Nevada Department of Wildlife

Predation Management Status Report

Fiscal Year 2019

State of Nevada

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Executive Summary

The goal of the Nevada Department of Wildlife's (NDOW's) Predator Management Program is to conduct projects consistent with the terrestrial portion of NDOW's Mission "to preserve, protect, manage, and restore wildlife and its habitat for the aesthetic, scientific, educational, recreational, and economic benefits to citizens of Nevada and the United States." Provisions outlined in NRS 502.253 authorize the collection of a $3 fee for each big game tag application, deposition of the revenue from such a fee collection into the Wildlife Fund Account, and use by NDOW to 1) develop and implement an annual program for the management and control of predatory wildlife, 2) conduct wildlife management activities relating to the protection of nonpredatory game animals and sensitive wildlife species, and 3) conduct research necessary to determine successful techniques for managing and controlling predatory wildlife. This statute also allows for: the expenditure of a portion of the money collected to enable the State Department of Agriculture and other contractors and grantees to develop and carry out programs designed as described above; developing and conducting predator management activities under the guidance of the Nevada Board of Wildlife Commissioners; and provide that unspent monies remain in the Wildlife Fund Account and do not revert to State General Funds at the end of any fiscal year.

NDOW maintains a philosophy that predator management is a tool to be applied deliberately and strategically. Predator management may include lethal removal of predators or corvids, non-lethal management of predator or corvid populations, habitat management to promote more robust prey populations which are better able to sustain predation, monitoring and modeling select predator populations, managing for healthy predator populations, and public education, although not all of these aspects are currently eligible for funding through predator fee dollars. NDOW intends to use predator management on a case-by-case basis, with clear goals, and based on an objective scientific analysis of available data. To be effective, predator management should be applied with proper intensity and at a focused scale. Equally important, when possible projects should be monitored to determine whether desired results are achieved. This approach is supported by the scientific literature on predation management. NDOW is committed to using all available tools and the most up-to-date science, including strategic use of predator management, to preserve our wildlife heritage for the long term.

In FY 2019, 13 projects were included in the planned activities, with each project having committed funding. Included in NDOW's ongoing work is Greater sage-grouse protection (Project 21 and Project 21-02), bighorn sheep protection (Project 22-01, Project 22-074, Project 37 and Project 44), pronghorn protection (Project 38), mule deer protection (Project 40) and waterfowl, turkey, and pheasant protection (Project 43). The appendix of this document can be found at
http://www.ndow.org/Nevada_Wildlife/Conservation/Nevada_Predator_Management/

Fiscal year 2017 predator fee revenues totaled $643,233. The Department needed to allocate about $514,586 on lethal removal to meet the requirements set forth by NRS 502.253. Proposed predator projects for fiscal year 2019 included $549,000 for lethal work, $528,659 was spent on lethal removal in fiscal year 2019.

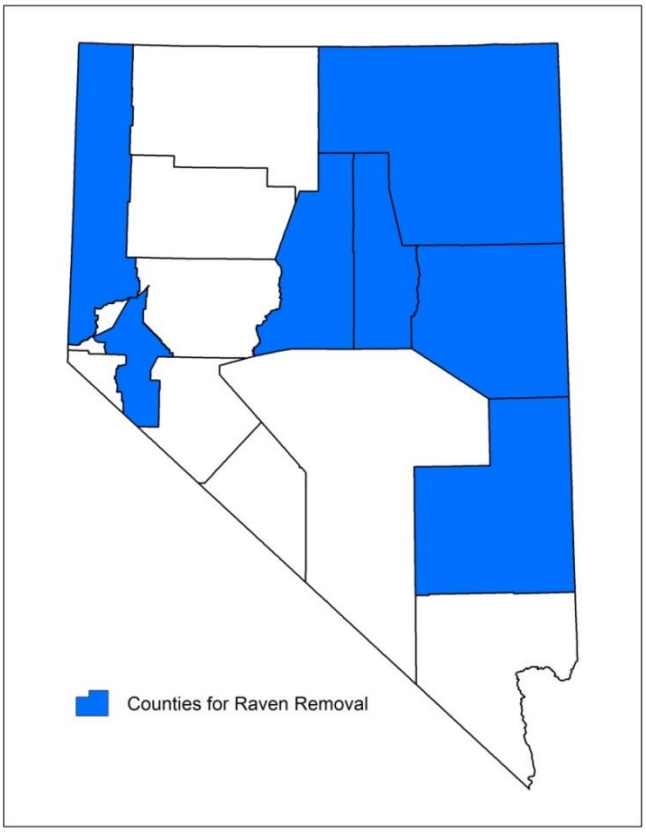
Project 21: Greater Sage-grouse Protection (Common Raven Removal)

Common raven (thereafter raven) control efforts to conserve Greater sage-grouse commenced in early March and extended throughout June 2019. The objective of this project is to increase Greater sage-grouse nest success and recruitment. USDA Wildlife Services (WS) performed raven control work through the placement of corvicide (DCR-1339) injected chicken eggs within occupied Greater sage-grouse habitats. The main treatment areas consisted of eastern and northeastern Nevada in situations where concentrations of ravens have been noted and where habitat has been compromised, potentially by wildfire or anthropogenic subsidies (e.g. landfills and transfer stations). Another treatment area, the Virginia Mountains in western Nevada, is being used as an experimental area and details of that project are reported below (Project 21-02).

Through the efforts of USDA WS personnel, an estimated 1,765 ravens were removed during spring 2019 for project 21. The total number of ravens taken for Project 21, and Project 21-02 was 2,3649. 2,500 is the current maximum that NDOW can remove under the current USFWS depredation permit (#MB37116A-0). Ravens were removed in 12 game management areas during the spring of 2019 under Project 21 and Project 21-02. Four raven nests were oiled (destroyed) by the USGS in the Tuscarora Mountains. More information on this take can be found within the Project 41 portion of this document.

Raven take by Management Area (MA) FY 2019.

Area	Ravens Removed
MA 3	113
MA 5	105
MA 6	161
MA 7	145
MA 8	34
MA 10	56
MA 11	55
MA 14	179
MA 15	420
MA 20	151
MA 22	247
MA 23	99
Total Ravens	1,765



Department Comments on Project

Raven management, including lethal removal, is imperative to maintain and improve Greater sage-grouse and the ecosystems they depend on. NDOW recommends continuing Project 21 while common ravens are believed to be a limiting factor for Greater sage-grouse.

$3 Planned Expenditures	P-R Planned Expenditures	Lethal Expenditures	NDOW Non-Lethal Expenditures	NDOW Salary, Travel, and Office	Total
$100,000	N/A	$86,028	$0	$1,857	**$87,885**

Project 21-02: Common Raven Removal to Enhance Greater Sage-grouse Nest Success

Work was initiated during February through April May 2019 to monitor the efficacy of raven control on the resident Greater sage-grouse population within the Virginia Mountains, located in southern Washoe County. Over a 2.5-month period, USDA WS deployed corvicide-treated eggs within previously identified Greater sage-grouse nesting habitats located around Sheep Springs, Spanish Flat, and lower Cottonwood Creek. An estimated 599 ravens were removed during the spring months.

Greater sage-grouse monitoring work is being conducted by the USGS Western Ecological Research Center. Seven years of baseline monitoring work have been conducted on this population to determine various vital rates and vegetative parameters in used versus random sites across multiple life phases. The information presented below provides summaries of the USGS field crew efforts from March through July 2019. This USGS work was not funded with $3 Predator Fee funds.

USGS Report

RAVEN MONITORING AT VIRGINIA MOUNTAINS

Methods

- Raven point count surveys were performed at Virginia Mountains in association with sage-grouse leks, nests, broods, and random locations

Results

- 164 surveys were conducted overall. 70 of these were independent random (IR) surveys (43%) and 66 were sage-grouse nest surveys (40%).
- 31 ravens were visually observed at distances < 2000 m
- 26 ravens were visually observed at distances < 1125 m
- 10 double-blind surveys were conducted with 2 total ravens observed; double-blind surveys count as 2 in the calculation below
- Raven index for density = # ravens/survey = 0.19 (overall)
    - 0.31 (at independent random surveys)
    - 0.11 (at nests)

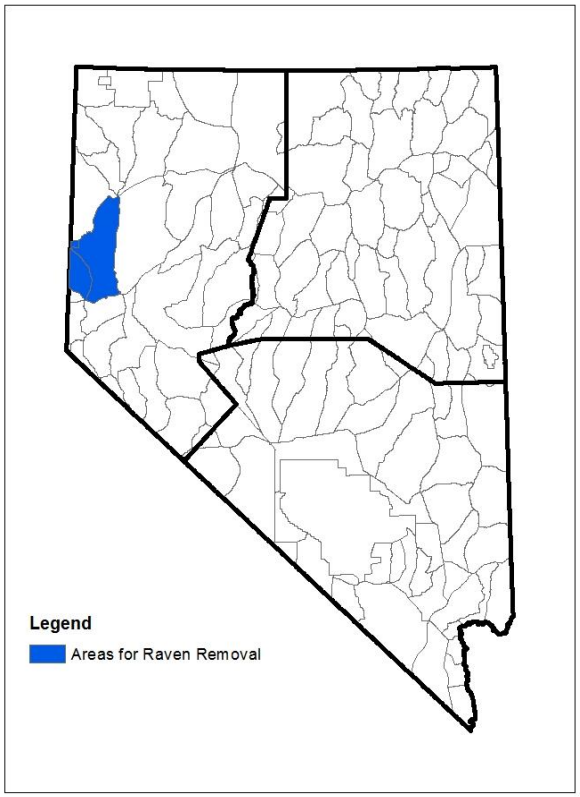
Synthesis

- Raven density appeared to remain relatively low at this site, compared to some previous years (0.5–0.96 ravens/survey; 2009–2011). Numbers are more similar compared to recent years (0.15–0.20 ravens/survey; 2013–2016), and raven density may have decreased slightly compared to last year (0.27 ravens/survey; 2018).
- Raven numbers appeared to be higher at random locations (0.31) than nest locations (0.11)

Department Comments on Project

The area experienced an unplanned, large scale fire in 2017. To better understand the effects of the fire and raven removal on sage-grouse populations, NDOW supports continuing this project through FY 2021.

$3 Planned Expenditures	P-R Planned Expenditures	Lethal Expenditures	NDOW Non-Lethal Expenditures	NDOW Salary, Travel, and Office	Total
$25,000	N/A	$27,910	$0	$1,857	**$29,767**



Project 22-01: Mountain Lion Removal to Protect California Bighorn Sheep

Attempts have been made to establish a California bighorn sheep population in Area 01. Substantial mountain lion-induced mortality has been observed. California bighorn sheep populations may require a reduction in mountain lion densities to reach population viability.

Between July 1, 2018 and June 30, 2019, 3 mountain lions were removed by USDA WS in Unit 011 and 1 mountain lions were removed in Unit 013. Mountain lion removal efforts were made by a private contractor in Unit 011, 2 mountain lions were removed. The private contractor submitted the Annual Predator Management Project Reporting Form (Appendix).

01 Sheep Herd Health (Biologist III Chris Hampson)

In January of 2019, 19 California bighorn sheep were released on the south end of the Massacre Rim. The augmentation will help to bolster the Massacre Rim sub-population and help the herd to reach a self-sustaining level.

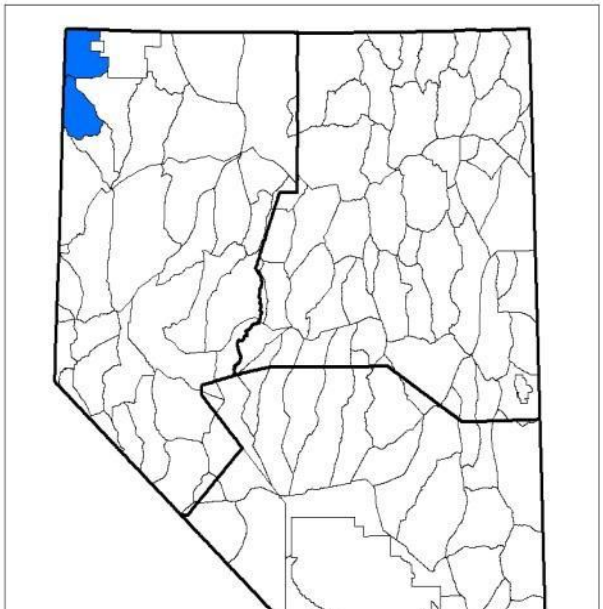
Aerial and ground composition surveys were conducted during the summer of 2019 in the Hays Canyon Range, Massacre Rim and Coleman Rim areas of units 011 and 013. The surveys classified 50 animals that had a composition ratio of 6 rams/100 ewes/45 lambs. The newly released sheep on the Massacre Rim were also observed and 24 ewes with 11 new lambs were observed in this area. The strong recruitment observed within all three subpopulations indicate upward population growth.

Twelve additional GPS collars were attached to the bighorn recently released on Massacre Rim. The additional collars provide biologists with movement and survival information. These collars also help to monitor any potential predation events so that removal efforts can be initiated quickly.

Department Comments on Project

NDOW supports continuing Project 22-01 until the local bighorn sheep populations reach viability as defined in the annual Predator Plan.

$3 Planned Expenditures	P-R Planned Expenditures	Lethal Expenditures	NDOW Non-Lethal Expenditures	NDOW Salary, Travel, and Office	Total
$90,000	N/A	$75,650	$0	$1,857	**$77,507**



Project 22-074: Monitor Rocky Mountain Bighorn Sheep for Mountain Lion Predation

Unit 074 Rocky Mountain bighorn sheep herd experienced a die-off in 1999. Two years following the die-off, the lamb recruitment was low, remaining consistent with typical bighorn sheep die-offs. Since then the average lamb recruitment has been 48 lambs:100 ewes. This level of recruitment should have resulted in an increasing bighorn sheep herd; however the population rebound has not completely occurred.

The Contact Area is a major deer winter range. It is possible that mountain lions following the deer herd from summer range in the Jarbidge Mountains to winter range switch their diet to bighorn sheep when deer return to their summer range. Some mountain lions may be staying in the area on a yearlong basis with their primary food source being Rocky Mountain bighorn sheep.

No mountain lion removal efforts were conducted during FY 2019.

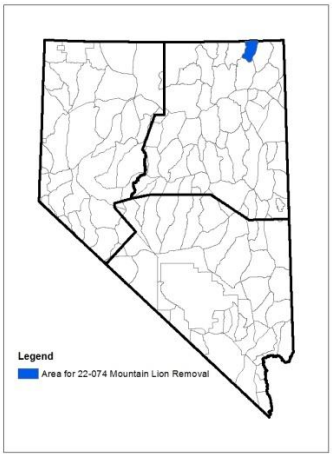
Bighorn Sheep Herd Health (Biologist III Kari Huebner)

On October 17, 2017 26 bighorn were classified in the Contact herd. Observations included 12 ewes (3 yearlings), 3 lambs, and 11 rams (3 yearlings). On October 26, 2017, five additional bighorn (4 ewes and 1 ram) were collared to determine if there are any mountain lion related predation events. The population is most likely between 25-30 sheep. Recruitment remains low, but improving. No known mountain lion mortalities have been observed since FY 2016.

Department Comments on Project

NDOW supports continuing Project 22-074 until the local bighorn sheep reaches population viability as defined in the annual Predator Plan.

$3 Planned Expenditures	P-R Planned Expenditures	Lethal Expenditures	NDOW Non-Lethal Expenditures	NDOW Salary, Travel, and Office	Total
$90,000	N/A	$0	$0	$1,857	**$1,857**



Project 32: Mountain Lion, Black Bear and Mule Deer Interactions

Conclusions from WCS:

This research has and will continue to 1) identify factors important in the restoration/natural re-colonization of black bears into historic ranges and important habitat for black bears and cougars across Nevada. In addition, this research allowed us to 2) obtain data that can be used by the Nevada Department of Wildlife to guide and direct regulation of hunting. For example, understanding how interactions between cougars and black bears affect population dynamics of each other and/or mule deer is important for sustainable use (i.e., sport harvest) for all three of these big game species in Nevada. For instance, scavenging by bears may affect reproductive output, survival, and recruitment of cougars and is important to understand since these populations will likely be different (i.e., lower) than models based on prey availability or harvest statistics alone would predict, particularly in fragmented habitat. Further, black bears that are re-colonizing historic ranges may substantially alter predator-prey dynamics (indirectly through competitive interactions with cougars), effectively acting as a second predator on mule deer populations; an important consideration because mule deer are in decline in several areas throughout Nevada and are an important big game species. Finally, long-term data sets, particularly pertaining to large carnivores that evoke polarized emotions, help to ensure management decisions can be grounded in the best available science.

The full report may be found in the appendix of this document.

$3 Planned Expenditures	P-R Planned Expenditures	Lethal Expenditures	NDOW Non-Lethal Expenditures	NDOW Salary, Travel, and Office	Total
$0	$0	$0	$16,353	$1,857	**$18,210**

Department Comments on Project
Final report received.

Project 37: Big Game Protection-Mountain Lions

In some circumstances, culling of top predators is beneficial for protection of newly translocated big-game populations, small and isolated big-game populations, or big-game populations held below carrying capacity by predation (Hayes et al. 2003, Rominger et al. 2004, McKinney et al. 2006). The geographic range of mountain lions is larger than any big-game mammal in North and South America (Logan and Sweanor 2000), and specific areas may benefit from removal efforts that may target more than a single mountain lion.

A private contractor lethally removed 1 mountain lion from the Jackson Mountains and 3 mountain lions and in the Calico mountains. The Annual Predator Management Project Reporting Form for Project 37 may be found in the appendix of this document.

Department Comments on Project

NDOW supports continuing Project 37 until local bighorn sheep populations become viable as defined in the annual Predator Report. NDOW supports the ability to remove mountain lions quickly.

$3 Planned Expenditures	P-R Planned Expenditures	Lethal Expenditures	NDOW Non-Lethal Expenditures	NDOW Salary, Travel, and Office	Total
$50,000	N/A	$67,233	$0	$1,857	**$69,090**

Project 38: Big Game Protection-Coyotes

Coyotes face an increase in caloric need when raising pups, both through an increase in parent energetic output and feeding growing pups (Till and Knowlton 1983, Sacks et al. 1999, Seidler et al. 2014). Parent coyotes and their pups may consume a drastically different diet than their non-parent counterparts at the same time of year; this difference in diet likely requires larger prey, including mule deer fawns. Removing coyotes may increase mule deer fawn and other wildlife species reproductive output.

Upon approval of Project 38, game biologists with pronghorn management responsibilities were asked whether or not their pronghorn herds may be underperforming due to coyote predation. Areas where predation by coyotes could be a factor limiting pronghorn populations received removal efforts from USDA WS.

Area	Coyotes Removed
MA 10	7
MA 13	3
MA 16	55
MA 25	7
Total	72

Department Comments on Project

NDOW supports continuing Project 38 pending available funding.

$3 Planned Expenditures	P-R Planned Expenditures	Lethal Expenditures	NDOW Non-Lethal Expenditures	NDOW Salary, Travel, and Office	Total
$50,000	N/A	$50,569	$0	$1,857	**$52,426**

Project 40: Coyote Removal to Complement Multi-faceted Management in Eureka County

Mule deer populations in Diamond Mountains in Eureka County are believed to be underperforming due to competition with feral equids, pinyon-juniper expansion, and predation. To alleviate pressure on resources, the BLM conducted a feral horse round-up in the Diamond Mountains in January 2013, removing 792 horses. Eureka County and the Eureka County Advisory Board to Manage Wildlife directed the removal of pinyon and juniper trees on private range lands in the Diamonds and Roberts Mountains in 2008, 2009, and 2011. USDA WS removed coyotes in the area in 2011 and 2012. A private contractor removed coyotes in 2014. On-going removal of coyotes may assist mule deer population recovery.

From July 2018 until June 2019 USDA WS conducted aerial gunning and trapping of coyotes in Area 14, removing 360 coyotes and 1 mountain lion.

NDOW had a contractor conduct 3 Forward Looking Infrared (FLIR) surveys. The purpose of these surveys was to located collared mule deer does, and determine the presence/absence of fawns. A collaboration with the University of Nevada, Reno resulted in a peer-rewiewed paper and an oral presentation at the national TWS conference, "Estimating Reproduction and Survival of Unmarked Mule Deer Offspring from Marked Parents." The abstract of this talk can be found in the appendix of this document.

144 Deer Herd Health (Biologist III Clint Garrett)

This project takes place mainly in the Diamond Range (hunt unit 144) within management area 14 (MA14: 141-145) and contains the majority of the mule deer for this hunt unit grouping. The project focus is on deer wintering and fawning grounds to reduce the effects of potentially high concentrations of coyotes that may be suppressing mule deer below carrying capacity. The project response variable stated within the NDOW predator plan utilizes spring fawn:adult ratios of 50:100 or higher for 3 consecutive years in hunt unit 144 before the project will be altered or discontinued. Other potentially affected game species within the project area include sage grouse and although no response variable is identified within the predator plan for sage grouse, the table below lists peak male attendance for the Diamond population management unit (PMU). Wildlife Services has actively been removing mountain lions and coyotes from the area.

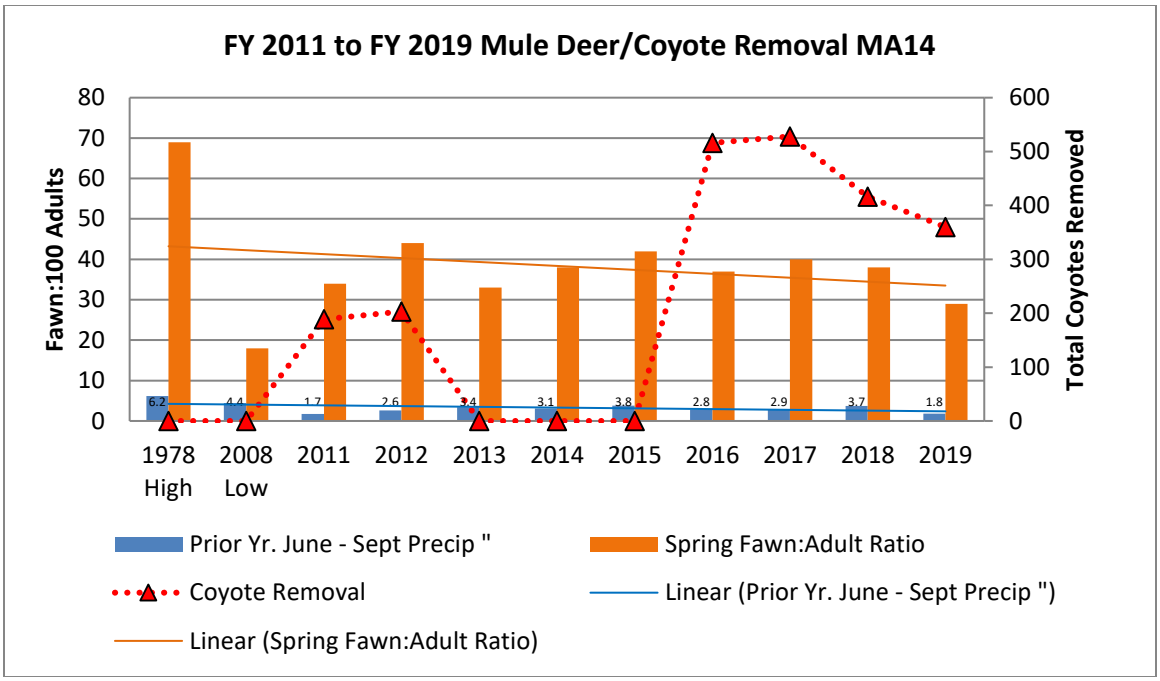
Deer were collared in January 2017 (10 collars) and 2018 (3 collars) to help understand the connectivity between the 144 hunt unit and surrounding hunt units. This collaring effort has given us a better understanding of limiting factors and seasonal use patterns of the deer herd within the Diamond Range. Currently there are only two collared does alive, one from the 2017 capture effort and one from the 2018 capture effort. To date there have been 8 of the 13 collared does killed by mountain lions within the Diamond's which have occurred in varied locations and times of the year.

Current deer modeling is done for MA14 as a whole. For MA14: The 2019 spring survey of 29 fawns:100 adults is the lowest it's been since the spring of 2009 at 21 fawns:100 adults. This is well below the previous 5-year average of 39 fawns:100 adults. The previous 5-year population estimate (2014-2018) is 4,600 deer with the 2018 and 2019 estimates being 4,800 and 4,500

respectively showing a decrease in population and fawn recruitment. The tables and charts below give numbers for MA14, hunt unit 144 and the Diamond PMU.

Deer Survey Year	HU 144 Fawns	HU 144 Adults	HU 144 Fawn/Adult Spring Ratio	June Thru Sept. Precip.	% Fawn Loss		WS Total Removed		Removal Season
					HU 144	MA 14	Coyotes	Mt. Lions	
Lowest Ratio Spring 2008	109	621	18/100	4.4	41%	43%	?	?	?
Highest Ratio Spring 1978	375	544	69/100	6.2	18%	12%	?	?	?
*Spring 2011	291	861	34/100	1.7	NFS	23%	189	0	FY11
Spring 2012	255	574	44/100	2.6	0%	11%	*203	0	FY12
Spring 2013	217	652	33/100	3.4	21%	18%	0	0	No NDOW/WS Removal
Spring 2014	333	877	38/100	3.1	1%	2%	0	0	No NDOW/WS Removal
*Spring 2015	369	876	42/100	3.8	NFS	13%	0	0	No NDOW/WS Removal
*Spring 2016	384	1,050	37/100	2.8	NFS	22%	516	0	FY16
Spring 2017	435	1,086	40/100	2.9	0%	10%	528	1	FY17
Spring 2018	422	1,111	38/100	3.7	0%	6%	416	6	FY18
Spring 2019	312	1,071	29/100	1.8	26%	34%	360	1	FY19

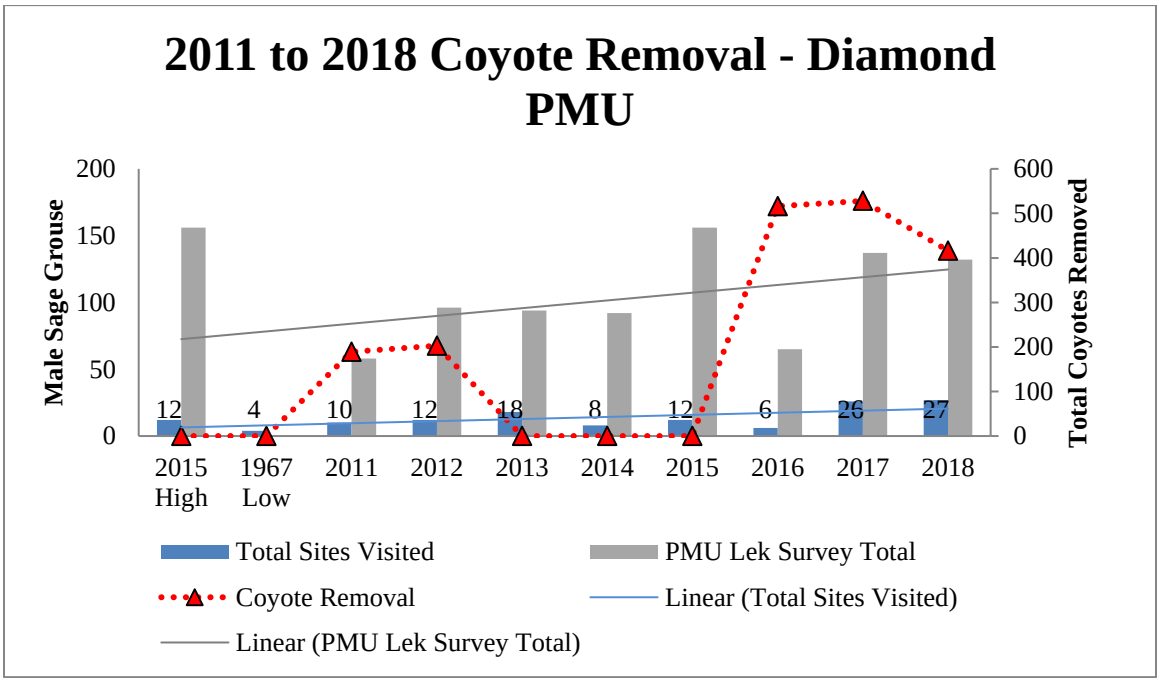
* No fall surveys (NFS) were conducted in 2014 or 2015 for MA14. Fawn loss could not be calculated for hunt unit 144 individually.
Survey/model information goes back to 1974 for MA14 but 1977 – 1978 was the first year a representative survey size was observed.
* Coyote removal was conducted prior to Project 40 implementation – NA4W 10-26: Eureka County and Project 22 Unit 144.
Coyote and Lion removal information is obtained from Nevada USDA-APHIS-WS
Precipitation information is obtained from https://wrcc.dri.edu Eureka, NV
? More information needs to be obtained from Nevada USDA-APHIS-WS



Sage Grouse Survey year	Diamond PMU - Individual Complex						PMU Totals	Total Sites Visited	WS Total Removed	
	West Diamond Valley	East Diamond Valley	South Eureka	Newark Summit	Antelope Valley	Newark Valley			Red Fox	Badger
Low Spring Count (yr)-# Sites 1955-2018	0 (1967)-4	10 (2002)-2	0 (00/01)-2	6 (2001)-1	0 (9 yrs.)-1	0 (1957)-4	0 (1967)-4	0 (6 yrs.)-0	?	?
High Spring Count (yr)-# Sites 1955-2018	21 (2012)-1	102 (1979)-1	28 (2015)-2	61 (2015)-4	23 (1985)-1	104 (2000)-6	156 (2015)-12	132 (2018)-27	?	?
Spring 2011	11	15	NS	NS	0	32	58	10	?	?
Spring 2012	21	15	1	28	NS	32	96	12	?	?
Spring 2013	11	19	0	38	0	26	94	18	?	?
Spring 2014	3	46	18	NS	NS	25	92	8	?	?
Spring 2015	12	35	28	61	NS	20	156	12	?	?
Spring 2016	7	42	NS	NS	0	16	65	6	0	0
Spring 2017	5	*54	19	*32	0	27	137	26	1	7
Spring 2018	3	*29	21	*50	0	*29	132	27	0	0
Spring 2019	3	*19	8	35	*7	*25	97	28	0	1

Includes recently added *new lek sites as well as * pending active lek sites.

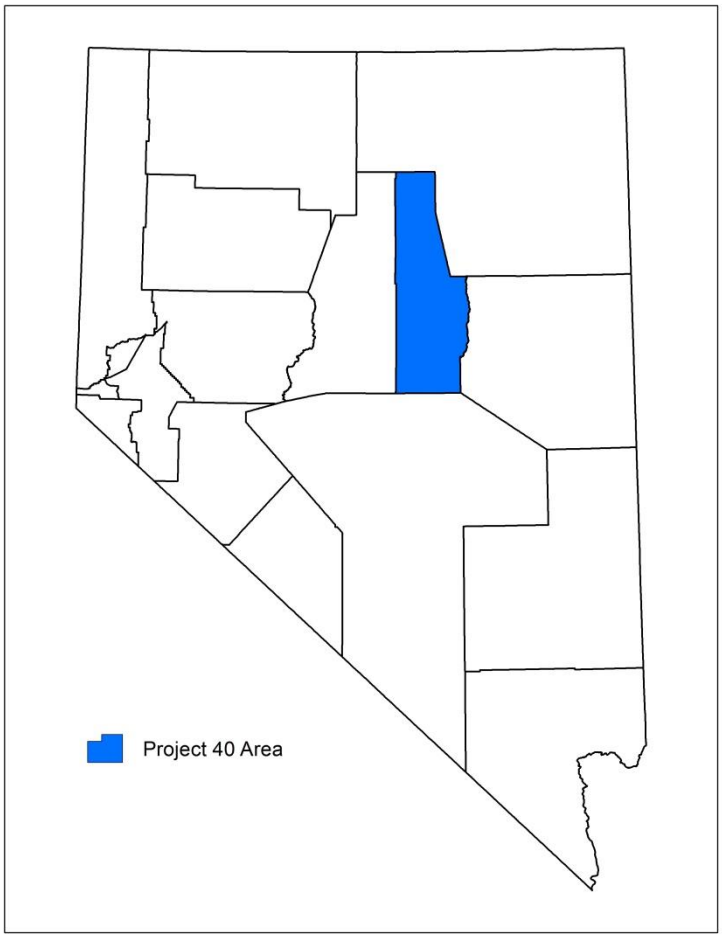
? More information needs to be obtained from Nevada USDA-APHIS-WS



Department Comments on Project

NDOW supports continuing Project 40 until mule deer populations reach levels defined in the annual Predator Plan.

$3 Planned Expenditures	P-R Planned Expenditures	Lethal Expenditures	NDOW Non-Lethal Expenditures	NDOW Salary, Travel, and Office	Total
$100,000	N/A	$107,461	$0	$1,857	**$109,318**


Project 40 Area

Project 41: Increasing Understanding of Common Raven Densities and Space Use in Nevada

The common raven (*Corvus corax*) has been identified as the most common nest predator of Greater sage-grouse (*Centrocercus urophasianus*) (Coates et al. 2008, Lockyer et al. 2013). Although the raven is a natural predator of Greater sage-grouse nests (Schroeder and Baydack 2001), human subsidies, including food sources (e.g., roadkill (Kristan III et al. 2004, Coates et al. 2014*a*, *b*), landfills (William III and Boarman 2007, Peebles 2015) and artificial nesting structures (e.g., power and utility lines (Knight et al. 1995, Coates et al. 2014*a*, *b*, Howe et al. 2014), dramatically increased raven abundance as much as 1600% in some areas (Boarman 1993, Sauer et al. 2017). Increased raven abundance coupled with Greater sage-grouse habitat loss (Schroeder et al. 2004) and degradation (e.g., invasive species invasion (Commons et al. 1999, Baruch-Mordo et al. 2013, Coates et al. 2016), wildfire (Crawford et al. 2004, Lockyer et al. 2015) resulted in reduced or decreased Greater sage-grouse population growth in portions of its range (Klebenow 2001, Stiver 2011).

Raven Transmitters

Between July 2018 and June 2019 we captured and radio-tagged 16 ravens: 8 adults and 8 juveniles. We started the season tracking 24 ravens radio-tagged during previous capture efforts resulting in a total of 40 birds tracked during the season. At the end of the season, 18 ravens were still alive with active transmitters (5 juveniles and 13 adults). Two ravens slipped transmitters, 5 devices stopped transmitting, 13 ravens died (8 previously caught juveniles and 5 adults) and 2 ravens had an unknown fate. Of the 9 radio-tagged juvenile mortalities, 2 appeared depredated or scavenged and 3 carcasses were found intact. We found the remains of the other 3 juveniles in recently plowed turn pivot fields. We did not find any remains near the transmitters of the 2 ravens with unknown fates.

Raven Nest Monitoring

We actively monitored 53 nests and focused juvenile capture efforts on 34 of those nests.

Point Count Surveys

NDOW technicians conducted 823 raven and raptor point count surveys. These data will be part of the USGS' statewide population estimate.

USGS Projects

The USGS engaged in 10 common raven related projects during fiscal year 2019. Project summaries and products can be found in the appendix, there titles are as follows:

1. Modeling common raven occurrence across sagebrush ecosystems in the Great Basin, USA
2. A rapid survey for site level estimates of raven densities
3. Estimating common raven densities in a semi-arid ecosystem: implications for conservation of sage-grouse and other sensitive prey species
4. Relating raven density to sage-grouse nest success at the nest level in California and Nevada
5. Spatially-explicit predator impact models: linking common raven density to sage-grouse nest success using hierarchical modeling
6. Raven and sage-grouse interactions and behavioral ecology
7. Raven monitoring at Virginia Mountains (not funded with $3 predator fee)
8. Raven monitoring across Nevada
9. Raven disease exposure in the Great Basin
10. Effectiveness of egg-oiling raven nests using drone technology and sage-grouse nesting responses

Department Comments on Project

Common raven predation may be the greatest limiting factor in Greater sage-grouse nest success, NDOW supports continuing Project 41.

$3 Planned Expenditures	P-R Planned Expenditures	Lethal Expenditures	NDOW Non-Lethal Expenditures	NDOW Salary, Travel, and Office	Total
$100,000	$300,000	$0	$323,443	$1,857	**$325,300**

Project 42: Assessing Mountain Lion Harvest in Nevada

No work was performed on Project 42 during FY 2019. Work has begun during FY 2020.

$3 Planned Expenditures	P-R Planned Expenditures	Lethal Expenditures	NDOW Non-Lethal Expenditures	NDOW Salary, Travel, and Office	Total
$0	$0	$0	$0	$1,857	**$1,857**

Project 43: Mesopredator Removal to Protect Waterfowl, Turkeys, and Pheasants on Wildlife Management Areas

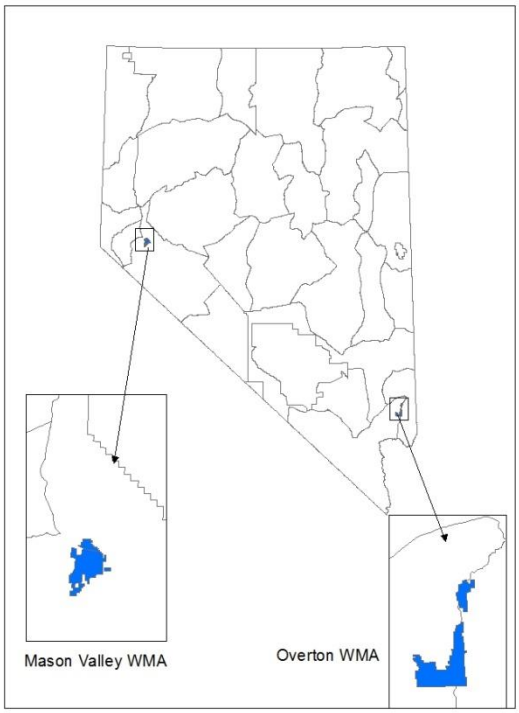
USDA WS conducted mesopredator removal for the benefit of primarily waterfowl and turkeys in Mason Valley and Overton Wildlife Management Areas in FY 2019.

Species	Mason Valley	Overton
Badger	0	3
Beaver	0	4
Coyote	7	6
Feral Cat	2	2
Porcupine	2	0
Raccoon	4	3
Spotted Stunk	0	4

Department Comments on Project
NDOW recommends continuing project 43 pending funding availability.

$3 Planned Expenditures	P-R Planned Expenditures	Lethal Expenditures	NDOW Non-Lethal Expenditures	NDOW Salary, Travel, and Office	Total
$50,000	$N/A	$38,038	$0	$1,857	**$39,895**

Wildlife Management Areas for Lethal Predator Control



Project 44: Lethal Removal and Monitoring of Mountain Lions in Area 24

Mountain lions are known predators of bighorn sheep and other big game species (Rominger et al. 2004). Though predation is a naturally occurring phenomenon for bighorn sheep and other big game, their populations can be lowered or suppressed by abiotic factors such as dry climate and loss of quality habitat. Mitigating abiotic factors by removing predators is imperative for some bighorn sheep populations to stabilize (Rominger 2007).

Attempts have been made to establish a desert bighorn sheep population in Area 24. Reintroduction attempts have provided mixed results, it has long been thought lion predation may be a contributing factor. Project 44 has evolved to be a reactive removal project. Mountain lions within the Delamars are captured, receive GPS collars, and kill sites are visited to determine diet. If a lion consumes a bighorn sheep it is lethally removed. Two mountain lions were identified as consuming bighorn sheep and were removed. The Annual Predator Management Project Reporting Form may be found at the appendix of this document.

From July 1, 2018 to June 30, 2019 11 mountain lions were collared. NDOW technicians and personnel visited 273 GPS clusters; 250 were mountain lion feeding sites. From these 250 active GPS clusters, 5 consisted of bighorn sheep. 67 of the 250 GPS clusters consisted of feral horse. This proportion is surprisingly large, these findings will likely result in a collaboration with the USGS and Utah State University.

01 Sheep Herd Health (Biologist III Cooper Munson)

The Delamar Mountain sheep herd continues to show low lamb recruitment and stagnant hunter success over the past 3 years. Surrounding bighorn herds have been stable or increasing in population while maintaining a high hunter success rate. The cause of population decline within this mountain range is not fully understood, although it is known that there are multiple factors that could be contributing, including predation by mountain lions and Mycoplasma Ovipneumoniae as well as bighorn sheep may also be selecting for other habitat in surrounding mountain ranges.

Drought can drastically change distribution of sheep in the Delamar mountain range as well. Previous years of drought may have pushed many sheep into areas that make them more susceptible to predation in search of water. Although there are many negative elements impacting the Delamar sheep herd, they continue to persist. Ongoing predator control efforts and maintenance of water developments may be the key elements that are holding this struggling population together.

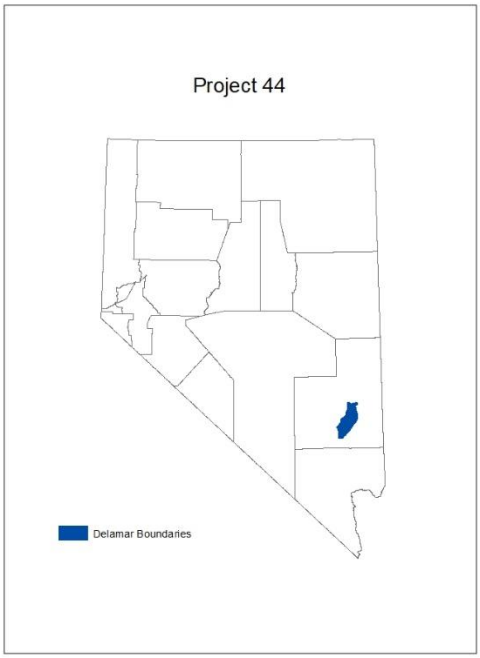
In September of 2019 an abbreviated survey was conducted in mid September where 21 sheep were observed in a 3 hour survey and classified as 8 rams, 12 ewes, and 1 lamb. Currently, this is the lowest lamb ratio observed in this mountain range and will continue to be monitored.

Department Comments on Project

NDOW supports continuing Project 44 until the local bighorn sheep populations reach viability as defined in the annual Predator Plan. NDOW also supports reactive removal of offending mountain

lions while learning more about local mountain lion diet. NDOW supports seeking outside collaboration and funding sources.

$3 Planned Expenditures	P-R Planned Expenditures	Lethal Expenditures	NDOW Non-Lethal Expenditures	NDOW Salary, Travel, and Office	Total
$50,000	N/A	$61,770	$0	$1,857	**$63,627**



Project 45: Passive Survey Estimate of Black Bears in Nevada

Black bears are expanding numerically and geographically, and in so doing they are recolonizing historic ranges in Nevada. It is imperative the Department be able to estimate Nevada's black bear population and monitor growth and change. Being able to do so passively will ensure the Department can reach these objectives safely and cost efficiently.

In a collaboration with Michigan State University and University of Montana, hair snare stations and trail cameras will be deployed on a grid to determine black bear density. Existing black bear GPS data will be incorporated into models. These data will ultimately result in a population estimate.

This is an ongoing project, a submitted Annual Predator Management Project Reporting Form can be found in the appendix of this document. The main excerpt includes:

> The project has progressed smoothly and efficiently since its inception in January of 2018. We have collected image data from a grid of approximately 100 camera traps distributed across ~5000 km^2 of black bear habitat since June of 2018, resulting in approximately 1.2 million images. These images are currently being analyzed at Michigan State University. We have also collected 300+ hair samples over two summer field seasons, which are also currently being analyzed at Michigan State University. Initial analyses of these data will be presented at The Wildlife Society and American Fisheries Society Annual Conference scheduled for October 2019 and held in Reno, Nevada. This presentation will be developed into an article for publication in a peer-reviewed journal. The project is scheduled to complete in June of 2021.

Department Comments on Project

Due to FY 2018 being extremely hot and dry, and FY 2019 having above average snow fall, NDOW supports continuing Project 45 through FY 2022.

$3 Planned Expenditures	P-R Planned Expenditures	Lethal Expenditures	NDOW Non-Lethal Expenditures	NDOW Salary, Travel, and Office	Total
$40,000	$120,000	$0	$343,955	$1,857	**$345,812**

Overall Budget and Expenditures for FY 2019

Project	$3 Planned Expenditures	P-R Planned Expenditures	Wildlife Services Expenditures	NDOW Non-Lethal Expenditures	NDOW Salary, Travel, and Office[b]	Total
Department of Ag Transfer[a]	$14,000	N/A	$14,000	$0	$0	$14,000
Project 21	$100,000	N/A	$86,028	$0	$1,857	$87,885
Project 21-02	$25,000	N/A	$27,910	$0	$1,857	$29,767
Project 22-01	$90,000	N/A	$75,650	$0	$1,857	$77,507
Project 22-074	$25,000	N/A	$0	$0	$1,857	$1,857
Project 32	$0	$0	$0	$16,353	$1,857	$18,210
Project 37	$50,000	N/A	$67,233	$0	$1,857	$69,090
Project 38	$50,000	N/A	$50,569	$0	$1,857	$52,426
Project 40	$100,000	N/A	$107,461	$0	$1,857	$109,318
Project 41	$100,000	$300,000	$0	$323,443	$1,857	$325,300
Project 42	$2,500	$7,500	$0	$0	$1,857	$1,857
Project 43	$50,000	N/A	$38,038	$0	$1,857	$39,895
Project 44	$50,000	N/A	$61,770	$0	$1,857	$63,627
Project 45	$40,000	N/A	$0	$343,955	$1,857	$345,812
Total[c]	**$696,500**	**$307,500**	**$528,659**	**$683,751**	**$24,141**	**$1,236,551**

[a]This transfer of $3 predator fees for administrative support to the Department of Agriculture partially funds state personnel that conduct work for the benefit of wildlife at the direction of USDA WS (e.g., mountain lion removal to benefit wildlife).
[b]Incorporates both $3 and P-R expenditures
[c] Fiscal year 2017 predator fee revenues totaled $643,233. The Department needed to allocate about $514,586 on lethal removal to meet the requirements set forth by Assembly Bill 78. Proposed predator projects for fiscal year 2019 included $549,000 for lethal work, $528,659 was spent on lethal removal in fiscal year 2019.

Expected Revenues and Beginning Balance of $3 Predator Fee

	FY 2017 Actual (revised)	FY 2018 Actual (revised)	FY 2019 Actual (revised)	FY 2020 Projected
Beginning balance	$778,844	$592,122	$412,582	$287,651
Revenues	$653,835	$677,186	$717,064	$717,064
Plan Budget	$839,500	$961,500	$691,500	$829,000
Expenditures	$840,557	$856,726	$841,995	$829,000
Ending balance	$592,122	$412,582	$287,651	$175,715

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Appendix

http://www.ndow.org/Nevada_Wildlife/Conservation/Nevada_Predator_Management/