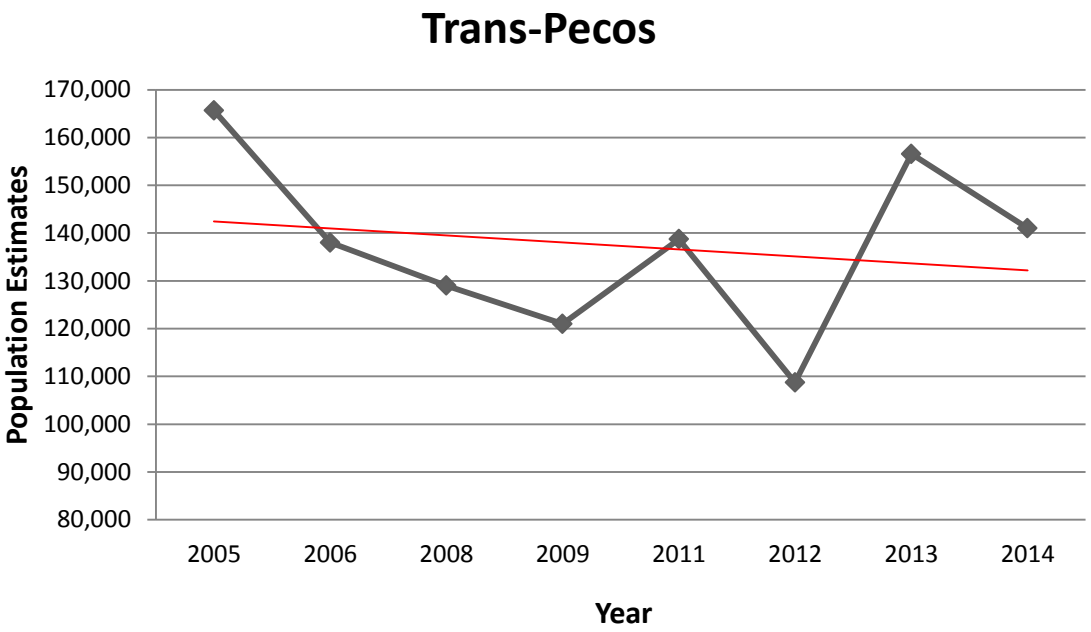
-Andy Lindbloom, South Dakota Department Game and Fish

Texas

Texas Parks and Wildlife Department (TPWD) conducts post-season helicopter surveys for mule deer utilizing a stratified random sampling design within monitoring units. In 2011, a sightability model was initiated to improve population estimates. The data are used to determine population trends, estimate population densities, and document herd composition to evaluate the impacts of regulations and management actions on mule deer at an ecoregion and monitoring unit scale.

Trans-Pecos

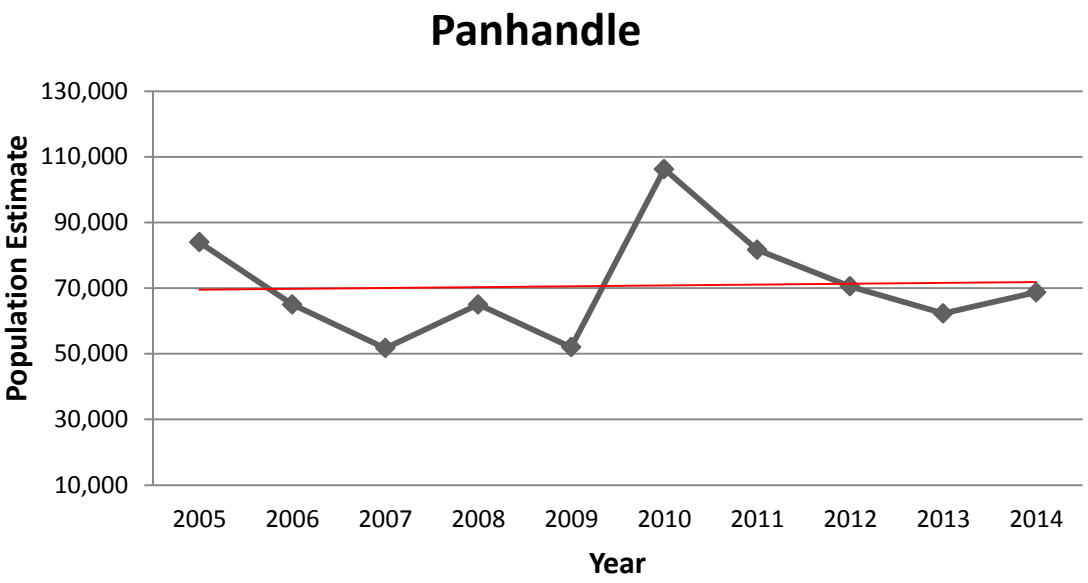
In general, the Trans-Pecos population is trending downward primarily from extended and expansive drought conditions during most survey years after 2005. However, the 2014 survey estimate (141,006) indicated a 30% increase from 2012 (108,739), primarily from improved range conditions and fawn production/recruitment over the past two years. Surveys were not conducted in 2007 and 2010. The estimated 2013 and 2014 fawn crops of 47 and 35 fawns:100 does, respectively were better than the 2012 estimate of 32. The sex ratio for 2014 was 36 bucks:100 does, and has remained somewhat stable since 2011.



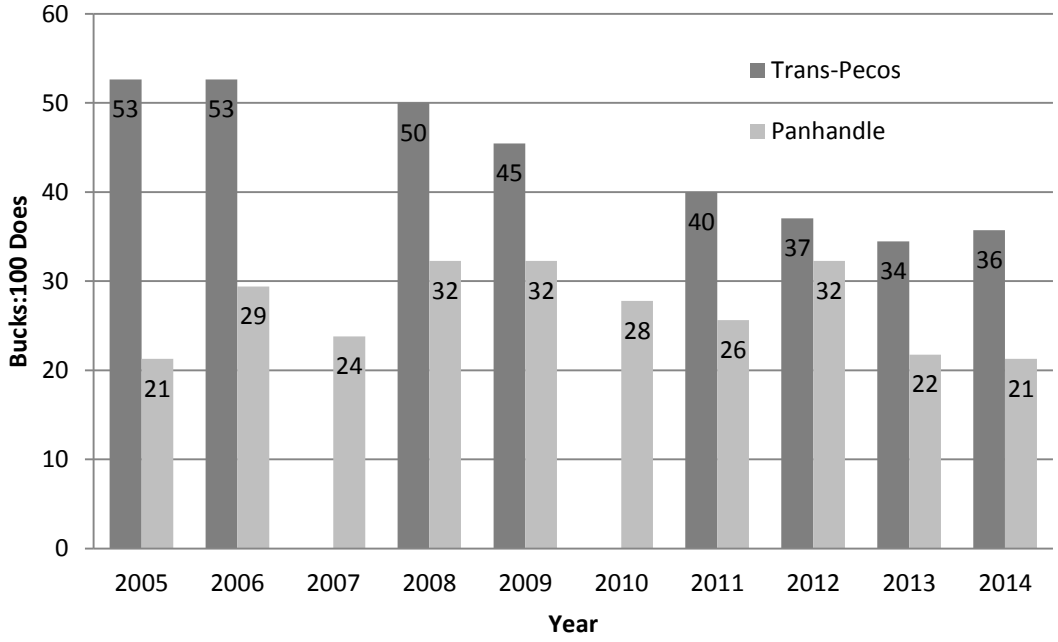
Trends in mule deer population estimates in the Texas Trans-Pecos, 2005 to 2014.

Panhandle

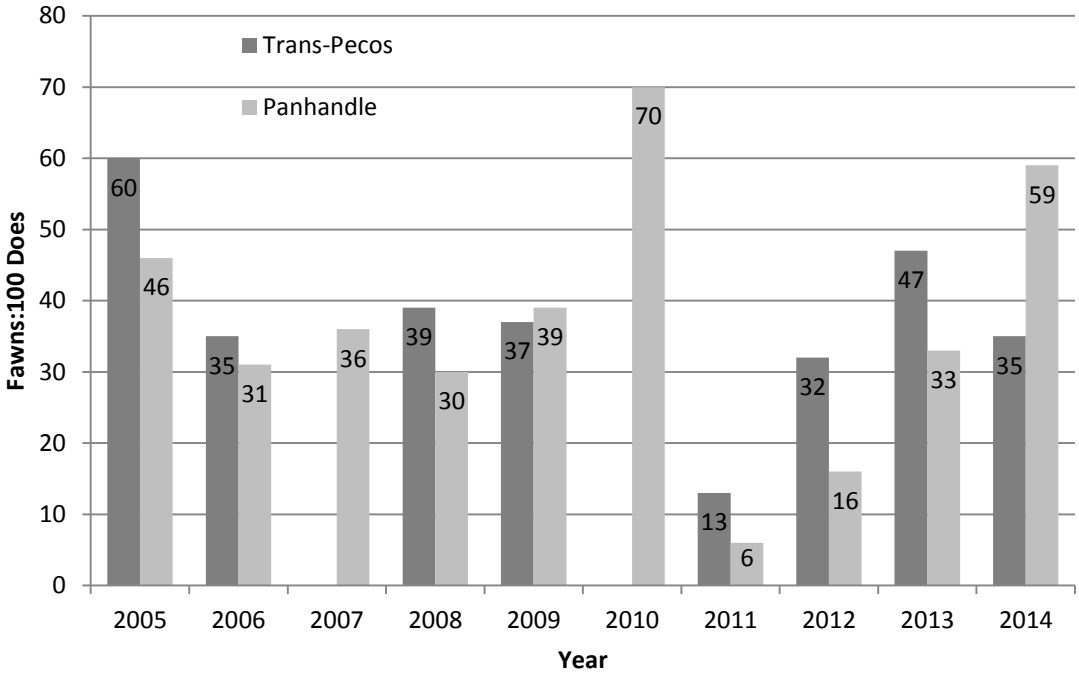
The Panhandle population trend has been stable to increasing since 2005. The 2014 population estimate of 68,726 was similar to estimates in 2012 and 2013. Fawn production has increased significantly in 2013 and 2014 compared to 2011. The sex ratio for 2014 was 21 buck:100 does. Sex ratios have varied from 21 to 32 bucks:100 does since post-season surveys were initiated in 2005. Sex ratio data indicate a higher harvest rate on mule deer bucks than in the Trans-Pecos, but in most years the post-season sex ratio has been above 21 bucks:100 does.



Trends in mule deer population estimates in the Texas Panhandle, 2005 to 2014.



Trends in the number of mule deer bucks per 100 does in the Texas Panhandle and Trans-Pecos area, 2005 to 2014.



Trends in the number of mule deer fawns per doe in the Texas Panhandle and Trans-Pecos area, 2005 to 2014.

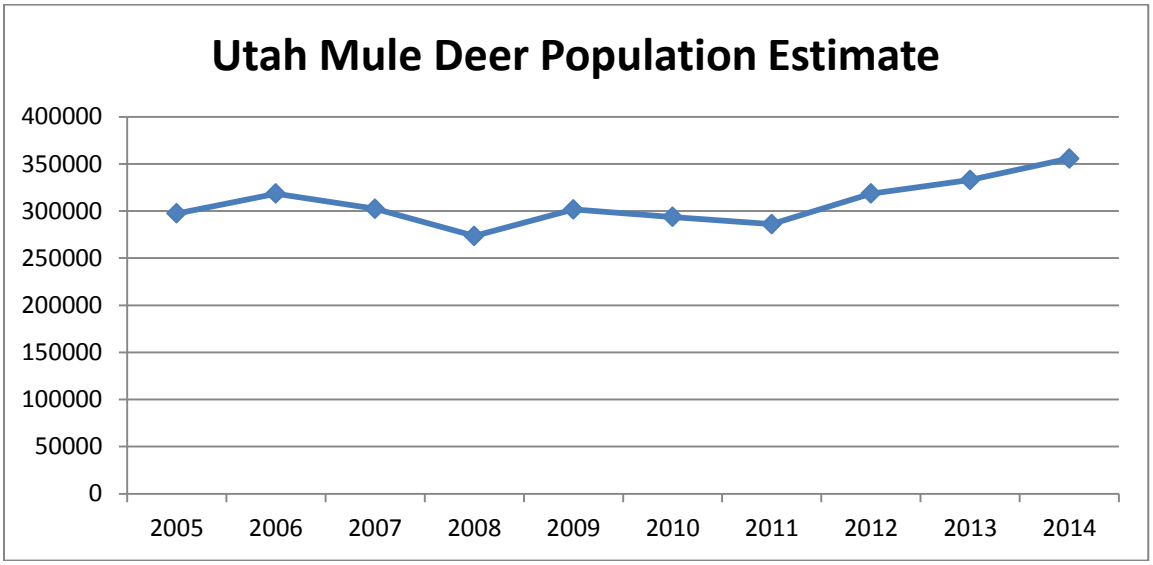
-Shawn Gray, Texas Parks and Wildlife Department

Utah

Mule deer populations are estimated using AIC models and have increased over the past several years. The current statewide population estimate is 355,600, and the population objective is 425,400. Fawn to doe ratios have been stable over the past 6 years, and have ranged between 61 and 65 fawns per 100 does. Since 2010, we have radio-collared several hundred does and fawns annually on 7 representative units throughout the state for monitoring purposes and to estimate survival rates. Doe survival has ranged between 0.84 and 0.86, and fawn survival has ranged between 0.52 and 0.82 annually. Over the past 3 years, annual fawn survival has been around 0.80, resulting in population growth in many areas in Utah.

Utah manages for diverse hunting opportunities and attempts to balance quality and opportunity. We have 30 general season units that are managed for hunter opportunity with a goal of 15-17 or 18-20 bucks per 100 does. Utah also has limited entry units that are managed for increased quality at 25-35 bucks per 100 does. In addition, we also have 2 premium limited entry units that are managed for 40-55 bucks per 100 does with ≥ 40% harvested bucks being 5 years of age or older.

Over the past 20 years, buck to doe ratios have increased as a result of growing populations and decreased buck permits. In 1994, roughly 97,000 public draw permits were issued for general season units, and the post season buck to doe ratio was 8. Last year 84,800 public draw permits were issued, and the post season buck to doe ratio exceeded 21. For the 2015 general season, permits were increased by 1,750, which represents the first substantial increase in general season permits since the 1980's.



Utah mule deer population estimates from 2005 to 2014.
-Justin Shannon, Utah Division of Wildlife Resources

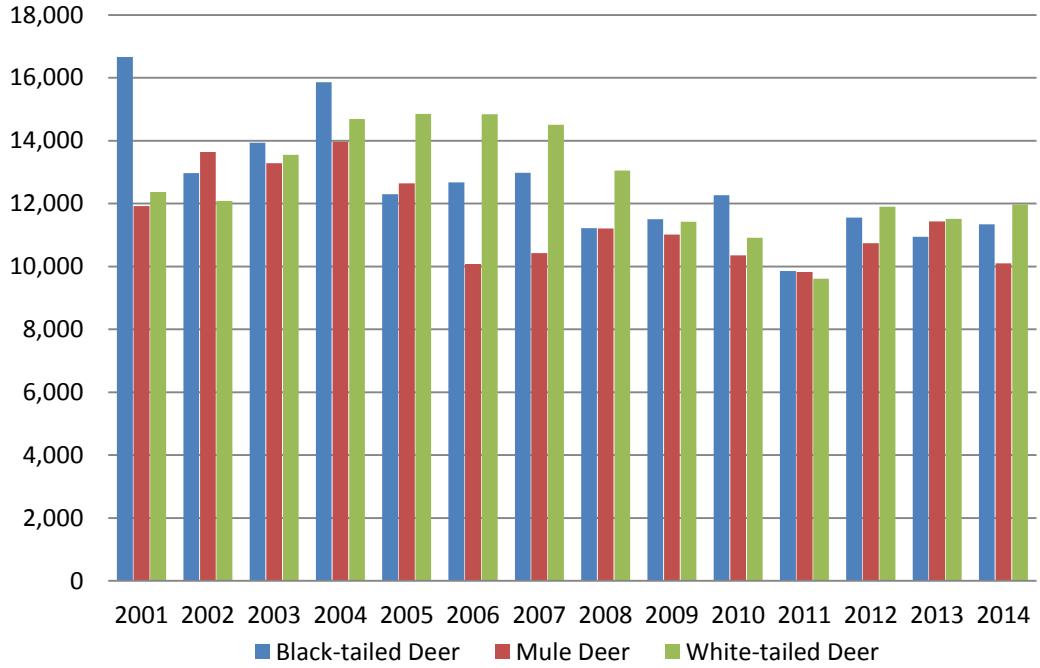
Washington

Washington state mule deer and black-tailed deer populations have rebounded and are doing well, with some exceptions. In north-central Washington (Okanogan, Chelan, and Douglas counties) mule deer seem to be at the capacity that the habitat will support and continue to respond positively to habitat improvements on WDFW Wildlife Management Areas, state forest, and federal forest. Mild to average winters the last 5 years allowed for better over-winter survival and strong recruitment. The 2014 Carlton Complex fire in Okanogan County substantially affected winter range. The population remains stable due to the mild winter, but severe drought conditions in the region are a concern. In the northeast, mule deer numbers have climbed slightly. More habitat enhancement (e.g., prescribed burns, thinning) is being focused on public lands that would benefit mule deer in the northeast. The Palouse and the Columbia Basin mule deer populations remain stable.

Aerial survey work in the foothills of the Blue Mountains showed robust to increasing mule deer populations associated with private agricultural land. Summers are a critical time of year for deer in these portions of the state and conditions have been consistently dry and hot. Wildfires have affected habitat slightly to benefit mule deer by setting back succession and promoting early successional species. South-central mule deer populations (Yakima and Kittitas counties) continue to show resurgence after recent declines attributed to hair loss caused by exotic lice. Deer numbers are still below what they were prior to the occurrence of hair loss, but are steadily improving.

The mule deer/black-tailed deer transitional populations along the Columbia River gorge on the state's southern border were stable, with harvest and post-hunt buck numbers responding to more restrictive hunting season structures that were implemented recently. Black-tailed deer in western Washington were stable. Some localized segments

of the population vary up and down due to forest production rotations. There is still potential to increase black-tailed deer numbers if private and public forests were managed for an increase in early successional habitat. Habitat loss due to human population increase is also a factor for black-tailed deer in western Washington.

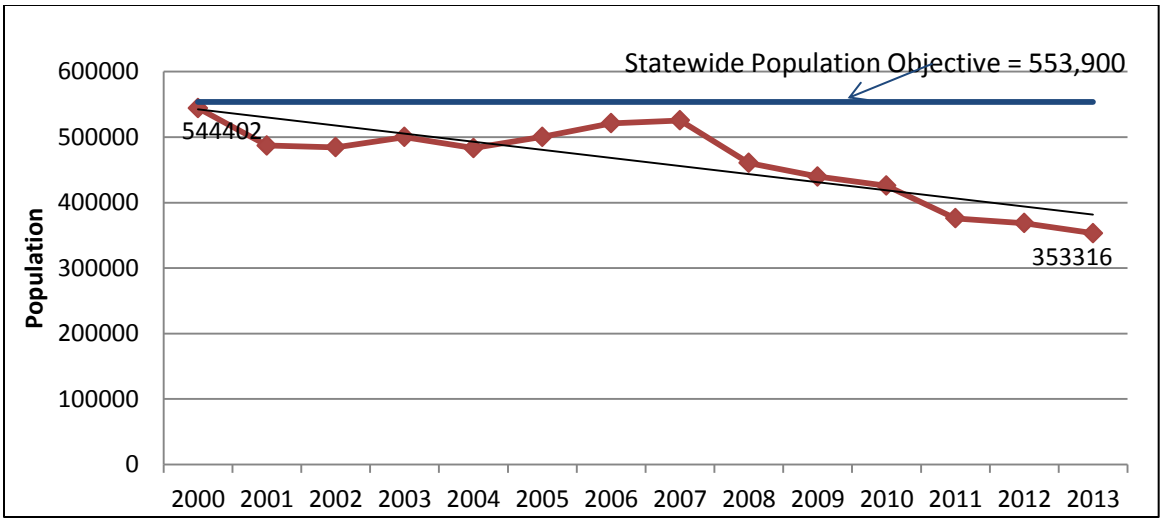


Estimated deer harvest by species/subspecies in Washington State, 2001 - 2014

-Sara Hansen, Washington Department of Fish and Wildlife

Wyoming

Mule deer populations throughout Wyoming have declined since the early 1990s. It is apparent, given declining production of mule deer fawns starting in the late 1980s, populations were responding in a density-dependent fashion to decreasing habitat availability and/or quality. Over the past 30 years, fawn productivity, on average, has decreased statewide by about 20% and has been below 66 fawns:100 does 13 times. Throughout Wyoming, mule deer populations have declined by an estimated 191,000 (35%) mule deer since 2000. After the 2013 hunting season, it was estimated there were 353,000 mule deer in the state. This is 36% below the statewide objective of 553,900 mule deer. Population estimates are derived using post-season fawn and buck classifications in concert with measured harvest and synthesized in a spreadsheet based population model.



Trends in the Wyoming statewide mule deer population estimate, 1990 to 2013.
-Daryl Lutz, Wyoming Game and Fish Department

Yukon

There has been no formal inventory work on mule deer in Yukon although a camera-based approach was initiated in the summer of 2015. Trends in abundance and distribution are monitored primarily through sighting and motor vehicle collision reports. Numbers and distribution have generally been on the upswing since first reports in the early 1920's but there are still likely fewer than 1,000 territory-wide.

The first deer hunting season was implemented in 2006. Licensed hunters in Yukon must apply for a male-only permit through a lottery system. Interest in the deer hunt continues to be high with 400 to 500 hunters applying for 10 permits issued each year. As of 2010, two additional permits have been available annually to young hunters. First Nation beneficiaries are entitled to harvest deer under their subsistence rights as of the effective date of their settled final agreements. The licensed harvest in 2014 was 10 deer. Generally, the annual licensed harvest ranges between 4 and 8 deer.

-Sophie Czetwertynski, Yukon Department of Environment

Acknowledgements

Information in this report was provided by MDWG members from the 23 Western Association of Fish and Wildlife Agencies (WAFWA) and compiled by Gerry Kuzyk and Jim Heffelfinger. Contributors are listed after their respective state and province report. We would also like to thanks Greg Sheehan, our WAFWA Director Sponsor and Miles Moretti of the Mule Deer Foundation for their support.