Status of Colorado's Deer, Elk, and Moose Populations

February 2020

<u>Overview</u>

Colorado has abundant big game populations that provide for an economically significant and diverse amount of big game-related wildlife recreation. Big game hunting in Colorado is highly regulated; carefully set limited license quotas manage all female harvest, which is the primary tool for population management.

Mule deer populations in Western Colorado have been declining since the 1970s. Colorado Parks and Wildlife (CPW) and the public still have concerns over mule deer declines in the largest herds of Western Colorado. Mule deer populations face more threats than ever, including loss of habitat from development, highways bisecting migration routes, human recreational disturbance, fire suppression, competition from elk, disease, invasive weeds replacing preferred forage plants, and predation. Anything that lowers adult doe survival will likely result in further declines in any mule deer populations that are already declining.
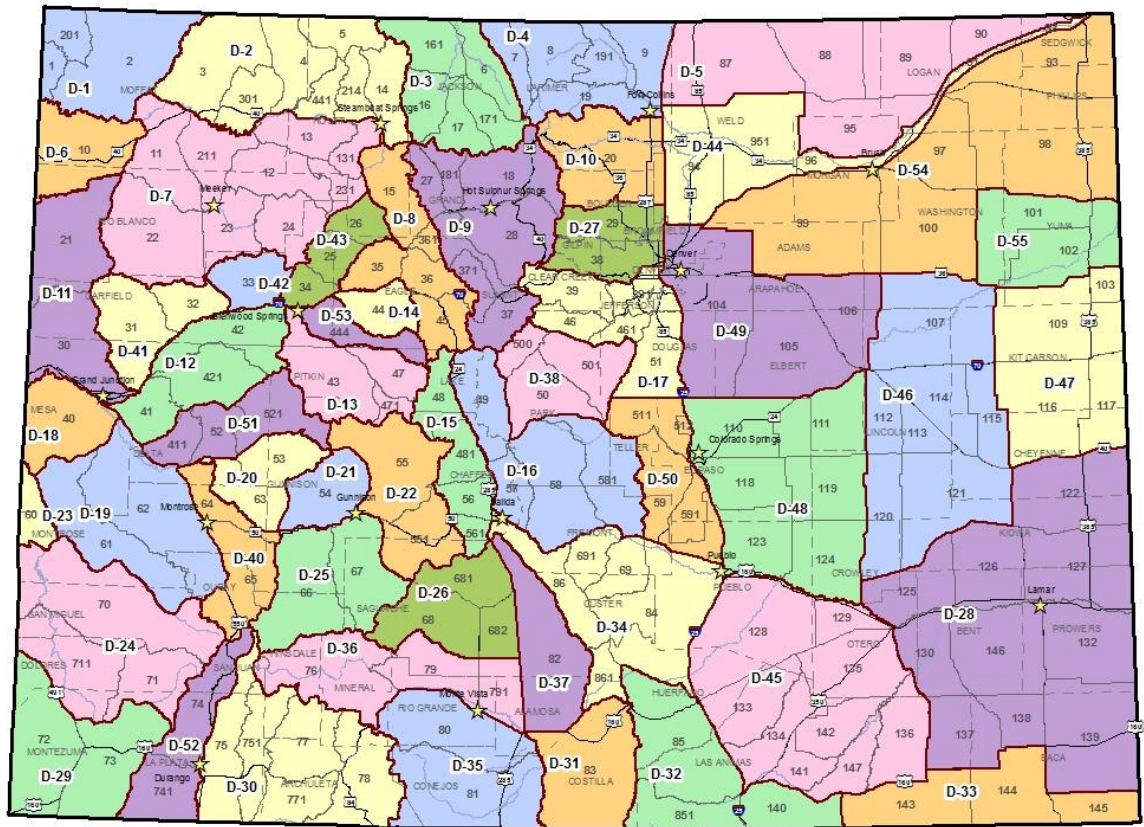
Colorado's statewide elk population was at its peak in 2001. Additional cow (female) licenses were used to reduce elk populations to Herd Management Plan (HMP) population objectives. Elk populations are now stable, but at a lower population size. CPW has compensated for declining calf ratios in the southern half of the state by significantly reducing the number of cow licenses issued.

CPW transplanted moose into Colorado with five releases from 1978 to 2010 to create hunting and wildlife viewing opportunities. Moose continue to increase in number and pioneer new habitats on their own.

<u>Deer Summary</u>

1. Colorado's statewide deer population declined from roughly 600,000 deer in 2006 to approximately 433,000 in 2018. Some herds have yet to recover from the severe winter of 2007-2008. Population estimates are still far below the sum of individual Herd Management Plan population objective ranges (500,000-560,000) for all 54 deer herds combined. Herds are named and numbered as Data Analysis Units (DAUs), see Figure 1 for a map of Deer DAUs.
Please note: post-hunting winter estimates from 2018 are the most recent available because 2019 post-hunt surveys are still underway as of February 2020. CPW surveys big game populations in the winter, when snow concentrates animals at lower elevations.
2. In 2018, 23 of 54 herds (43%), were below their population objective ranges. See Table 1 for individual population sizes relative to population objectives.
3. In 2014, Colorado Parks and Wildlife completed the West Slope Mule Deer Strategy, which guides management decisions to help rebuild our mule deer populations. The Strategy states: Together with the public and stakeholders, CPW will work to stabilize, sustain and increase mule deer populations in Western Colorado and, in turn, increase hunting and wildlife-related recreational opportunities.

4. The West Slope Mule Deer Strategy outlined 7 strategic priorities to address the many threats facing mule deer populations. To learn more, read Colorado's Mule Deer Story and Colorado's West Slope Mule Deer Strategy at: https://cpw.state.co.us/learn/Pages/CO-WestSlopeMuleDeerStrategySummit.aspx

5. Deer hunting is managed by a license quota system (totally limited licenses; see Figure 2). CPW has reduced doe harvest in Western Colorado significantly because herds there are below population objective ranges. This reduction in doe harvest is intended to allow herds to increase to management objectives. CPW has been increasing buck deer licenses in Western herds to manage to sex ratio objectives, but total license numbers are not back to pre-2007 levels (Figure 2). Many deer herds in the central and northern mountains as well as the eastern plains are performing well, and population sizes and license numbers in those areas are increasing. In fact, more female deer are now harvested east of the Continental Divide than in Western Colorado.

6. CPW intensively monitors annual adult doe survival and winter fawn survival in five Intensive Mule Deer Monitoring Areas. We also monitor buck survival in two of these herds. CPW annually monitors well over 1,000 radio-collared mule deer in the five monitoring areas, and annual survival rates from these herds are used in deer population models for the rest of the herds west of I-25.

7. CPW conducts winter herd classification inventories with helicopters to estimate the sex ratios of males/100 females and the age ratios of young/100 females.

8. During the herd inventories in 2018, CPW staff classified 71,000 deer (16% of the herd, which is an excellent sample size). Ratios of fawns/100 does are an index of annual fawn production and survival to December, which is an indicator of the "fitness" of an individual herd. The ratio of mule deer fawns/100 does has declined since the early 1970's.

9. Chronic Wasting Disease (CWD) in deer is a concern for CPW. CWD prevalence has increased significantly in some herds since the early 2000s. The Colorado Parks and Wildlife Commission approved the Chronic Wasting Disease Response Plan in January 2019. The plan will guide future management decisions that strive to reduce or keep CWD at low levels. In 2017, CPW initiated a fifteen-year mandatory sampling program to estimate CWD prevalence in deer statewide. For more information and for prevalence estimates, please go to: https://cpw.state.co.us/learn/Pages/About-CWD-in-Colorado.aspx

10. CPW has a long history of mule deer research in Western Colorado. For publications and more information, visit: https://cpw.state.co.us/learn/Pages/ResearchMammalsPubs.aspx

COLORADO PARKS AND WILDLIFE - Deer DAUs

April 2019

Figure 1. Deer Data Analysis Units (herds) and their associated Game Management Units (subsets of DAUs).

Table 1. 2018 Winter Deer Population Estimates and Population Objective Ranges

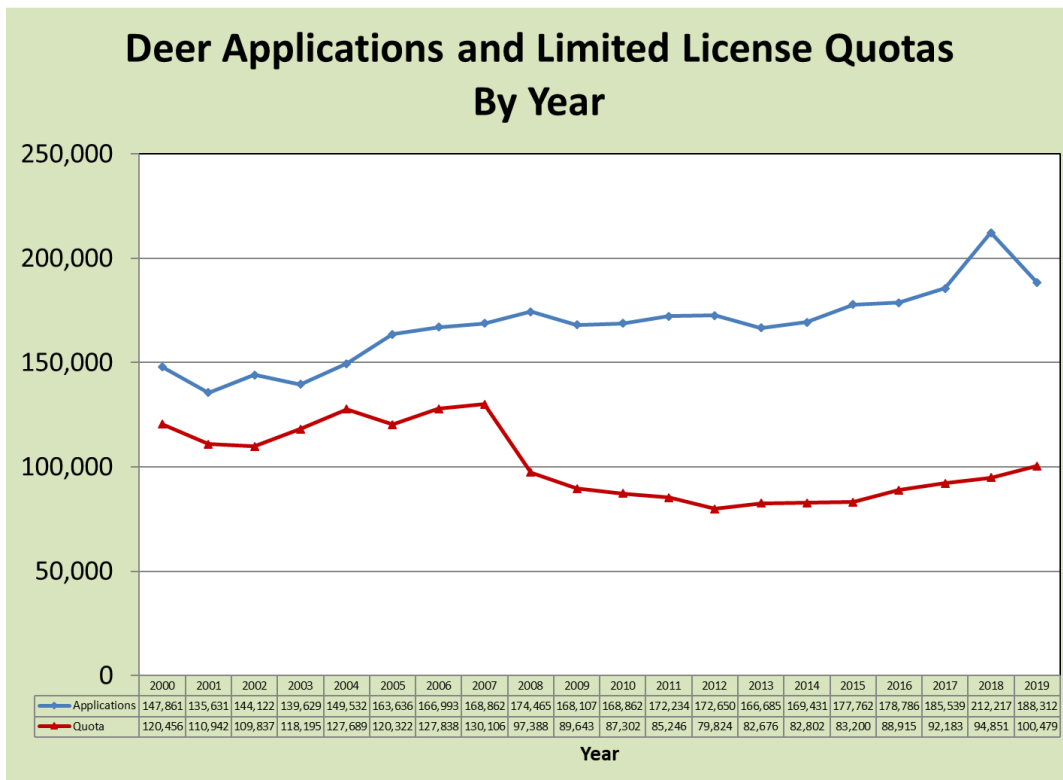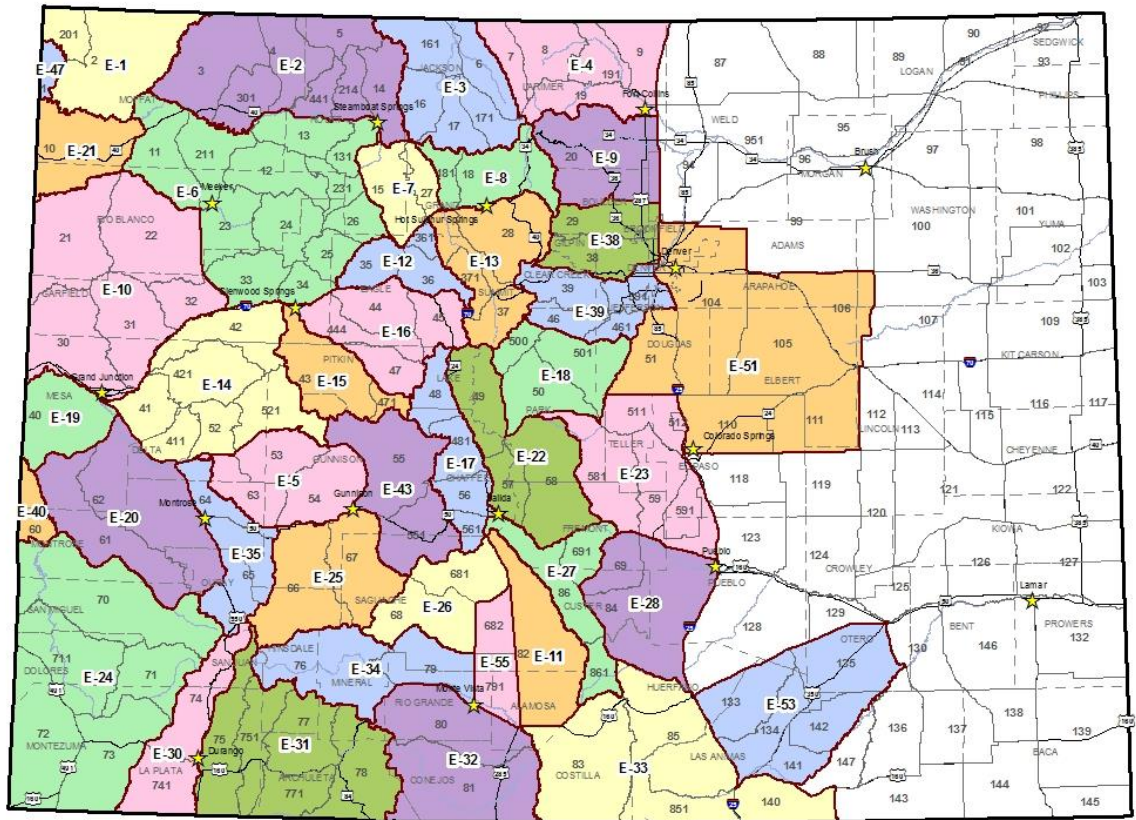| DAU	Name	Region	West of Interstate I-25	Population Objective Min	Population Objective Max	2018 Winter Population Estimate	2018 Population Estimate Relative to Population Objective Range
		DAU			**POPULATION**		
D-4	Red Feather	NE	Yes	13,000	15,000	**14,890**	Within Objective
D-5	Table Lands North	NE	No	2,400	2,700	**3,290**	Above Objective
D-10	Big Thompson	NE	Yes	8,000	10,000	**8,750**	Within Objective
D-17	Bailey	NE	Yes	7,500	8,300	**8,240**	Within Objective
D-27	Boulder	NE	Yes	6,000	7,500	**7,330**	Within Objective
D-38	South Park	NE	Yes	2,500	3,100	**3,060**	Within Objective
D-44	South Platte River	NE	No	3,500	3,800	**3,910**	Above Objective
D-49	Bijou Creek	NE	No	5,500	6,500	**6,250**	Within Objective
D-54	South Tablelands	NE	No	2,900	3,100	**3,820**	Above Objective
D-55	Arickaree	NE	No	2,300	2,700	**2,640**	Within Objective
	NE Subtotal			53,600	62,700	**62,170**	
D-1	Little Snake	NW	Yes	13,500	13,500	**1,990**	Below Objective
D-2	Bear's Ears	NW	Yes	37,800	37,800	**43,360**	Above Objective
D-3	North Park	NW	Yes	5,400	6,600	**6,530**	Within Objective
D-6	Rangely	NW	Yes	7,000	7,000	**1,010**	Below Objective
D-7	White River	NW	Yes	67,500	67,500	**37,370**	Below Objective
D-8	State Bridge	NW	Yes	13,500	16,500	**13,720**	Within Objective
D-9	Middle Park	NW	Yes	10,500	12,500	**14,740**	Above Objective
D-11	Bookcliffs	NW	Yes	10,000	12,000	**7,570**	Below Objective
D-12	North Grand Mesa	NW	Yes	17,000	23,000	**16,550**	Below Objective
D-13	Maroon Bells	NW	Yes	7,500	8,500	**7,260**	Below Objective
D-14	Red Table Mountain	NW	Yes	7,000	7,000	**2,070**	Below Objective
D-18	Glade Park	NW	Yes	6,500	8,500	**4,810**	Below Objective
D-41	Logan Mountain	NW	Yes	6,500	8,500	**5,610**	Below Objective
D-42	Rifle Creek	NW	Yes	7,700	9,400	**7,980**	Within Objective
D-43	Sweetwater Creek	NW	Yes	5,000	6,000	**5,710**	Within Objective
D-53	Basalt	NW	Yes	5,300	5,300	**4,440**	Below Objective
	NW Subtotal			227,700	249,600	**180,710**	
D-15	Cottonwood Creek	SE	Yes	6,300	7,700	**3,560**	Below Objective
D-16	Cripple Creek	SE	Yes	16,000	20,000	**13,440**	Below Objective
D-28	Arkansas River	SE	No	3,600	3,600	**5,720**	Above Objective
D-32	Trinidad	SE	Yes	9,800	10,800	**8,410**	Below Objective
D-33	Mesa de Maya	SE	No	2,350	2,350	**1,760**	Below Objective
D-34	Wet Mountain	SE	Yes	16,500	17,500	**11,680**	Below Objective
D-45	Las Animas	SE	No	3,400	3,400	**3,500**	Above Objective
D-46	Big Sandy	SE	No	2,500	2,500	**4,350**	Above Objective
D-47	South Republican	SE	No	2,000	2,000	**3,180**	Above Objective
D-48	Chico Basin	SE	No	1,800	1,800	**2,710**	Above Objective
D-50	Rampart	SE	Yes	4,000	5,000	**4,620**	Within Objective
	SE Subtotal			68,250	76,650	**62,930**	
D-19	Uncompahgre	SW	Yes	36,000	38,000	**14,820**	Below Objective
D-20	North Fork Gunnison R.	SW	Yes	7,500	9,500	**7,330**	Below Objective
D-21	West Elk	SW	Yes	5,000	5,500	**5,570**	Above Objective
D-22	Taylor River	SW	Yes	5,000	5,500	**7,950**	Above Objective
D-23	La Sal	SW	Yes	2,500	3,000	**1,340**	Below Objective
D-24	Groundhog	SW	Yes	15,000	19,000	**14,860**	Below Objective
D-25	Powderhorn Creek	SW	Yes	5,400	5,900	**7,360**	Above Objective
D-26	Saquache	SW	Yes	5,500	6,500	**5,460**	Below Objective
D-29	Mesa Verde	SW	Yes	5,500	7,000	**6,480**	Within Objective
D-30	San Juan	SW	Yes	27,000	27,000	**23,590**	Below Objective
D-31	Trinchera	SW	Yes	2,000	2,500	**1,170**	Below Objective
D-35	Lower Rio Grande	SW	Yes	5,500	6,500	**5,810**	Within Objective
D-36	Upper Rio Grande	SW	Yes	2,000	2,500	**2,290**	Within Objective
D-37	Sand Dunes	SW	Yes	1,500	2,000	**2,650**	Above Objective
D-40	Cimarron	SW	Yes	13,500	15,000	**6,830**	Below Objective
D-51	South Grand Mesa	SW	Yes	8,000	10,000	**8,750**	Within Objective
D-52	Hermosa	SW	Yes	4,000	6,000	**5,050**	Within Objective
	SW Subtotal			150,900	171,400	**127,290**	
STATEWIDE TOTAL				**500,450**	**560,350**	433,100	

Figure 2. Limited deer license applications and license quotas from 2000-2019.

Elk Summary

1. Colorado's elk population peaked at 305,000 in 2001.
2. The 2018 winter elk population estimate of 287,000 elk is just over the sum of Colorado's individual Herd Management Plan (HMP) population objective ranges for elk statewide of 233,000-282,000 for all 42 elk herds combined (Figure 3). See Table 2 for individual population sizes relative to population objectives.
3. CPW has intentionally reduced elk populations to achieve population objectives set for each herd. Currently, 22 of 42 (52%) elk herds are still above their current population objective ranges (Table 2). Nonetheless, public perception of the desired number of elk in Colorado varies. CPW gives serious consideration to changing population objectives in herds as HMPs are updated and tries to balance public interests of landowners, local communities, and sportsmen with information from public land management agencies about habitat conditions. Long-term experience with balancing these interests has informed CPW on the upper and lower social thresholds for elk population size in many herds, which benefits us greatly in herd management planning efforts.

4. In 2018, during the post-hunting winter herd inventories, CPW staff used helicopter surveys to classify 96,000 elk (33% of the herd, which is an excellent sample size).
5. In these surveys, CPW observed declining calf/cow ratios over the last decade in the southern half of the state. Ratios of calves/100 cows are an index of annual calf production and survival to mid-winter, which is an indicator of the "fitness" of the herd.
6. Human recreation is increasing in Colorado, and its effects on big game are of concern to many sectors of the public and to CPW.
7. All licenses for cow elk are limited (i.e., have a set quota). CPW has reduced cow and either-sex elk licenses significantly as herds reach or approach population objectives or when calf ratios have declined. Statewide antlerless and either-sex elk licenses have been reduced by 46% since 2005. In 2005, CPW issued 151,600 antlerless and either-sex licenses compared to 82,400 antlerless and either-sex elk licenses issued in 2019. This is a reduction of 69,200 licenses. This trend of reducing elk licenses, and therefore hunting opportunity, is expected to continue (see Figure 4).
8. Southwest Colorado has seen some of the largest declines in calf ratios. Consequently, CPW has reduced cow elk harvest in the Southwest Region to less than half of what it was in 2004, from 9,800 in 2004 down to 4,400 in 2018.
9. Elk herds in northern Colorado have higher calf ratios and therefore the Commission has not reduced cow licenses in this area as drastically as in Southern and Southwestern Colorado. Still, cow harvest in Northwest Colorado has been reduced by 38%, from 17,600 in 2004 to 10,800 in 2018. Cow harvest east of the continental divide has only been reduced by 17%, from 3,500 in 2004 to 2,900 in 2018.
10. CPW has several important elk research projects underway to determine causes of calf ratio declines. For publications and more information, please visit: https://cpw.state.co.us/learn/Pages/ResearchMammalsPubs.aspx

COLORADO PARKS AND WILDLIFE - Elk DAUs

April 2019

Figure 3. Elk Data Analysis Units (herds) and their associated Game Management Units (subsets of DAUs).

Table 2. 2018 Winter Elk Population Estimates and Population Objective Ranges

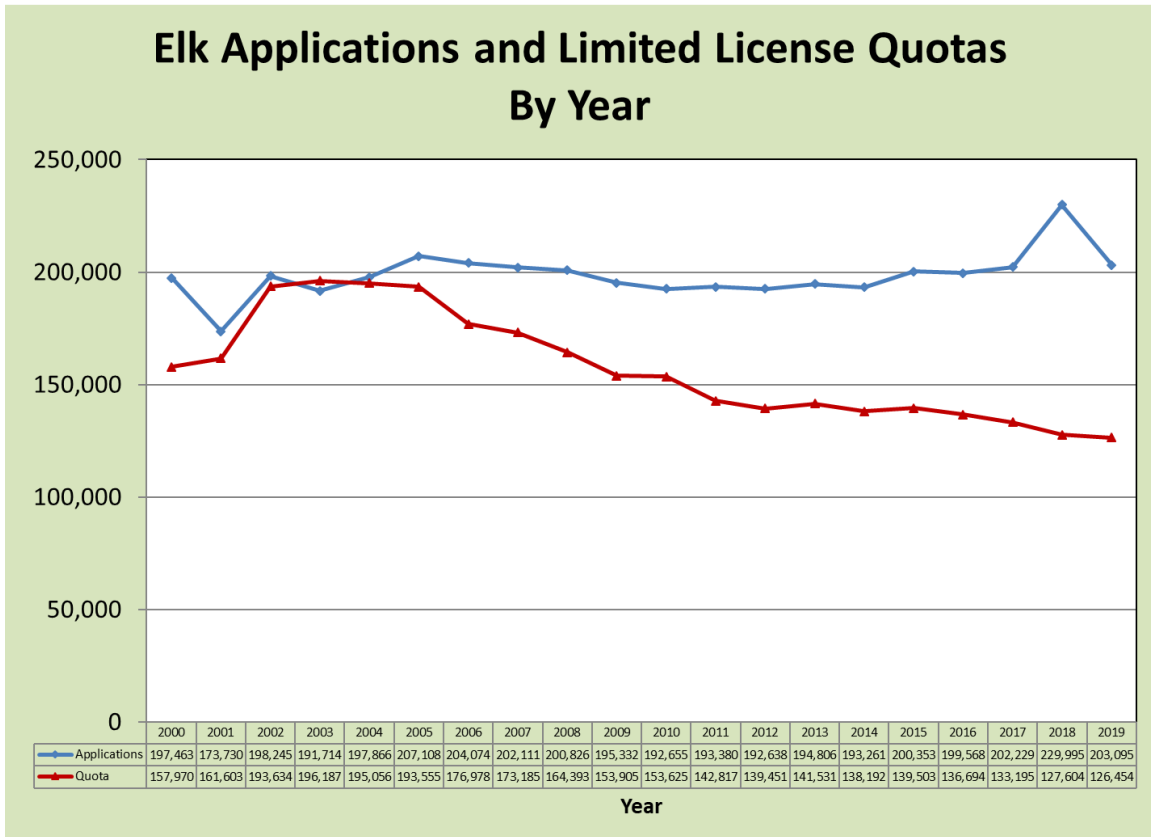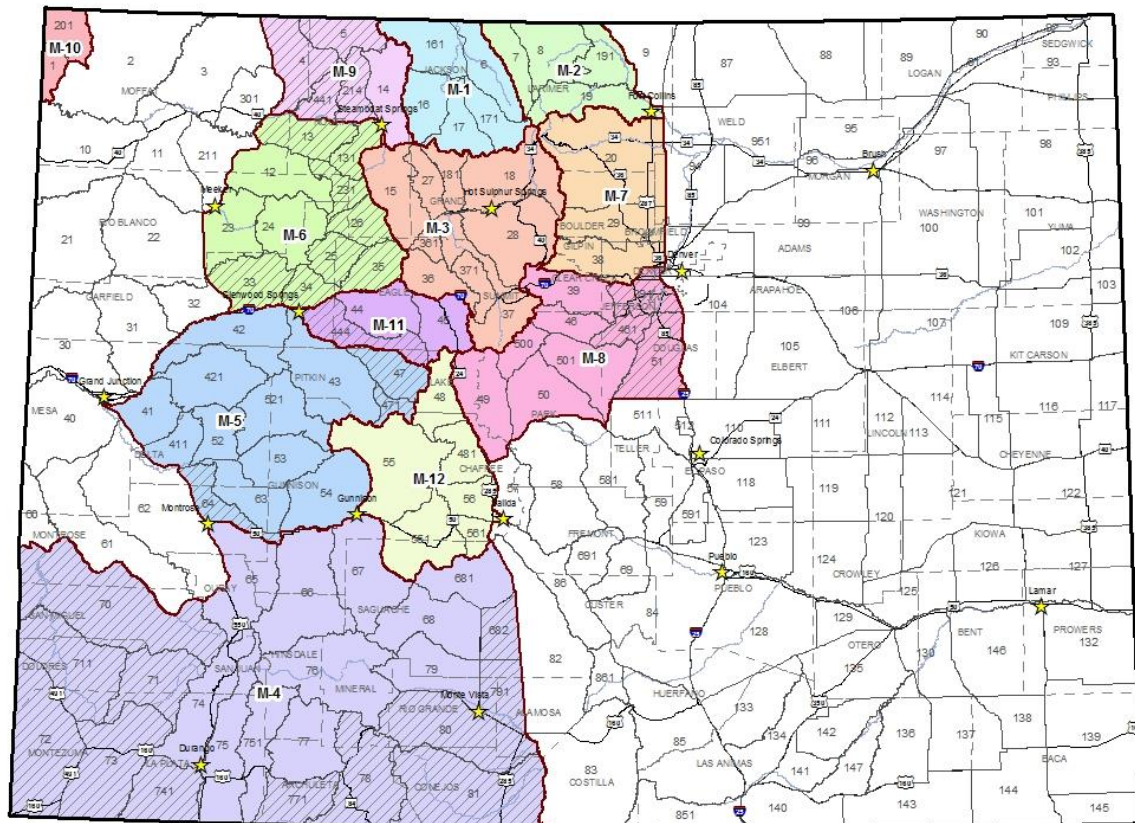| DAU	Name	Region	Population Objective Min	Population Objective Max	2018 Population Estimate	2018 Population Estimate Relative to Population Objective Range
E-4	Poudre River	NE	3,600	4,200	4,160	Within Objective
E-9	St. Vrain	NE	2,200	2,600	2,380	Within Objective
E-18	Kenosha Pass	NE	2,000	2,400	2,190	Within Objective
E-38	Clear Creek	NE	1,000	1,400	1,230	Within Objective
E-39	Mt Evans	NE	2,200	2,600	2,270	Within Objective
E-51	Castle Rock	NE	1,200	1,200	1,480	Above Objective
	NE Subtotal		12,200	14,400	13,710	
E-1	Cold Springs	NW	700	1,700	1,630	Within Objective
E-2	Bear's Ears	NW	15,000	18,000	24,080	Above Objective
E-3	North Park	NW	4,000	4,500	6,480	Above Objective
E-6	White River	NW	32,000	39,000	45,870	Above Objective
E-7	Gore Pass	NW	3,500	4,500	5,750	Above Objective
E-8	Troublesome Creek	NW	3,600	4,300	4,480	Above Objective
E-10	Yellow Creek	NW	7,000	9,000	11,070	Above Objective
E-12	Piney River	NW	3,000	4,600	3,730	Within Objective
E-13	Williams Fork River	NW	4,700	5,500	5,880	Above Objective
E-14	Grand Mesa	NW/SW	15,000	19,000	13,340	Below Objective
E-15	Avalanche Creek	NW	3,600	5,400	4,240	Within Objective
E-16	Frying Pan River	NW	5,500	8,500	6,060	Within Objective
E-19	Glade Park	NW	2,800	3,800	3,400	Within Objective
E-21	Rangely - Blue Mountain	NW	1,200	1,200	1,640	Above Objective
E-47	Green River	NW	170	170	200	Above Objective
	NW Subtotal		101,770	129,170	137,830	
E-17	Collegiate Range	SE	3,150	3,850	3,420	Within Objective
E-22	Buffalo Peaks	SE	3,150	3,500	3,800	Above Objective
E-23	Eleven Mile	SE	2,700	3,300	3,940	Above Objective
E-27	Sangre de Cristo	SE	1,450	1,650	2,090	Above Objective
E-28	Grape Creek	SE	1,400	1,600	2,080	Above Objective
E-33	Trinchera	SE	14,000	16,000	16,200	Above Objective
E-53	Apishipa	SE	250	250	1,020	Above Objective
	SE Subtotal		26,100	30,150	32,540	
E-5	West Elk Mountains	SW	7,800	8,800	8,070	Within Objective
E-11	Sand Dunes	SW	3,000	4,000	5,080	Above Objective
E-20	Uncompahgre	SW	8,500	9,500	9,540	Above Objective
E-24	Disappointment Creek	SW	17,000	19,000	16,890	Below Objective
E-25	Lake Fork	SW	6,000	7,000	6,560	Within Objective
E-26	Saguache	SW	4,000	4,800	3,710	Below Objective
E-30	Hermosa	SW	5,000	6,000	4,810	Below Objective
E-31	San Juan	SW	17,000	21,000	18,690	Within Objective
E-32	Lower Rio Grande	SW	11,500	13,000	10,320	Below Objective
E-34	Upper Rio Grande	SW	4,000	5,500	5,100	Within Objective
E-35	Cimarron	SW	5,000	5,500	6,190	Above Objective
E-40	Paradox	SW	900	1,100	2,810	Above Objective
E-43	Fossil Ridge	SW	3,000	3,500	4,650	Above Objective
E-55	Northern San Luis Valley Floor	SW	0	0	150	Above Objective
	SW Subtotal		92,700	108,700	102,570	
STATEWIDE TOTAL			232,770	282,420	286,640	

Figure 4. Limited elk license applications and license quotas from 2000-2019.

Moose Summary

1. CPW transplanted moose into Colorado to create hunting and wildlife viewing opportunities. The first transplant occurred in 1978–1979 into North Park. Other major transplants included Laramie River drainage (1987), Upper Rio Grande River (1990), Grand Mesa (2000), and White River drainage (2010).
2. As a result of these efforts, moose have become an important big game hunting and popular watchable wildlife species in Colorado.
3. Moose populations are increasing and they continue to pioneer into new habitats on their own. The estimated statewide 2018 winter moose population is 3,200.
4. We now have moose hunting in 63 Game Management Units (GMUs), up from 39 GMUs in 2013 (Figure 5).
5. CPW has been increasing cow moose hunting licenses to manage moose populations toward population objectives, to keep moose populations within the capability of their habitat, and to address moose conflicts in some areas.
6. For 2019, CPW continued to increase licenses with a total of 508 moose licenses. This includes 216 bull and either-sex licenses and 292 cow licenses.

7. Bull moose harvest is once-in-a-lifetime opportunity in Colorado. Demand far exceeds the number of available licenses; in 2019, 41,000 individuals applied for the 508 moose licenses.
8. Colorado is fortunate that moose populations continue to do well because many other states are experiencing declines in their moose populations.
9. CPW has moose research projects underway. For publications and more information please visit: https://cpw.state.co.us/learn/Pages/ResearchMammalsPubs.aspx

COLORADO PARKS AND WILDLIFE - Moose DAUs (hunted DAUs only)
Nonhunted GMUs

April 2019

Figure 5. Moose Data Analysis Units (herds) and their associated Game Management Units (subsets of DAUs).

Background

Colorado manages big game populations using Herd Management Plans (HMPs) which establish population objective ranges and sex ratio objective ranges. The HMP for each herd incorporates the capability of the habitat to support big game populations, other social and biological limiting factors, and input from the public, organizations, and other agencies about their issues and concerns regarding hunting management and herd objectives. Each HMP is publicly approved by the Colorado Parks and Wildlife Commission. For more information on Herd Management Planning visit:
https://cpw.state.co.us/thingstodo/Pages/HerdManagementPlans.aspx

Annual harvest objectives and the resulting license recommendations for all hunts are designed to achieve the management objectives approved in the HMP. Hunting license recommendations are based on a regular evaluation of harvest, age and sex classification data, population estimates, hunter distribution, and social considerations for each big game herd in Colorado. Female harvest is the primary population management tool for big game populations. When herds are below population objective ranges, the number of female licenses is reduced or eliminated to allow herds to increase. When herds are above population objective ranges, female licenses are increased.

A Data Analysis Unit (DAU) is the geographic area and identifying number of a relatively discrete big game population. DAUs can contain multiple Game Management Units (GMUs), which are geographic areas delineated to distribute hunters, rather than manage populations.