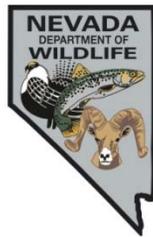


Nevada Department of Wildlife PREDATION MANAGEMENT PLAN

FISCAL YEAR 2014

1 July 2013 to 30 June 2014



30 JUNE 2013

STATE OF NEVADA

Brian Sandoval, Governor

Nevada Department of Wildlife

Tony Wasley, Director

Rich Haskins, Deputy Director

Patrick Cates, Deputy Director

LARRY T. GILBERTSON, CHIEF, GAME DIVISION

GAME DIVISION STAFF REPORTS BY – PETE BRADLEY, SHAWN ESPINOSA, MIKE COX, MIKE DOBEL, STEVE KIMBLE, KEN GRAY, TOM DONHAM, CHRIS HAMPSON, MIKE SCOTT AND PAT JACKSON

BOARD OF WILDLIFE COMMISSIONERS

Jack Robb Chairman, Reno
Jeremy Drew Vice Chairman, Minden
Karen Layne Las Vegas
Michael McBeath Las Vegas
David McNinch..... Reno
Peter Mori..... Tuscarora
Chad Bliss.....Eureka
Grant Wallace.....Dyer
Bill YoungLas Vegas

The Nevada Department of Wildlife receives funds from Federal Aid and Wildlife Restoration Acts. Federal and State law state that there shall be no difference in the treatment of individuals because of race, color, creed, religion, native origin, sex or disability. Anyone receiving alleged discriminatory treatment in any Department program, activity or facility should report it to either:

Director
Nevada Department of Wildlife
1100 Valley Road
Reno, NV 89512

U.S. Fish & Wildlife Service
Department of the Interior
18th & C Streets
Washington, D.C. 20240

Cover Art: Radio-collared cougar (*Puma concolor*). Photo provided by NineCaribou Productions and Alyson Andreassen.

TABLE OF CONTENTS

				Page
Executive Summary				4
				(Thousand Dollars)
<u>FY 2014 Predation Management Projects</u>				<u>\$3Fee Match Total</u>
Project 18	Mule Deer Protection (Unit 014)	85	85	6
Project 21	Greater Sage-Grouse Protection (Statewide)	40	40	8
	Sub Project 21-02 Virginia Mtns Sage-Grouse Broods (Area 2)	20	20	10
Project 22	Mule Deer and Other Big Game Protection (Statewide)	110	110	12
	Sub Project 22-14 Diamond-Roberts Mule Deer Fawns (Area 14)	40	40	14
Project 25	Coyote Mule Deer Predator / Prey Analysis (Areas 16,17)	25	75	100
Project 29	Road kill Removal for Greater Sage-Grouse (Statewide)	25	25	50
Project 30	Landfill / Animal Pit Management for Sage-Grouse (Stwd)	25	25	50
Project 31	Cougar - Mule Deer – Bighorn Analysis (Statewide)	0	0	0
Project 32	Cougar – Mule Deer – Black Bear Analysis (Areas 20,29)	15	45	60
Project 33	Sage-Grouse Nesting Habitat (Piñon-Juniper) (Area 20)	25	25	50
Project 34	Sage-Grouse Brood Habitat (Stringer Meadow) (Area 14)	<u>0</u>	<u>0</u>	<u>0</u>
		\$410	\$195	\$605
<u>Cancelled Projects</u>				32
Project 6	Desert Bighorn Protection (Unit 241)			32
Project 20	California Bighorn Protection (Unit 022)			34
<u>Preliminary 2014 Budget</u>				36
<u>Literature Cited</u>				37



EXECUTIVE SUMMARY

The goal of the Nevada Department of Wildlife's (NDOW) Predation Management Program is to initiate projects consistent with the terrestrial portion of the Department'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." In addition, provisions outlined in NRS 502.253 authorize the collection of a \$3 fee for processing each application for a big game tag, depositing the revenue from such a fee collection into the Wildlife Fund Account and used by the Department to 1) manage and control predatory wildlife, 2) pay for management activities relating to the protection of non-predatory game animals and sensitive wildlife species and related wildlife habitat, 3) conduct research, as needed, to determine successful techniques for managing and controlling predatory wildlife, including studies necessary to ensure effective programs for the management and control of predatory wildlife; 4) fund education of the general public concerning the management and control of predatory wildlife, 5) expend 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, 6) and to develop and conduct predator management activities under the guidance of the Wildlife Commission. Another key provision of this statute was that "The money in the Wildlife Fund Account remains in the Account and does not revert to the State General Fund at the end of any fiscal year."

Six of 8 FY13 projects have been recommended for continuation in FY14. Four new projects have been proposed for FY14 bringing the total to 10 projects for FY14. Approximately \$526,700 will be available from the \$3 Fee in FY14. Several matching funds may also come available over time for these projects including federal grants, NGOs, and other State funding mechanisms (Upland Game Stamp, Heritage, etc).

NDOW maintains a philosophy that predation management is a tool to be applied deliberately and strategically. Predator management may include the select removal of carnivores or corvids, using nonlethal methods to reduce carnivore or corvid populations, monitoring and modeling select carnivore populations, managing for viable carnivore populations, and/or analyzing predator-prey relationships to better understand ecosystem function. Predation management should be applied on a location specific, case-by-case basis, with clear goals, and based on an objective scientific analysis of available data. It should be applied with proper intensity and at a focused scale. Equally important, projects should be monitored to determine whether desired results are achieved.

The killing of predators continues to be controversial and has often turned out not to be the panacea some wish it to be. Predator removal does not always produce desired effects (Crabtree 2012; Stewart and Wasley 2011; Hurley et al 2011; Coates et al 2007). There are specific times and places where controlling select predators can have a desired effect (Ballard et al 2001). In order to maximize potential for success and reduce risk of unintended ecological consequences, strategic approaches must be employed when predator control is deemed warranted (e.g. in cases where endangered species and/or nonviable sensitive wildlife populations may be at risk). NDOW is



committed to using all tools available and the most up-to-date science available, including strategic use of predator management, to preserve our wildlife heritage for the long term. Projects 21 and 22 are examples of our continued commitment to focused, efficient and fiscally responsible predator removal efforts.

Projects 25, 31 and 32 are attempts to better understand ecosystem function and the role large carnivores play in maintaining a well-tuned functioning ecosystem with all of its attendant and original parts. We intend through this investigation to bring more of a science-based management approach to game, predator and ecosystem management in Nevada (Leopold 1949).

In light of issues associated with the potential listing of greater sage-grouse under criteria outlined in the Endangered Species Act (ESA), special management activities including nonlethal raven population control and a new habitat management component were included. One deals with reducing nest predation during the spring by specifically targeting common ravens. Project 21 has been expanded to include studies of greater sage-grouse in the Virginia Mountains (Units 021 and 022), Pine Nut Mountains (Unit 291) and Callahan Mountain (Unit 154) to assess recruitment before and after raven removal. This project was expanded to include survey and inventory of common raven nests on NV Energy power transmission and ATT telephone lines that intersect greater sage-grouse habitats with a goal to assess the relative value of perch deterrent structures and permanent nest removal as a means of non-lethal common raven population control. In addition to expanding Project 21, Projects 29 and 30 were expanded to further reduce the availability of food resources to common ravens along roads in northern Nevada, along raven migration corridors in southern Nevada, and at public landfills and public/private dead animal pits. Better waste-stream management and removal of road kills have been identified by the USFWS as non-lethal tools to help return raven populations to more natural levels in the American West, thus reducing negative interactions with greater sage-grouse. The NDOW is required to show efforts to utilize “non-lethal” methodology to address common raven issues by the U.S. Fish and Wildlife Service (USFWS) as part of the application process for the permit to institute removal efforts.

Two new projects (33 & 34) were designed to help restore appropriate vegetative nesting and brood-rearing security cover in high priority sage-grouse habitats to reduce incidences of nest predation and predation on broods. Project 33 would focus work on providing healthy security cover in historical high priority sage-grouse habitats where singleleaf piñon and Utah juniper have invaded sagebrush and mountain brush habitat zones. Project 34 would focus work on providing healthy security cover in high priority sage-grouse habitats where stringer meadows and associated brood habitats have been degraded by intensive grazing management over time. A byproduct of these last two projects would be the improvement of habitat for several sagebrush obligate and resident wildlife species including mule deer, pronghorn, bighorn, pygmy rabbit, sage sparrow, vesper sparrow, Brewer’s sparrow, sage thrasher, loggerhead shrike and ferruginous hawk.



FY 2014 PROPOSED AND/OR APPROVED PROJECTS

Project 18: Protection of Mule Deer - Unit 014

Project 18 at a Glance

GOAL: Enhance existing mule deer population in Unit 014, North Washoe County
PROJECT AREA: Treatment Area - Granite Range (014); Control Areas (No Targeted Predator Control) – Surrounding Mountain Ranges (Units 011, 012, 013, 015 and 033).

IMPLICATIONS FOR MANAGEMENT OF WILDLIFE POPULATIONS/HABITATS:

1) The removal of carnivores was intended to result in enhancement of this mule deer herd. 2) Further data collection and analysis determined the effectiveness of this project and will direct wildlife management policy in the future.

DURATION: 2004-2014.

CONCLUSION: Since predator control is never a long-term solution, any benefits should have occurred by now following 9 years of control efforts.

TOTAL KILL 2004-2012: 1,204 carnivores (46 lions, 1,158 coyotes)

TOTAL EXPENDITURES 2004-2012: \$615,362

FY13 APPROVED BUDGET: \$ 85,000

FY14 PROPOSED BUDGET: 0

FY14 APPROVED BUDGET: \$ 85,000

RECOMMENDATION: Terminate Project 18 as of 30 June 2014.

Introduction

From early 2004 to 2013, in an effort to protect and enhance a mule deer population in northern Washoe County, NDOW killed over 1200 carnivores in the Granite Mountain Range, Unit 014. NDOW funded Wildlife Services to remove as many large carnivores as was possible given the constraints of weather, time and available funding. Surrounding mountain ranges received limited predator control during the same study period and included those portions of northern Washoe, Humboldt and Pershing Counties in Units 011, 012, 013, 015 and 033. Limited predator kill in control areas was associated either with agriculture, legal hunting and/or poaching.

In 2010, an extensive analysis was conducted in cooperation with UNR attempting to identify benefits or differences in performance of Unit 014 treatment area mule deer and California bighorn populations in comparison to adjacent northern Washoe-Humboldt-Pershing County control units in relation to different levels of predator removal (Stewart and Wasley 2011). Those data continue to be analyzed.

Results and Discussion

Differences in recruitment as measured by spring deer surveys were statistically insignificant between areas with or without carnivore control. Although the 014 deer



population did increase over the life of this project, similar patterns in deer population changes in the absence of predator control in other units suggests mule deer production and recruitment were also driven by landscape scale phenomena such as climate, ecological carrying capacity and nutritional availability and have little or no correlation to numbers of Apex carnivores removed in a given area (Ballard et al 2001; Wasley 2004; Hurley et al 2011; Stewart and Wasley 2011).

Aside from fawn ratios, other metrics used over the years to assess effects of large carnivore control on the Unit 014 mule deer herd included hunter success, total harvest, and greater than or equal to 4 antler points in the harvest. All were independently regressed against both cougar and coyote kill and none of these metrics resulted in statistically significant correlations. Nor did any of these metrics provide evidence or insight into any population level benefits of Project 18 predator control that may have led to the population increase, tag increases or improved buck quality. The area biologist indicated the start of Project 18 coincided with extremely conservative county wildlife advisory board recommendations that resulted in very low deer tag levels that were not directly proportional to buck availability or the 2004 deer population level. The 2004 deer tag levels that were based on socio-political considerations rather than biology makes them unreliable as a metric to assess the effects of predator control. Published deer population estimates were the only metric that showed some potential positive correlation with predator control but unfortunately did so in spite of fawn recruitment which was not significantly different from adjacent areas.

Conclusion

This project was designed to protect a mule deer population from large carnivore predation in hopes of enhancing that population and thus improving hunter opportunity in the Granite Mountain Range of northern Washoe County. Analysis of the associated data indicates population dynamics and harvest data did not show positive correlations that would support this hypothesis. When evaluated in the context of the larger northern Washoe mule deer population, deer in the 014 Project Area do not require extra or targeted predator removal in order to maintain robust population viability over the long term. Assessment of this long-term predator removal project indicates the expenditure of the nearly three-quarters of a million dollars could have been used more effectively to improve and enhance mule deer populations and habitats elsewhere in the State. Even if a percentage of the 014 deer population increase could be attributed to predator control, the cost/benefit ratio would not support continued expenditure of sportsmen's dollars.

Recommendation

Reporting requirements for FY2014 projects will be reflective of the final language in Commission Policy #23. Based on the final analysis at the end of FY14 which will represent a decade of predator control along with a cost-benefit analysis, it is likely that Project 18 will be discontinued as of 30 June 2014.



Project 21: Greater Sage-Grouse Protection

Project 21 at a Glance

GOAL: Increase populations of Greater Sage-Grouse.

PROJECT AREA: High Priority Greater Sage-Grouse breeding, nesting and brood-rearing habitat throughout northern and central Nevada.

IMPLICATIONS FOR MANAGEMENT OF WILDLIFE POPULATIONS/HABITATS:

1) The removal of corvids and carnivores is intended to result in long-term protection for greater sage-grouse populations. 2) Further data collection and analysis will determine the effectiveness of this project and direct wildlife management policy in the future in priority greater sage-grouse habitats.

PROJECT DURATION: 2007-2015.

TOTAL KILL 2007-2012: 6,850 Predators: [6,743 Common Ravens, 107 Carnivores (44 Coyotes, 63 American Badgers)]

TOTAL EXPENDITURES 2007-2012: \$55,615 + \$91,885(Heritage) = \$147,500

FY13 APPROVED BUDGET: \$60,000

FY14 PROPOSED BUDGET: \$40,000

FY14 APPROVED BUDGET: \$40,000

RECOMMENDATION: Fund project through FY 2015.

Introduction

Common raven control projects were first initiated in the spring of 2007. Most raven control work was conducted in association with greater sage-grouse strutting grounds in 8 counties of northern and central Nevada (Churchill, Elko, Humboldt, Lander, Lincoln, Nye, Washoe and White Pine).

Methods

Methodology for killing ravens was to deploy chicken eggs treated with the poison “3-chloro-*p*-toluidine hydrochloride” (CPTH) (DRC-1339). Estimates of raven losses were based on previous work and published literature (Coates et al 2007). Eggs were placed at treatment sites from late March through mid June 2007-2012. To reduce non-target species exposure, no eggs were left in the environment for over 168 hours. No leftover eggs were used on subsequent treatments. All remaining eggs and any dead ravens found were collected and disposed of properly as per poison control protocol. Depending on the species and situation, coyotes and American badgers were also killed by aerial gunning, calling, shooting, leg-hold traps and/or snares in high priority sage-grouse habitat.

Conclusion

While some short-term benefits probably were realized in isolated areas, it remains unlikely current predator control programs are having the desired effect of bolstering



select ground-nesting upland game bird populations over the long term. Raven numbers, for example, rebounded each spring to abundances seen prior to CPTH application in one study conducted in northern Nevada (Coates et al 2007). While lethal removal of ravens may provide some short term benefit to ground nesting game birds in isolated situations, reducing and/or making unavailable food and nesting structure resource subsidies (i.e. open landfill dumps, road-kill carrion, power and phone line nesting structures) is the only real long term solution for bringing raven numbers into balance within Great Basin ecosystems (Coates et al 2007).

Still greater analytical tools are being deployed in 2013 and 2014 to analyze statistically, the effect of predator removal on nest success of greater sage-grouse in select areas across the Great Basin. This work along the rehabilitation and preservation of greater sage-grouse habitats should help in efforts to preserve the grouse over the long term (Espinosa 2012).

Recommendations

Game Division staff should evaluate proposals with regional game supervisors and biologists prior to contacting a permitted contractor to initiate control efforts.

Use Project 21 for emergency projects or to complete previously identified ones.

Coordinate with Wildlife Services to continue predator removal work in high priority greater sage-grouse habitats throughout the state. Evaluate each sub-project on its own merits annually.

Fund Project 21 through FY 2015. Evaluate efficacy of Project 21 annually.

Reporting requirements for FY2014 projects will be reflective of the final language in Commission Policy #23.



Sub Project 21-02: Sage-Grouse Brood Survival in Virginia Mountains

Sub Project 21-02 at a Glance

GOAL: Analyze greater sage-grouse brood survival in control/treatment setting in the Virginia Range (Unit 022).

PROJECT AREA: Tule and Vinegar Peak areas of the Virginia Mountains west of Pyramid Lake in northwest Nevada.

IMPLICATIONS FOR MANAGEMENT OF WILDLIFE POPULATIONS/HABITATS:

1) The targeted removal of corvids is intended to result in short-term increases in brood survival of greater sage-grouse. 2) Analysis of data from control and treatment study areas in the Virginia Mountains would determine the effectiveness of this project and help direct wildlife management policy in the future in priority greater sage-grouse habitats statewide.

PROJECT DURATION: 2013-2016.

FY14 PROPOSED BUDGET: \$20,000

FY14 APPROVED BUDGET: \$20,000

RECOMMENDATION: Fund project through FY 2016.

Introduction

Greater sage-grouse nest survival and avian predator abundance data have been gathered recently by USGS and NDOW in the absence of Corvid removal in the Virginia Mountains (see map) and other high priority sites across the Great Basin. Common raven lethal control projects are being initiated in select sites to provide before/after as well as control/treatment nest survival data comparisons in FY2014.

Methods

Methodology for killing common ravens would be to deploy chicken eggs treated with the poison "3-chloro-*p*-toluidine hydrochloride" (CPTH) (DRC-1339). Eggs would be placed at treatment sites from late March through April 2014. To reduce non-target species exposure, no eggs would be left in the environment for over 168 hours. No leftover eggs would be used on subsequent treatments. All remaining eggs and any dead ravens found would be collected and disposed of properly as per poison control protocol. No lethal carnivore control would be conducted in association with this project.

Conclusion

This project is an attempt to deploy more sophisticated analytical tools in analyzing the effect of predator removal on brood survival of greater sage-grouse in select areas across the Great Basin. This work along with the rehabilitation and preservation of greater sage-grouse habitats should help in efforts to preserve the grouse over the long term (Espinosa 2012).

Recommendations



Reporting requirements for FY2014 projects will be reflective of the final language in Commission Policy #23.



Sub Project 21-02 Map (Virginia Mountains Project Area -Turquoise).



Project 22: Mule Deer/Big Game Enhancement – Statewide

Project 22 at a Glance

GOAL: Enhance mule deer and other big game populations where herds may be at risk, experiencing chronic low carrying capacity and/or catastrophic decline.
PROJECT AREA: Statewide.
IMPLICATIONS FOR MANAGEMENT OF WILDLIFE POPULATIONS/HABITATS:
 1) The removal of carnivores is intended to result in enhancement of mule deer and other big game herds. 2) Further data collection and analysis will determine the effectiveness of this project and direct wildlife management policy in the future statewide.
PROJECT DURATION: 2010-2015.
TOTAL KILL TO DATE: 879 carnivores (862 coyotes, 17 cougars).
TOTAL EXPENDITURES 2010-2012: \$328,764 +\$271,166 Heritage = \$599,930
FY13 APPROVED BUDGET: \$ 80,000
FY14 PROPOSED BUDGET: \$ 50,000
FY14 APPROVED BUDGET: \$110,000
RECOMMENDATION: Fund project through FY 2015.

Introduction

In 2009, Project 22 was initiated statewide to provide flexibility and opportunity to respond quickly to conditions on the ground that biologists believe could be adversely affecting population viability of select mule deer herds and other big game populations. Project area selection criteria were developed to define where and when a carnivore control policy would be deployed to enhance or protect sensitive big game herds.

Methods

NDOW funds supported Wildlife Services to remove as many large carnivores as was possible given the constraints of weather, time and available funding using aerial gunning, dogs, calling, call boxes, shooting, leg-hold traps and snares to accomplish the treatment. Selective and timely control work focused on critical seasonal big game ranges. The timing of control work was in accordance with individual project criteria, but occurred primarily on critical winter ranges and summer fawning areas and/or in release/augmentation areas.

Conclusion

Historical broad scale, untargeted predator control has proven unsuccessful in providing any long-term population level benefits to big game species in Nevada and has not been an effective nor efficient use of Sportsmen dollars. Targeted approaches that focus efforts on specific problem areas (i.e. reintroduction efforts, catastrophic habitat loss, catastrophic fawn/lamb loss, sustained below-average recruitment, etc) have on



the other hand shown better results in some instances. Project 22 is becoming the vehicle for this targeted approach.

Recommendations

Game Division staff should evaluate proposals with regional game supervisors and biologists prior to contacting our contractor to initiate control efforts.

Use Project 22 for emergency projects or to complete previously identified ones.

Coordinate with Wildlife Services to continue predator removal work in targeted big game herd units. Evaluate each sub-project on its own merits annually.

Fund Project 22 through FY 2015. Evaluate efficacy of Project 22 annually.

Reporting requirements for FY2014 projects will be reflective of the final language in Commission Policy #23.



Sub Project 22-14 Diamond Roberts Mule Deer Fawns - Area 14

Sub Project 22-14 At a Glance

GOALS: Conduct integrated predation management project in the Diamond – Roberts Mountain Complex. Evaluate impacts to mule deer, greater sage-grouse and other wildlife species of an integrated approach to predation management including on-going sagebrush habitat restoration efforts, targeted lethal and/or non-lethal control of coyotes, cougars and common ravens and a public education campaign aimed at reducing manmade resource subsidies in the area.

PROJECT AREA: Diamond, Roberts Creek, Sulphur Springs and Whistler Mountains; Newark, Diamond and Kobeh Valleys.

IMPLICATIONS FOR MANAGEMENT OF WILDLIFE POPULATIONS/HABITATS:

1) An integrated approach to predation management is intended to result in enhancement of mule deer, greater sage-grouse and other wildlife species in the Project Area. 2) Data collection and analysis would determine the effectiveness of this project and direct wildlife management policy in the future statewide.

PROJECT DURATION: 2014-2017.

FY14 PROPOSED BUDGET: \$40,000

FY14 APPROVED BUDGET: \$40,000

RECOMMENDATION: Fund project through FY 2017.

Introduction

Sub Project 22-14 is an attempt to understand the complexity in managing wildlife species in a recovering sagebrush ecosystem in central Nevada. Work is currently being conducted in the Project Area to restore the native sagebrush steppe ecosystem to good or excellent condition. To that end, nearly 1,000 feral horses have been removed recently from a portion of the Project Area and there is work being conducted to restore sage-grouse brood habitat in and near water sources through targeted removal of piñon-juniper woodlands in historical sagebrush and stringer meadow habitats. We intend through this project to insert targeted, site specific predator removal/management in a time sequence over the landscape in an attempt to illicit positive responses in game and other wildlife populations over time. Specifically, changes in mule deer fawn recruitment, greater sage-grouse brood survival and the success of habitat restoration efforts would be monitored over the course of the project.

Methods

NDOW would continue to help fund sagebrush habitat restoration efforts in the Project Area. NDOW also plans to fund a Contractor to remove coyotes and cougars from specific deer winter ranges in Project Area A (see map) during FY2014 and FY2015. NDOW also plans to fund public education efforts to reduce manmade food subsidies and plans to fund carrion removal efforts (non-lethal predation management) and raven removal efforts (lethal control) in Project Area A during this same time period. Project



Area B would receive these same treatments during a time period from FY 2016 to FY 2017.

For the purposes of data analysis, both A and B Project Areas as well as adjacent untreated hunt units would serve as control areas during the years when no treatment is being conducted within their borders. Aside from normal game population monitoring efforts, indices of pre and post treatment carnivore numbers would also be generated through track counts, scent station monitoring, etc. Pre and post corvid numbers would be assessed through breeding bird survey techniques. And finally, lagomorph and rodent populations would be assessed using appropriate spotlight and small mammal trapping techniques.

Lethal treatment would include aerial gunning, dogs, calling, call boxes, shooting, leg-hold traps, snares and poison (DRC-1339) eggs. In keeping with the increased focus on removal of man-made resource subsidies, whenever possible, all predator carcasses would be removed from the landscape immediately. Furthermore, following processing (weight, length, age, sex, reproductive condition, fetus count, skinning, portion of tongue removal for DNA analysis, whisker removal for isotope analysis, and tooth removal for age confirmation), all carnivores would be deposited in local animal pits and covered immediately. Whenever possible, Corvids would be deposited in local animal pits and covered immediately as well.

Conclusion

For decades, Area 14 is a landscape where wildlife habitat conditions have been degraded by various impacts to the sagebrush steppe ecosystem. As such, the area may provide a unique opportunity to monitor recovery of wildlife populations in the context of habitat recovery and targeted predation management over time. A targeted approach to predation management that integrates habitat restoration, nonlethal and lethal predator management as well as public education may prove a useful prescription in areas where game populations may be experiencing sustained below-average recruitment.

Recommendations

Fund Sub Project 22-14 through FY 2017.

Evaluate efficacy of Sub Project 22-14 annually.

Reporting requirements for FY2014 projects will be reflective of the final language in Commission Policy #23.





Sub Project 22-14 Map (Project Area A – Diamond Mountains -Blue)
(Project Area B Roberts Creek Mountains - Ocher)



Project 25: Coyote Ecology Analysis – USU – Areas 16 and 17

Project 25 at a Glance

GOAL: Understand effects of food availability on abundance, home range size and litter size of coyotes.
PROJECT AREA: Toquima, Monitor and Toiyabe Mountain Ranges in Nye, Lander and Eureka Counties.
TARGET QUESTIONS: 1) How does availability of lagomorphs and small mammals influence coyote abundance, diet, and home range size? 2) What is the productivity of coyotes in central Nevada and how do these levels differ among 4 project sites?
IMPLICATIONS FOR MANAGEMENT OF WILDLIFE POPULATIONS/HABITATS:
1) Improved success of game population management is a potential result of an improved understanding of coyote dietary preference, coyote productivity and prey switching capabilities. 2) Improved understanding of coyote population dynamics and resource partitioning could improve our ability to manage wildlife habitats for optimum wildlife productivity statewide.
DURATION: 2010-2015.
TOTAL EXPENDITURES 2010-2012: \$193,463 (1/4 \$3 Fee + 3/4 P-R Federal Aid)
FY13 APPROVED BUDGET: \$100,000 (\$3 Fee)
FY14 PROPOSED BUDGET: \$ 25,000 (\$3 Fee) + \$75,000 P-R Match
FY14 APPROVED BUDGET: \$ 25,000 (\$3 Fee) + \$75,000 P-R Match
RECOMMENDATION: Fund project through FY 2015.

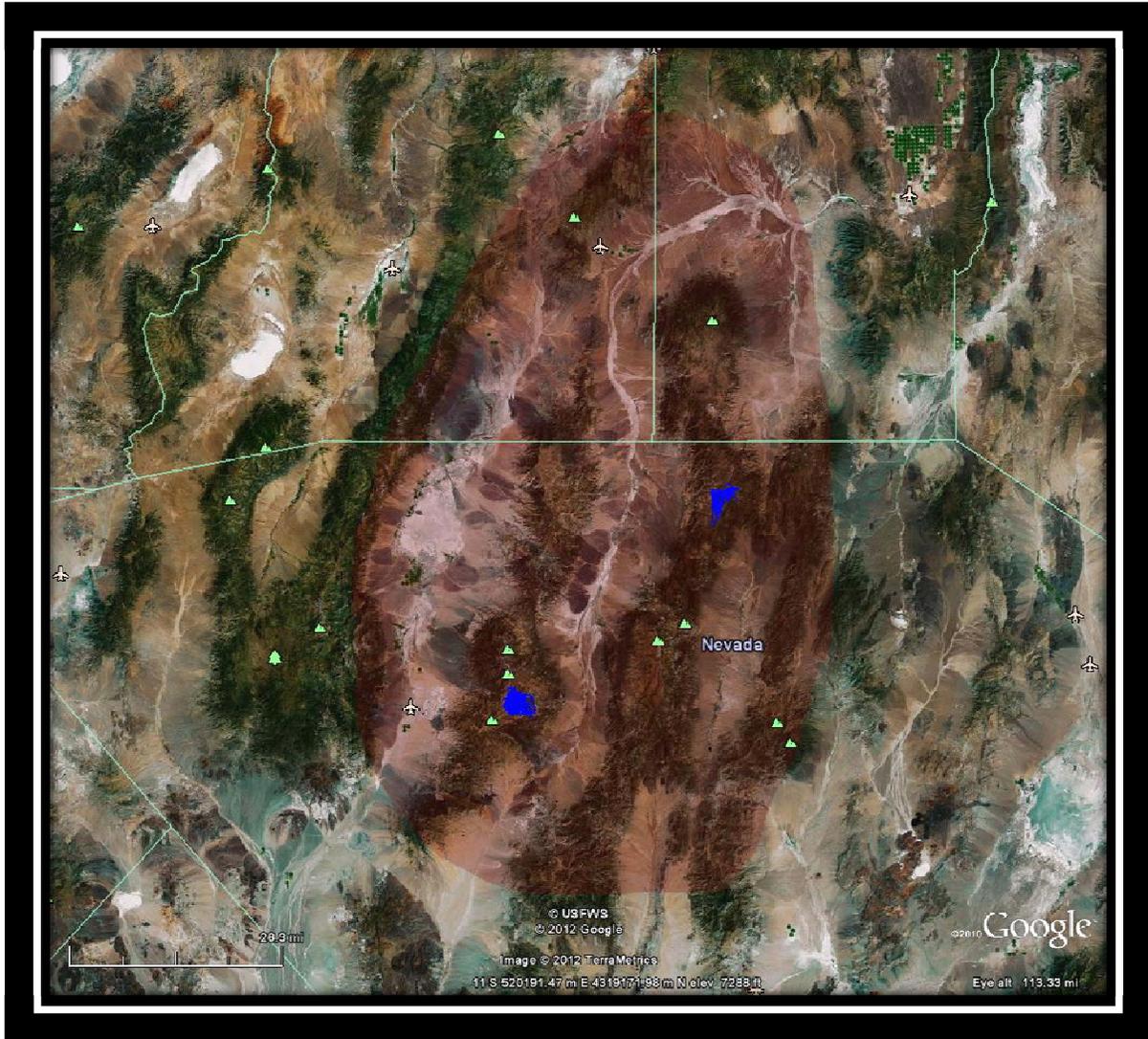
Introduction

Masters candidate Patrick Jackson (USU) began evaluating coyote ecology in the Monitor, Toiyabe, and Toquima ranges in central Nevada on 15 May 2011 (FY10) (See map). The project was designed to assess effects of food availability on abundance, home range size and litter size of coyotes. Radio-collar data will continue to provide data to facilitate understanding of how coyotes utilize available prey resources, habitats, and terrain throughout the year during all 4 seasons and relative to the effects of weather.

Methods

Coyotes were live-trapped year round and immobilized with a ketamine/xylazine injection. Animals were weighed, measured, ear-tagged and fitted with telemetry. Tagged coyotes were monitored year round. During summer, coyote scat, Lagomorph, passive-tracking and small mammal prey abundance surveys were conducted in the area as well (Clark 1972, Engeman et al 2010, Gantz and Knowlton 2005, Gese et al 1996, Hamlin et al 1984).





Project 25 Coyote Project Area (Nye, Lander, Eureka County Interface).
(Blue scribbles are 2 of many coyote home ranges identified to date).

Conclusion

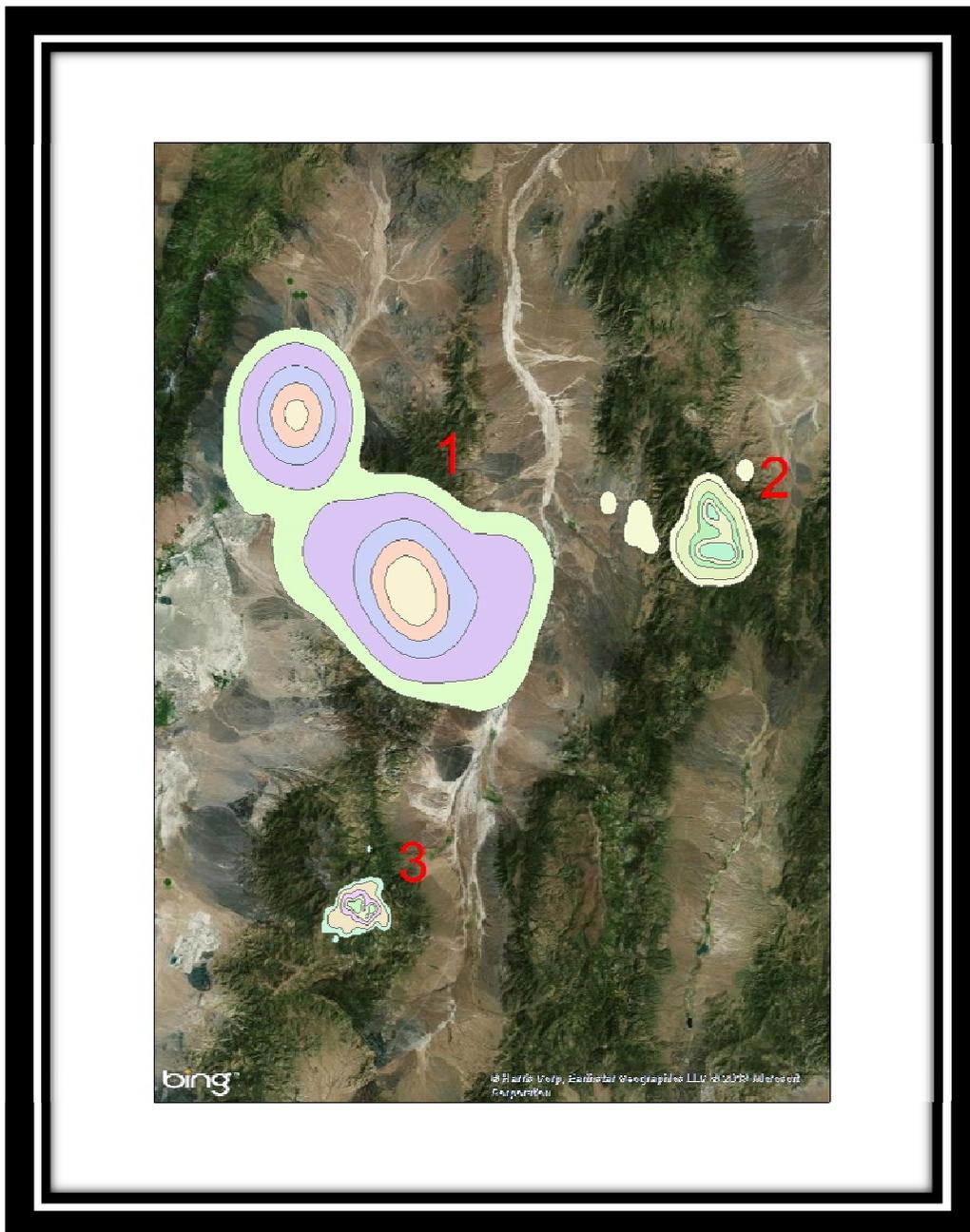
USU student personnel are conducting carnivore investigations successfully in relatively harsh field conditions. NDOW biologists will continue to coordinate with project proponents to manage financial assistance through \$3 Predator Fee Program commitments to this project. The anticipated end date for this project is 31 August 2015.

Recommendation

Fund Project 25 through FY 2015. Evaluate efficacy of Project 25 annually.

Reporting requirements for FY2014 projects will be reflective of the final language in Commission Policy #23.





Additional Project 25 data from April 2013 Progress Report. Adaptive kernel home range estimations of three coyotes wearing ATS IRIDIUM GPS collars in central Nevada, 2013. From right to left, the Monitor Range, Monitor Valley, Toiyabe Range, Big Smoky Valley and the Toiyabe Range.



Project 29: Roadway Carrion Management to Enhance Sage-grouse Populations

Project 29 at a Glance

GOALS: 1) Reduce manmade food resource subsidy availability to Common Ravens along roads in northern Nevada and along Common Raven migration corridors in southern Nevada. 2) Evaluate effects of resource subsidy availability on Greater Sage-Grouse recruitment and Common Raven abundance, home range size and clutch size.

PROJECT AREA: Greater Sage-Grouse range in northern Nevada and Common Raven migration corridors in central and southern Nevada.

TARGET QUESTIONS: 1) How does sage-grouse recruitment, common raven clutch size and home range size differ between 3 treatment/ control areas before and after manmade resource subsidies have been removed permanently? 2) Determine common raven migration corridors.

IMPLICATIONS FOR MANAGEMENT OF WILDLIFE POPULATIONS/HABITATS:

1) In areas where manmade resource subsidies for resident common raven populations are found to be a dietary factor, greater sage-grouse nest success and brood survival may be optimized by strategic removal of these subsidies. 2) In areas where seasonal common raven migration corridors are found to link manmade resource subsidies to high priority resident sage-grouse populations, greater sage-grouse nest success and brood survival may be optimized in priority sage-grouse habitats by strategic removal of these raven migration corridor food subsidies. Depending on the extent of raven migration, some of these food subsidies could be found tens or even hundreds of miles away from priority sage-grouse habitat. 3) Better road-carrion management has been identified by the USFWS as a non-lethal tool to help return common raven populations to more natural levels in the American West in the context of protection for greater sage-grouse populations.

PROJECT DURATION: 2013-2022.

TOTAL EXPENDITURES TO DATE: \$ 0

FY13 APPROVED BUDGET: \$15,000

FY14 PROPOSED BUDGET: \$25,000 (\$3 Fee) + \$25,000 (Upland Game)

FY14 APPROVED BUDGET: \$25,000 (\$3 Fee) + \$25,000 (Applying now)

RECOMMENDATION: Fund project through FY 2022.

Introduction

Common raven populations have increased in Nevada since ornithologists first documented relative abundance of passerines in the Great Basin. Robert Ridgeway, for example, made little mention of raven sightings on a USGS bird survey through northern Nevada in 1867 (Ridgeway 1877). Manmade resource subsidies like road-kill carrion have, over the last 135 years, helped expand distribution and increase relative abundance of the species in the Great Basin. Some ground-nesting bird species have experienced increased nest predation by ravens in recent years (Coates et al 2007). This project is an attempt to reduce manmade resource subsidies in the Great Basin



and to bring common raven populations in to balance with the rest of the ecosystem using non-lethal population control methods.

Methods

In cooperation with NDOT, County Road crews, USFWS and UNR, NDOW plans to hire seasonal employees to remove road carrion from three areas in northern Nevada in and around priority greater sage-grouse nesting habitat. Carrion will be deposited underground in designated animal pits. Seasonals will also be responsible for monitoring known raven nests in treatment and control areas as well as conducting raven population surveys, raven telemetry follow-up and sage-grouse brood surveys in treatment and control areas.

In the project's inaugural year (FY13), NDOW budgeted \$10,000 to go toward carrion removal efforts in Elko, White Pine, Lyon and Mineral Counties and \$5,000 to go toward 5 VHF radio transmitters to allow us to begin to understand common raven migration in eastern Nevada.

Conclusion

The importance of healthy, abundant sage-grouse nesting habitat, free of manmade resource subsidies for ravens, cannot be overstated.

Recommendation

Coordinate with contractors or cooperators to expand road carrion removal efforts in high priority greater sage-grouse habitats statewide.

Fund Project 29 through FY 2022. Evaluate efficacy of Project 29 annually.

Reporting requirements for FY2014 projects will be reflective of the final language in Commission Policy #23.



Project 30: Landfill Waste Stream Management to Enhance Sage-grouse

Project 30 at a Glance

GOAL: Reduce manmade resource subsidy availability to Common Ravens at public landfills and public dead animal pits across Nevada.

PROJECT AREA: Statewide with special focus on Greater Sage-Grouse nesting habitat.

TARGET OBJECTIVES: 1) Short Term - Reduce number of public landfills and dead animal pits in priority sage-grouse nesting habitat that remain desirable foraging areas for common ravens by 50% in five years. 2) Long Term - Reduce number of public landfills and dead animal pits in priority sage-grouse nesting habitat that remain desirable foraging areas for common ravens by 100% in ten years.

IMPLICATIONS FOR MANAGEMENT OF WILDLIFE POPULATIONS/HABITATS:

1) In areas where manmade resource subsidies for resident common raven populations are found to be a dietary factor, greater sage-grouse nest success and brood survival may be optimized by strategic removal of these subsidies. 2) In areas where seasonal common raven migration corridors are found to link manmade resource subsidies to high priority resident sage-grouse populations, greater sage-grouse nest success and brood survival may be optimized in priority sage-grouse habitats by strategic removal of these raven migration corridor food subsidies. Depending on the extent of raven migration, some of these food subsidies could be found tens and even hundreds of miles away from priority sage-grouse habitat. 3. Better waste-stream management has been identified by the USFWS as a non-lethal tool to help return common raven populations to more natural levels in the American West in the context of protection for greater sage-grouse populations.

PROJECT DURATION: 2013-2022.

TOTAL EXPENDITURES TO DATE: \$ 0

FY13 APPROVED BUDGET: \$ 6,000

FY14 PROPOSED BUDGET: \$25,000(\$3 Fee) + \$25,000 (Upland Game)

FY14 APPROVED BUDGET: \$25,000(\$3 Fee) + \$25,000 (Applying Now)

RECOMMENDATION: Fund project through FY 2022.

Introduction

Common raven populations have increased in Nevada since ornithologists first documented relative abundance of passerines in the Great Basin. Robert Ridgeway, for example, made little mention of raven sightings on a USGS bird survey through northern Nevada in 1867 (Ridgeway 1877). Manmade resource subsidies like household food waste and dead animal pits have, over the last 135 years, helped expand distribution and increase relative abundance of the species in the Great Basin. Some ground nesting bird species have experienced increased nest predation by ravens in recent years (Coates et al 2007). This project is an attempt to reduce manmade resource subsidies in the Great Basin and to bring common raven



populations in to balance with the rest of the ecosystem using non-lethal population control methods.

Methods

In cooperation with City and County Municipalities and the USFWS, NDOW plans to work to change waste stream policies to include changes in food waste collection, the addition of special covered pits specifically for household/commercial food waste separate from the normal household/commercial garbage pits as well as increases in the frequency of food waste and dead animal pit burial at these sites. NDOW will use conservation education messages or direct contact with private landowners to encourage them to cover their dead-animal pits and other sources of manmade resource subsidies on the landscape that commonly attract ravens.

As the popularity of ground-squirrel shooting (“varmint hunting”), particularly in the spring, has increased in Nevada, it has come to the attention of biologists that these areas can become sources of protein for ravens. As a second prong of this project, NDOW will utilize conservation education messages encouraging sportsmen to remove and bury ground squirrels or other unprotected mammals they shoot, and possibly evaluate proposed changes to the language regulating ground-squirrel shooting.

In the project’s inaugural year (FY13), NDOW budgeted \$6,000 to go toward municipal fuel and personnel charges to increase burial frequency at five landfills and dead animal pits in priority greater sage-grouse habitats in Humboldt, Eureka and Lander Counties. NDOW is also coordinating specifically with and supports efforts at the Midas Transfer Station and other Transfer Stations to make waste material inaccessible to ravens. This may include alternative containers for disposal.

Conclusion

The importance of healthy, abundant sage-grouse nesting habitat, free of manmade resource subsidies for ravens, cannot be overstated.

Recommendation

Coordinate with contractors or cooperators to expand waste stream management efforts in high priority greater sage-grouse habitats statewide.

Fund Project 30 through FY 2022. Evaluate efficacy of Project 30 annually.

Reporting requirements for FY2014 projects will be reflective of the final language in Commission Policy #23.



Project 31: Cougar Diets Where Bighorn, Mule Deer and Cougar Coexist

Project 31 at a Glance

GOALS: 1) Elucidate spatial/temporal changes in Cougar diets and how these changes may be timed to epic seasonal, latitudinal and/or altitudinal migration patterns of big and small game species as well as to landscape scale changes in wildlife habitats. 2) Investigate effects of manmade resource subsidy availability (feral horse and domestic livestock) on male and female cougar carrying capacities in these same areas.

PROJECT AREA: Statewide (Specific Areas likely would include Units 021/022, 033/011, 074/076, 114/115, 201/204, 211, 251/252 and possibly 101/105.)

TARGET QUESTIONS: 1) How do cougars modify their foraging strategies in an ever-changing food resource / habitat landscape? 2) Is alternate cougar prey availability (mule deer, porcupine, hare, feral horse and/or domestic livestock) reducing population viability of reintroduced bighorn populations?

IMPLICATIONS FOR MANAGEMENT OF WILDLIFE POPULATIONS/HABITATS:

1) In areas where manmade resource subsidies for resident cougar populations are found to be a dietary factor, success of bighorn reintroduction efforts may be optimized by voluntary coordinated management of other range uses (livestock or feral horses) in and near specific bighorn release sites. 2) In areas where seasonal mule deer, elk or pronghorn migration corridors are found to provide increased food resources for resident cougar populations in close association with nascent bighorn herds, this specific circumstance may provide wildlife managers with a unique opportunity to target cougars, both temporally and spatially, that may be suppressing minimum population viability in specific bighorn herds and also impacting adjacent mule deer, elk or pronghorn populations. 3) Improved success of big game releases and big game population management are potential results of improved understanding of lion dietary preference and prey switching capabilities.

DURATION: 2014-2023.

TOTAL EXPENDITURES TO DATE: \$ 0

FY14 PROPOSED BUDGET: \$25,000 (\$3 Fee) + \$75,000 (P-R)

FY14 APPROVED BUDGET: \$ 0 (\$3 Fee)

RECOMMENDATION: Fund project through FY 2023.

Introduction

Cougar distribution has been reduced by 2/3 in North America since European contact (Hornocker and Negri 2010). In 21st Century Nevada, the Basin and Range Province retains its importance as a vast bastion of available habitat for the species. As part of an effort to reintroduce bighorn sheep to all of their former range in Nevada, scientists are attempting to understand carnivore-prey relationships, particularly where bighorn populations overlap in distribution with mule deer, porcupine, hare, feral horse and domestic livestock. This investigation was designed to help elucidate interspecific interaction between cougar, bighorn, mule deer and other prey populations in Nevada and to assess the long-term prognosis for nascent bighorn herds in the State.

Methods



In cooperation with UNR and the Wildlife Conservation Society (WCS), and in particular with Dr. Jon Beckmann and Alyson Andreasen (Carnivore Ecologists) and Dr. Kelley Stewart (Large Mammal Ecologist), NDOW plans to monitor behavioral and physiological parameters of cougars in 7 areas across Nevada where Desert, Rocky and California Bighorn populations share the landscape with mule deer.

Over a 10-year period, NDOW, WCS and UNR plan to satellite collar 10 cougars in 7 areas across Nevada (70 Vectronic collars). Through the analysis of location data, kill-site follow-up, tissue analysis, prey availability and habitat conditions (Andreasen et al 2012), we hope to determine seasonal diet patterns, home range, movement patterns and population linkage of cougars in the Virginia/Peterson (021/022), Sheldon/Massacre (033/011), Salmon/Granite (074/076), Snake (114/115), Sweetwater (201/204), Boundary (211), Kawich/Reveille (251/252) and possibly East Humboldt/Spruce (101/105) Complexes. In the project's inaugural year (FY14), there is a proposed budget of \$100,000 for the initial purchase, deployment and monitoring of 10 satellite cougar collars in the Salmon/Granite and Sheldon/Massacre Complexes.

Conclusion

Well-designed predator-prey investigations would improve success of big game releases, big game population management and improve our understanding of lion dietary preference and prey switching capabilities.

Recommendation

Coordinate with contractors or cooperators to design and implement investigative efforts statewide.

Fund Project 31 through FY 2023. Evaluate efficacy of Project 31 annually.

Reporting requirements for FY2014 projects will be reflective of the final language in Commission Policy #23.



Project 32: Ecology of Cougar-Black Bear Interaction – Areas 20,29

Project 32 at a Glance

GOALS: 1) Elucidate Apex Carnivore resource partitioning/ competition/ commensalism in desert ranges immediately east of Sierra/Carson Front where Black Bear have established territories recently that overlap those of Cougars.

PROJECT AREA: Douglas, Lyon, Mineral and possibly Esmeralda Counties (Areas 20, 29 and possibly 21).

TARGET QUESTIONS: 1) Does cougar home range size differ between areas with and without black bear home range overlap? 2) How do diets of the two sympatric carnivores compare? 3) Do mule deer experience increased predation by cougars in desert ranges where black bears and cougars are sympatric.

IMPLICATIONS FOR MANAGEMENT OF WILDLIFE POPULATIONS/HABITATS:

1) Improved success of big game population management, both ungulate and carnivore big game, is a potential result of improved understanding of lion/bear dietary preference, dietary overlap and prey switching capabilities. 2) Improved and targeted carnivore population management in these desert ranges could potentially improve attendant big game population management which has implications for improved big game tag allocation and wildlife viewing opportunities in these desert ranges adjacent the Sierra Nevada. 3) Improved mule deer population/habitat management could result from this project.

DURATION: 2014-2018.

TOTAL EXPENDITURES TO DATE: \$0

FY14 PROPOSED BUDGET: \$25,000 (\$3 Fee) + \$75,000 (P-R)

FY14 APPROVED BUDGET: \$15,000 (\$3 Fee) + \$45,000 (P-R)

RECOMMENDATION: Fund project through FY 2018.

Introduction

The black bear population has expanded its distribution in western Nevada recently to include historical bear habitat in desert mountain ranges east of the Sierra/Carson Front (Beckmann and Berger 2003; Lackey 2004) (See Map). Natural diet overlap of bears and cougars (Hornocker and Negri 2010), and the recent range expansion by bears provide an opportunity to evaluate resource partitioning in these two Apex Carnivores.

Methods

In cooperation with the Wildlife Conservation Society (WCS) and UNR, NDOW plans to monitor black bear and cougar movement patterns in 3 areas of southwest Nevada. Through the analysis of location data, kill-site follow-up, tissue analysis, prey availability and habitat conditions (Andreasen et al 2012), we hope to begin to understand the relationship between the 2 species including differences in seasonal diet patterns, home ranges, movement patterns, and population linkages. Over a 5-year period, NDOW, WCS and UNR plan to satellite collar 15 cougars and 15 black bears in the 3 areas (30 Vectronic collars). In the project's inaugural year (FY14), we have budgeted \$100,000



to go toward the purchase, deployment and monitoring of 10 satellite lion/bear collars in the Sweetwater - Pine Grove Mountain Complex (Units 201/202/204).

Conclusion

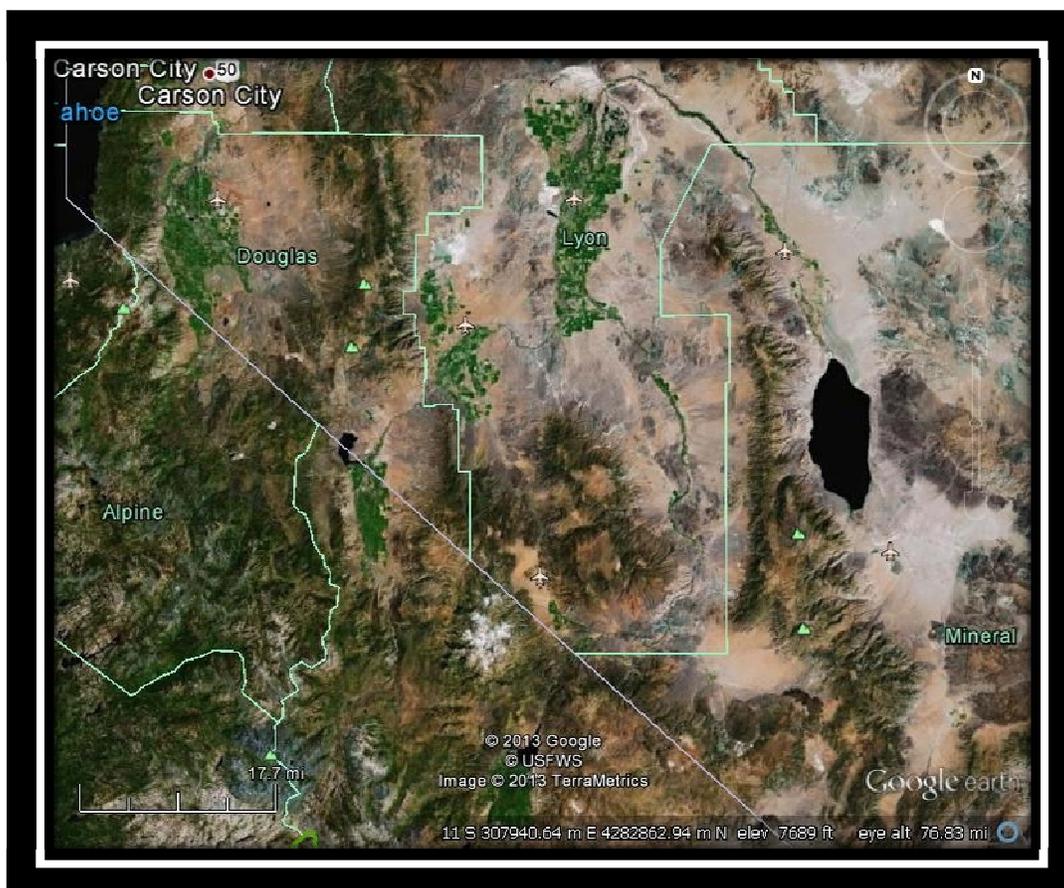
Well-designed predator-prey investigations would improve success of big game releases, mule deer population management and improve our understanding of lion/bear dietary preference and prey switching capabilities.

Recommendation

Coordinate with contractors or cooperators to design and implement investigative efforts in Areas 20 and 29.

Fund Project 32 through FY 2018. Evaluate efficacy of Project 32 annually.

Reporting requirements for FY2014 projects will be reflective of the final language in Commission Policy #23.



PROJECT 32 GENERAL PROJECT AREA MAP
(DOUGLAS, LYON, MINERAL COUNTY, NEVADA REGION)



Project 33: Greater Sage-Grouse Nesting Habitat Restoration –Area 20

Project 33 At a Glance

GOAL: Reduce predation via restoration of several hundred acres of high priority Bi-State Greater Sage-Grouse nesting habitat to good or excellent condition.

PROJECT AREA: Sweetwater and Bald Mountain areas of Lyon, Douglas and Mineral Counties (Units 201 and 204).

IMPLICATIONS FOR MANAGEMENT OF WILDLIFE POPULATIONS/HABITATS: Bi-State Sage-Grouse populations would benefit from a greater abundance and higher quality of sagebrush steppe habitat in the Bald Mountain and Sweetwater Areas.

PROJECT DURATION: 2014-2018.

TOTAL EXPENDITURES TO DATE: \$ 0

FY14 PROPOSED BUDGET: \$50,000 (\$3 Fee) + \$50,000 (Heritage)

FY14 APPROVED BUDGET: \$25,000 (\$3 Fee) + \$25,000 (Applying Now)

RECOMMENDATION: Fund project through FY 2018.

Introduction

Sage-Grouse populations in Nevada have, over the years, been compromised by decades of habitat fragmentation, habitat deterioration and outright habitat loss. This project is an attempt to restore key high priority sagebrush habitats in the hopes of making the Bi-State Population more robust and able to handle the vagaries of changing environmental conditions over time.

Methods

With minimum tools, contractors would remove young piñon-juniper vegetation from areas within roadless portions of the Bald Mountain and Sweetwater areas that have been identified as former high-quality nesting habitat for the greater sage-grouse. Crews would focus on areas adjacent native sagebrush, perennial grass and forb seed sources.

Conclusion

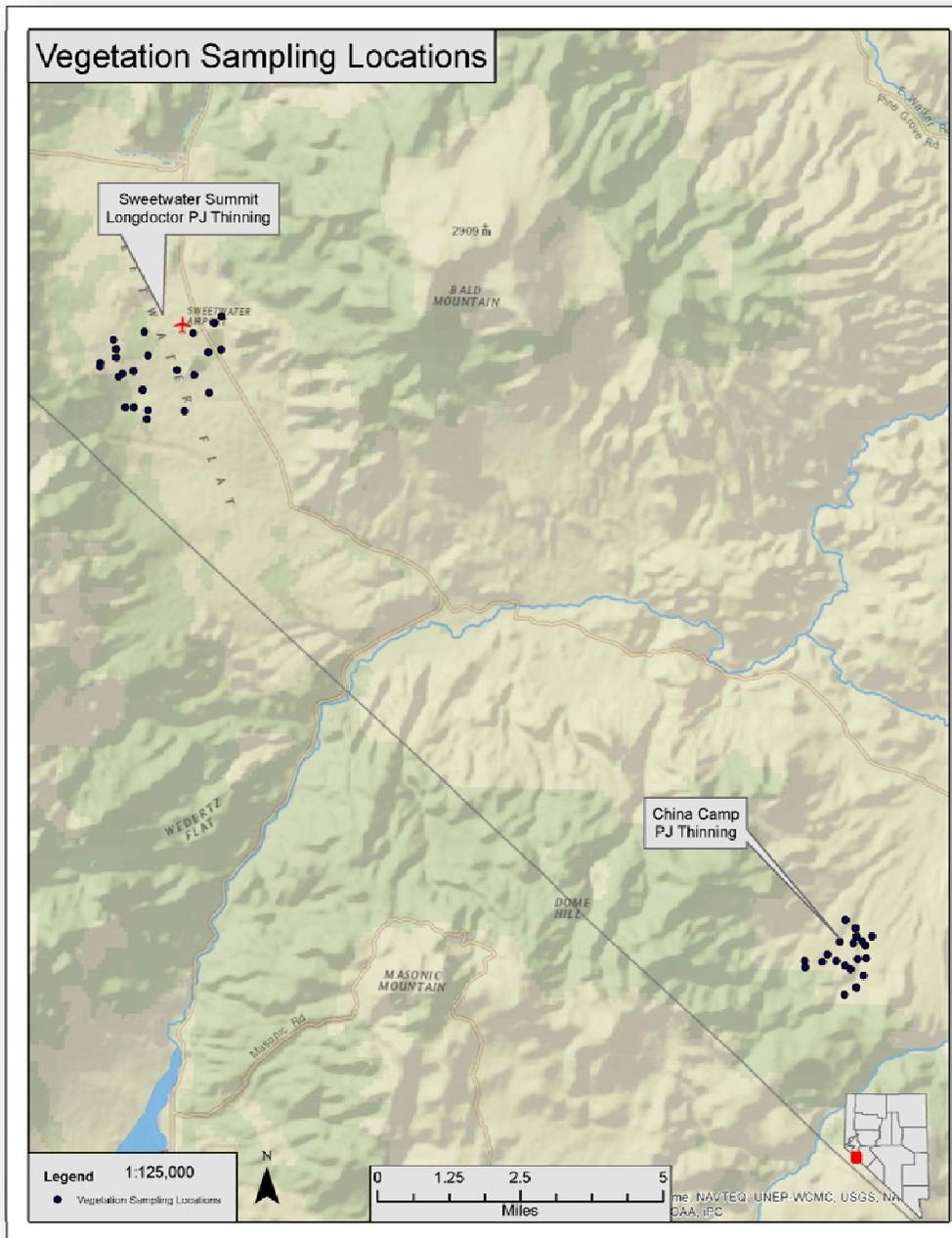
The importance of healthy, abundant sage-grouse nesting habitat cannot be overstated. When one compares sage-grouse nest success for example in the Sheldon National Wildlife Refuge (Unit 033) to adjacent units, it becomes readily apparent that abundant sagebrush habitat with a healthy understory of native perennial grasses and forbs provides the best possible security cover and forage availability to nesting and brooding sage-grouse.

Recommendation



Coordinate with contractors or cooperators and Habitat Division to expand and accelerate sagebrush steppe ecosystem restoration in high priority Bi-State Greater Sage-Grouse habitats in Lyon, Douglas and Mineral Counties.

Fund Project 33 through FY 2018. Evaluate efficacy of Project 33 annually. Reporting requirements for FY2014 projects will be reflective of the final language in Commission Policy #23.



Project 33 Bi-State Sage-Grouse Nesting Habitat Restoration Project Area



Project 34: Greater Sage-Grouse Brood Habitat Restoration –Area 14

Project 34 At a Glance

GOAL: Reduce predation via restoration of several hundred acres of high priority Greater Sage-Grouse brood habitat to good or excellent condition.

PROJECT AREA: Roberts, Sulphur Springs, Diamond and N. Monitor Mountain Ranges of Eureka County (Units 142-144,162).

IMPLICATIONS FOR MANAGEMENT OF WILDLIFE POPULATIONS/HABITATS: Greater Sage-Grouse populations would benefit from a greater abundance of high quality brood-rearing habitat adjacent springs and stringer meadows in southern Eureka County.

PROJECT DURATION: 2014-2018.

TOTAL EXPENDITURES TO DATE: \$ 0

FY14 PROPOSED BUDGET: \$50,000 (\$3 Fee) + \$50,000 (Heritage)

FY14 APPROVED BUDGET: \$ 0 (\$3 Fee)

RECOMMENDATION: Fund project through FY 2018.

Introduction

Sage-Grouse populations in Nevada have, over the years, been compromised by decades of habitat fragmentation, habitat deterioration and outright habitat loss. This project is an attempt to restore key high priority brood-rearing habitats adjacent springs and stringer meadows in hopes of making the southern Eureka County sage-grouse population more robust and able to handle the vagaries of changing environmental conditions over time.

Methods

Contractors or cooperators would remove young piñon-juniper vegetation from areas adjacent springs, spring complexes and stringer meadows in portions of southern Eureka County that have been identified as former high-quality brood-rearing habitats for the greater sage-grouse. Crews would focus on areas adjacent native sagebrush, perennial grass and forb seed sources.

Conclusion

The importance of healthy, abundant sage-grouse brood-rearing habitat adjacent to water sources cannot be overstated. By comparing sage-grouse brood-rearing success in the Sheldon National Wildlife Refuge (Unit 033) to adjacent units, it becomes readily apparent that abundant sagebrush habitat with a healthy understory of native perennial grasses and forbs provides the best possible security cover and forage availability to nesting and brood-rearing sage-grouse.

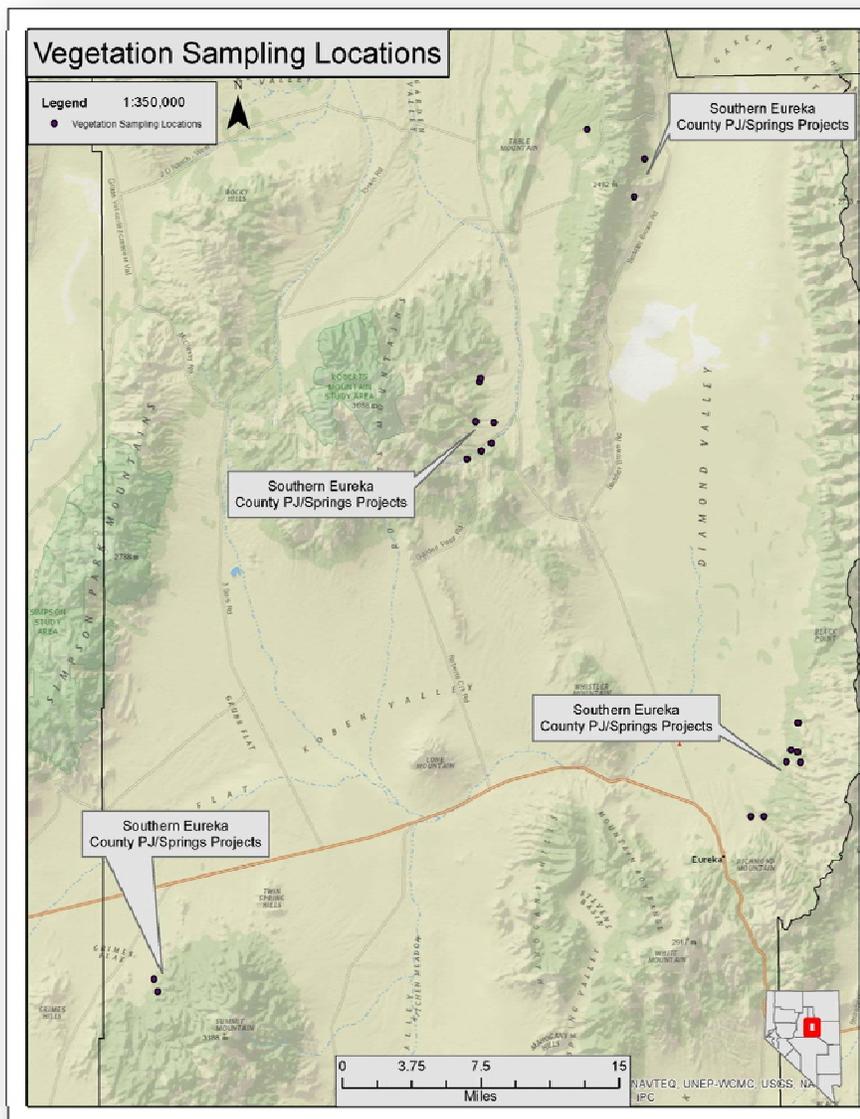


Recommendation

Coordinate with contractors or cooperators and Habitat Division to expand and accelerate sagebrush steppe ecosystem restoration adjacent springs, spring complexes and stringer meadow habitats in high priority Greater Sage-Grouse habitats of southern Eureka County.

Fund Project 34 through FY 2018. Evaluate efficacy of Project 34 annually.

Reporting requirements for FY2014 projects will be reflective of the final language in Commission Policy #23.



Project 34 Sage-Grouse Brood-rearing Habitat Restoration Project Area



CANCELED PROJECTS

Project 6: Protection of Desert Bighorn – Areas 24/22

Project 6 at a Glance

GOAL: Help to establish and exceed minimum population viability of a Desert Bighorn Sheep herd reintroduced March 2001 in central Lincoln County.

PROJECT AREA: Delamar, Meadow Valley, South Pahroc and Hiko Mountain Ranges (Units 241, 243, 223).

IMPLICATIONS FOR MANAGEMENT OF WILDLIFE POPULATIONS / HABITATS:

1) The removal of carnivores was intended to result in accelerating the establishment of this desert bighorn herd. 2) Further data collection and analysis helped determine the effectiveness of this project and will direct wildlife management policy in the future.

DURATION: 2001-2013.

CONCLUSION: After 12 years of predator control and the release of 287 desert bighorn sheep into the range, it appears other limiting factors need investigation.

TOTAL KILL 2001-2012: 147 carnivores (127 coyotes, 13 cougars, 4 bobcats and 3 American badgers).

TOTAL EXPENDITURES 2001-2012: \$265,462

FY13 APPROVED BUDGET: \$ 82,000

FY14 PROPOSED BUDGET: \$ 0

FY14 APPROVED BUDGET: \$ 0

BY COMMISSION VOTE: Terminated Project 6 as of 30 June 2013.

Introduction

From March 2001 to November 2011, in an effort to reestablish native desert bighorn populations in central Lincoln County, NDOW released 287 desert bighorn sheep in the Delamar and Meadow Valley Mountain Ranges, Units 241 and 243. Wildlife Services conducted predator removal activities in the Project Area from 2001 to 2013.

Results and Discussion

Bighorn population surveys continue to remain low for the most part despite aggressive predator control and an aggressive bighorn transplant program.

Conclusion

This project was designed to reduce bighorn losses to predation until such time that the reintroduced herd reached minimum population viability, or where such losses were overcome by bighorn recruitment on a sustained basis. Results of helicopter surveys in the Delamars suggest that after 12 years of predator control and the release of 287 desert bighorn sheep into the range, other limiting factors may be responsible for the low densities of bighorn in the Delamar Mountains. Bighorn management in this area



will be discussed by staff at the annual big game translocation project meeting and recommendations made for future management of bighorn in that unit.

Recommendation

Terminate Project 6 as of 30 June 2013.



Project 20: Protection of California Bighorn – Unit 022

Project 20 at a Glance

GOAL: Help to establish and exceed minimum population viability of a California Bighorn Sheep herd reintroduced March 1990 in southern Washoe County.

PROJECT AREA: Virginia Mountains (Unit 022), Dogskin & Peterson Mtns (021).

IMPLICATIONS FOR MANAGEMENT OF WILDLIFE POPULATIONS / HABITATS:

1) The removal of carnivores was intended to result in accelerating the establishment of this California bighorn herd. 2) Further data collection and analysis helped determine the effectiveness of this project and will direct wildlife management policy in the future.

DURATION: 2008-2013.

CONCLUSION: When evaluated in the context of an interconnected bighorn population unit, the Project Area has been hovering near population viability for at least 3 years and the trend is stable to increasing.

TOTAL KILL 2008-2012: 13 carnivores (12 cougars, 1 black bear).

TOTAL EXPENDITURES 2008-2012: \$32,361

FY13 APPROVED BUDGET: \$ 2,500

FY14 PROPOSED BUDGET: \$ 0

FY14 APPROVED BUDGET: \$ 0

BY COMMISSION VOTE: Terminated Project 20 as of 30 June 2013.

Introduction

From March 1990 to November 2008, in an effort to reestablish a native California bighorn population in southern Washoe County, NDOW released 49 bighorn sheep in the Virginia Mountains, Unit 022. Wildlife Services conducted predator removal activities in the Project Area from 2008 to 2013.

Results and Discussion

Bighorn population surveys in the Virginia Mountains and surrounding Hunt Units have been encouraging in the last 2-3 years. When evaluated in the context of an interconnected bighorn population unit, the Virginia and Peterson Mountain Ranges have been hovering near population viability for 3 years and the trend is stable to increasing. Combined population estimates were 100, 110 and 110 for 2010, 2011 and 2012 respectively. Bighorn presence in mountain ranges adjacent the Virginias such as the Dogskins and Petersons (021) also suggests the herd is expanding. Sportsmen reported bighorn attempting to make their way even further southwest into the Peavine Mountain area (Unit 196) in 2012.

Conclusion

This project was designed to reduce bighorn losses to predation until such time that the reintroduced herd reached minimum population viability, or where such losses were overcome by bighorn recruitment on a sustained basis. When evaluated in the context of an interconnected bighorn population unit, the California bighorn population in the



022/021 Project Area no longer requires predator removal in order to maintain population viability over the long term. This predator removal project was conducted in a targeted fashion for an adequate amount of time and was an effective and efficient use of Sportsmen dollars.

Recommendation

Terminate Project 20 as of 30 June 2013.



Tentative FY14 Budget* (Last Revised 21 September 2013)

PROPOSED PREDATION MANAGEMENT PROGRAM BUDGET FY14				
July 1, 2013 Projected Beginning Balance				\$526,700
Item	Unit	Day	2014 Budget	TOTALS
Predation Management Projects:				
Project 18 Carnivore Control For Protection of Mule Deer/Big Game	Unit 014		\$85,000	
Project 21 Common Raven Control for Greater Sage-Grouse	Statewide		\$40,000	
Sub-Project 21-02 Virginia Mtns Sage-Grouse Nests	Area 2		\$20,000	
Project 22 Carnivore Control For Mule Deer Enhancement	Statewide		\$110,000	
Sub-Project 22-14 Diamond-Roberts Mule Deer Fawns	Areas 14/16		\$40,000	
Project 25 Coyote Ecology Study	Areas 16/17		\$25,000	
Project 29 Road Carrion Management in Gr Sage-Grouse Habitat	Statewide		\$25,000	
Project 30 Landfill Management in Greater Sage-Grouse Habitat	Statewide		\$25,000	
Project 31 Cougar Mule Deer Bighorn Diet Analysis	Statewide		\$0	
Project 32 Cougar Mule Deer Black Bear Diet Interaction	Areas 20/29		\$15,000	
Project 33 Sage-Grouse Nesting Habitat (Piñon-Juniper Mgt)	Area 20		\$25,000	
Project 34 Sage-Grouse Brood Habitat (Piñon-Juniper Mgt)	Areas 14/16		\$0	
			Project Total	\$410,000
NDOW Budget: Salary				
*Productive Hrly Rt.				
Game Division Chief	\$62.61	10		\$5,009
Staff Biologist	\$54.02	180		\$77,789
Field Biologists	\$48.83	15		\$5,860
Administrative Assistants	\$35.65	10		\$2,852
Total Salary				\$91,510
Operating				
Aerial Surveys				\$15,000
Other Operating				\$ 5,000
Total Operating				\$20,000
Travel (In-State and Out-of-State)				
Mileage (Vehicle use)	\$0.55	5000		\$ 2,750
Fixed Costs (Uniforms etc.)				\$ 200
			NDOW Total	\$116,360
TOTAL EXPECTED FY14 PROGRAM EXPENDITURES:				\$526,360
LEFTOVER FROM FY14:		Beginning Balance - FY14 Expenditures =		\$340 (projected)
REVENUE 2013-14:		Fees collected from Tag Applications**		\$456,926 (projected)
		Donations through Tag Application processes:		\$13,000 (projected)
June 30, 2014 Ending Balance (Beginning Balance for FY15): ESTIMATE.				\$470,266

*A Final FY14 budget will be available sometime in Fall 2013 when all contract receipts are reconciled with available funds.



Literature Cited

- Andreasen, A.; W. Longland; K. Stewart and J.P. Beckmann. 2012. (in prep) Characterizing mountain lion distribution and interactions with prey populations in Nevada.
- Ballard, W. B.; D. Lutz; T. W. Keegan; L. H. Carpenter and J. C. deVos Jr. 2001. Deer-predator relationships: a review of recent North American studies with emphasis on mule and black-tailed deer. *Wildl. Soc. Bulletin* 29(1):99-115.
- Beckmann, J.P. and J. Berger. 2003. Rapid ecological and behavioural changes in carnivores: the responses of black bears (*Ursus americanus*) to altered food. *J. Zool. Lond.* 261:207-212.
- Clark, F. W. 1972. Influence of jackrabbit density on coyote population change. *Journal of Wildlife Management* 36:343–356.
- Coates, P.S. and D. J. Delehanty. 2004. The effects of raven removal on sage grouse nest success. *Proc of Vert Pest Conf.* 21:17-20.
- Coates, P.S.; J. O. Spenser and D. J. Delehanty. 2007. Efficacy of CPTH-treated egg baits for removing ravens. *Human-Wildlife Conflicts* 1(2):224-234.
- Crabtree, R. L. 2012. Letter defining results of 28 years of coyote research. Yellowstone Ecological Research Center. 21 June 2012. 5pp
- Engeman R. M., M. J. Pipas, K. S. Gruver, and L. Allen. 2000. Monitoring coyote population changes with a passive activity index. *Wildlife Research* 27:553–557.
- Espinosa, S. P. 2012. Upland and migratory game bird, rabbit and furbearing mammals: Harvest data and population status reports. NDOW. 94 p.
- Gantz, G. F., and F. F. Knowlton. 2005. Seasonal activity areas of coyotes in the Bear River Mountains of Utah and Idaho. *Journal of Wildlife Management* 69:1652–1659.
- Gese, E. M., Ruff, R. L. and R. L. Crabtree. 1996. Foraging ecology of coyotes (*Canis latrans*): the influence of extrinsic factors and a dominance hierarchy. *Canadian Journal of Zoology* 74:769–783.
- Hamlin, K. L., S. J. Riley, D. Pyrah, A. R. Dood, and R. J. Mackie. 1984. Relationships among mule deer fawn mortality, coyotes, and alternate prey species during summer. *Journal of Wildlife Management* 48:489–499.
- Hornocker, M.G. and S. Negri (eds). 2010. *Cougar: ecology and conservation*. 306pp.
- Hurley, W.M.; J.W. Unsworth; P. Zager; M. Hebblewhite; E.O. Garton; D.M. Montgomery; J.R. Skalski and C.L. Maycock. 2011. Demographic response of mule deer to experimental reduction of coyotes and mountain lions in SE Idaho. *Wildl Monogr* 178. 33p.
- Lackey, C.W. 2004. Nevada's black bear: ecology and conservation of a charismatic omnivore. Nevada Department of Wildlife. *Biological Bulletin #15*. 46pp.
- Leopold, A. 1949. *A Sand County almanac*. Oxford Univ Press. 295 pp.
- Ridgeway, R. 1877. Part III – Ornithology [in] Clarence King Survey - Report of the 1867 geological exploration of the fortieth parallel. United States Geological Survey.
- Stewart, K.M. and G.A. Wasley. 2011. Effects of predator removal on mule deer populations in Elko County. *Proc 9th Western States and Prov Deer and Elk Workshop*. 9:11.
- Wasley, G.A. 2004. Nevada's mule deer population dynamics: issues and influences. *Nev Dept of Wildl. Biol Bulletin # 14*. 70pp.

