Nevada Department of Wildlife

Upland Game Bird Stamp Program

Fiscal Year 2018

June 2017

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Relevant Upland Game Bird Stamp Nevada Revised Statutes

NRS 502.292 Fee to hunt certain upland game birds: Requirements regarding documentation of payment; amount.

1. Except as otherwise provided in this section, it is unlawful for any person to hunt any upland game bird, except turkey and crow, unless at the time he is hunting he carries on his person such documentation as the Department provides as proof that he has paid to the Department, for the licensing period that includes the time he is hunting, the fee required pursuant to this section.

2. The provisions of this section do not apply to a person who is under the age of 12 years.

3. The documentation required pursuant to this section must be sold by the Department, and persons authorized by the Department to sell hunting licenses, for a fee of $10.

4. The Department shall determine the form of the documentation.

(Added to NRS by 2003, 2540)

NRS 502.294 Fee to hunt certain upland game birds: Deposit of proceeds; accounting records; reimbursement of administrative costs. All money received pursuant to NRS 502.292 must be deposited with the State Treasurer for credit to the Wildlife Obligated Reserve Account in the State General Fund. The Department shall maintain separate accounting records for the receipt and expenditure of that money. An amount not to exceed 10 percent of that money may be used to reimburse the Department for the cost of administering the program of documentation. This amount is in addition to compensation allowed persons authorized to issue and sell licenses.
(Added to NRS by 2003, 2540)

NRS 502.296 Fee to hunt certain upland game birds: Use of proceeds.

1. Before the Department may undertake any project using money received pursuant to NRS 502.292, it must analyze the project and provide the Commission with recommendations as to the need for the project and its feasibility.

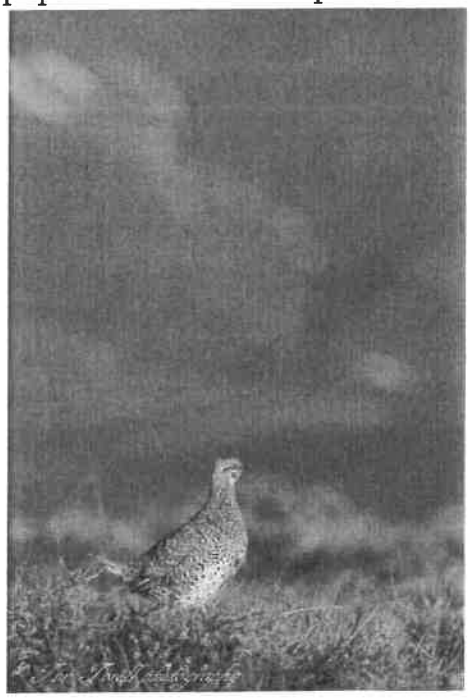
2. Money received pursuant to NRS 502.292 must be used for projects approved by the Commission for the protection and propagation of upland game birds and for the acquisition, development and preservation of the habitats of upland game birds in this State.
(Added to NRS by 2003, 2540)

NRS 502.298 Fee to hunt certain upland game birds: Reports to Legislature regarding program. The Department shall, not later than the fifth calendar day of each regular session of the Legislature, submit to it a report summarizing any projects undertaken and the receipt and expenditure of money and public benefits achieved by the program for the sale of documentation to hunt any upland game bird, except turkey and crow.
(Added to NRS by 2003, 2540)

Progress Report on Upland Game Bird Stamp Projects Funded in FY 2017

Project Name: **Columbian Sharp-tailed Grouse Restoration Project**
Other Funding Sources: Upland Game Management Grant (75%)
Project Start Date: April 2013
Estimated Completion Date: The first year of translocations took place in 2013. We anticipate completing the effort in 2017; however, two more augmentations may be necessary to establish a self-sustaining population.

Project Accomplishments:
Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*; hereafter CSTG) historically occupied the Intermountain West, including northern Nevada where they were considered abundant in Elko County. However, populations were extirpated from Nevada by the mid-20th century and now occupy less than 10% of their historic range. The Nevada Department of Wildlife has worked collaboratively with the U.S. Geologic Survey, Idaho Department of Fish and Game and Elko Land and Livestock to reestablish a viable population of CSTG in northeastern Nevada. Through April of 2017, 212 CSTG have been translocated to Elko County, NV from southeastern Idaho. Of these, 133 females and 41 males were marked with VHF transmitters and were monitored by ground and aerial telemetry. In addition, a subsample of female CSTG were artificially inseminated prior to translocation to promote nesting and the rearing of broods at the release site ($n = 6$, 2014; $n = 9$, 2015; $n = 9$, 2016).



Capture and Known Fate Results
During 2016, a total of 50 CSTG consisting of 15 males and 35 females were captured and translocated to the Bull Run Basin in Elko County, NV. Additionally, in 2017, 24 females were captured and moved to Nevada; however, two died in the release boxes prior to their actual release (see Table 1).

Table1. Summary of Translocations from 2013 to 2017

Year	Males (*Radio Marked*)	Females (*Radio Marked*)	Total Released
2013	14 (*8*)	35 (*35*)	49
2014	15 (*13*)	27 (*27*)	42
2015	15 (*10*)	34 (*29*)	49
2016	15 (*10*)	35 (*30*)	50
2017	0 (*0*)	22 (*12*)	22
Totals:	59 (*41*)	153 (*133*)	212

Telemetry

USGS research crews obtained 419 locations on 60 CSTG during 2016. Of those, 20 were birds translocated in 2014 (n=8 grouse) or 2015 (n=12 grouse). The average distance that a bird was located from the release location in 2016 was 2.7 (±4.6 km) km (see Figure 1).

Survival

An increase in mortality during the weeks immediately following release was observed by USGS research crews in 2016. Fourteen mortalities were located during the first 50 days following release. Four other mortalities were found during the remainder of the field season (≈90 days). A total of 19 mortalities were recorded from April – August (n=1 female translocated in 2015; n=18 males and females translocated in 2016). This represented the highest number of deaths recorded in a field season during the four years of the project. Fifteen more mortalities were recorded during telemetry flights conducted from September – November of 2016, which also represented the largest number of fall mortalities recorded during the project. By December of 2016, 32 of the 40 radio-marked birds released during 2016 had perished.

Nest Survival

During the first four years of this project, 2015 was the most successful year in terms of number of nests (n=36), nests that successfully hatched (n=24) and the probability that a nest would survive the entire 37-day nesting period [0.64 (95% CI 0.47 – 0.77)]; Table 2. The least successful year statistically was the first year; however, that was largely expected because CSTG were subjected to a novel area and habitat type.

Table 2. Nesting information accumulated from 2013 through 2016.

Year	# of Nests	Successfully Hatched	Daily Nest Survival	Incubation Period Survival	Clutch Size
2013	14	7	0.97	0.29	10.9
2014	26	17	0.98	0.51	10.5
2015	36	24	0.99	0.64	10.9
2016	21	10	0.98	0.40	9.5
Averages:	24.3	14.5	0.98	0.46	10.5

Brood Survival

As with nest survival, the best year for brood survival during the project was 2015 with 16 successful broods recorded and a 50-day brood survival (≥1 chick survived to 50 days post hatch) of 0.64. A minimum of 44 chicks survived the brood rearing period in 2015, which was greater than the combined totals of 2013 and 2014. The lowest 50-day brood survival rate was 0.45 recorded in 2016. Likewise, the lowest number of chicks surviving the entire brood rearing period was also recorded in 2016 (n=8).

Table 3. Brood information accumulated from 2013 through 2016.

Year	# of Broods	# of Successful Broods	Daily Brood Survival	50-day Brood Survival	Est. # of Chicks Surviving
2013	7	4	0.99	0.55	17-20
2014	17	7	0.99	0.58	20-23
2015	24	16	0.99	0.64	44
2016	10	4	0.98	0.45	8
Total or Average:	58	31	0.99	0.58	89-95

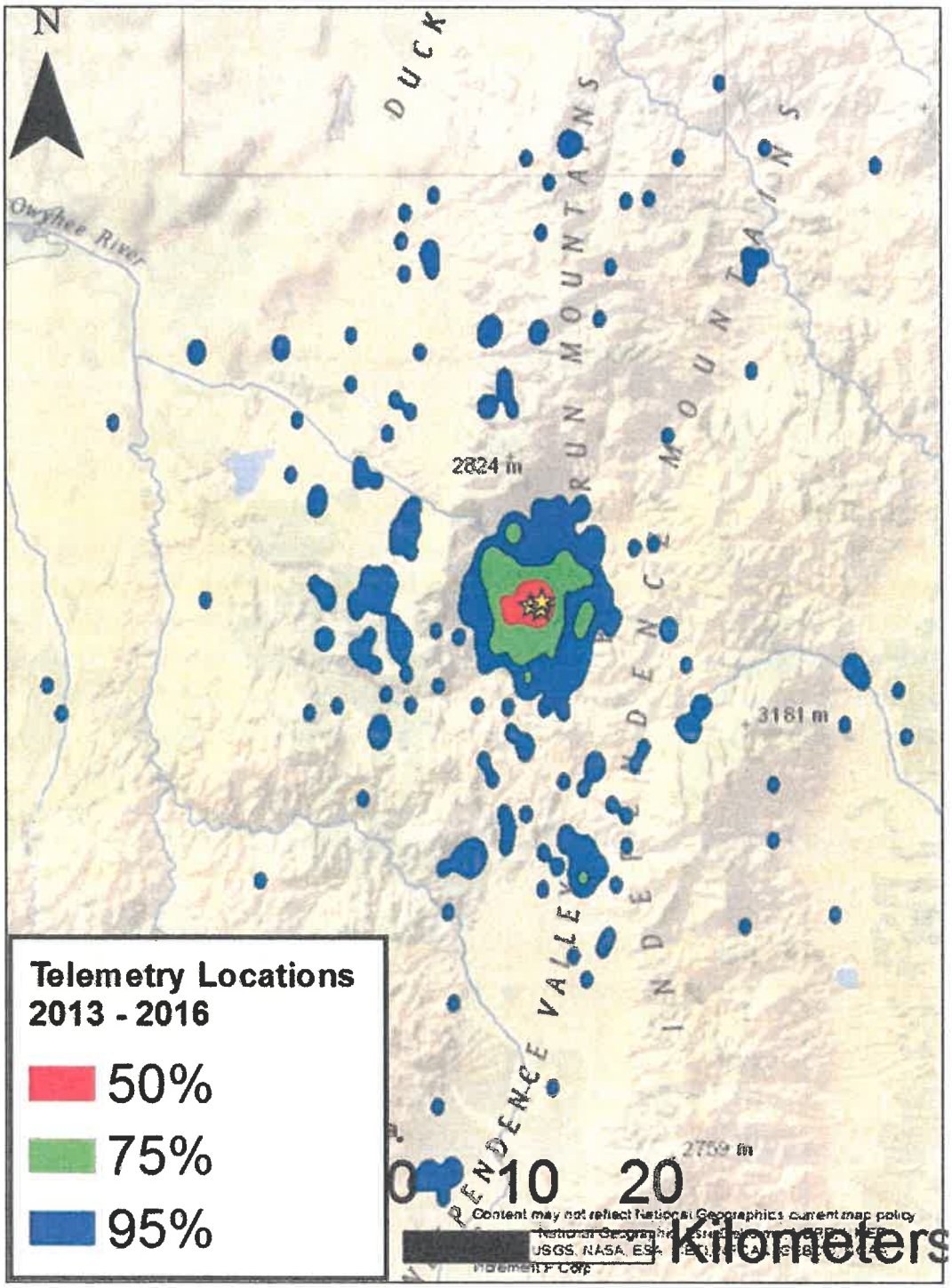


Figure 1. Utilization distribution of translocated Columbian sharp-tailed grouse from 2013-2016. Fifty percent of all telemetry locations are within the red area, 75% of all locations are within the green area and so forth. The yellow stars represent both the release location and the active lek locations.

Project Name: **Mountain Quail and Ruffed Grouse Translocation**
Other Funding Sources: Upland Game Management Grant (75%)
Carson Valley Chukar Club
Project Start Date: December 2016
Estimated Completion Date: March 2018 [for Fish Creek Range Mountain Quail Release]

Mountain Quail Restoration Project

On March 14, 2017, a total of 88 mountain quail were released into the Fish Creek Mountains in Lander County located approximately 32 air miles south of Battle Mountain. The birds were originally captured from areas surrounding Myrtle Creek, Oregon during December of 2016. A total of 100 mountain quail were obtained from Oregon and delivered to the brooder house at Mason Valley Wildlife Management Area (WMA) in early January of 2017 where they spent the winter months. Two mortalities were recorded during the almost two and a half month stay at Mason Valley WMA. It is not known what happened to the ten other birds that should have been in the pen upon collection for release in the Fish Creek Mountains. The release was conducted in mid-March to take advantage of early spring growth of forbs, emerging buds and insect availability. A subsequent release of approximately 100 mountain quail is scheduled for the Fish Creek Mountains in 2018.

Mountain quail photograph taken by Victor Trujillo of Hawthorne, NV.

Ruffed Grouse Establishment Project

Although fairly substantial efforts were made to locate and determine the status of ruffed grouse populations throughout northern Nevada during the summer of 2016, no ruffed grouse were translocated. This was largely due to few birds being detected at potential in-state source populations, thus capture efforts were canceled, or at least postponed, until ruffed grouse populations recover or are deemed healthy enough to remove birds for translocation purposes.

Project Name: **Greater Sage-grouse Population Monitoring**
Other Funding Sources: Nevada Sage-grouse Conservation Grant (75%)
Project Start Date: July 1, 2016
Estimated Completion Date: June 30, 2017

Lek Count Technicians

Two seasonal survey technicians were used to assist with sage-grouse lek counts in the Eastern Region during late March, April and early May of 2017. One seasonal was stationed in Ely and worked in White Pine County while the other was stationed in Elko and worked in Elko County. The survey technician stationed in Ely spent 22 days in the field conducting lek counts during the spring of 2017 while the seasonal stationed in Elko spent 7 days conducting lek counts.

Aerial Lek Survey

Aerial helicopter lek surveys were performed during the spring of 2017; however, no upland game stamp funds were used to pay for these surveys. Supplementary funding was obtained from the Bureau of Land Management and U.S. Forest Service to conduct sage-grouse monitoring in 2017. Helicopter lek surveys were conducted in the Bilk Creek, Black Rock, Montana Mountains and Santa Rosa Ranges in Humboldt County; Sonoma and Tobin Ranges in Pershing County; Pine Grove and Bodie Hills and Wassuk Range of Mineral County; Pine Nut Mountains in Lyon County; Wilson Creek Range in Lincoln County; Diamond, Cortez and Roberts Creek Mountains in Eureka County; and the Monitor, Toquima and Toiyabe Ranges of Nye County.

Fixed Wing Infrared Surveys

We contracted with Owyhee Air Research to conduct aerial infrared surveys to detect undocumented leks and survey known lek locations at high elevations and largely inaccessible by vehicle. Technological advancements and vendor experience have improved the capabilities of this methodology. We used the U.S. Geological Survey's Spring Habitat Suitability map to initially identify potential search areas and then

developed a sage-grouse lek habitat suitability model in-house to develop search polygons and subsequent transects. Surveys were conducted during three periods in the spring of 2017 in central, northwestern and northeastern Nevada.

Central Nevada Survey

Owyhee Air Research conducted four days of fixed wing infrared surveys in the Monitor, Toquima and Toiyabe Ranges located in Nye County from March 29th through April 4th. As many as 13 new lek locations may have been found during this survey; however, further follow-up is needed on these detections to classify them as active leks. Two new leks were found in the Monitor Range with 34 birds located at one location and 13 birds at another. As many as seven new leks may have been discovered in the Toquima Range; however, some of those detections may have been small groups of hens simply foraging or loafing. In the Toiyabe Range, four new leks may have been documented of which at least one is very likely a lek with 9 birds observed.

Aside from detecting new lek locations, several unknown status leks were also surveyed in the Toquima and Toiyabe Ranges. Two unknown status leks in the Toquima Range were surveyed with 63 birds documented on the Corral Canyon lek (Figure 2) and 38 birds observed on the Boulder Canyon lek. In addition, two high elevation leks were surveyed in the Toiyabe Range with nine birds observed on each (Toiyabe 1 and Toiyabe 2).

Figure 2. A screenshot of video infrared imagery of displaying sage-grouse obtained from a portion of the Corral Canyon lek located in the Toquima Range in Nye County, Nevada (April 3, 2017).

Northwestern Nevada Survey

The Jackson Mountains in Humboldt County were surveyed on March 29, 2017. Survey transects gridded the northeastern portion of the mountain range, but no detections were made during this survey. Infrared surveys were also conducted in the Black Rock Range, also located in Humboldt County, on April 20th and 25th. The survey on the 20th was cut short due to cloud cover. No new lek detections were made during either of these surveys; however, four known lek locations were surveyed with numbers of sage-grouse observed at three of the four locations.

Northeastern Nevada Survey

One day of lek detection survey was conducted in the northern Tuscarora Range on April 19th, 2017. No detections of new leks or birds were detected during the survey.

In addition to these surveys, aerial infrared lek counts were conducted during a two day period on April 29th and 30th working in conjunction with USGS research crews that were stationed at leks and were conducting simultaneous counts as the aircraft flew over. This is the third year in a row that these data have been collected in order to compare the two methodologies and develop a correction factor.

Fixed Wing Telemetry Surveys

Fixed wing telemetry surveys were contracted through Owyhee Air Research services and conducted during the fall and winter months when research and monitoring crews have left the field. The surveys are conducted to obtain location and mortality information to help determine monthly and annual survival rates. Through the end of April of 2017, 34 hours of aerial telemetry survey have been conducted. The areas where populations have been aerially monitored in FY17 include the following:

- Boulder Mountain to Massacre Bench (northern Washoe County);
- Sheldon National Wildlife Refuge (Washoe/Humboldt County);
- Santa Rosa Range/western Owyhee Desert (Humboldt County);
- Monitor Valley/Range (Nye County).

Approximately $11,840 of upland game stamp funding was spent on these flights in State Fiscal Year 2017.

Project Name:	**Estimating Greater Sage-grouse Vital Rates within Nevada's Most Novel Habitats**
Other Funding Sources:	Nevada Sage-grouse Conservation Grant (75%) Ruby Pipeline Mitigation Funding (12.5%)
Project Start Date:	September 2015
Estimated Completion Date:	December 2018

Project Accomplishments:

The Nevada Department of Wildlife, U.S. Geological Survey - Western Ecological Research Center (WERC) and Bureau of Land Management (BLM) initiated a study design to evaluate habitat use, movement patterns, and population dynamics (i.e. nest, brood, and adult survival) of sage-grouse populations within the Monitor Range and Santa Rosa Mountains study sites over a three year period (2016 – 2018). This study serves as a control for comparison to eight ongoing study areas across Nevada and California where the USGS is monitoring sage-grouse response to some type of actual or potential disturbance (e.g. transmission lines, geothermal facilities, mines, etc.). During 2016, 43 birds were radio-marked in Monitor Valley, and 45 birds were captured and radio-marked in the Santa Rosa Range. Six nest locations were documented in Monitor Valley (1 successful, 5 failed), and 13 nests were located in the Santa Rosas (4 successful, 9 failed). We obtained 222 ground telemetry locations from March – July in both study areas. Primary data collection efforts include gathering baseline data on space-use, habitat selection, and population vital rates. Reported results should be interpreted with caution as they are preliminary, and further data are required to draw any conclusions.

Capture and Monitoring Results (2015 and 2016)

Monitor Valley

During the fall of 2015, we deployed 27 VHF collars on female sage-grouse, and 4 GPS backpacks on two male, and two female grouse. During spring 2016, we deployed 16 VHF collars on female sage-grouse. In the fall of 2016, we deployed 10 more radio collars. We obtained 109 ground telemetry locations from 35 of 43 radio-collared birds in 2016.

Population level utilization distributions by season were calculated for all marked birds. In the spring, sage-grouse distributed farther north, up to the area south of Grimes Hills near Highway 50. During the summer, collared females tended to move east, out of the valley, and into the mountains. In the fall, birds moved back into the lower elevation areas in Monitor Valley north of Blackrock Canyon. Sage-grouse used a very small area in Monitor Valley north of Blackrock Canyon during the winter months.

Santa Rosa

During spring 2016, 30 females were captured and radio-marked with VHF transmitters and in the fall of 2016, research crews captured and marked 12 females with VHF transmitters. We obtained 118 telemetry locations from 28 collared females during the spring and summer. Three aerial telemetry flights were conducted to help the field crew find missing birds.

Population level utilization distributions by season were calculated for VHF-marked birds. Earlier in the spring, female grouse were observed utilizing lower elevation areas. Birds were more localized in the area between Coyote Mountain and the Little Humboldt River. In the summer, females began to distribute over a wider range and began using higher elevation areas near Hinkey Summit and Table Mountain. Females utilized a much greater area during summer, resulting in some individuals relocating near the Oregon border.

Nest Survival

Monitor Valley

Six nests were discovered during 2016. One nest was successful and five failed. The average daily nest survival probability was 95.5% (95% CI, 88.7 – 98.3%) and the cumulative nest survival probability was 18.6% (95% CI, 1.2 – 53.5%). One failed nest showed evidence of avian depredation and one female had abandoned her nest. Due to low sample sizes the confidence intervals are very large, and multiple years of data collection are needed in order to estimate nest survival in the Monitor Valley study area.

Santa Rosa

Thirteen nests were discovered during the 2016 breeding season. Four nests were successful and nine failed. The daily nest survival probability during the incubation phase was 94.4% (95% CI, 89.6 – 97.1%), and the cumulative nest survival probability was 12% (95% CI, 17.2 – 33.6%), which is considered extremely low for Greater sage-grouse.

All of the nest failures appeared to be the result of depredation. Six of the nest remains had egg shells with holes in them, indicating avian depredation. The other three nests were found with crushed and fragmented egg shells, indicating possible mammalian depredation. None of the nesting females attempted to re-nest after their first nests failed.

Brood Survival

Monitor Valley

Only one of the monitored nests successfully hatched in the spring, which left the crew with one brood to track. The brood survived to the 50-day brood check with three chicks. There are not enough data to estimate the brood survival probability; additional years of monitoring are necessary to calculate brood survival in Monitor Valley.

Santa Rosa

The 10-day interval brood survival probability for the 50-day brood-rearing period was 77.8% (95% CI, 46.1 – 92.3%) during 2016. The cumulative brood survival probability was 28.5% (95% CI, 2.1 – 67.0%). Thirteen brood-rearing females were monitored in 2016. One brood was successful, three failed, and one was unknown. The successful brood was found at a lower elevation near a stream in an area of lush vegetation. One brood failed before the 40-day check. The other two broods failed before the 10-day check.

Project Name: **Bi-State Greater Sage-grouse Monitoring**
Other Funding Sources: Nevada Sage-grouse Conservation Grant (75%)
Project Start Date: September 2015
Estimated Completion Date: This is a 3-year monitoring effort.

Project Accomplishments:
The 2016 field season represented the second year of a three year monitoring period for Greater sage-grouse within the Bi-State Distinct Population Segment or planning area. Research and monitoring is being conducted by U.S. Geological Survey field crews that are actively monitoring birds in the Desert Creek and Mount Grant Population Management Units (PMUs) located in Lyon and Mineral Counties in Nevada. Collected data are used to evaluate habitat selection and areas of utilization, estimate vital rates (e.g., nest, brood and individual survival), and relate those vital rates to environmental factors, including the presence of specific predators including avian species such as ravens and raptors.

Capture and Monitoring Results (2015 and 2016)
A total of 43 sage-grouse were captured and radio marked during the fall of 2015 and spring of 2016. Initial capture efforts began in the fall of 2015 with 12 sage-grouse captured and radio marked in the Mount Grant PMU and eight sage-grouse in the Desert Creek PMU. During the spring of 2016, 10 sage-grouse were captured and radio-marked in the Mount Grant PMU and 13 in the Desert Creek PMU.

USGS research crews obtained 191 telemetry locations from 38 birds throughout the 2016 season (Figure 3). Seventeen females out of 22 active radio-marked individuals were located in Mount Grant and all 21 radio-marked females were located in the Desert Creek PMU.

Adult Survival
Survival probabilities were calculated for the two PMUs combined. The average monthly survival probability was calculated at 97.3% (95% CI, 95.4 – 98.4%) and annual adult survival probability was 71.7% (95% CI, 56.5 – 82.5%) during 2015-2016. Seven mortalities were recovered in 2016. Assumed causes of mortality included depredation by avian (n=2), mammalian (n=2) or unknown (n=1) predators, and unknown causes (n=1). The seventh mortality tested positive for West Nile virus.

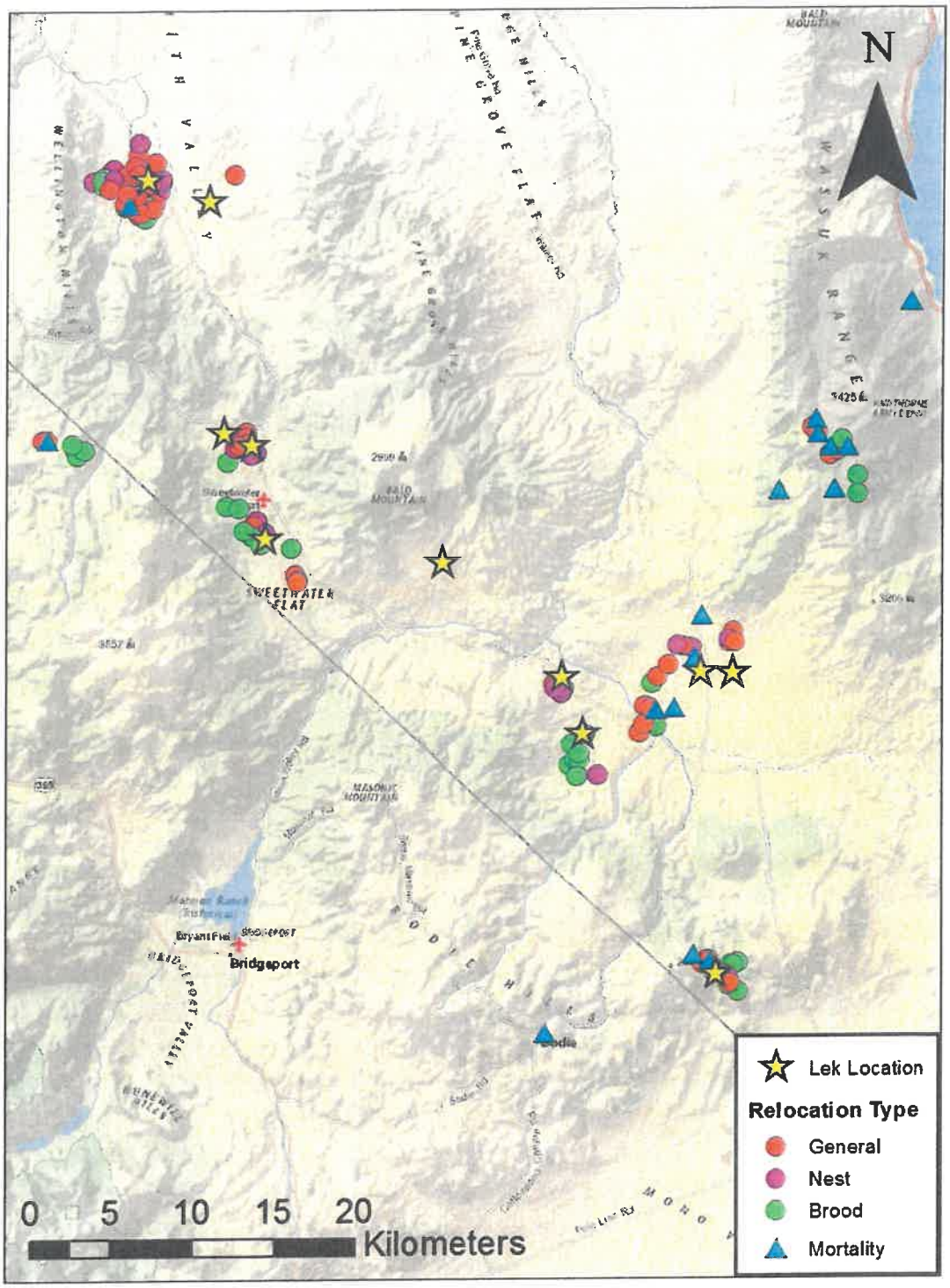


Figure 3. General, nest, brood and mortality telemetry location (n=191) in the Mount Grant/Desert Creek study area.

Nest Survival

A total of 27 nests were located in 2016 by USGS research crews. In the Mount Grant PMU, 8 nests hatched, four failed and one female had a successful second nesting attempt. Nine nests hatched and six failed in the Desert Creek PMU. Daily nest survival was 96.7% (95% CI, 93.9 – 98.2%) and cumulative average nest survival probability for the 37-day egg laying and incubation period was 28.5% (95% CI, 9.7 – 51.0%).

Brood Survival

Seventeen broods were monitored during 2016 within the Desert Creek (n=9) and Mount Grant (n=8) PMUs. Within the Desert Creek PMU, two broods were successful, two failed and five had unknown fates. In Mount Grant, one brood was successful, three failed and four had unknown fates due to difficulty accessing the Hawthorne Army Depot lands. The cumulative 50-day brood survival probability for both PMUs was 63.3% (95% CI, 33.3 – 82.7%).

Project Name:	**Monitoring the Effects of Pinyon and Juniper Removal on Greater Sage-grouse in Southeastern Nevada**
Other Funding Sources:	Nevada Sage-grouse Conservation Grant (75%)
Project Start Date:	September 2015
Estimated Completion Date:	June 30, 2018

Project Accomplishments:

The Nevada Department of Wildlife (NDOW) and the Bureau of Land Management – Ely District (BLM) are partnering on a Greater Sage-grouse (hereafter referred to as "sage-grouse") monitoring project to determine the efficacy of various vegetative treatments, particularly pinyon and juniper removal, on small to moderately sized sage-grouse populations within portions of Lincoln and southern White Pine County. Population level impacts to sage-grouse can occur at very low levels of conifer encroachment. For example, in a study conducted in south-central Oregon, Baruch-Murdo et al. (2013), found that no sage-grouse leks remained active when conifer canopy exceeded 4%. The BLM and NDOW, along with various other partners including private landowners, are working to address this issue throughout Sage-grouse Management Zone III within south-central Nevada and southern Utah. Sage-grouse monitoring work is currently ongoing in southern Utah in the Skutempah, Dog Valley and Hamlin Valley areas by Dr. Nicki Frey with Utah State University. We have expanded upon her ongoing efforts by including study sites in Lincoln and southern White Pine Counties. Some of Dr. Frey's monitoring work in southern Utah has taken place in Nevada as Hamlin Valley is virtually bisected between Nevada and Utah and sage-grouse use habitats in both states.

Hamlin Valley Study Area

There were five active GPS-PTT transmitters on sage-grouse in the Hamlin Valley study area during the fall and early winter of 2016. These birds delivered 1,512 locations from October through December of 2016; however, two males died during this timeframe. Birds from this study area used three main areas including Table Mountain, White Rock Mountain, and Mount Wilson, which provide some of the best sage-grouse summer habitat in Lincoln County.

Cave Valley Study Area

In Cave Valley, 14 sage-grouse outfitted with GPS-PTT transmitters delivered 3,852 GPS locations from October through December 2016. Three birds died during this period including one juvenile female and two adult males. Sage-grouse in the southern Cave Valley population spent most of their time near Cave Valley Ranch and Sawmill Well. However, we had one bird move down to the Lewis Well area during the October-December timeframe.

Future Plans

Additional capture efforts occurred during the spring of 2017; however, the graduate student working on the project resigned during the spring field season. Results of those efforts were not available for this report. With larger sample sizes at both field sites, we hope to better document and assess use of treatment areas by sage-grouse in the future.

Project Name:	**Monitoring the Effects of Landscape-Level Treatment on Greater Sage-grouse within the Desatoya Mountains of Central Nevada**
Other Funding Sources:	Nevada Sage-grouse Conservation Grant (75%) Carson Valley Chukar Club
Project Start Date:	September 2013
Estimated Completion Date:	June 30, 2018

Project Accomplishments:

The Nevada Department of Wildlife (NDOW) and the U.S. Geological Survey Western Ecological Research Center (USGS) initiated a before-after study design in the fall of 2013 to investigate the potential effects of landscape scale habitat enhancement and restoration projects on sage-grouse population vital rates, habitat selection, movement patterns, as well as effects on predator community composition, in the Desatoya Mountains located in central Nevada. The Bureau of Land Management (BLM), in collaboration with NDOW and Smith Creek Ranch, have been implementing a landscape-scale, multi-year integrated habitat restoration and maintenance project (also

known as the Desatoya Mountains Habitat Resiliency, Health and Restoration Project) to improve wildlife habitat and restore degraded vegetation communities within the Desatoya Mountains through singleleaf pinyon pine (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*; hereafter PJ) removal treatments and restoration of sagebrush communities, wet meadows, and other riparian complexes over a ten year period (BLM 2012). Proposed habitat enhancement and restoration actions that will directly impact approximately 32,000 acres include various PJ removal treatments (20 – 100% removal), fencing to protect wet meadows and riparian areas, stabilizing stream channels, and wild horse removal.

Capture and Monitoring Results

From 2013–2016, USGS research and monitoring crews have captured 110 sage-grouse and outfitted them with either VHF radio or GPS – Satellite PTT devices. Research crews obtained 134 telemetry locations from 28 collared females in 2014, 238 telemetry locations from 46 marked sage-grouse in 2015, and 298 telemetry locations from 57 marked sage-grouse in 2016 (Figure 4). A total of 42,887 GPS locations have been obtained during all years of the study (Figure 5).

Movement Patterns

Two general patterns of sage-grouse movement have been observed from spring breeding areas to summer habitat. Sage-grouse moved to either lowland riparian and agricultural complexes, or to high elevation areas within the Desatoya Mountains. Sage-grouse congregated in the valley near Smith Creek and the surrounding agricultural fields. Some GPS-marked individuals moved from the Smith Creek valley to higher elevations near Edwards Creek. Two GPS-marked females captured at the Rock Creek lek on the west side of the Desatoya Mountains moved from the valley to the mountains after their broods failed in 2014. In the Desatoya Mountains, it appears that birds are using springs and other ephemeral water sources near Edwards Creek, Haypress, and Topia Creek. During fall, sage-grouse activity was highly concentrated around Smith Creek, Edwards Creek, Haypress Meadow and along Smith Creek Valley towards the

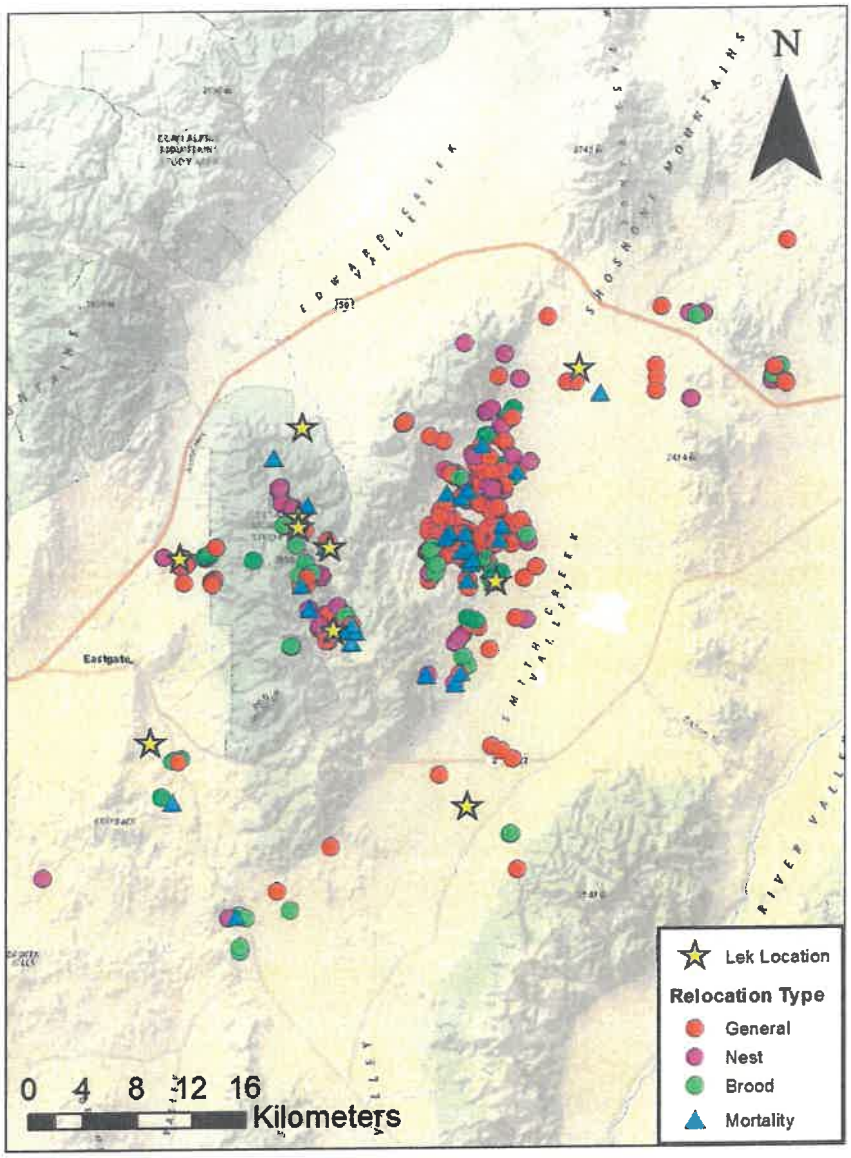


Figure 4. Nest, brood, mortality and general telemetry locations in the Desatoya Mountains, NV, 2014-2016.

New Pass lek. However, during winter, sage-grouse began to congregate around lek sites and away from Smith Creek and high elevation areas.

Nest Survival

In 2014, 14 nests were located of which four were successful and 10 failed. Twenty nests were located in 2015 of which eight were successful and 12 failed. In 2016, 25 nests were located of which 17 were successful and eight failed. Daily nest survival was estimated at 97.2% (95% CI, 96.0 – 98.1%), and cumulative average nest survival probability for the

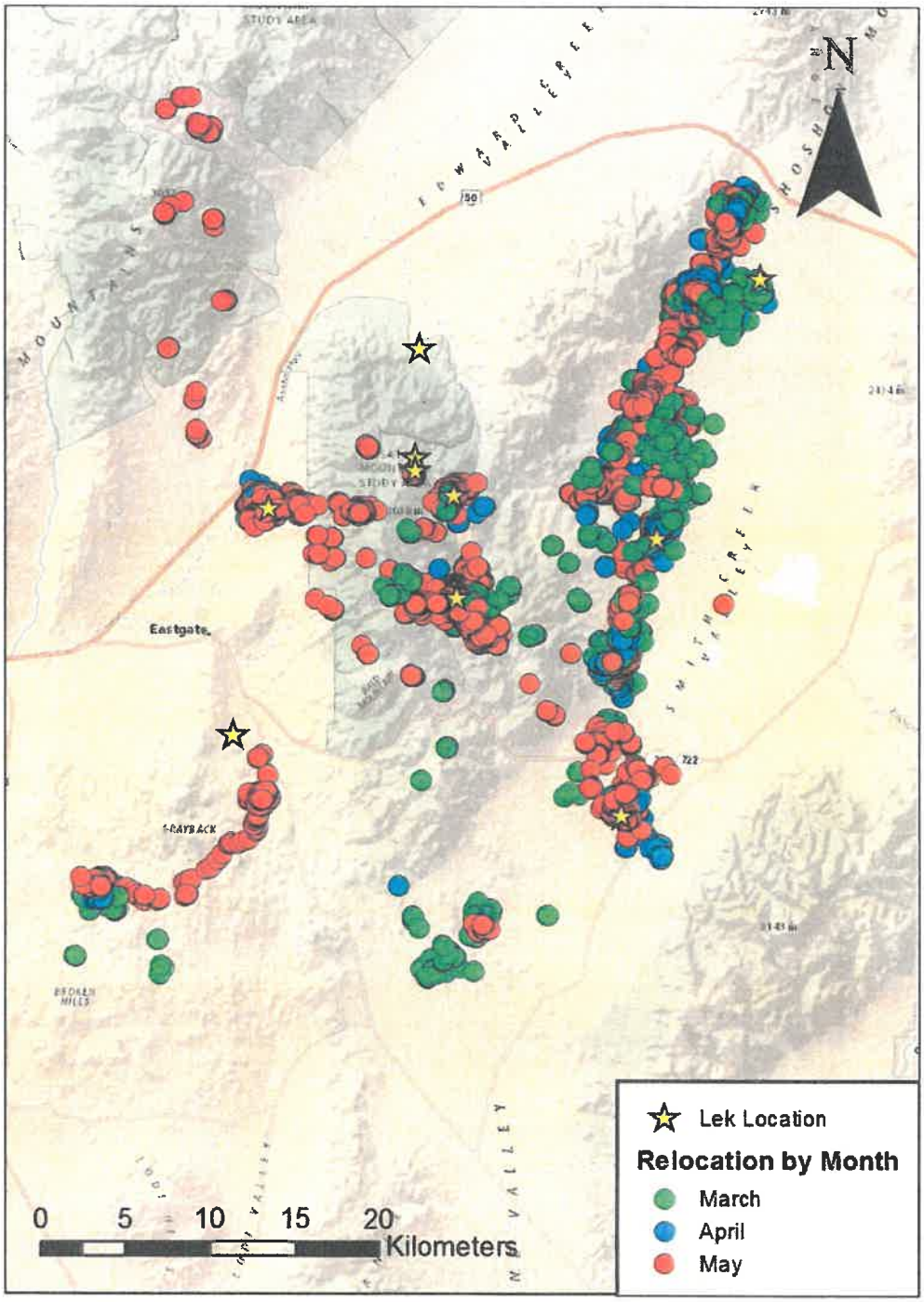


Figure 5. GPS locations by month during the spring in the Desatoya Mountains, NV from 2014-2016.

37-day egg laying and incubation phase was 35.4% (95% CI, 22.5 – 48.7%) over the course of the study.

Brood Survival

All five broods monitored in 2014 failed. In 2015, eight broods were monitored of which two were successful, five failed, and one was unknown. In 2016, 17 broods were monitored of which four were successful, 10 failed, and three had unknown fates. The 10-day interval brood survival probability was 77.4% (95% CI, 66.9 – 85.0%) and the cumulative average survival probability for the 50-day brood rearing period during 2014 – 2016 was 27.8% (95% CI, 13.4 – 44.3%).

Project Name: **Predicting the Value of Greater Sage-grouse Late Brood Rearing Habitats in Nevada**

Other Funding Sources: Nevada Sage-grouse Conservation Grant (75%)

Project Start Date: July 2016

Estimated Completion Date: January 2018

Project Accomplishments:

Identifying quality habitat is a critical step in the conservation and management of populations. Species often select habitat that maximizes their fitness in terms of reproduction and survival. For Greater sage-grouse, the presence of protein rich forbs is required for chicks to persist on the landscape. In the Great Basin, many of these forbs are abundant in spring, but die during dry summers, with the exception of forbs found in moisture-rich refuges. These refuges can be either in the form of wet meadows or elevations that are high enough to receive more precipitation than the surrounding landscape. Using known locations of sage-grouse during July and August from 2013 to 2015, we built a year-specific resource selection model to identify these refuges as high quality late summer habitat (Figure 6). We assessed how the location of sage-grouse on the landscape relative to the predicted late summer habitat quality, affected survival of pre-fledged chicks and adults. We found that chicks in predicted lower quality habitat did not survive as well as chicks in higher quality habitat. Alternatively, adults that spent more time in the high quality habitat did not survive as well as adults that were located in habitat of lower quality. These results suggest that moisture rich refuges are essential for successful reproduction but attending these refuges likely comes at a cost in terms of adult survival. We attribute these costs to biotic processes such as density dependence and predation. We fit the habitat model to a validation dataset located 260 km (Eureka County) from where the data used to train the model were collected, and found that the model accurately predicted where the birds were through both space and time. A predicted surface was

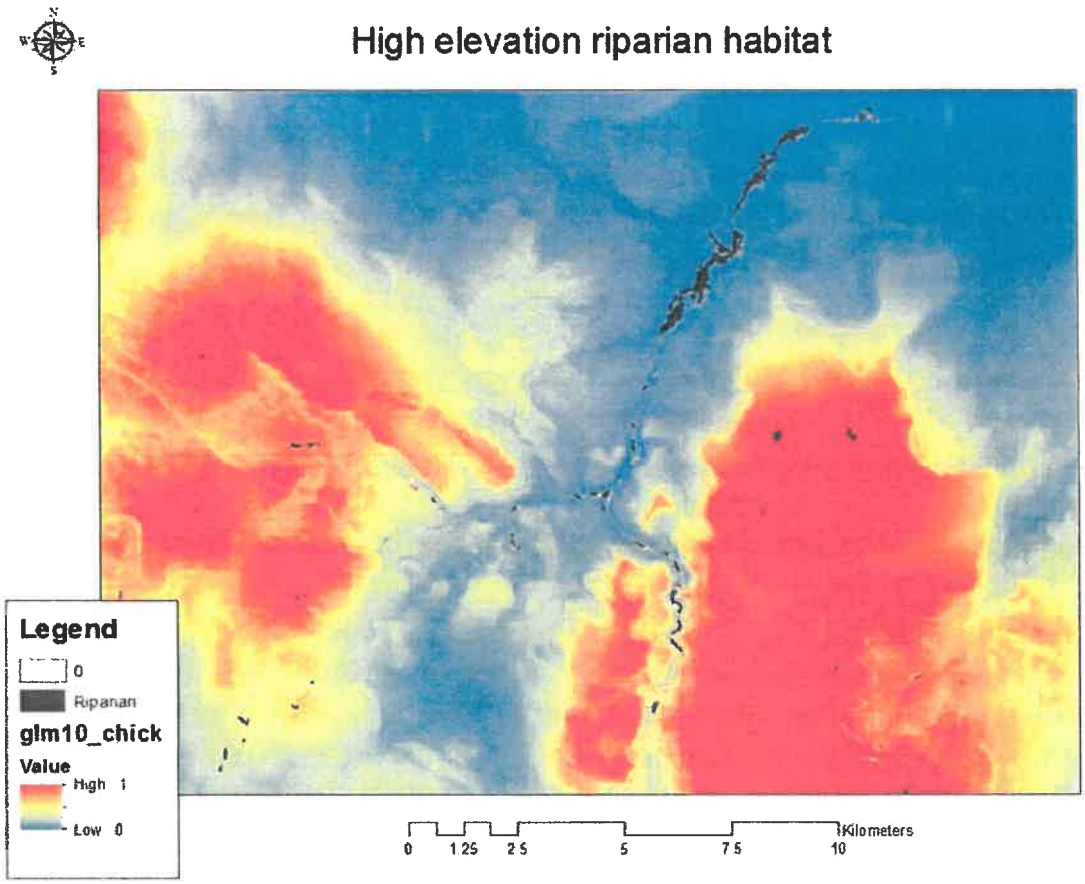


Figure 6. Predicted surfaces for known sage-grouse breeders, from portions of the training dataset for late summer habitat in 2015. Riparian vegetation is plotted in black on the map, and represents areas with water. This is the predicted surface for the Blowout Mountain (left side of figure) and Rock Springs Table (right side of figure) portions of the Sheldon National Wildlife Refuge. The larger riparian areas identified in black is the lower reaches of Virgin Valley Creek, which is largely surrounded by salt-desert shrub type communities.

created for the entire state of Nevada for this limiting resource. Identifying these areas will help the Nevada Department of Wildlife (NDOW) make recommendations to federal land management agencies to balance grazing pressure, mining, and energy development in the Great Basin with the long term persistence of sage-grouse.

These results were completed in the spring of 2016, and presented at the Biannual Columbian Sharp-tail and Sage-grouse Symposium, the joint meeting of the North American Ornithological Society and American Ornithologist Union, and the Western Section of the Wildlife Society. The results garnered interest, additional funding, and additional data from the Oregon Department of Fish and Wildlife, Bureau of Land Management, and United States Fish and Wildlife Service with the goal to extend the model to the state of Oregon. NDOW provided additional funding to extend these

models into the past, and predict an independent surface for every year from 1985 through 2016. We have incorporated additional data, collected during the summer of 2016 to help train our model. We have gathered all of the spatial data needed to make these projections for both Nevada and Oregon, and are in the finishing stages of updating the habitat model and reevaluating its effect on survival and recruitment. Our next step is to evaluate how well changes in the annual predicted surfaces can explain variation in lek counts from both Nevada and Oregon. NDOW and the University of Nevada-Reno expect the completion of this analysis by January 2018. Understanding these relationships, will not only identify areas of conservation need, but it will allow us to predict the effectiveness of each conservation strategy into the future.

Project Name: **Effects of Conventional Raven Control on Greater Sage-grouse Vital Rates within the Virginia Mountains**

Other Funding Sources: Nevada Sage-grouse Conservation Grant (75%)

Project Start Date: September 2015

Estimated Completion Date: December 2020

Project Accomplishments:

Few studies have quantified the effects of raven removal on sage-grouse nest survival, which is a specific life-history stage, but studies that evaluate evidence on the how predator removal influences population growth rates are lacking. This information would be beneficial in guiding management decisions. For example, raven removal might improve nesting success, but this improvement may not influence population growth rates because of compensatory mortality effects (e.g., limiting factors influencing chick survival).

We are currently investigating raven predation and the effects of raven removal on this sage-grouse population by employing a before-after-control-impact (BACI) study design. Specifically, we have collected baseline data on space-use, habitat selection, and population vital rates over eight years, which encompasses five years (2009-2013) of pre-raven control and three years of raven control efforts (2014-2017). Our goal is to develop an integrated population model using the lek count and demographic data to investigate the effects of raven removal on nest survival, as well as population growth rates. In addition, we have collected videography at nest sites (n = 58) and conducted avian predator surveys (n = 2474) to identify sage-grouse nest predators common to this study site. Therefore, we will also investigate raven predation rates and evaluate potential effects of compensatory predation (e.g., removing ravens increases badger predation).

Sage-grouse Monitoring

A total of 204 sage-grouse with VHF transmitters have been monitored during 2009–2016. The total number of males and females tracked by radio telemetry were 13 and 191, respectively. Most sage-grouse were relocated in the Spanish Flat area (Figure 7). The population level home range (95% UD) encompassed 10,835 ha during spring and 4261 ha during summer. In each year, the core area was located at Spanish Flat. Sage-grouse captured from both the Sheep Springs and Spanish Flat lek sites used this area before moving to wintering areas. The majority of individual home ranges throughout spring and summer overlapped within the Spanish Flat area, indicating relatively less use of the Sheep Springs area.

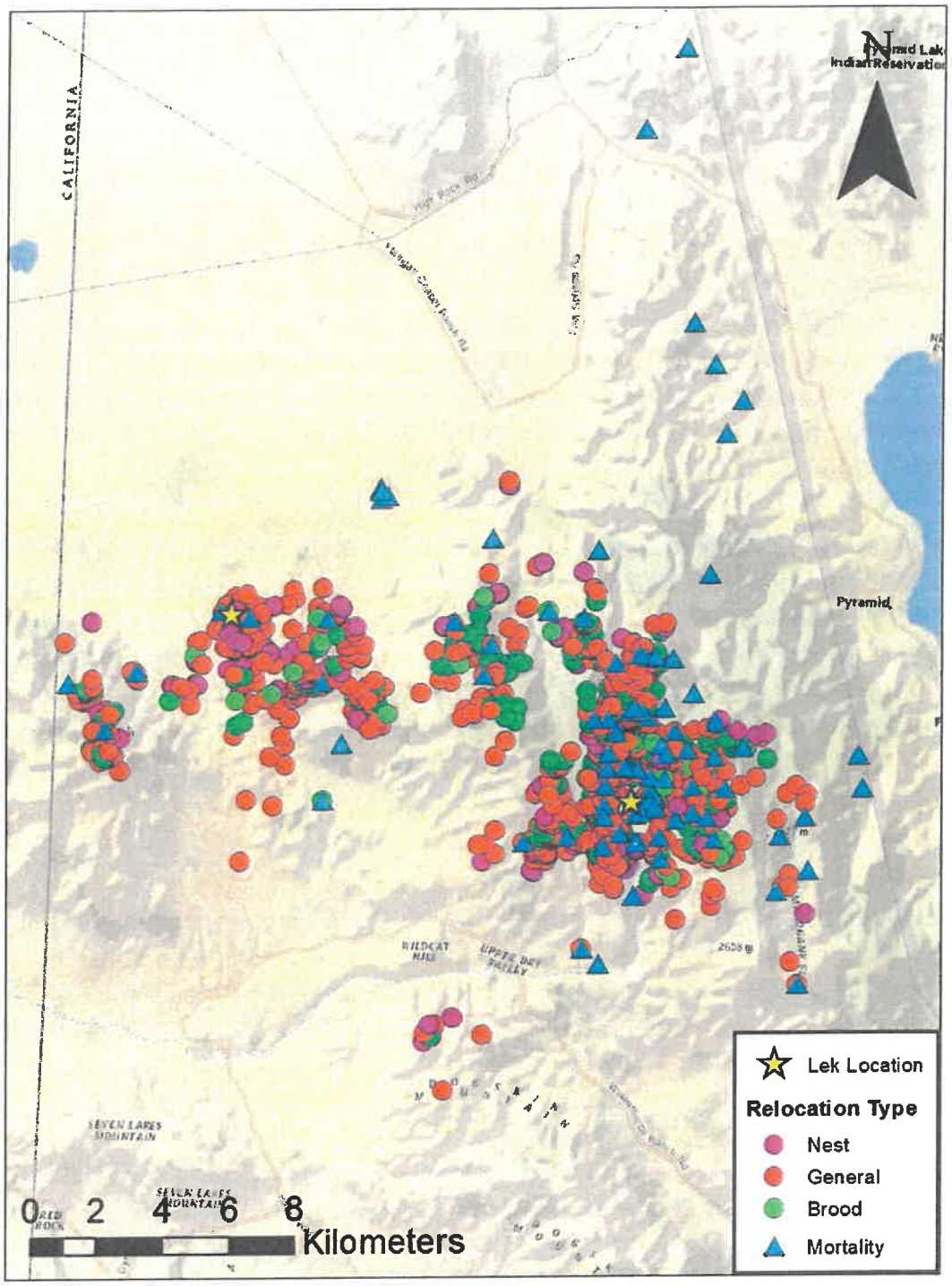


Figure 7. Locations of general radio-marked birds, nests, broods and leks in the Virginia Mountains from 2009-2016.

Sage-grouse Survival

Monthly adult survival probability was 95.6% (95% CI, 94.6 – 96.4%) and cumulative annual adult survival probability was 58.1% (95% CI, 51.5 – 64.1%) during 2009 – 2016. For study years 2009 – 2011, 19 marked sage-grouse mortalities were found. Presumed causes of death included mammalian predators (n = 6), avian predators (n = 4), unknown predators (n = 1), anthropogenic structure collisions (n = 2), and unknown causes (n = 6). During 2012, five dead marked sage-grouse were located. All mortalities were located to the east of the Spanish Flat lek within the foothills of Tule Ridge. The average distance of the mortalities to the lek site was 2.4 ± 0.3 km (mean ± SE). Three mortalities appeared to be caused by mammalian predators, and one mortality appeared to be caused by an avian predator. Carcass remains are used to infer the cause of mortality; however, carcasses are often scavenged by other carnivores, thus obscuring evidence of the initial predator's identity.

Thirty-eight radio-marked sage-grouse mortalities were located during study years 2013 – 2015. Assumed cause of death included depredation by mammalian predators (n = 13), avian predators (n = 3), and unknown causes (n = 22). In 2016, 13 marked sage-grouse mortalities were recovered. Assumed cause of death included depredation by avian predators (n = 2), mammalian predators (n = 1), and unknown causes (n = 10). A majority of the unknown causes were transmitters identified as mortalities during fall through spring aerial telemetry monitoring, from which very little evidence remained to help identify the cause of mortality.

Nest Survival

Cumulative average nest survival probability for the 37-day egg-laying and incubation phase for study years 2009 – 2011 and 2013 – 2016 was 28.6% (95% CI, 20.6 – 37.0%). Data from 2012 were not used in this survival estimation because very few nests were found in 2012 and nests were initially located during later stages of incubation due to field logistic constraints.

Sage-grouse Nest Videography

Fifty-eight nests were video-monitored during 2009 (n = 6), 2010 (n = 16), 2011 (n = 17), 2014 (n = 2), 2015 (n = 10), and 2016 (n = 7). Nest depredations, partial nest depredations, and successful hatches were recorded. Nest survival for video-monitored nests was calculated in the same manner as described for all nests. The reason for calculating survival of video-monitored nests both together and separately from all nests was to determine if video-monitored nests are more or less likely to fail. Nest survival across all video-monitored nests for 2009 – 2011 was 43.7 ± 0.1% (means ± SE), with yearly survival rates of: 22.2 ± 0.1% (2009), 35.0 ± 0.1% (2010), and 60.6 ± 0.1% (2011). Successful hatching was recorded at 22 nests. Predator activity was recorded at 19 nests, of which

16 nests were depredated, two nests were partially depredated, and one nest hatched with no eggs apparently lost directly due to removal by the predator. Both partially depredated nests still hatched ≥1 egg following the event. Depredation was the primary cause of sage-grouse nest failure. Nest predators were avian, mammalian, and reptilian. Predation of both eggs and chicks were recorded at the nest. Ravens were the most frequent sage-grouse nest predator in the Virginia Mountains, accounting for 38.9% of nest depredations. Equipment failure occurred at the remaining three nests, and nest fate was not recorded. Of the two nests that were video-monitored in 2014, one was successful and one was depredated by a coyote. In 2015, eight video-monitored nests successfully hatched, one was depredated by a coyote, and one was abandoned. In 2016, six video-monitored nests successfully hatched and one was abandoned. Video recordings for the 2014 – 2016 nests have not been analyzed, so the following results do not contain detailed descriptions of nest fate.

Brood Survival

During 2009 – 2016, 79 broods were monitored. Thirty-five females with broods were confirmed successful (≥1 chick survived to 50-days post-hatch) and 35 broods failed. Of the 35 unsuccessful females, 22 were confirmed as failed on or before the 25-day post-hatch interval. The remaining nine broods could not be relocated to determine survival at 50-day post-hatch; therefore, their fate is unknown. The 10-day interval brood survival probability was 88.8% (95% CI = 84.4 – 92.0%) during 2009 – 2016. The cumulative average brood survival probability for 50-day brood rearing phase (probability of success through the brood rearing period) was 55.1% (95% CI = 42.9 – 65.8%) for 2009 – 2016.

Project Name:	**Conservation Principles for Greater Sage-grouse in the Great Basin (book and related guidelines handbook)**
Other Funding Sources:	Nevada Sage-grouse Conservation Grant (75%)
Project Start Date:	April 2016
Estimated Completion Date:	December 2017

Project Accomplishments:

A sub-grant agreement was completed and is in place through December 31, 2017 that directs and provides funding for the U.S. Geological Survey, working in cooperation with various universities and sage-grouse researchers, to develop a comprehensive, scientifically reviewed and edited book focused on the population ecology of Greater sage-grouse in the Great Basin ecoregion. The agreement also identifies the development of an accompanying, easy to follow, management guidelines handbook specifically focused on the Great Basin to inform management decisions and be

incorporated in land use planning documents in the future. The book will include five main sections including: 1) the nesting phase; 2) the brood rearing phase; 3) juvenile survival; 4) adult survival; 5) integrated population modeling techniques. Each section will have one to many chapters depending on contributions from sage-grouse researchers across the Great Basin.

To date, a final draft of the first section of the book has been completed and is under review. This section, titled "Nest Site Selection of Greater sage-grouse in the Great Basin" identifies factors that affect nest site selection at various spatial scales. This section is essentially a synthesis of nesting habitat data collected across nine study sites in Nevada and northeastern California over seven field seasons from 2009-2015. Succinctly put, this analysis found that horizontal cover was a significant contributing factor to sage-grouse nest site selection and that land use practices that reduce any component of horizontal cover, such as grasses (live or residual), forbs (live or residual), or shrubs in recognized nesting habitat would like by detrimental to nesting sage-grouse and cause females to nest in sub-optimal locations.

Kirch WMA Food Plots

The purpose of this project was to enhance habitat for waterfowl, upland game birds, and mule deer. Forty acres of the lower dove field were planted with Siberian wheat in September, 2016. Forty acres of the upper dove field were planted with a mixture of cereal grains and sunflowers in May, 2017. Forty acres of the Old Place unit will be planted in June, 2017. The moist-soil units within the Old Place unit will be planted with a summer seed mix composed of millets and cereal grains.

Mason Valley WMA Upland Wildlife Food Plot

The Mason Valley WMA crew planted 140 acres of upland food plots during the fall of 2016 and spring of 2017. Water from the Bolster Well was used to irrigate wheat fields in the fall. Irrigation water from the Walker River was used to irrigate the spring plantings of millets, sorghums and sunflowers.

Mason Valley WMA Food Plot

Key Pittman WMA Food Plots

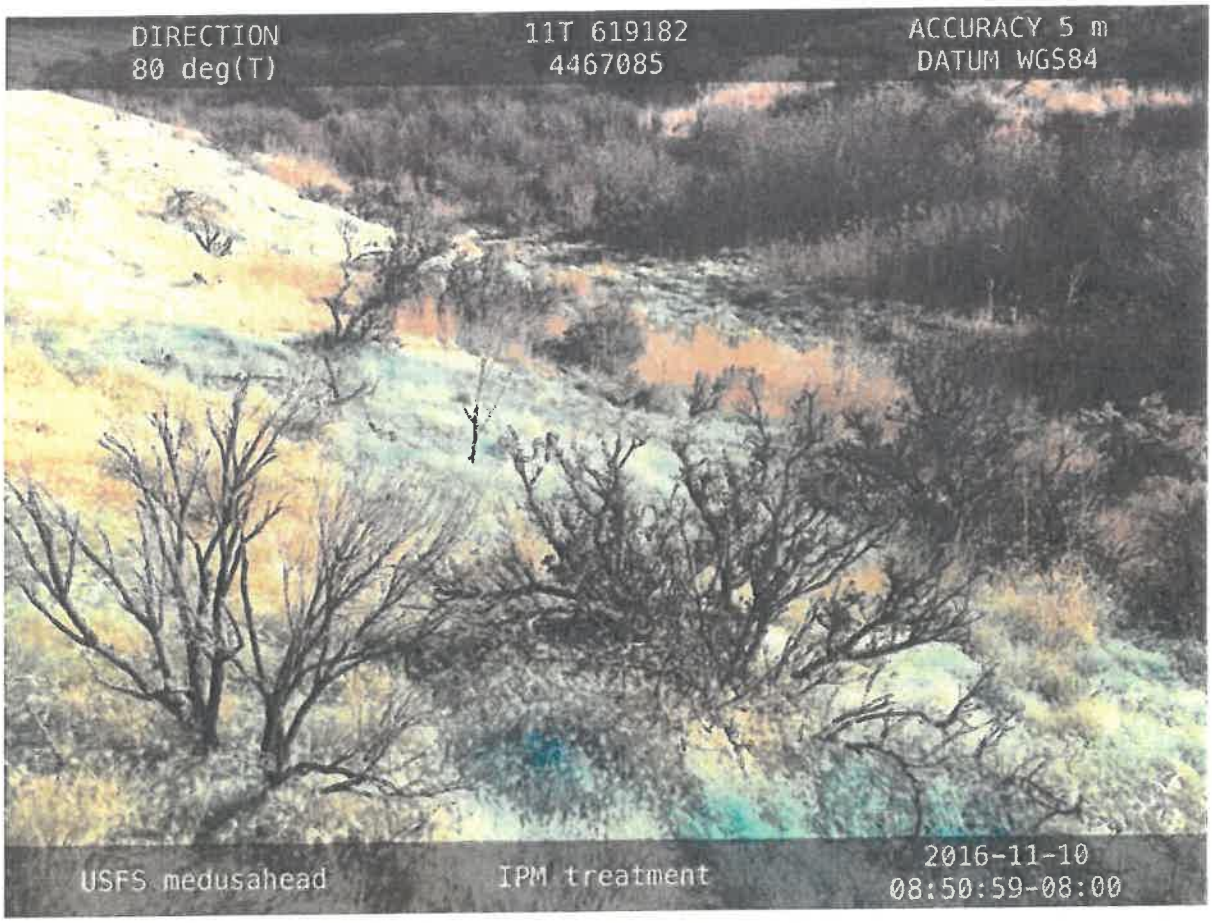
A total of $3,900 was expended from Upland Stamp funds and $2,600 from Duck Stamp funds on seed. Approximately 60 acres were planted in October with winter wheat, fall cereal rye, barley, alfalfa, Austrian winter pea and hairy vetch as a winter cover crop and to enhance hunter success while hunting the fields on the Key Pittman WMA. An additional 40 acres were planted in January with intermediate wheat grass, sand dropseed and sandberg bluegrass to enhance desirable vegetation in areas where the removal of noxious weeds left areas that were lightly vegetated or in areas where improved vegetation cover and variety is needed. Approximately 70 acres were over seeded in late February with Spring wheat, oats, Sainfoin, Ladak Alfalfa, Rocky Mountain bee plant and native annual sunflower. The annual seeding projects is

completed to increase forage production in feeding areas on the WMA and to enhance hunter opportunities. This project was completed by in-house personnel.

Eastern Region WMA Weed Control

With increased funding levels and the addition of a new position, NDOW enhanced its efforts during FY17 to control noxious and invasive species on NDOW's unmanned WMAs and State-owned properties. The Eastern Region is responsible for management of nearly 30,000 acres of designated WMA and State-owned properties. Emphasis in FY 17 was placed on the Stowell properties and the Mink Ranch associated with the Bruneau WMA. The Eastern Region amassed a multi-divisional effort targeting tall whitetop, Canada thistle, and Scotch thistle along the Bruneau Riparian corridor and on old agricultural fields. Crews from the Western and Eastern Fisheries Division in addition to Eastern Region Game and Habitat Divisions worked for a week to conduct weed control and cleanup efforts on the Stowell property. Additional weed control efforts were applied to Forest Service (FS)-administered lands in the Ruby Mountains. The Forest Service has been attempting to control a medusa head infestation along Green Mountain Creek at an administrative site for several years without much success. Concerns with the increase and distribution of medusa head provided an opportunity for NDOW to initiate additional treatments on the property with FS approval utilizing a private contractor. The infestation has spread from FS- administered lands to County and private lands. The Green Mountain area is a wildlife rich region providing habitat for the State's largest deer herd, sage grouse and Lahontan cutthroat trout, a listed species. Two additional follow up treatments are planned and NDOW has been able to enter into a cost sharing agreement with the FS for future treatments.

Tall Whitetop Control. Bruneau Wildlife Management Area. Stowell Property. 2016.



Herbicide Application - Medusahead Treatment. Green Mountain Admin Site, Ruby Mountains. 11/2016.

Cricket Springs Restoration

In the fall of 2017, the water development portion of the project was implemented and completed. This portion of the project consisted of a French drain installed at lower Cricket Springs that was then piped to a 1,200 gallon tire trough. At the trough, a float valve was installed as well as an output drain that was piped to re-route overflow back to the riparian area. A valve was installed in line between the French drain and the trough so that the development can be winterized and water can be diverted back to the spring when the permittee does not have livestock using the allotment. Funding from this phase of the project totaled $6,255 with $1,999 and $4,256 being contributed by the Upland Game Bird Stamp and Habitat Conservation Fee programs, respectively.

Presently, a scope has been submitted to prospective contractors to complete the fencing portion of the project. There will be two spring sources and their respective wet meadow complexes fenced, with a total of 2,268 feet of pipe rail fence. The bid tour with

contractors took place May 22nd, 2017 with an implementation start date of June 15th, 2017. The work performance period ends October 31, 2017.

Cricket Springs, Elko County, Nevada; Pre-Project Conditions, Fall 2016

Medusahead Mapping in Buffalo Hills

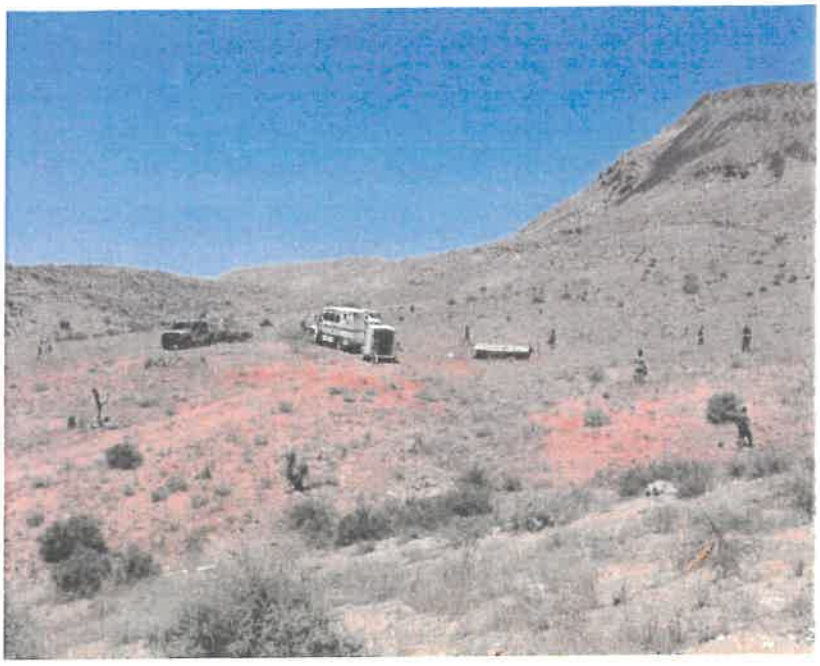
This project is oriented around mapping and treatment of medusahead and other noxious invasive species in the Buffalo-Skedaddle Greater Sage-grouse Population Management Unit. A contractor has been awarded a sub-grant to conduct the work and has currently expended $5,000 of the $10,000 awarded to this project. Project work is currently underway and funds should be spent by September 30, 2017. During the 2016 fiscal year, approximately 93 days were spent on-site, with 450 acres of land treated on those days. It is expected that approximately 350-400 acres will be treated between May 1 and September 30, 2017.

Post-Fire Upland Habitat Restoration near Guzzlers

During the late fall of calendar year 2016 through the spring of calendar year 2017, this project spent approximately $23,500 on a number of restoration activities near small game guzzler sites in NDOW's Southern Region. These activities include repairing road access to Guzzler #37, and planting 440 plants at five Kane Springs Valley guzzler sites. Monitoring of 10 restoration sites previously restored and located in Lincoln County's Kane Springs Valley has shown a high survival rate of plantings (≥75%) due to

subsequent manual watering and timely precipitation events. An increase in quail and chukar populations has also been observed near restored guzzler sites.

Additional repairs and maintenance to access roads may be necessary after significant precipitation events and additional plantings, watering and monitoring will occur at guzzler sites during the remainder of FY17. Work to be completed during the remainder of FY17 is listed below:



Kane Springs Valley Post-fire Restoration near Small Game Guzzlers

- Guzzler road access maintenance/repair.
- Preparation of sites and planting of native plant stock at specified guzzlers.
- Installation of Dri-Water irrigation, herbivore proof plant cages, and hand watering.
- Subsequent plant replacement, watering, Dri-Water replacement, plant cage repair.
- Project monitoring.

Southern Nevada Small Game Water Developments

The majority of the FY14 and FY15 Southern Nevada Small Game Water Development funding was allocated towards the purchase of materials to be used in the repair of existing small game water developments (*hereafter*, guzzlers). A lesser degree of funding was allocated towards tools needed to complete repairs, and maintenance of a state-owned ATVs/UTVs used by state personnel to access remote sites where small game guzzlers are located. From 1 July 2016 to 30 June 2017, NDOW water development staff conducted 231 inspections on existing guzzlers in Clark, Lincoln, and Nye Counties and performed minor maintenance procedures on 71 of those units. Most of the maintenance activity included repair or replacement of exclusionary fencing, storage tanks, frames, collection aprons, and plumbing. A total of 2,700 gallons of water was hauled to 9 existing guzzlers in the Bullfrog Hills after it was reported that all the small game guzzlers in the region of the Bullfrog Hills were dry.

Proposed FY18 Upland Game Bird Stamp Projects

Title of Proposed Project	**Project Manager**	**$ Requested from UGBS Account**	**Other Funding Sources** (not including in-kind contributions)
Bi-State Sage-grouse Research and Monitoring	Shawn Espinosa	$22,500	Federal Greater Sage-grouse Conservation Grant ($67,500)
Columbian Sharp-tailed Grouse Restoration Project	Shawn Espinosa	$25,000	Federal Game Management Grant ($75,000)
Dusky Grouse Ecology and Management in Nevada	Shawn Espinosa	$7,500	Utah State University ($19,680); Federal Greater Sage-grouse Conservation Grant ($81,518)
Effects of Pinyon and Juniper Removal on Sage-grouse in Southeastern Nevada	Shawn Espinosa	$10,000	Federal Greater Sage-grouse Conservation Grant ($30,000)
Effects of Vegetation Treatments on Sage-grouse in the Desatoya Mountains	Shawn Espinosa	$15,000	Federal Greater Sage-grouse Conservation Grant ($45,000)
Greater Sage-grouse Control Site Research and Monitoring	Shawn Espinosa	$22,494	Federal Greater Sage-grouse Conservation Grant ($67,481)
Mountain Quail and Ruffed Grouse Translocation	Shawn Espinosa	$10,000	Carson Valley Chukar Club ($2,500); Federal Game Management Grant ($30,000)
Nevada Greater Sage-grouse Monitoring	Shawn Espinosa	$58,000	Federal Greater Sage-grouse Conservation Grant ($145,000)
Virginia Mountains Sage-grouse Research and Monitoring	Shawn Espinosa	$20,000	Federal Greater Sage-grouse Conservation Grant ($60,000)
Corners for Quail - Quinn River Valley - Vanderhoke	Bobby Jones	$11,000	National Wild Turkey Federation ($5,000)

Proposed FY18 Upland Game Bird Stamp Projects

Title of Proposed Project	**Project Manager**	**$ Requested from UGBS Account**	**Other Funding Sources** (not including in-kind contributions)
Key Pittman WMA Wildlife Food Plots	Ron Mills	$3,900	Duck Stamp Account ($2,600); NDOW personnel costs covered by Federal WMA Grant
Bi-State Conifer Removal Project	Jasmine Kleiber	$50,000	BLM ($124,984); Habitat Conservation Fee Account ($77,016)
Post-Fire Upland Habitat Restoration - Gold Butte	Anthony Miller	$25,000	NDOW personnel costs covered by Habitat Restoration Grant
Post-Fire Upland Habitat Restoration – Kane Springs Valley	Anthony Miller	$29,700	BLM ($235,000); $5,300 of equipment and NDOW personnel costs covered by Federal Habitat Restoration Grant
Eastern Nevada Properties Weed Control	Adam Henriod and Matt Glenn	$25,000	Duck Stamp Account ($25,000); a couple of local CWMAs may contribute a few thousand dollars
Totals		**$335,094**	**$1,098,579**

Upland Game Bird Stamp Account Budget Status

Balance in the Account at Start of FY 2017	$ 500,883
Estimated Revenue Accrued During FY 2017	$ 238,187
Estimated Total FY 2017 Expenditures	$ 270,000
Estimated Administrative Costs (10% of Revenue)	$ 23,819
Estimated Balance at End of FY 2017 / Start of FY 2018	$ 445,251
Estimated Revenue to be Accrued During FY 2018	$ 238,187
Estimated Administrative Costs (10% of Revenue)	$ 23,819
Proposed New Project FY 2018 Expenditures	$ 335,094
Estimated Balance at End of FY 2018	$ 324,525

Note: The budget information in this table is preliminary and subject to change.

nevada department of WILDLIFE

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	Bi-State Sage-grouse Research and Monitoring
Project Manager:	Shawn Espinosa Phone: 775-688-1523 Email sespinosa@ndow.org
Project Monitor:	Shawn Espinosa Start Date: 7/1/2017
Implementation Lead:	Nevada Department of Wildlife End Date: 6/30/2017
Partners:	Nevada Department of Wildlife, U.S. Geological Service, US Forest Service, Bureau of Land Management
Project Category:	Wildlife Population Protection or Enhancement
Project Category:	Wildlife Monitoring and Research
Project Actions:	
Priority Resource:	Small game
Priority Species:	Sage grouse
County Location:	Mineral, Lyon

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Upland Game Stamp	$22,500		
USFWS Wildlife Restoration Grant	$67,500		
Project Totals:	**$90,000**		

Project Proposal

1. Brief Purpose and Goal of the Project

Since 2000, a substantial amount of information has been collected on Greater sage-grouse within the Bi-State Distinct Population Segment; however, the majority of research and intensive monitoring work has taken place within the California portion of this population. The Nevada Department of Wildlife is proposing to conduct radio-marking and follow-up work to more clearly understand habitat use and demographic parameters within the Desert Creek and Mount Grant Population Management Units in Nevada. In addition, vegetative measurements will also be collected at used and random sites during various life stages. This information will also help to further refine the resource selection function model for the Bi-State DPS. We propose to conduct this monitoring over a three year period from 2016 through 2018. The information collected will also help assess the effects of various habitat improvement projects, as identified within the Bi-State Action Plan, that are set to take place within this portion of the Bi-State DPS over the next ten years.

This project is intended to better understand habitat utilization, identify key habitats and determine movement patterns of sage grouse as well as determine vital rates within the Desert Creek and Mount Grant Population Management Units. The greatest threats to these populations of sage-grouse are pinyon and juniper encroachment, suburban development, wildfire and the degradation of small meadows and spring complexes over time that serve as late brood rearing habitat.
Initial objectives include the following:
1) Capture at least 10 female sage-grouse and place GPS/Satellite transmitters to determine seasonal movement patterns and determine home range;
2) Capture approximately 20 females sage-grouse and place VHF radio transmitters to augment the GPS/Satellite marked sample; and
3) Maintain approximately 20-30 VHF radio-marked females for two subsequent years after year 1 of the study through year 3.

This work will assist with determining the following:
a) adult survival rates (monthly and annual);
b) identification of nest sites and nest success;
c) examination of nest-site vegetative characteristics and if differences exist between successful and unsuccessful nest sites;
d) determination of nest survival rates;
e) brood rearing habitat selection
f) vital rate associations with habitat co-variates;
g) overall distribution and seasonal movement patterns

2. Project Approach and Tasks

Bi-State Habitat Utilization and Effectiveness Monitoring
Sage grouse movement, survivorship, and reproduction will be monitored following release. Portable receivers (Communication Specialist Inc., Orange, CA; Advanced Telemetry Systems Inc., Isanti, MN) are used along with 3-element Yagi antennas to monitor radio-marked grouse. Relocation error is minimized by circling around each grouse 30 – 50 m. Using the approximated distance and a compass bearing, the location coordinates (Universal Transverse Mercator) are obtained using GPS. Throughout the nesting and brood-rearing period, researchers attempted to locate female grouse ≥2 times per week.

Relocation coordinates are transferred into a GIS (ArcMap 9.2, ESRI Products, Redlands, CA) for space-use analysis. Kernel density (50, 90, and 95%) is calculated for all radio locations and for each grouse separately (95%). The purpose of using all locations is to estimate area used at the population level. Kernel density is also calculated for brood-rearing females. Kernel calculations are carried out in multiple steps. First, relocation points are weighted to account for biases associated with non-equivalent relocation intervals. Second, robust estimates of smoothing parameters (h) are generated using Animal Space Use 1.3 (Horne and Garton 2009). Last, those parameters are used in Hawth's Tools (ArcMap 9.2) to calculate fixed kernel densities. Kernel density maps are generated based on the estimated densities for 2009 and 2010.

If a grouse is found at the same location during the nesting period, researchers visually determined if a grouse is nesting. Nests are monitored ≥3 times per week until fate is determined. Successful nests are classified as ≥1 chick hatched. Nests are also scored as depredated, partially depredated, or abandoned.

Following nest fate, understory cover is recorded at the nest bowl using a coverboard (Jones 1968), Robel pole (Robel 1970), and digital photography method. Vegetation composition cover is measured at multiple subplots (20 X 50 cm) located ≤25 m of each nests using Daubenmire method (Daubenmire 1959). Canopy cover is measured along two 25-m transects, one 50-m transect, and one 100-m transect extending from the nest bowl every 90°. The orientation of the quadrants is randomized. Shrub species are recorded and measured. Width (cm) and heights (cm) of a random sample of individual shrubs along the line are recorded. These shrub widths are measured within 5, 10, and 25 m from the nest for all four transect lines, within 50 m for two transect lines, and 100 m for one transect line. The purpose of the

different transect lengths is to identify the scale of use for shrub cover within 100 m radius of a nest site.

To identify vegetation factors selected by grouse, defined as the disproportionate use to availability, measurements of vegetation characteristics are compared at nests to those at random points. Thus, the same habitat measurements are conducted at random points to represent available habitat. Evidence for multi-scale selection generating two random points for each nest is evaluated. One point is within 200 m of the nest (dependent) and the other is within the study area (independent). The preliminary results are reported as means (±SE) of vegetation characteristics for random points and nests. However, multiple a priori generalized mixed effects models with a binomial error distribution at multiple spatial scales will be compared for strength of evidence. Researchers will use an information-theoretic approach, including ΔAIC, Akaike's weights, evidence ratios, likelihood-based R2, and likelihood ratio tests to evaluate models. Model averaged parameter estimates will be used to develop resource selection functions.

Following the completion of a successful nest, female grouse with broods are monitored closely by obtaining >2 locations per week. Spotlights are used every 10 days following nest hatch during night hours to count the number of chicks in the brood. Broods are considered unsuccessful if no chicks are found during spotlight surveys. To confirm unsuccessful broods (prevent false negative), females are rechecked within 48 hours. A similar habitat measurement protocol is conducted at brood sites as that at nest sites. However, transects maximum extent is 25 m for broods sites. Canopy cover is measured along three 25 m transects, which extended from the brood location every 120° with random orientation. The width (cm) of each shrub species is measured along the three transect lines within 5, 10, and 25 m from the brood location. Because habitat changes through time and broods are mobile, measurements are collected at each 10-day interval. Differences in vegetation use between night (roosting) and day (foraging) hours are also investigated. These surveys included one day and one night observation of habitat used by broods (within a 24 hour period), as well as, one observation of a random location within 200 m of the brood (dependent) to estimate disproportionate use to availability.

3. Anticipated Beneficial Effects of the Project

Over the course of this monitoring effort (3 years), we will be able to determine certain population characteristics such as seasonal use areas, important movement corridors, and potential connectivity with other adjacent Bi-State DPS sage-grouse populations. In addition, we will be able to estimate vital rates among individual birds such as nest initiation rates, nest survival, adult and juvenile survival rates, brood survival rates and potential differences in mortality between seasons. These data, collected before, during and after implementation of several projects listed in the Bi-State Action Plan, and in the NEPA planning stages, will serve as one mechanism to monitor the overall effectiveness of the proposed habitat enhancement projects.

4. Project Schedule

State Fiscal Year 2018 will be the third year of a planned three year monitoring effort within the Mount Grant and Desert Creek Population Management Units of the Bi-State Sage-grouse Conservation Area. Initial capture work took place during the fall of 2015 with additional efforts in the spring of 2016. Follow up work on radio-marked birds is ongoing and technician follow-up work will conclude in August of 2017. Fall and winter location and mortality monitoring will be conducted using aircraft. Capture and radio-marking of additional birds will take place during the fall of 2017 and the spring of 2018 followed by additional follow-up and vegetative monitoring work during the spring and summer of 2018.

5. Required Clearance Activities and Schedule (NEPA, other permits, authorizations)

6. Monitoring Plan

See above

7. Relationship to NDOW Plans, Policies, and Programs

This project fits within the 1st Edition of the Greater Sage-grouse Conservation Plan for Nevada and Eastern California (2004). The project also assists with objectives outlined in the Bi-State Action Plan (2012).

Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Bi-State Sage-grouse Monitoring within Desert Creek and Mount Grant PMUs**
Name of Proposed Project Manager: **Shawn Espinosa**

Please provide a breakdown of the project's total costs over the life of the project in the table below. If your project is expected to last more than one fiscal year, define the total to be spent during each fiscal year in your response to question XI in the project's proposal form and not in this table. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be included in your cost estimate.

Project Components	*Costs to be Paid by NDOW Special Reserve Account(s)*	*Costs to be Paid by Other Sources*
1. Land Acquisitions		
2. Personnel Costs		
A. NDOW Personnel		
B. Other Personnel	$ 14,187.00	$ 42,563.00
C. Total Personnel Costs	$ 14,187.00	$ 42,563.00
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A. VHF Transmitters (50 @ $225 ea.)	$ 2,812.00	$ 8,438.00
B. Vehicles (2 @ 10,500 per 6 month field season lease)	$ 5,250.00	$ 15,750.00
C. Total Equipment Costs	$ 8,062.00	$ 24,188.00
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Field Housing	$ 250.00	$ 750.00
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 250.00	$ 750.00
7. In-Kind Services		
A.		
B.		
E. Total In-Kind Services	$ -	$ -
Subtotals	$ 22,499.00	$ 67,501.00
Total Project Costs	$	90,000.00

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Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	Columbian Sharp-tailed Grouse Restoration Project
Project Manager:	Shawn Espinosa Phone: 775-688-1523 Email sespinosa@ndow.org
Project Monitor:	Shawn Espinosa Start Date: 7/1/2017
Implementation Lead:	Nevada Department of Wildlife End Date: 6/30/2018
Partners:	Nevada Department of Wildlife, U.S. Geological Service, Newmont Mining Corp., Nevada Chukar Foundation, Carson Valley Chukar Club
Project Category:	Wildlife Population Protection or Enhancement
Project Category:	Species Re-Introduction
Project Actions:	
Priority Resource:	Small game
Priority Species:	Columbian Sharp-tailed Grouse
County Location:	Elko

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Upland Game Stamp	$25,000		
U.S. Geological Service			$22,500
USFWS Wildlife Restoration Grant	$75,000		
Project Totals:	**$100,000**		**$22,500**

Project Proposal

1. Brief Purpose and Goal of the Project

This project is part of an ongoing effort to restore Columbian Sharp-tailed Grouse (CSTG) in northeastern Nevada. CSTG distribution has declined greatly over the last 50-75 years. However, improvements in historic habitats has resulted from enhanced grazing strategies and as more resilient areas recover from wildfire. This project is intended to provide a population "anchor point" from which to establish additional CSTG populations to connect with existing populations in southern Idaho. Requested funding would provide match for the Nevada Department of Wildlife's W-48 grant to capture CSTG for translocation, conduct research and monitoring on the translocated birds and determine the ultimate outcome of the project. This work has been contracted through the USGS – Western Ecological Resource Center and Idaho State University for the past five years.

The goal of this project is to establish a self-sustaining population of CSTG in northeastern Nevada that exhibits long-term persistence. Approval and implementation of this proposal helps assist the Nevada Department of Wildlife's Game Division fulfill objectives stated in the following:
- Nevada Upland Game Species Management Plan (2008);
- Upland Game Release Plan for FY2016-17;
- NDOW's W-48 Federal Assistance Grant (Pittman-Robertson).

The major objective of this project was to place ~250 CSTG within an identified project area (Bull Run/Independence Mountains) located in Elko County over a five-year period with the hopes of establishing self-sustaining populations. This objective has largely been accomplished; however, due to elevated mortality during 2015 and 2016 (which may have been due to several contributing factors including high adult mortality immediately following release and also during winter months, which experienced above average snowpack) an additional two years of female releases are recommended to strengthen the populations' ability to grow.

We are proposing to approach the British Columbia Ministry of Forests, Lands and Natural Resources – Fish and Wildlife Branch for their approval to obtain source stock of CSTG for translocation. Populations of CSTG in British Columbia are strong and widely distributed. In prior years of translocation, our objective was to obtain 35 females and 15 males for translocation; however, with an established population in the Bull Run Basin and the presence of an active lek, we feel a reduced complement of birds and focusing on the release of females (approximately 20-30 each year for two years) would provide enough reproductive capability to achieve a positive population growth rate. To date, a total of 207 grouse (147 females, 60 males) have been released into the Bull Run Basin.

2. Project Approach and Tasks

Our translocations efforts would follow the tasks outlined below and the recommendations established within the Guidelines for the Management of Columbian Sharp-tailed Grouse Population and Their Habitats (Hoffman et al. 2015). The majority of research and monitoring tasks would be implemented by a graduate student and associated wildlife technicians with Idaho State University and USGS staff, who also would be responsible for documenting project results. Assistance with capturing birds for translocation would be made available by Nevada Department of Wildlife personnel.
*Capture approximately 40-60 CSTG over a two-year period consisting of female grouse;
* Capture approximately 20-30 female CSTG for releases in each year beginning in 2018 (year 6) through 2019 (year 7).
Captured grouse should be transported in specially-built boxes with individual compartments designed to house the birds separately and constrain their movements. The bottom of each compartment will be lined with clay cat litter to reduce contact between feces and the bird's feet. The box should be designed so that it can be opened remotely from a distance allowing the birds to walk or fly away without being frightened.
* Due to the distance between the capture area and the release site, birds will likely be flown back to Elko for release the following day by a contracted aerial service provider.
- Outfit approximately 50-75% of translocated females released in the spring with radio transmitters;
- Each translocated bird would have a leg band attached;
- Upon release, the box should be positioned in such a way so as to provide a clear path to escape cover without any obstacles such as fences. Scan the area for raptors prior to release;
- Females would be tracked 2-3 times per week during the nesting period;
- Determine nest initiation dates of each female grouse;
- Identify predators of nests using continuous digital video recording systems from a subset of nests;
- Calculate the kernel home-ranges of female grouse during the nesting season;
- Identify movement patterns during the nesting season;
- Within 48 hours of nest fate, measure multiple microhabitat characteristics at each nest site, including total shrub cover, sagebrush cover, perennial and annual grasses, perennial and annual forbs, vertical cover, and horizontal cover (measured at 5, 10, 25, 50, 100 m from nest site);

* Place four perpendicular transects centered at the nest and record the percent shrub cover for each meter along the transect at scales of 5, 10, 25, 50, 100 m;
* In addition place two 20 X 50 cm Daubenmire plots along each transect and one at the nest center where percent cover is estimated and all plants are measured and keyed as annual or perennial;
* Use three methods (Jones cover board, Robel pole, and a cover ball photography) to estimate vertical and horizontal cover at each point of subplots and at the nest bowl;
• Measure the habitat characteristics (field and GIS) at random points that are spatially dependent and independent from the nest site;
• Conduct multi-scale habitat selection analysis using random and used points;
• Conduct surveys of badgers, ravens and raptors at nesting and random areas throughout the study site;
• Determine nest fate of each female grouse and estimate daily nest survival probabilities;
• Estimate the effects of habitat characteristics and predator abundance on nest survival rates;
• Estimate the effects of grouse age and body condition on nest survival rates;
• Track individual birds by ground or aircraft 2-3 time per week during the brooding period;
• Conduct habitat measurements (field and GIS) at a subsample of brood locations during day and night and dependent random locations for each 10-day interval;
• Calculate 10-day interval brood survival rate;
• Develop and compare brood survival models that include vegetation characteristics as covariates to identify the effects of vegetation factors;
• Use aircraft to identify wintering grounds by locating radio-marked grouse at least once per month;
• Determine monthly survival of radio-marked grouse to determine whether or not grouse experience elevated mortality rates during specific time periods;
• Determine whether or not there are differences between sexes for monthly and annual survival.

3. Anticipated Beneficial Effects of the Project

If successful in accomplishing our long-term goal, this project will assist with expanding CSTG distribution into the historic range of the species. Also, this project could eventually increase sportsmen opportunity and recreational bird watching in northeastern Nevada.

4. Project Schedule

Spring 2018: Capture approximately 20-30 CSTG females from established leks in southern British Columbia during the spring breeding season and translocate them to the Bull Run Basin in Nevada. Conduct follow-up monitoring of approximately 20-30 radio marked females throughout their life cycle.

5. Required Clearance Activities and Schedule (NEPA, other permits, authorizations)

6. Monitoring Plan

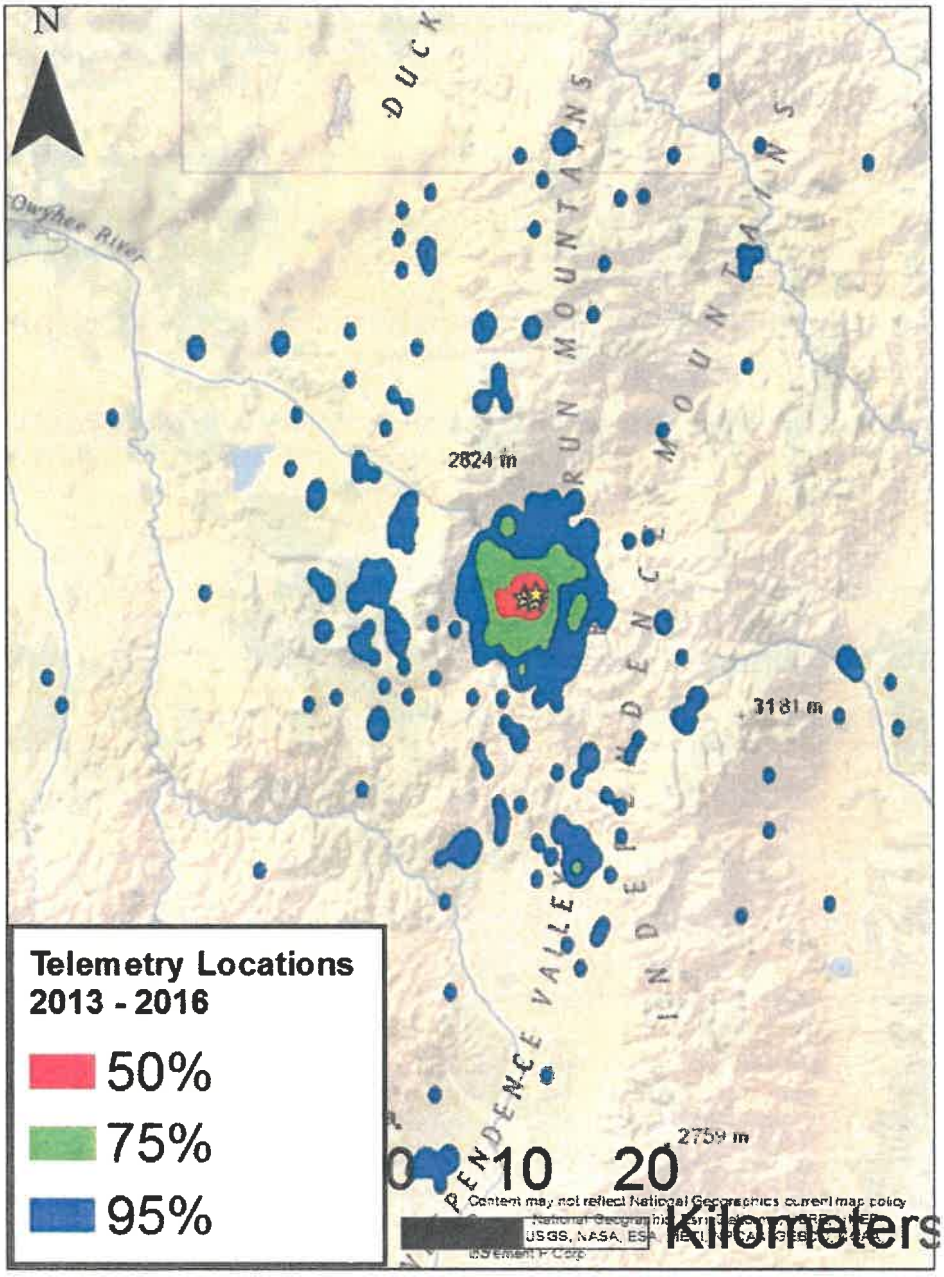
See above.

7. Relationship to NDOW Plans, Policies, and Programs

The following documents were used while developing this proposal:
• Nevada Upland Game Species Management Plan (2008);
• Upland Game Release Plan for FY2016-17;
• NDOW's W-48 Federal Assistance Grants (Pittman-Robertson);
• Data Summary of a Columbian Sharp-tailed Grouse Habitat Suitability Examination between Idaho and Nevada (Coates et al. 2011).
• Guidelines for the Management of Columbian Sharp-tailed Grouse Populations and Their Habitats (Hoffman et al. 2015).

Distribution of Translocated Columbian Sharp-Tailed Grouse – Independence and Bull Run Mountains, Elko County, Nevada

Utilization distribution of translocated Columbian sharp-tailed grouse within the Independence and Bull Run Mountains of Elko County from 2013-2016. Ninety-five percent of all telemetry locations are within the blue area. The majority of birds remain concentrated around the release area which is indicated by the yellow stars.



Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Columbian Sharp-tailed Grouse Restoration**
Name of Proposed Project Manager: **Shawn Espinosa**

Please provide a breakdown of the project's total costs over the life of the project in the table below. If your project is expected to last more than one fiscal year, define the total to be spent during each fiscal year in your response to question XI in the project's proposal form and not in this table. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be included in your cost estimate.

Project Components	*Costs to be Paid by NDOW Special Reserve Account(s)*	*Costs to be Paid by Other Sources*
1. Land Acquisitions		
2. Personnel Costs		
A. NDOW Personnel		
B. Other Personnel	$ 17,625.00	$ 52,875.00
C. Total Personnel Costs	$ 17,625.00	$ 52,875.00
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A. VHF Transmitters (30 @ $225 ea.)	$ 1,687.00	$ 5,063.00
B. Handheld GPS (2 @ $250 ea)	$ 125.00	$ 375.00
C. Total Equipment Costs	$ 1,812.00	$ 5,438.00
5. Materials		
A. Spotlights (4 @ $50 ea.)	$ 50.00	$ 150.00
B.		
C.		
D. Total Materials Costs	$ 50.00	$ 150.00
6. Miscellaneous		
A. Field Housing	$ 250.00	$ 750.00
B. Vehicles (2 @ $10,500/ea. For 6 month field season)	$ 5,250.00	$ 15,750.00
C.		
D.		
F. Total Miscellaneous Costs	$ 5,500.00	$ 16,500.00
7. In-Kind Services		
A. Research Wildlife Biologist (Permanent, 0.2 FTE)		$ 19,250.00
B. Travel		$ 3,300.00
C. Total In-Kind Services	$ -	$ 22,550.00
Subtotals	$ 24,987.00	$ 97,513.00
Total Project Costs	$	122,500.00

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Wildlife Reserve Account Project Proposal

Project Summary

Project Name: Dusky Grouse Ecology and Management in Nevada

Project Manager: Shawn Espinosa Phone: 775-688-1523 Email sespinosa@ndow.org

Project Monitor: Shawn Espinosa Start Date: 7/1/2017

Implementation Lead: Nevada Department of Wildlife End Date: 6/30/2018

Partners: Nevada Department of Wildlife, Utah State University, US Forest Service

Project Category: Wildlife Population Protection or Enhancement

Project Category: Wildlife Monitoring and Research

Project Actions: Click to add..

Priority Resource: Small game

Priority Species: Dusky Grouse

County Location: White Pine

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Upland Game Stamp	$7,500		
USFWS Wildlife Restoration Grant	$81,518		
Utah State University	$19,680		
Project Totals:	**$108,698**		

Project Proposal

1. Brief Purpose and Goal of the Project

Dusky (Dendragapus obscurus) are currently an important upland game resource in Nevada. Blue grouse were recently split into two distinct species; dusky grouse (interior) and sooty grouse (Dendragapus fuliginosus; coastal) (Barrowclough et al. 2004). Both species of blue grouse currently occupy Nevada, with sooty grouse occurring on the western edge of the state in the Sierra Mountain Range and dusky grouse occupying relatively isolated mountain ranges to the east.

The vast majority of past research on blue grouse occurred several decades ago and with the sooty variety. There remains a lack of research-based information on dusky grouse biology and life history, especially the effects of management actions (e.g., hunter harvest, livestock grazing, fire, and timber management) to guide future conservation efforts. Based on the limited knowledge we have, dusky

grouse use multiple vegetation cover types to meet their seasonal needs such as sagebrush (Artemisia spp.), aspen (Populus tremuloides), and conifer areas from low to high elevations in mountainous terrain (Stauffer and Peterson 1985, Pekins et al. 1989). There currently remains a dearth of dusky grouse nesting studies, which could illuminate habitat use and key nest survival factors, although anecdotal information suggests sagebrush may be an important nesting habitat type for dusky grouse (Weber 1975). This lack of ecological information is particularly acute in the isolated populations of central and western Nevada, where habitat types are unique to these mountain ranges with relatively low proportions of aspen and relatively high proportions of mahogany (Cercocarpus spp.) and Limber Pine (Pinus fexilis). Apparently, dusky grouse show some flexibility in habitat use based on their wide range across the forested landscapes of the Intermountain West.

Dusky grouse are known to exhibit 'reverse migration' moving up in elevation to winter exclusively in conifer forests (Cade 1985, Stauffer and Peterson 1985, Cade and Hoffman 1990, Pekins et al. 1991, Cade and Hoffman 1993). For other forest grouse species, such as ruffed and spruce grouse (Falcipennis canadensis), winter diets and use areas are influenced by secondary plant compounds in aspen and spruce trees, respectively (Bryant and Kuropat 1980, Hewitt and Messmer 2000). These relationships are currently unknown for dusky grouse.

There is a paucity of life history and population trend information on dusky grouse throughout their range, and particularly in Nevada, leaving the species vulnerable to critique if/when future conservation concerns arise. For example, greater sage-grouse (Centrocercus urophasianus) populations currently have an abundance of data-based information because of past collaborative monitoring and research efforts. These data have been critical to current conservation efforts for sage-grouse in Nevada, and across their range. Our proposed research herein would provide an initial step to gaining a scientific knowledge base for future management (e.g., harvest, population monitoring, habitat management etc.) of dusky grouse in Nevada.

We are proposing a 4-year project, 3 field seasons and a year of analysis, focused on the highest priority conservation information needs of the Nevada Department of Wildlife (NDOW) concerning dusky grouse. Needed information includes, but may not be limited to, harvest rates, population monitoring, survival and reproductive rates, and habitat selection. Within habitat selection, NDOW is particularly interested in use of limber pine and sub-alpine fir (Abies lasiocarpa) habitats during the winter in relation to beetle kill, and overall use of mountain mahogany.

Our goal for this research project is the long-term conservation of dusky and ruffed grouse populations through increased knowledge of both species.
Our specific objectives for this first phase 2-year study are:
• Survival, Reproductive, and Harvest Rates – determine life stage annual and seasonal survival rates, including harvest rate during the fall hunting season, and female reproductive (i.e., nest initiation, clutch size, nest success, and brood success) rates of dusky grouse for radio-marked and banded dusky grouse and assess environmental factors that affect these vital rates.
• Population Surveys - develop a rigorous protocol to index breeding populations of dusky grouse and use male display location information to help characterize breeding habitats.
• Habitat Selection – utilize location data of individually radio-marked dusky grouse to perform resource selection functions (RSFs) to characterize annual and seasonal habitat use. Specifically, to assess use of limber pine sub-alpine fir habitats during winter months and year-round use of mountain mahogany habitats. We will also characterize micro-habitats (within 50 m) for nest and brood locations.

2. Project Approach and Tasks

Survival, Reproductive, and Harvest Rates – we will use walk-in traps and noose poles to catch, band (aluminum leg bands), and release dusky grouse throughout the spring, summer, and early fall (Zwickle and Bendell 1967, Schroeder 1986, Pelren and Crawford 1995). Dogs will be used to help locate dusky grouse for trapping efforts (Dahlgren et al. 2012). We expect to radio-mark and maintain a sample of approximately 30 female dusky grouse. We will use GPS rump-mount style radios (Ecotone -

http://www.ecotone-telemetry.com; Harrier L and M models) that employ store-on-board location data logger and UHF long range remote download. A small 3.5 gram VHF radio will be attached to the GPS radio to help track individual dusky grouse to perform remote downloads. Once our radio sample is exhausted we will continue to trap dusky grouse and mark them with an aluminum leg band. All captured male dusky grouse will be banded with an aluminum leg band. We will use standard modeling (e.g., program RMARK) to estimate seasonal and annual survival. We will track females to nest and brood sites to estimate reproductive rates. Nest and brood success will be defined as 1 or more egg or chick hatching or surviving to > 35 days. Although we will attempt to estimate harvest based on hunter band returns, it will likely take more than three years of data to estimate harvest rate. Band recovery rates will need to be adjusted for pre-season mortality rates, crippling loss, and non-reported bands (see example in DeStefano and Rusch 1986). We will use the multiple-recapture method to estimate pre-hunting season survival (Seber 1973). Having a radio-marked sample may also help us understand factors that may influence harvest rate, such documenting the annual variation in onset of fall migration (see Appendix A; Mussehl 1960). Crippling loss will be estimated with radio-marked sample if available, or assumed from reported literature of other grouse species. Non-reporting rates for bands will be assumed from available game bird literature.

Population Surveys - we will use past research and our own experience to develop spring breeding surveys to index population change. Currently, there are no published methods or guidelines for dusky grouse population surveys. We will establish breeding season walking and roadside routes in several locations across the study area. Hierarchical modeling procedures which incorporate occupancy and abundance estimates will be our primary breeding season index. Points along routes will be established and detection of male dusky grouse will occur in three 5 minute consecutive intervals. We will also employ female electronic calls following the 15 minute sampling interval to increase detection rates of dusky grouse males. These methods allow for occupancy estimates which provide detection probabilities and then counts of each species will provide the abundance information (Alldredge et al. 2007). We will conduct a power analysis following data collection to better understand the effort needed to obtain reliable information for each survey type (Steidl et al. 1997). Protocols will be reassessed over time based on our findings.

Habitat Selection – we will use radio-marked and non-marked grouse flush locations to assess seasonal habitat characteristics. We will use standard techniques to assess tree cover, shrub cover, herbaceous cover, and other ground cover characteristics to assess micro-site information for brood and nest sites. We will use GPS location data and spatial vegetation cover data to conduct RSF analysis to determine general (2nd order) and seasonal habitat (3rd order) use at the landscape scale. We will ensure that analyses include Limber Pine, Sub-Alpine Fir, other conifers, aspen, sagebrush, and mountain shrub communities, including mountain mahogany, are included in the analysis.
We will use the "Guidelines to the use of Wild Birds in Research" for this research project (Fair et al. 2010). We will work through USU's Institutional Animal Care and Use Committee (IACUC) to obtain an IACUC permit for all trapping, handling, and field research activities. This study will begin April 2018 and continue through June 2021. We anticipate developing a capture and banding database for dusky grouse. We will also develop a monitoring database for both spring breeding and late summer surveys. All databases will be housed at Utah State University but shared openly with NDOW Upland Game Program Managers.

3. Anticipated Beneficial Effects of the Project

Gaining a better understanding of dusky grouse demographic parameters and habitat use will help resource managers potentially improve habitat conditions through management actions or projects. Noticeable limber pine and sub-alpine fir die-offs have occurred in several central and eastern Nevada mountain ranges and we need to gain a better understanding of whether or not this is contributing to mortality during the winter months, when the dusky grouse diet relies on pine needles, or if grouse are able to use other resources such as mountain mahogany to supplement their diet. If pine and fir die offs are contributing to elevated mortality levels in dusky grouse, perhaps actions such as limber pine plantings in key locations would provide habitat in future years.

4. Project Schedule

We will begin trapping grouse April 2018. We will hire a graduate student to begin January 2018. Breeding surveys will be conducted from mid to late April and continue through early June in 2018, 2019, and 2020. Trapping efforts will continue throughout the field season from April to September (2018-2020). Marked grouse will be monitored during the spring and summer field seasons. Aerial (fixed-wing or helicopter) monitoring of radio-marked birds will occur regularly during the fall and winter and periodically through the spring and summer, especially when ground tracking fails to keep track of radio-marked birds. Bands will be collected throughout the 2018, 2019, and 2020 dusky grouse hunting seasons. Data analysis and writing will be conducted from September 2020 to June 2021. The graduate student will complete and defend their dissertation by June 30, 2021.

5. Required Clearance Activities and Schedule (NEPA, other permits, authorizations)

6. Monitoring Plan

See above.

7. Relationship to NDOW Plans, Policies, and Programs

This project was identified as a population management need identified in the 2008 Nevada Upland Game Species Management Plan.

Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Dusky Grouse Ecology and Management in Nevada**
Name of Proposed Project Manager: **Shawn Espinosa**

Please provide a breakdown of the project's total costs over the life of the project in the table below. If your project is expected to last more than one fiscal year, define the total to be spent during each fiscal year in your response to question XI in the project's proposal form and not in this table. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be included in your cost estimate.

Project Components	*Costs to be Paid by NDOW Special Reserve Account(s)*	*Costs to be Paid by Other Sources*
1. Land Acquisitions		
2. Personnel Costs		
A. NDOW Personnel		
B. Other Personnel	$ 980.28	$ 38,491.00
C. Total Personnel Costs	$ 980.28	$ 38,491.00
3. Travel Costs		
A. Per Diem	$ 250.00	$ 750.00
B. Mileage		
C. Total Travel Costs	$ 250.00	$ 750.00
4. Equipment		
A. GPS Radio Transmitters (28 units @ $1,367 ea.)	$ 1,186.56	$ 44,940.00
B. Data Download Station (2 @ $1,258)	$ 629.00	$ 1,887.00
C. Telemetry Gear (receivers/antenna)	$ 1,000.00	$ 3,000.00
D. Tablet/GPS Handheld Units	$ 150.00	$ 450.00
E. Total Equipment Costs	$ 2,965.56	$ 50,277.00
5. Materials		
A. Trapping and other Materials	$ 1,059.28	$ 4,940.72
B.		
C.		
D. Total Materials Costs	$ 1,059.28	$ 4,940.72
6. Miscellaneous		
A. Vehicle Rental Fee (3 months @ $1,200 per)	$ 900.00	$ 2,700.00
B. ATV Monthly Fee (9 months @ $250)	$ 562.50	$ 1,687.50
C. Telemetry Flights	$ 400.00	$ 1,200.00
D. Field Housing	$ 375.00	$ 1,125.00
F. Total Miscellaneous Costs	$ 2,237.50	$ 6,712.50
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 7,492.62	$ 101,171.22
Total Project Costs	$	108,663.84

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Wildlife Reserve Account Project Proposal

Project Summary

Project Name: Effects of Pinyon and Juniper Removal on Sage-grouse in Southeastern Nevada

Project Manager: Shawn Espinosa Phone: 775-688-1523 Email sespinosa@ndow.org

Project Monitor: Shawn Espinosa Start Date: 7/1/2017

Implementation Lead: Nevada Department of Wildlife End Date: 6/30/2018

Partners: Bureau of Land Management, Nevada Department of Wildlife, Utah State University

Project Category: Wildlife Population Protection or Enhancement

Project Category: Wildlife Monitoring and Research

Project Actions:

Priority Resource: Small game

Priority Species: Sage grouse

County Location: Lincoln

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Upland Game Stamp	$10,000		
USFWS Wildlife Restoration Grant	$30,000		
Project Totals:	**$40,000**		

Project Proposal

1. Brief Purpose and Goal of the Project

The Nevada Department of Wildlife (NDOW) and the Bureau of Land Management – Ely District (BLM) are partnering on a Greater Sage-grouse (hereafter referred to as "sage-grouse") monitoring project to determine the efficacy of various vegetative treatments, particularly pinyon and juniper removal, on small to moderately sized sage-grouse populations within portions of Lincoln and southern White Pine County (see the attached map). Population level impacts to sage-grouse can occur at very low levels of conifer encroachment, whereas no sage-grouse leks remained active when conifer canopy exceeded 4% (Baruch-Murdo et al. 2013).

The BLM and NDOW, along with various other partners including private landowners, are working to address this issue throughout Sage-grouse Management Zone III within south-central Nevada and

southern Utah. Sage-grouse monitoring work is currently ongoing in southern Utah in the Skutempah, Dog Valley and Hamlin Valley areas by Dr. Nicki Frey with Utah State University. We have expanded upon her ongoing efforts by including study sites in Lincoln and southern White Pine Counties. Some of Dr. Frey's monitoring work in southern Utah has taken place in Nevada as Hamlin Valley is virtually bisected between Nevada and Utah and sage-grouse use habitats in both states. This monitoring effort is expected to span a three year period beginning in State Fiscal Year (SFY) 2016 and conclude in SFY 2018.

The project objectives are as follows: Capture and GPS satellite PTT mark up to 15 female sage-grouse initially at each study site (South Cave Valley and Hamlin/Table Mountain) and maintain that approximate sample size over the course of the 3-year study; Dropped transmitters will be refurbished (if possible) and redeployed during the second and third breeding season. Capture and band any male sage-grouse encountered during trapping efforts;

2. Project Approach and Tasks

Periodically download and categorize data obtained from GPS satellite PTT transmitters;
- Determine approximate nest initiation dates of each female grouse;
- Identify movement patterns during the nesting season;
- Determine nest fate of each female grouse and estimate daily nest survival probabilities;
- Estimate the effects of environmental characteristics on nest survival rates;
- Calculate kernel home-ranges of female grouse during the nesting season;
- Identify specific use areas during the brooding period;
- Conduct brood counts every 10-d interval through the brood-rearing period to document brood success. Broods with no chicks will be scored unsuccessful and confirmed within 48-hours;
- Calculate 10-day interval brood survival rate;
- Identify late-fall feeding area for congregated broods;
- Estimate differences between male and female (with broods) departure dates to wintering areas;
- Identify wintering grounds and attempt to develop a winter seasonal habitat map;
- Calculate Brownian bridge movement path models to identify corridors between seasonal use areas;
- Calculate seasonal and annual survival rates and identify differences between sexes.

Habitat Measurements and Analyses
- Within 48 hours of nest fate, measure multiple microhabitat characteristics at each nest site, including total shrub cover, sagebrush cover, perennial and annual grasses, perennial and annual forbs, vertical cover, and horizontal cover (measured at 5, 10, 25, 50, 100 m from nest site);
- Place four perpendicular transects centered at the nest and record the percent shrub cover for each meter along the transect at scales of 5, 10, 25 m;
- In addition, place two 20 X 50 cm Daubenmire plots along each transect and one at the nest center where percent cover is estimated and all plants are measured and keyed as annual or perennial;
- Use three methods, including Jones cover, board to estimate vertical and horizontal cover at each point of subplots and at the nest bowl;
- Conduct multiple measurements to quantify the amount of conifers within the nesting area (Monitor study site);
- Use maps of vegetation types derived from remote sensing data in a Geographical Information System (GIS) to measure habitat characteristics at larger spatial scales;
- Measure the habitat characteristics (field and GIS) at random points that are spatially dependent and independent from the nest site;
- Develop a cover class layer of conifers using 1-m resolution NAIP and NDVI data (Monitor study site);
- Conduct multi-scale habitat selection analysis using random and used points;
- Estimate the effects of grouse age and body condition on nest survival rates;
- Conduct habitat measurements (field and GIS) at a subsample of brood locations dependent random locations for each 10-day interval;
- Develop and compare brood survival models that include vegetation characteristics as covariates to identify the effects of vegetation factors;

3. Anticipated Beneficial Effects of the Project

This project will help understand sage-grouse habitat use associated with several vegetation treatments that either have been conducted or are being implemented within each of these study sites. Pinyon and juniper treatments have been implemented in portions of Hamlin Valley and the Atlanta Road area as well as Cave Valley in the vicinity of Patterson Pass.

The long-term benefits of pinyon and juniper removal for sage-grouse continue to be explored throughout the west and further monitoring assists with project justification. Aside from habitat use, we also gain an understanding of survival and reproductive capabilities of birds associated with these treatments which can also help with validating these projects.

4. Project Schedule

This project is proposed for a three year monitoring period. The initial year of capture and monitoring work began in SFY 2016 and will conclude in SFY 2018.

5. Required Clearance Activities and Schedule (NEPA, other permits, authorizations)

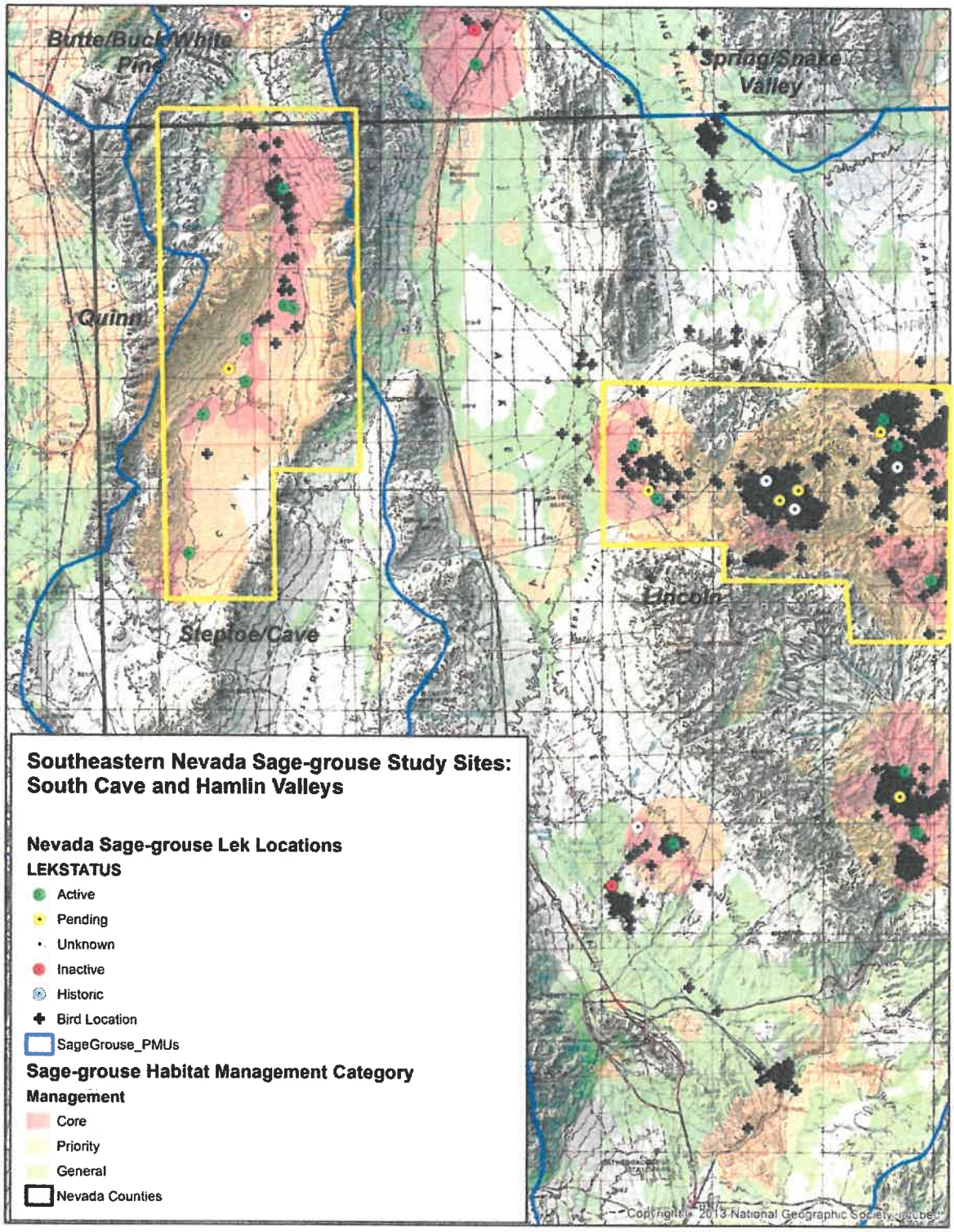
6. Monitoring Plan

See above.

7. Relationship to NDOW Plans, Policies, and Programs

This project fits within the 1st Edition of the Greater Sage-grouse Conservation Plan for Nevada and Eastern California (2004).

Southeastern Nevada (South Cave and Hamlin Valleys) General Study Areas



Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Monitoring Effects of Pinyon and Juniper Removal in Southeastern Nevada**

Name of Proposed Project Manager: **Shawn Espinosa**

Please provide a breakdown of the project's total costs over the life of the project in the table below. If your project is expected to last more than one fiscal year, define the total to be spent during each fiscal year in your response to question XI in the project's proposal form and not in this table. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be included in your cost estimate.

Project Components	*Costs to be Paid by NDOW Special Reserve Account(s)*	*Costs to be Paid by Other Sources*
1. Land Acquisitions		
2. Personnel Costs		
A. NDOW Personnel		
B. Other Personnel	$ 7,250.00	$ 21,750.00
C. Total Personnel Costs	$ 7,250.00	$ 21,750.00
3. Travel Costs		
A. Per Diem	$ 500.00	$ 1,500.00
B. Mileage	$ 1,750.00	$ 5,250.00
C. Total Travel Costs	$ 2,250.00	$ 6,750.00
4. Equipment		
A.		
B.		
C. Total Equipment Costs	$ -	$ -
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Field Housing	$ 500.00	$ 1,500.00
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 500.00	$ 1,500.00
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 10,000.00	$ 30,000.00
Total Project Costs	$	40,000.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	Effects of Vegetation Treatments on Sage-grouse in the Desatoya Mountains
Project Manager:	Shawn Espinosa Phone: 775-688-1523 Email sespinosa@ndow.org
Project Monitor:	Shawn Espinosa Start Date: 7/1/2017
Implementation Lead:	Nevada Department of Wildlife End Date: 6/30/2018
Partners:	Nevada Department of Wildlife, Bureau of Land Management, U.S. Geological Service, Nevada Chukar Foundation
Project Category:	Wildlife Population Protection or Enhancement
Project Category:	Wildlife Monitoring and Research
Project Actions:	Click to add..
Priority Resource:	Small game
Priority Species:	Sage grouse
County Location:	Churchill, Lander

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Upland Game Stamp	$15,000		
U.S. Geological Service			$19,842
USFWS Wildlife Restoration Grant	$45,000		
Project Totals:	**$60,000**		**$19,842**

Project Proposal

1. Brief Purpose and Goal of the Project

Cooperative efforts are underway to improve habitat conditions in the Desatoya Range located in central Nevada (Churchill/Lander County border; see the attached map). The Bureau of Land Management, Smith Creek Ranch, Nevada Department of Wildlife and Natural Resources Conservation Service are all engaged in supporting various habitat and management related projects for vegetative and wildlife health. To better understand the effectiveness of these projects, we have been actively monitoring the sage-grouse population within the Desatoya Range for the last three years. As habitat related projects are implemented, it is important to continue monitoring sage-grouse habitat usage and vital rates to determine the ultimate effects to the species.

Measuring how intended landscape improvement projects ultimately affect target species such as sage-grouse is critically important with respect to adaptive management. Information gained from this project will not only identify important seasonal use areas, movement and potential connectivity corridors to other adjacent populations of sage-grouse, but also help understand the response to various treatments or management actions including pinyon/juniper removal, meadow enhancement and wild horse removal.

Being that the primary purpose of the proposed action is to improve availability, quantity, and quality of sage-grouse habitat, in particular late brood rearing habitat that is dependent upon springs/wet meadows that support abundant and diverse forb and insect populations, continued monitoring of the sage-grouse population within this area will ultimately be the measure of success, failure or neutral effect of the overall project.

This project is intended to better understand habitat utilization, identify key habitats and determine movement patterns of sage-grouse between these areas and determine vital rates within the Desatoya Population Management Unit. The greatest threat to this population of sage-grouse is pinyon and juniper encroachment and the degradation of small meadows and spring complexes that serve as late brood rearing habitat.

Research efforts are expected to lead to the identification of factors limiting this population and habitat associations including:

1. Capture/maintain approximately 20-30 female sage-grouse marked with VHF radio transmitters per year;
2. Capture at least 10 female sage-grouse and place GPS/Satellite transmitters to determine seasonal movement patterns and determine home range;

This work will assist with determining the following:
a) identification of nest sites and nest initiation rates;
b) examination of nest-site vegetative characteristics and if differences exist between successful and unsuccessful nest sites;
c) determination of nest survival rates;
d) determination of survival rates of adults and juveniles (both male and female); and
e) determination of differences of seasonal survival rates

2. Project Approach and Tasks

Portable receivers (Communication Specialist Inc., Orange, CA; Advanced Telemetry Systems Inc., Isanti, MN) are used along with 3-element Yagi antennas to monitor radio-marked grouse. Relocation error is minimized by circling around each grouse 30 – 50 m. Using the approximated distance and a compass bearing, the location coordinates (Universal Transverse Mercator) are obtained using GPS. Throughout the nesting and brood-rearing period, researchers attempted to locate female grouse ≥2 times per week.

Relocation coordinates are transferred into a GIS (ArcMap 9.2, ESRI Products, Redlands, CA) for space-use analysis. Kernel density (50, 90, and 95%) is calculated for all radio locations and for each grouse separately (95%). The purpose of using all locations is to estimate area used at the population level. Kernel density is also calculated for brood-rearing females. Kernel calculations are carried out in multiple steps. First, relocation points are weighted to account for biases associated with non-equivalent relocation intervals. Second, robust estimates of smoothing parameters (h) are generated using Animal Space Use 1.3 (Horne and Garton 2009). Last, those parameters are used in Hawth's Tools (ArcMap 9.2) to calculate fixed kernel densities. Kernel density maps are generated based on the estimated densities for 2009 and 2010.

If a grouse is found at the same location during the nesting period, researchers visually determined if a

grouse is nesting. Nests are monitored ≥3 times per week until fate is determined. Successful nests are classified as ≥1 chick hatched. Nests are also scored as depredated, partially depredated, or abandoned.

Following nest fate, understory cover is recorded at the nest bowl using a coverboard (Jones 1968), Robel pole (Robel 1970), and digital photography method. Vegetation composition cover is measured at multiple subplots (20 X 50 cm) located ≤25 m of each nests using Daubenmire method (Daubenmire 1959). Canopy cover is measured along two 25-m transects, one 50-m transect, and one 100-m transect extending from the nest bowl every 90°. The orientation of the quadrants is randomized. Shrub species are recorded and measured. Width (cm) and heights (cm) of a random sample of individual shrubs along the line are recorded. These shrub widths are measured within 5, 10, and 25 m from the nest for all four transect lines, within 50 m for two transect lines, and 100 m for one transect line. The purpose of the different transect lengths is to identify the scale of use for shrub cover within 100 m radius of a nest site.

To identify vegetation factors selected by grouse, defined as the disproportionate use to availability, measurements of vegetation characteristics are compared at nests to those at random points. Thus, the same habitat measurements are conducted at random points to represent available habitat. Evidence for multi-scale selection generating two random points for each nest is evaluated. One point is within 200 m of the nest (dependent) and the other is within the study area (independent). The preliminary results are reported as means (±SE) of vegetation characteristics for random points and nests. However, multiple a priori generalized mixed effects models with a binomial error distribution at multiple spatial scales will be compared for strength of evidence. Researchers will use an information-theoretic approach, including ΔAIC, Akaike's weights, evidence ratios, likelihood-based R2, and likelihood ratio tests to evaluate models. Model averaged parameter estimates will be used to develop resource selection functions.

Following the completion of a successful nest, female grouse with broods are monitored closely by obtaining >2 locations per week. Spotlights are used every 10 days following nest hatch during night hours to count the number of chicks in the brood. Broods are considered unsuccessful if no chicks are found during spotlight surveys. To confirm unsuccessful broods (prevent false negative), females are rechecked within 48 hours. A similar habitat measurement protocol is conducted at brood sites as that at nest sites. However, transects maximum extent is 25 m for broods sites. Canopy cover is measured along three 25 m transects, which extended from the brood location every 120° with random orientation. The width (cm) of each shrub species is measured along the three transect lines within 5, 10, and 25 m from the brood location. Because habitat changes through time and broods are mobile, measurements are collected at each 10-day interval. Differences in vegetation use between night (roosting) and day (foraging) hours are also investigated. These surveys included one day and one night observation of habitat used by broods (within a 24 hour period), as well as, one observation of a random location within 200 m of the brood (dependent) to estimate disproportionate use to availability.

3. Anticipated Beneficial Effects of the Project

This project will help understand sage-grouse habitat utilization prior to and during a landscape scale project that the Bureau of Land Management is conducting in the Desatoya Range of central Nevada. There are several collaborators on the project including, but not limited to, the Nevada Department of Wildlife, the U.S. Fish and Wildlife Service and the Smith Creek Ranch. The BLM project area is approximately 230,000 acres within the Porter Canyon and Edwards Creek grazing allotments. There are 192,700 acres of the Desatoya sage-grouse Population Management Unit (PMU) and 34,195 acres of the Desatoya Wilderness Study Area within the project area.

Approximately 30,000 acres of various treatments are proposed within the project area. While the project's primary focus is to enhance sage-grouse habitat, multiple wildlife species dependent upon healthy forests and sagebrush communities will benefit. Treatments will include piñon/juniper removal and thinning, wet meadow and spring rehabilitation/protection, potential rabbitbrush control using herbicide treatment and seeding, and excess wild horse removal. It will be important to monitor sage-grouse movement and demographic parameters before, during and after project implementation.

4. Project Schedule

Initial capture efforts were conducted in early fall of 2013 and re-commenced during the spring months of 2014. Follow-up of radio marked individuals has taken place each year since the inception of the project. More intensive monitoring has occurred during the spring breeding period through late brood rearing (August/September). During the late fall and winter months, follow-up monitoring has been conducted using a contracted fixed-wing aircraft to monitor locations and mortality. State fiscal year 2018 will be the fifth year of this monitoring effort.

5. Required Clearance Activities and Schedule (NEPA, other permits, authorizations)

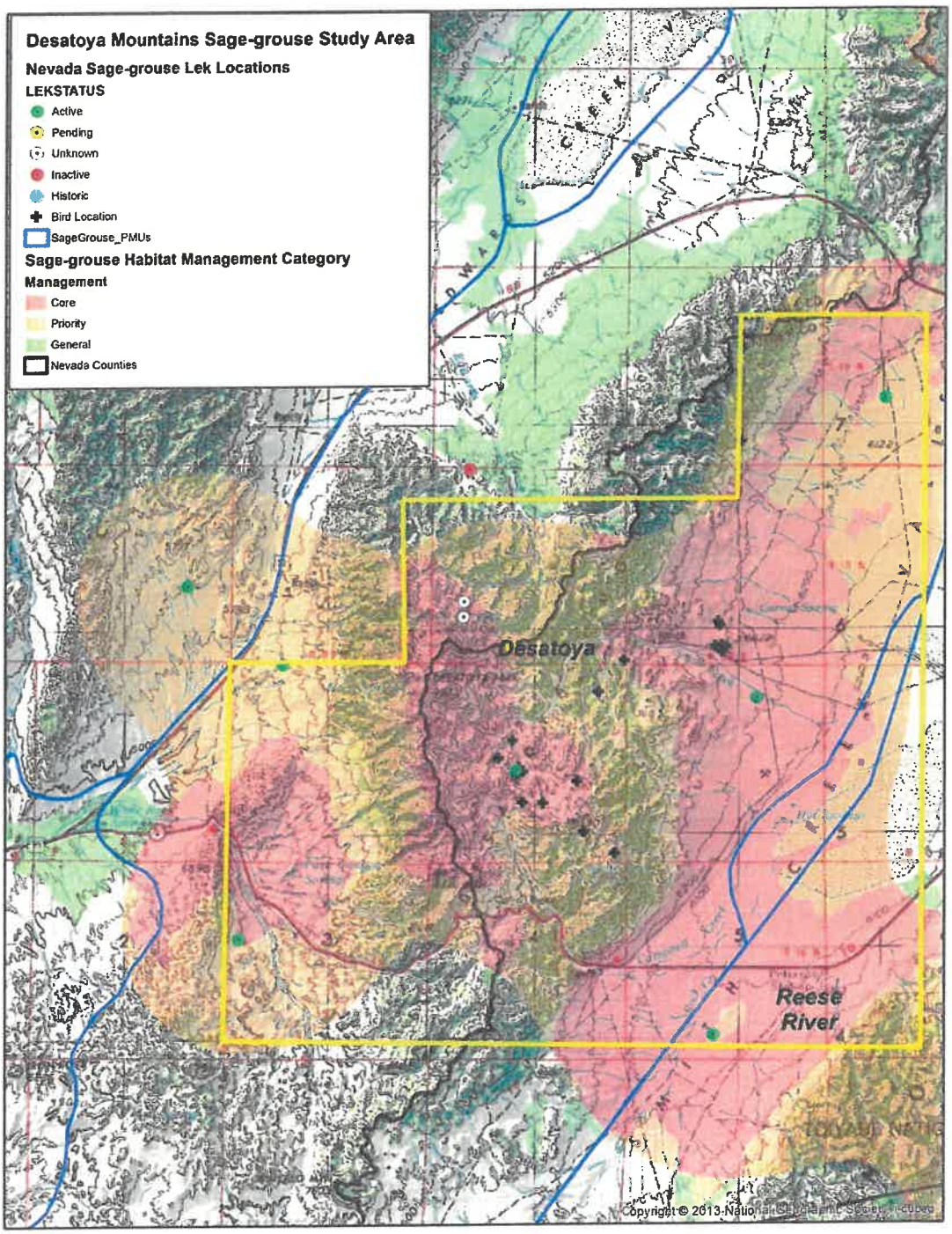
6. Monitoring Plan

See above.

7. Relationship to NDOW Plans, Policies, and Programs

This project fits within the 1st Edition of the Greater Sage-grouse Conservation Plan for Nevada and Eastern California (2004).

Desatoya Range Sage-Grouse Study Area



Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Desatoya Greater Sage-grouse Research and Monitoring**

Name of Proposed Project Manager: **Shawn Espinosa**

Please provide a breakdown of the project's total costs over the life of the project in the table below. If your project is expected to last more than one fiscal year, define the total to be spent during each fiscal year in your response to question XI in the project's proposal form and not in this table. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be included in your cost estimate.

Project Components	*Costs to be Paid by NDOW Special Reserve Account(s)*	*Costs to be Paid by Other Sources*
1. Land Acquisitions		
2. Personnel Costs		
A. NDOW Personnel		
B. Other Personnel	$ 7,812.00	$ 23,438.00
C. Total Personnel Costs	$ 7,812.00	$ 23,438.00
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A. VHF Transmitters (30 @ $225 ea.)	$ 1,687.00	$ 5,063.00
B. Vehicles (2 @ 10,500 per 6 month field season lease)	$ 5,250.00	$ 15,750.00
C. Total Equipment Costs	$ 6,937.00	$ 20,813.00
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Field Housing	$ 250.00	$ 750.00
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 250.00	$ 750.00
7. In-Kind Services		
A. USGS Research Wildlife Biologist (Permanent, 0.1 FTE)		$ 6,417.00
B. USGS Wildlife Biologist (Term, 0.1 FTE)		$4,925.00
C. Travel (Per diem)		$1,500.00
D. Additional equipment (Radio receivers, antennas, capture and banding supplies, etc.)		$7,000.00
E. Total In-Kind Services	$ -	$ 19,842.00
Subtotals	$ 14,999.00	$ 64,843.00
Total Project Costs	$	79,842.00

nevada department of WILDLIFE

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	Greater Sage-grouse Control Site Research and Monitoring
Project Manager:	Shawn Espinosa Phone: 775-688-1523 Email sespinosa@ndow.org
Project Monitor:	Shawn Espinosa
Implementation Lead:	Nevada Department of Wildlife
Partners:	Nevada Department of Wildlife
Project Category:	Wildlife Population Protection or Enhancement
Project Category:	Wildlife Monitoring and Research
Project Actions:	
Priority Resource:	Small game
Priority Species:	Sage grouse
County Location:	Nye

Start Date: 7/1/2017

End Date: 6/30/2018

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Upland Game Stamp	$22,494		
U.S. Geological Service			$22,684
USFWS Wildlife Restoration Grant	$67,481		
Project Totals:	**$89,975**		**$22,684**

Project Proposal

1. Brief Purpose and Goal of the Project

Much of the recent research that has been conducted on Greater sage-grouse in Nevada has been in response to some form of anthropogenic perturbation such as the development of utility scale transmission lines, geothermal energy facilities or mine development. Some of these developments have offered a classic Before, After, Control, Impact (BACI) study design, but many have not. In order to better understand how sage-grouse are responding to anthropogenic disturbances and habitats that are in less than desirable condition, we feel that it is important to gain a more comprehensive knowledge base of demographic parameters and habitat use in areas that are considered in relatively good ecological condition, free from anthropogenic structures (utility scale) and associated noise, and offer contiguous habitat (large, uninterrupted blocks).

This project is intended to determine key demographic parameters and gain a better understanding of habitat utilization and movement patterns within otherwise healthy and un-fragmented sagebrush habitats. Areas that have been selected for research and monitoring generally contain a diverse array of sagebrush species and mountain shrub community with an understory of perennial grasses and forbs. Additionally, little in the way of anthropogenic development has been realized in these areas. Research efforts are expected to lead to the identification of habitat associations and estimation of vital rates over a period of three years.

The following describes the objectives and demographic parameters for the project:

1. Capture approximately 25-30 female sage-grouse and place VHF radio transmitters and leg bands on the birds at each study site. At a minimum, maintain that number of radio marked females annually;
2. Capture at least 5 female sage-grouse and place GPS/Satellite transmitters to determine seasonal movement patterns and determine home range at each study site;

This work will assist with determining the following:
a) determination of survival rates of adults and juveniles (both male and female); and
b) identification of nest sites and nest initiation rates;
c) determination of nest survival rates;
d) examination of nest-site vegetative characteristics and if differences exist between successful and unsuccessful nest sites;
e) determination of differences of seasonal survival rates; and
f) understand and map movement patterns, seasonal distribution and key habitats.

2. Project Approach and Tasks

Field work for this project will be conducted by the USGS Western Ecological Research Center in Dixon, California. Match funding for this project is being provided by the Nevada Upland Game Stamp program ($22,500) and the Ruby Pipeline Mitigation Fund ($22,500), allowing for the expenditure of $135,000 of WSFR-PR funds for a total project cost of $180,000.

Radio-Telemetry. We are proposing to capture approximately 20-30 female and up to 10 male sage-grouse annually over a three year period and maintain at least 20 live females during each reproductive season. Sage grouse movement, survivorship, and reproduction will be monitored following release. Portable receivers (Communication Specialist Inc., Orange, CA; Advanced Telemetry Systems Inc., Isanti, MN) will be used along with 3-element Yagi antennas to monitor radio-marked grouse. Relocation error is minimized by circling around each grouse 30 – 50 m. Using the approximated distance and a compass bearing, the location coordinates (Universal Transverse Mercator) are obtained using GPS. Throughout the nesting and brood-rearing period, researchers attempted to locate female grouse ≥2 times per week.

Space-Use. Relocation coordinates will be transferred into a GIS (ArcMap 9.2, ESRI Products, Redlands, CA) for space-use analysis. Kernel density (50, 90, and 95%) is calculated for all radio locations and for each grouse separately (95%). The purpose of using all locations is to estimate area used at the population level. Kernel density is also calculated for brood-rearing females. Kernel calculations are carried out in multiple steps. First, relocation points are weighted to account for biases associated with non-equivalent relocation intervals. Second, robust estimates of smoothing parameters (h) are generated using Animal Space Use 1.3 (Horne and Garton 2009). Last, those parameters are used in Hawth's Tools (ArcMap 9.2) to calculate fixed kernel densities. Kernel density maps are generated based on the estimated densities for 2009 and 2010.

Nests and vegetation. If a grouse is found at the same location during the nesting period, researchers visually determined if a grouse is nesting. Nests are monitored ≥3 times per week until fate is determined. Successful nests are classified as ≥1 chick hatched. Nests are also scored as depredated, partially depredated, or abandoned.

Following nest fate, understory cover is recorded at the nest bowl using a coverboard (Jones 1968), Robel pole (Robel 1970), and digital photography method. Vegetation composition cover is measured at multiple subplots (20 X 50 cm) located ≤25 m of each nests using Daubenmire method (Daubenmire 1959). Canopy cover is measured along two 25-m transects, one 50-m transect, and one 100-m transect extending from the nest bowl every 90°. The orientation of the quadrants is randomized. Shrub species are recorded and measured. Width (cm) and heights (cm) of a random sample of individual shrubs along the line are recorded. These shrub widths are measured within 5, 10, and 25 m from the nest for all four transect lines, within 50 m for two transect lines, and 100 m for one transect line. The purpose of the different transect lengths is to identify the scale of use for shrub cover within 100 m radius of a nest site.

To identify vegetation factors selected by grouse, defined as the disproportionate use to availability, measurements of vegetation characteristics are compared at nests to those at random points. Thus, the same habitat measurements are conducted at random points to represent available habitat. Evidence for multi-scale selection generating two random points for each nest is evaluated. One point is within 200 m of the nest (dependent) and the other is within the study area (independent). The preliminary results are reported as means (±SE) of vegetation characteristics for random points and nests. However, multiple a priori generalized mixed effects models with a binomial error distribution at multiple spatial scales will be compared for strength of evidence. Researchers will use an information-theoretic approach, including ΔAIC, Akaike's weights, evidence ratios, likelihood-based R2, and likelihood ratio tests to evaluate models. Model averaged parameter estimates will be used to develop resource selection functions.

Brood-rearing and vegetation. Following the completion of a successful nest, female grouse with broods are monitored closely by obtaining >2 locations per week. Spotlights are used every 10 days following nest hatch during night hours to count the number of chicks in the brood. Broods are considered unsuccessful if no chicks are found during spotlight surveys. To confirm unsuccessful broods (prevent false negative), females are rechecked within 48 hours. A similar habitat measurement protocol is conducted at brood sites as that at nest sites. However, transects maximum extent is 25 m for broods sites. Canopy cover is measured along three 25 m transects, which extended from the brood location every 120° with random orientation. The width (cm) of each shrub species is measured along the three transect lines within 5, 10, and 25 m from the brood location. Because habitat changes through time and broods are mobile, measurements are collected at each 10-day interval. Differences in vegetation use between night (roosting) and day (foraging) hours are also investigated. These surveys included one day and one night observation of habitat used by broods (within a 24 hour period), as well as, one observation of a random location within 200 m of the brood (dependent) to estimate disproportionate use to availability.

Predator Monitoring

Raven and Raptor Surveys. Surveys are conducted for Common Ravens (Corvus corax; hereafter ravens) and raptors during nesting and following nest fate. Surveys are conducted using binoculars at each nest for 15 minutes searching all four quadrants around the nest equally. Time of sighting, bearing, distance (using a rangefinder) of each raptor and corvid is tallied and birds are identified to species when possible.

Additional surveys are used to estimate raven and raptor densities using Program Distance (Thomas et al. 2009) across the landscape and relate it to nest survival parameters. Survey points are randomly generated within the study area. Points are generated on and off roads. No points are assigned to paved roads. Surveys are completed between mid-May and late-July. The time of survey is randomized between one half hour our before sunrise to one half hour following sunset. The same protocol for nest surveys is carried out at points. These data will provide valuable information on factors that influence raven and raptor numbers before and after energy development throughout the study area.

Fall and winter location. During the fall and winter months (September – February), flights will be conducted every 3-4 weeks to determine location and survivorship. Attempts will be made to locate each individual radio-marked sage-grouse and determine its status (alive or dead).

These approaches are subject to change based on improved data collection techniques and improved technologies.

3. Anticipated Beneficial Effects of the Project

Over the course of this monitoring effort (3 years), we will be able to estimate sage-grouse vital rates (e.g. nest initiation rates, nest survival rates, male and female survival rates, adult and juvenile survival rates, and brood survival rates) as well as determine important seasonal use areas, movement corridors, and potential connectivity with other adjacent sage-grouse populations within Nevada's most undisturbed and intact sagebrush landscapes. These data can be used for comparison purposes for other ongoing research projects that are currently investigating various forms of anthropogenic disturbance or development such as utility scale transmission lines, geothermal energy development and mining activities/associated infrastructure

4. Project Schedule

Capture and radio-marking efforts for this project will take place during the spring of each year from early March through April beginning in 2016. Follow-up work will extend from this period through August of each year. Monthly flights to locate radio marked individuals will occur from November through February.

5. Required Clearance Activities and Schedule (NEPA, other permits, authorizations)

6. Monitoring Plan

See above.

7. Relationship to NDOW Plans, Policies, and Programs

This project fits within the 1st Edition of the Greater Sage-grouse Conservation Plan for Nevada and Eastern California (2004).

Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Estimating Greater Sage-grouse Vital Rates within Nevada Control Sites**

Name of Proposed Project Manager: **Shawn Espinosa**

Please provide a breakdown of the project's total costs over the life of the project in the table below. If your project is expected to last more than one fiscal year, define the total to be spent during each fiscal year in your response to question XI in the project's proposal form and not in this table. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be included in your cost estimate.

Project Components	*Costs to be Paid by NDOW Special Reserve Account(s)*	*Costs to be Paid by Other Sources*
1. Land Acquisitions		
2. Personnel Costs		
A. NDOW Personnel		
B. Other Personnel	$ 13,250.00	$ 39,750.00
C. Total Personnel Costs	$ 13,250.00	$ 39,750.00
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ 500.00	$ 1,500.00
4. Equipment		
A. VHF Transmitters (50 @ $225 ea.)	$ 1,743.75	$ 5,231.25
B. Radio receivers/antennas	$ 750.00	$ 2,250.00
C. Total Equipment Costs	$ 2,493.75	$ 7,481.25
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Field Housing	$ 250.00	$ 750.00
B. Vehicles (4WD truck lease: 2 @ $10,500/ea.)	$ 5,250.00	$ 15,750.00
C. ATVs (1 ATV @ $2,000)	$ 500.00	$ 1,500.00
D. ATV Fuel and Vehicle Maintenance	$ 250.00	$ 750.00
F. Total Miscellaneous Costs	$ 6,250.00	$ 18,750.00
7. In-Kind Services		
A. USGS Research Wildlife Biologist (Permanent, 0.2 FTE)		$ 12,834.00
B. USGS Wildlife Biologist (Term, 0.2 FTE)		$9,850.00
E. Total In-Kind Services	$ -	$ 22,684.00
Subtotals	$ 22,493.75	$ 67,481.25
Total Project Costs	$	112,659.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	Mountain Quail and Ruffed Grouse Translocation		
Project Manager:	Shawn Espinosa	Phone: 775-688-1523 Email	sespinosa@ndow.org
Project Monitor:	Shawn Espinosa	Start Date:	7/1/2017
Implementation Lead:	Nevada Department of Wildlife	End Date:	6/30/2018
Partners:	Nevada Department of Wildlife		
Project Category:	Wildlife Population Protection or Enhancement		
Project Category:	Species Augmentation		
Project Actions:			
Priority Resource:	Small game		
Priority Species:	Quail		
County Location:	Humboldt, Lander, Elko		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
Carson Valley Chukar Club	$2,500		
NDOW Upland Game Stamp	$10,000		
USFWS Wildlife Restoration Grant	$30,000		
Project Totals:	**$42,500**		

Project Proposal

1. Brief Purpose and Goal of the Project

The overall goal of this project is to increase population redundancy and resiliency of mountain quail and ruffed grouse within suitable habitats across Nevada's landscape. Since 2008, the Nevada Department of Wildlife has released 860 mountain quail within Churchill, Humboldt, Lander, Washoe and White Pine Counties. In addition, 203 ruffed grouse have been captured and translocated to portions of Elko, Humboldt, Lander and Nye Counties. These translocations, and subsequent augmentations, are conducted to fulfill the objective of expanding mountain quail and ruffed grouse distribution within Nevada as stated in the Nevada Upland Game Species Management Plan developed in 2008. These efforts have also led to increased sportsmen opportunity and have contributed to traditional non-consumptive uses as well.

2. Project Approach and Tasks

The capture and translocation of either species is highly dependent on habitat conditions, both at the capture site and the proposed release site. If adequate habitat conditions are not experienced, it is likely that these efforts will be re-scheduled.

Mountain Quail
We propose to obtain approximately 100 mountain quail from western Oregon through the use of a contract capture vendor. Capture attempts within Nevada could occur for translocation purposes if conditions are conducive to a successful effort. Mountain quail may be held over at the Mason Valley Wildlife Management Area during the winter and early spring for release in late February or early March depending on habitat and access conditions, or released immediately upon translocation to Nevada A proportion (20-30%) of the mountain quail may be marked with VHF telemetry units to help determine survival rates and habitat usage. Fixed wing telemetry surveys will be conducted monthly for the life of the units to determine mortality rates and distribution from the release site.

Ruffed Grouse
We propose to capture 20-30 ruffed grouse, likely in the Santa Rosa Range to augment a recent prior release in the Pine Forest Range of Humboldt County. We also propose to capture 20-30 ruffed grouse from northern Elko County to augment the Toiyabe Range population. A subset of these birds (n=5 to 8 each) may be radio-marked with VHF telemetry units to help determine habitat usage and survival rates. Fixed wing telemetry surveys will be conducted monthly for the life of the units.

3. Anticipated Beneficial Effects of the Project

Expanding the distribution of mountain quail and ruffed grouse populations addresses concerns of population decline and loss of redundancy (numbers of populations) across the range of the species. This provides assurances that populations will persist over the long-term and enable resiliency in case of stochastic events. Ultimately, if successful, the establishment of these populations also increases recreational opportunities for sportsmen and wildlife watchers.

4. Project Schedule

Capture work would be conducted by a contracted capture vender (Relocator LLC) near Roseburg, Oregon. Birds are expected to be captured during November and December of 2017, held in Roseburg at the Oregon Department of Fish and Wildlife office and then transported by NDOW personnel to either Mason Valley Wildlife Management Area to a holding facility or to the release sight if conditions are deemed appropriate (adequate forbs, moderate weather conditions).
Ruffed grouse capture efforts would commence in late summer or early fall of 2017 if habitat conditions are deemed appropriate. This type of effort normally takes approximately 10-14 days to complete. However, this is highly dependent on habitat conditions and productivity of ruffed grouse populations from potential source stock areas.

5. Required Clearance Activities and Schedule (NEPA, other permits, authorizations)

6. Monitoring Plan

7. Relationship to NDOW Plans, Policies, and Programs

The following documents were used while developing this proposal:
- Nevada Upland Game Species Management Plan (2008);
- Upland Game Release Plan for FY2018-19;
- NDOW's W-48 and W-64 Federal Assistance Grants (Pittman-Robertson);

Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Mountain Quail and Ruffed Grouse Translocation**

Name of Proposed Project Manager: **Shawn Espinosa**

Please provide a breakdown of the project's total costs over the life of the project in the table below. If your project is expected to last more than one fiscal year, define the total to be spent during each fiscal year in your response to question XI in the project's proposal form and not in this table. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be included in your cost estimate.

Project Components	*Costs to be Paid by NDOW Special Reserve Account(s)*	*Costs to be Paid by Other Sources*
1. Land Acquisitions		
2. Personnel Costs		
A. NDOW Personnel		$ 25,416.00
B. Other Personnel		
C. Total Personnel Costs	$ -	$ 25,416.00
3. Travel Costs		
A. Per Diem		$ 3,584.00
B. Mileage		
C. Total Travel Costs	$ -	$ 3,584.00
4. Equipment		
A. VHF radio transmitters (10 @ $200 ea.)	$ 1,000.00	$ 1,000.00
B.		
C. Total Equipment Costs	$ 1,000.00	$ 1,000.00
5. Materials		
A. Capture materials (ruffed grouse)	$ 2,000.00	
B.		
C.		
D. Total Materials Costs	$ 2,000.00	$ -
6. Miscellaneous		
A. Capture Vendor (Relocator LLC)	$ 7,000.00	
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 7,000.00	$ -
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 10,000.00	$ 30,000.00
Total Project Costs	$	40,000.00

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Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	Nevada Greater Sage-grouse Monitoring		
Project Manager:	Shawn Espinosa	Phone: 775-688-1523 Email	sespinosa@ndow.org
Project Monitor:	Shawn Espinosa	Start Date:	7/1/2017
Implementation Lead:	Nevada Department of Wildlife	End Date:	6/30/2018
Partners:	Nevada Department of Wildlife, Bureau of Land Management, US Forest Service, U.S. Geological Service		
Project Category:	Wildlife Population Protection or Enhancement		
Project Category:	Wildlife Monitoring and Research		
Project Actions:	Click to add..		
Priority Resource:	Small game		
Priority Species:	Sage grouse		
County Location:	Statewide		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Upland Game Stamp	$58,000		
US Forest Service			$40,000
US Forest Service			$20,000
USFWS State Wildlife Grant	$145,000		
Project Totals:	**$203,000**		**$60,000**

Project Proposal

1. Brief Purpose and Goal of the Project

This project supports various NDOW specific monitoring efforts throughout the range of Greater Sage-grouse in Nevada. Monitoring activities include ground surveys to conduct lek related work (e.g. counts, routes and searches) using seasonal technicians, aerial lek surveys (helicopter), fixed-wing lek and wintering ground surveys using Forward Looking Infrared (FLIR) technology and fixed-wing telemetry (VHF) follow-up surveys. As of 2016, there were 1,886 known lek locations identified in the Nevada Statewide Sage-grouse Database (Nevada portion only), of which 697 were considered active (defined as 2 or more males observed during 2 years in a 5 year period), 229 were considered "pending active",

meaning that an additional year of observing 2 or more males is necessary to be considered an active lek, and 524 were considered "unknown" status leks. This volume of lek locations requires that some part-time and aerial resources are dedicated to support on the ground efforts.

1) Assist with sage-grouse lek survey through the use of qualified technicians;
2) Conduct aerial survey of sage-grouse leks in difficult to access areas;
3) Search for undocumented leks and survey "unknown" status leks using aerial infrared technology on a fixed wing aircraft platform;
4) Conduct fixed wing aerial telemetry surveys to search for, locate and determine the status (live, dead) of radio-marked sage-grouse during the fall and winter months

2. Project Approach and Tasks

Lek Count Technicians
Assistance with lek counts, in the form of part-time technicians, allows us to achieve our objectives of surveying at least 40% of known lek locations throughout Nevada (n=754). This is a somewhat lofty objective considering the number of field biologists in each region and the availability of volunteers and federal agency personnel available to conduct lek survey work. The use of part time technicians dedicated solely to lek surveys alleviates some of the workload on agency field biologists at a time of the year when surveys for other species (e.g. big game animals) are taking place and big game quota recommendations are being made.

Aerial Lek Survey
Aerial survey work provides an efficient tool to survey several leks in one morning and access areas that are not normally accessible by vehicle during the spring months. Surveying leks for activity using a helicopter allows for a more accurate classification of lek status from year to year and has been an effective method for locating undiscovered leks.

Forward Looking Infrared Surveys
We are also interested in the use of forward looking infrared (FLIR) imaging technology to remotely document activity for sage-grouse leks, count the number of birds in attendance, and detect other leks on the landscape. The objective here is to conduct approximately 4-5 flights within a given study area to record activity and size range of "pending active" status leks and potentially utilize this methodology in population estimation models. This technology will also be utilized to survey areas for wintering sage-grouse. Very little comprehensive work has been conducted to document winter use areas and delineate this important seasonal habitat. Funding is also requested to assist with aerial lek survey using a helicopter. A number of leks are inaccessible by vehicle during the spring months at upper elevations and helicopter survey provides efficient survey and search ability.

Aerial Telemetry Surveys
In addition to the lek survey work described above, this project will also cover fixed wing aerial telemetry surveys to follow-up on radio-marked grouse in several project areas. We anticipate at least 5-6 research and monitoring projects that will be in need of periodical follow-up flights. These flights will largely occur once each month from October through February and roughly involve approximately 45 hours of work. These surveys not only provide locations of birds, but are also able to document mortality which is important for estimating monthly, seasonal and annual survival rates. Additionally, telemetry information obtained from sage-grouse throughout Nevada has been utilized to inform a statewide resource selection function model (RSF) and mapping product for the species.

Fixed Wing Infrared Lek Survey and Wintering Ground Identification
We are proposing to conduct aerial infrared surveys from a fixed wing aircraft platform to search for undocumented sage-grouse leks as well as identify winter concentration area. Winter concentration surveys will be conducted in late December through late January in suspected winter habitats. Lek

detection surveys will be conducted during the period from late March through late April to locate undocumented leks and potentially survey "unkown" status leks.

Lek surveys will be guided by a "lek habitat suitability model" developed by NDOW during the spring of 2017. A trial use of this product is currently ongoing and the early results are encouraging in terms of search area focus and identification of new, previously undiscovered leks that have taken place to date. This survey methodology may also be adapted to design a stratified random sampling scheme across the state to develop statistically robust population estimates. This will allow for applied statistical analysis to determine population rate of change or annual growth rate.

3. Anticipated Beneficial Effects of the Project

Lek Count Technicians:
Assistance with lek counts, in the form of part-time technicians, allows us to achieve our objectives of surveying 40% of known lek locations throughout Nevada (n=754). This is a somewhat lofty objective considering the number of field biologists in each region, volunteers and federal agency personnel available to conduct lek survey work. Additionally, this alleviates some of the workload on agency field biologists at a time of the year when surveys for other species (e.g. big game animals) are taking place.

Aerial Lek Survey:
Aerial survey work also provides an efficient tool to survey several leks in one morning and access areas that are not normally accessible by vehicle during the spring months. Surveying leks for activity using aerial survey allows for a more accurate classification of lek status from year to year and has been an effective method for locating undocumented leks.

FLIR Lek Detection and Wintering Ground Survey:
Forward Looking Infrared technology is utilized on a fixed wing aircraft and has the ability to detect presence/absence of sage-grouse at leks without much disturbance, obtain counts of individuals at leks and detect new lek locations. Accurate counts of numbers of birds at a lek can also be determined. This tool allows for efficient survey of multiple leks or suspected wintering grounds each morning. The methodology is very new and cost/benefit ratios are still being analyzed.

Forward Looking Infrared (FLIR) technology has proven to be effective to determine lek activity (presence/absence) and determine winter utilization areas. This tool may be employed in PMUs where we currently have limited knowledge of lek locations, but suspect there to be several more leks than now known, and to survey "pending active" status leks. A good example of this is the Desert PMU located in northwestern Elko County (remote and difficult to access) near the Idaho border. This survey would build upon initial FLIR surveys initiated during the 2012 spring breeding period and recent efforts conducted during the winter of 2013 in the Tuscarora PMU. The first flight would be conducted to survey known active lek locations and a second flight would be conducted within a previously identified polygon where sage-grouse breeding activity is suspected, but is currently unknown.

Fixed Wing Telemetry Surveys:
These surveys greatly increase the strength of our dataset and can assist with the development of a resource selection function model being developed by the USGS. Additionally, beyond locating radio-marked sage-grouse, these surveys allow us to determine monthly survival and periods of elevated mortality which could help influence management decisions.

4. Project Schedule

Lek count work conducted via ground/vehicle surveys would take place during the spring breeding season which is typically defined as March 1 – May 15 of each year.

Aerial survey work (helicopter lek counts) would be conducted during the spring breeding season defined as March 1 – May 15th.

FLIR work would be conducted during the winter or spring breeding season depending on the purpose of the survey.

Fixed wing telemetry surveys would be conducted throughout the fiscal year, with emphasis on locating radio-marked birds during late fall and winter periods when research crews are out of service.

5. Required Clearance Activities and Schedule (NEPA, other permits, authorizations)

6. Monitoring Plan

See above.

7. Relationship to NDOW Plans, Policies, and Programs

This project fits within the 1st Edition of the Greater Sage-grouse Conservation Plan for Nevada and Eastern California (2004). The project also assists with objectives outlined in the Bi-State Action Plan (2012).

Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Nevada Greater Sage-grouse Monitoring**
Name of Proposed Project Manager: **Shawn Espinosa**

Please provide a breakdown of the project's total costs over the life of the project in the table below. If your project is expected to last more than one fiscal year, define the total to be spent during each fiscal year in your response to question XI in the project's proposal form and not in this table. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be included in your cost estimate.

Project Components	*Costs to be Paid by NDOW Special Reserve Account(s)*	*Costs to be Paid by Other Sources*
1. Land Acquisitions		
2. Personnel Costs		
A. NDOW Personnel		$ 77,500.00
B. Other Personnel	$ 9,000.00	
C. Total Personnel Costs	$ 9,000.00	$ 77,500.00
3. Travel Costs		
A. Per Diem		
B. Mileage		$ 17,500.00
C. Total Travel Costs	$ -	$ 17,500.00
4. Equipment		
A.		
B.		
C. Total Equipment Costs	$ -	$ -
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Helicopter Services (lek survey)	$ 15,000.00	$ 30,000.00
B. Fixed Wing Infrared Imagery Flights (lek detection)	$ 21,000.00	$ 20,000.00
C. Fixed-wing Telemetry Survey	$ 13,000.00	
D.		
F. Total Miscellaneous Costs	$ 49,000.00	$ 50,000.00
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 58,000.00	$ 145,000.00
Total Project Costs	$	203,000.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	Virginia Mountains Sage-grouse Research and Monitoring
Project Manager:	Shawn Espinosa Phone: 775-688-1523 Email sespinosa@ndow.org
Project Monitor:	Shawn Espinosa Start Date: 7/1/2017
Implementation Lead:	Nevada Department of Wildlife End Date: 6/30/2018
Partners:	Nevada Department of Wildlife, U.S. Geological Service, Nevada Chukar Foundation
Project Category:	Wildlife Population Protection or Enhancement
Project Category:	Wildlife Monitoring and Research
Project Actions:	
Priority Resource:	Small game
Priority Species:	Sage grouse
County Location:	Washoe

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Upland Game Stamp	$20,000		
U.S. Geological Service			$11,342
USFWS Wildlife Restoration Grant	$60,000		
Project Totals:	**$80,000**		**$11,342**

Project Proposal

1. Brief Purpose and Goal of the Project

Over the past seven years, The Nevada Department of Wildlife (NDOW), U.S. Geological Survey (USGS), and Idaho State University (ISU) have collaborated on an intensive effort to monitor and conduct research on a population of Greater Sage-grouse (hereafter sage-grouse) in the Virginia Mountains of southern Washoe County (see the attached map). This effort was implemented primarily to determine movement patterns, use areas and demographic parameters as baseline monitoring prior to the construction of a proposed utility scale renewable energy (wind) development. At this point in time, it does not appear that this project is going to move forward at the initially proposed site. Results of this research and monitoring work has indicated that ravens are a causal factor contributing to low nest survival rates in the Virginia Mountains (Lockyer et al. 2012). Thus, we decided to conduct intensive

raven control work using USDA Wildlife Services and placement of corvicide injected eggs at strategic locations for three years to determine its effectiveness. Further, a major wildfire burned approximately 60,000 acres during the summer of 2016 and greatly impacted available suitable habitat for sage-grouse in the Virginia Mountains. We feel it is important to continue monitoring sage-grouse in this study area to determine the response to this fire.

Research conducted by Lockyer et al. (2012) found that the cumulative nest survival for the Virginia Mountain population (22.4%) was substantially lower than other published results within the Great Basin of 36% (Rebholz et al. 2009) and 42% (Coates and Delehanty 2010). Vital rates for other life stages of this population have not been analyzed, but such low nest survival could limit potential population size. Nest survival rates are highly variable across sage-grouse populations (Taylor et al. 2011), and such a low nest survival rate for a small population such as the Virginia Mountains is of considerable concern.

To identify predators responsible for nest failure, continuous digital video-recording systems were deployed at a subset of sage-grouse nests. Common ravens (Corvus corax) were the most frequent sage-grouse nest predator identified and accounted for 46.7% of nest depredations. Raven population size, density, and distribution has increased substantially across the western United States as a result of habitat conversion and human activities that act to subsidize ravens with food and nesting opportunities (Sauer et al. 2004, Kristan and Boarman 2007, Bui et al. 2010, Howe 2012). Historically the sagebrush-steppe ecosystem likely had relatively low raven population densities (Leu et al. 2008). However, this ecosystem currently supports higher numbers of ravens because of increased vertical perching and nesting substrates (e.g., electrical power line towers and other structures), as well as human-related food sources such as road kill and refuse (Boarman 1993 and Sauer et al. 2004). This is an important change because sage-grouse rely on visual concealment for nesting while ravens rely on visual detection for hunting (Gregg et al. 1994, Conover et al. 2010).

The most explanatory nest site selection models identified low occurrence of cheatgrass (Bromus tectorum), low occurrence of ravens, increased shrub canopy cover (%), and high elevation as explanatory variables for nest site selection. Increased shrub canopy at local spatial scales was the most explanatory selection factor for sage-grouse nest survival.

Raven control (both lethal and non-lethal e.g. nest removal) may be an appropriate tool to utilize as a conservation action to increase nest success and ultimately, recruitment. This situation offers an opportunity to research the effects of raven control within the context of a classic Before, After Control Impact (BACI) experimental project design to determine the effects on various sage-grouse vital rates and attempt to determine ultimate effects to recruitment of individuals into the adult population.

Aside from monitoring the effects of raven control, the occurrence of the fire in 2016 allows us to collect data on demographic parameters post-fire and compare these figures to the already collected pre-fire data. Other studies are currently ongoing to determine the effects of wildfire on sage-grouse populations including the Buffalo Hills (Rush Fire) in California and the Trout Creek Mountains in Oregon. Data collected from the Virginia Mountains will contribute nicely to these other datasets.

This project is intended to better understand the effects of raven control on a localized sage-grouse population where the extant habitat condition has been compromised by wildfire (1999 & 2016).

We intend to fulfill the following objectives through the implementation of this project:

1) Radio-mark a minimum of 20 sage-grouse hens annually to determine habitat utilization, nest site selection, nest initiation rates and nest survival rates;
2) Conduct lek counts on at least two leks within the study area to help determine population trend;
3) Place at least six to eight cameras at nest sites to determine type of predator and predation rates;
4) Determine recruitment rates through follow-up brood surveys;
5) Place corvicide laced chicken-egg baits within identified nesting habitat to reduce raven numbers (this

task is covered under a Nevada Predator Management Plan project.

This project may have greater application range-wide to serve as guidance as to when raven control is appropriate and the overall effectiveness of its application.

2. Project Approach and Tasks

Sage grouse movement, survivorship, and reproduction have been and will continue to be monitored following release. Portable receivers (Communication Specialist Inc., Orange, CA; Advanced Telemetry Systems Inc., Isanti, MN) are used along with 3-element Yagi antennas to monitor radio-marked grouse. Relocation error is minimized by circling around each grouse 30 – 50 m. Using the approximated distance and a compass bearing, the location coordinates (Universal Transverse Mercator) are obtained using GPS. Throughout the nesting and brood-rearing period, researchers attempted to locate female grouse ≥2 times per week.

Relocation coordinates are transferred into a GIS (ArcMap 9.2, ESRI Products, Redlands, CA) for space-use analysis. Kernel density (50, 90, and 95%) is calculated for all radio locations and for each grouse separately (95%). The purpose of using all locations is to estimate area used at the population level. Kernel density is also calculated for brood-rearing females. Kernel calculations are carried out in multiple steps. First, relocation points are weighted to account for biases associated with non-equivalent relocation intervals. Second, robust estimates of smoothing parameters (h) are generated using Animal Space Use 1.3 (Horne and Garton 2009). Last, those parameters are used in Hawth's Tools (ArcMap 9.2) to calculate fixed kernel densities. Kernel density maps are generated based on the estimated densities for 2009 and 2010.

If a grouse is found at the same location during the nesting period, researchers will visually determine if a grouse is nesting. Nests are monitored ≥3 times per week until fate is determined. Successful nests are classified as ≥1 chick hatched. Nests are also scored as depredated, partially depredated, or abandoned. In addition to monitoring nests with radio-telemetry, camouflaged micro-cameras are installed with time-elapsed digital video recorders (DVR). The primary purpose of cameras is to identify nests predators. Another purpose is to identify factors that influence patterns of incubation. Cameras are placed about 0.5 m from the nest bowl, which aided in unambiguous identification of animal encounters and grouse behavior. Cameras and video recorders are uninstalled immediately following nest depredation, abandonment, or hatch. Researchers reduce human scent by wearing rubberized gloves and using spray designed to mask scent.

Following nest fate, understory cover is recorded at the nest bowl using a coverboard (Jones 1968), Robel pole (Robel 1970), and digital photography method. Vegetation composition cover is measured at multiple subplots (20 x 50 cm) located ≤25 m of each nests using Daubenmire method (Daubenmire 1959). Canopy cover is measured along two 25-m transects, one 50-m transect, and one 100-m transect extending from the nest bowl every 90°. The orientation of the quadrants is randomized. Shrub species are recorded and measured. Width (cm) and heights (cm) of a random sample of individual shrubs along the line are recorded. These shrub widths are measured within 5, 10, and 25 m from the nest for all four transect lines, within 50 m for two transect lines, and 100 m for one transect line. The purpose of the different transect lengths is to identify the scale of use for shrub cover within 100 m radius of a nest site.

To identify vegetation factors selected by grouse (defined as the disproportionate use compared to availability) measurements of vegetation characteristics are compared at nests to those at random points. Thus, the same habitat measurements are conducted at random points to represent available habitat. Evidence for multi-scale selection generating two random points for each nest is evaluated. One point is within 200 m of the nest (dependent) and the other is within the study area (independent). The preliminary results are reported as means (±SE) of vegetation characteristics for random points and nests. However, multiple a priori generalized mixed effects models with a binomial error distribution at multiple spatial scales will be compared for strength of evidence. Researchers will use an information-theoretic approach, including ΔAIC, Akaike's weights, evidence ratios, likelihood-based R2, and likelihood

ratio tests to evaluate models. Model averaged parameter estimates will be used to develop resource selection functions.

Following the completion of a successful nest, female grouse with broods are monitored closely by obtaining >2 locations per week. Spotlights are used every 10 days following nest hatch during night hours to count the number of chicks in the brood. Broods are considered unsuccessful if no chicks are found during spotlight surveys. To confirm unsuccessful broods (prevent false negative), females are rechecked within 48 hours. A similar habitat measurement protocol is conducted at brood sites as that at nest sites. However, transects maximum extent is 25 m for broods sites. Canopy cover is measured along three 25 m transects, which extended from the brood location every 120° with random orientation. The width (cm) of each shrub species is measured along the three transect lines within 5, 10, and 25 m from the brood location. Because habitat changes through time and broods are mobile, measurements are collected at each 10-day interval. Differences in vegetation use between night (roosting) and day (foraging) hours are also investigated. These surveys included one day and one night observation of habitat used by broods (within a 24 hour period), as well as, one observation of a random location within 200 m of the brood (dependent) to estimate disproportionate use to availability.

Predator Monitoring and Control

Raven and Raptor Surveys: Surveys are conducted for Common Ravens (Corvus corax; hereafter ravens) and raptors during nesting and following nest fate. Surveys are conducted using binoculars at each nest for 15 minutes searching all four quadrants around the nest equally. Time of sighting, bearing, distance (using a rangefinder) of each raptor and corvid is tallied and birds are identified to species when possible.

Additional surveys are used to estimate raven and raptor densities using Program Distance (Thomas et al. 2009) across the landscape and relate it to nest survival parameters. Survey points are randomly generated within the study area. Points are generated on and off roads. No points are assigned to paved roads. Surveys are completed between mid-May and late-July. The time of survey is randomized between one half hour our before sunrise to one half hour following sunset. The same protocol for nest surveys is carried out at points. These data will provide valuable information on factors that influence raven and raptor numbers before and after energy development throughout the study area.

Raven videography: Because ravens are known to be an effective sage grouse nest predator, additional observational data is collected on raven nests using videography within the study area. Objectives for using videography included: (1) investigate links between raven foraging activities with sage-grouse incubation patterns, (2) estimate feeding frequencies, and (3) identify components of nestling diet. Researchers plan to investigate differences between nests in anthropogenic and natural nesting substrates. Information might lead to management implications in the future on how to properly manage raven and sage-grouse interactions, especially in areas with increasing energy development.

Badger Surveys: Following each nest fate, American badgers (Taxidea taxus; hereafter, badgers) surveys are conducted by walking in a bowtie pattern with the nest bowl at the center for a total length of 680 m. An area 4 m on each side of the survey line is actively searched for badger sign. Specifically, fresh intact holes, collapsed holes, small digs or scrapes, and scat or tracks encountered along the survey line are recorded. Surveys are conducted at random points generated for each nest.

Predator Control: Raven control work will be conducted by USDA – Wildlife Services located in Reno, NV. Raven control work will take place from March through May within the study area through the use of chicken egg baits treated with DRC-1339, a corvicide used to control avian species (Spencer 2002). USDA-WS will place 2 egg baits every 250 m along identified raven removal routes every 7 days. Egg bait fate will be recorded within 72 hours of placement, and non-depredated eggs will be disposed. During the spring, nearby transmission lines will be surveyed for active raven nests. If located, nests will either be removed or eggs will be oiled to decrease viability while still maintaining the territorial pair at the site.

3. Anticipated Beneficial Effects of the Project

This project has provided the Nevada Department of Wildlife with a substantial amount of data relative to sage-grouse habitat selection, adult survival rates, nest initiation rates and success, and nest predator identification in an area that had been impacted by fire in 1999. A journal article entitled "Greater Sage-grouse Nest Predators in the Virginia Mountains of Northwestern Nevada" was published in the Journal of Fish and Wildlife Management in 2013 (Lockyer et al. 2013) and a subsequent article, "Nest Site Selection and Reproductive Success of Greater sage-grouse in Fire Impacted Habitats in Northwestern Nevada" was published in the Journal of Wildlife Management in 2015 (Lockyer et al. 2015).

This area provides a good opportunity to monitor the ultimate outcome of proposed raven control work including the use of DRC-1339 corvicide and non-lethal means of control. We are proposing to conduct intensive raven control work in the Virginia Mountains over the next three year period and monitor sage-grouse and raven population response. Additionally, some habitat enhancement work is expected to occur over the next couple of years within the Virginia Mountains including sagebrush planting in areas affected by wildfire within the Spanish Flat/Vinegar Peak area. Continued monitoring of this population would help determine the effects of certain habitat enhancement efforts.

4. Project Schedule

Raven control will be extended into State Fiscal Year 2017 to provide three full years of comprehensive raven control efforts using the deployment of corvicide injected eggs at strategic locations. We hope to continue monitoring the local sage-grouse population in the Virginia Mountains for another three years after raven control efforts have ceased in order to understand the longer term impacts of raven control on the sage-grouse population and whether or not there are lasting effects.

5. Required Clearance Activities and Schedule (NEPA, other permits, authorizations)

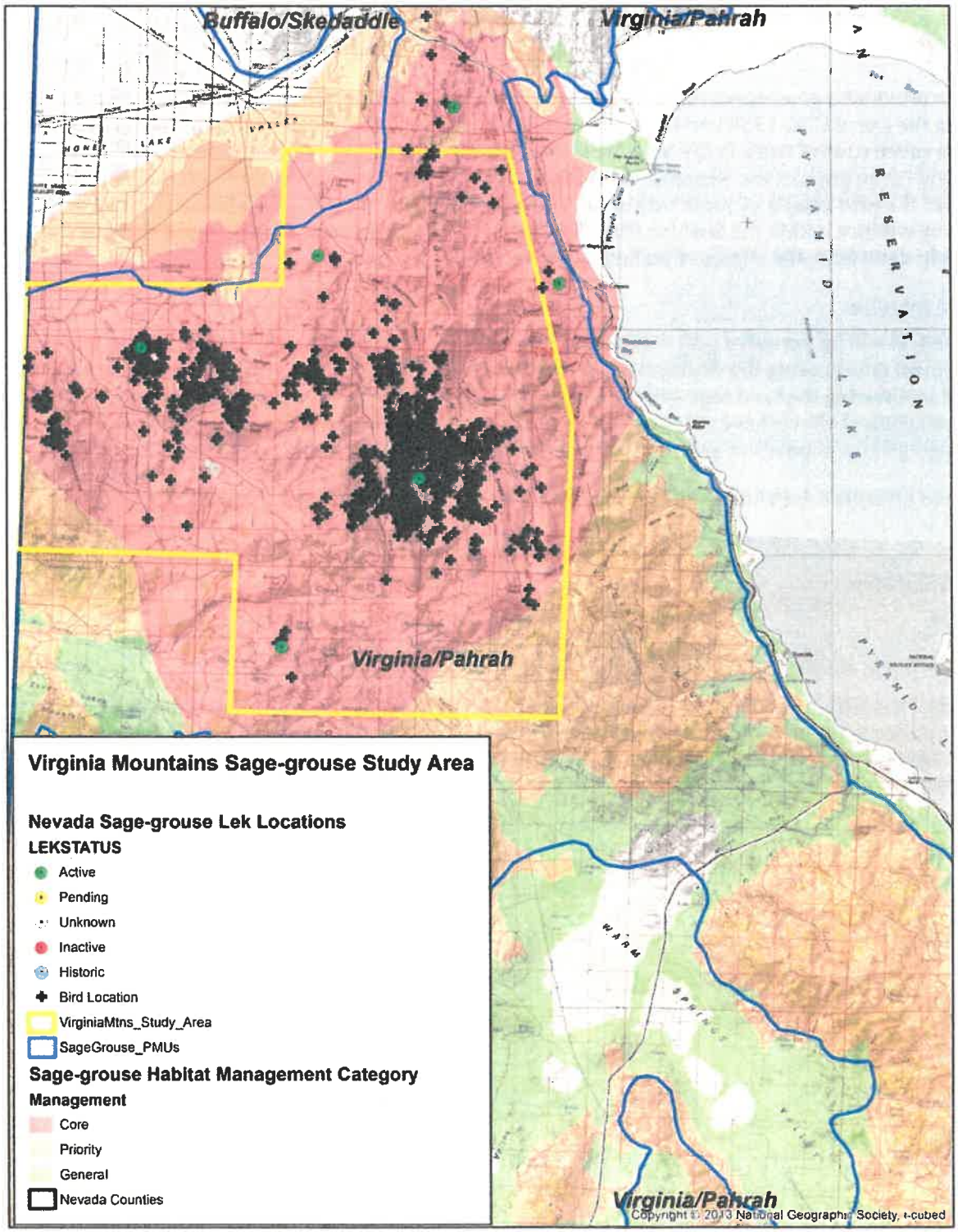
6. Monitoring Plan

See above.

7. Relationship to NDOW Plans, Policies, and Programs

This project fits within the 1st Edition of the Greater Sage-grouse Conservation Plan for Nevada and Eastern California (2004). The project also helps monitor a project identified within the Nevada Department of Wildlife's Predator Management Plan (Project 21).

Virginia Mountains Sage-Grouse General Study Area



Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Effects of Raven Removal and Wildfire on GSG within the Virginia Mtns.**
Name of Proposed Project Manager: **Shawn Espinosa**

Please provide a breakdown of the project's total costs over the life of the project in the table below. If your project is expected to last more than one fiscal year, define the total to be spent during each fiscal year in your response to question XI in the project's proposal form and not in this table. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be included in your cost estimate.

Project Components	*Costs to be Paid by NDOW Special Reserve Account(s)*	*Costs to be Paid by Other Sources*
1. Land Acquisitions		
2. Personnel Costs		
A. NDOW Personnel		
B. Other Personnel	$ 12,850.00	$ 38,550.00
C. Total Personnel Costs	$ 12,850.00	$ 38,550.00
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs		
4. Equipment		
A. VHF Transmitters (30 @ $225 ea.)	$ 1,650.00	$ 4,950.00
B. Total Equipment Costs	$ 1,650.00	$ 4,950.00
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Field Housing	$ 250.00	$ 750.00
B. Vehicles (4WD truck lease: 2 @ $10,500/ea.)	$ 5,250.00	$ 15,750.00
C. Total Miscellaneous Costs	$ 5,500.00	$ 16,500.00
7. In-Kind Services		
A. USGS Research Wildlife Biologist (Permanent, 0.2 FTE)		$ 6,417.00
B. USGS Wildlife Biologist (Term, 0.2 FTE)		$4,925.00
E. Total In-Kind Services	$ -	$ 11,342.00
Subtotals	$ 20,000.00	$ 71,342.00
Total Project Costs	$	91,342.00

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Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	Corners for Quail - Quinn River Valley - Vanderhoke		
Project Manager:	Bobby Jones	Phone: 775-623-6565 Email bsjones@ndow.org	
Project Monitor:	Shawn Espinosa	Start Date:	10/1/2017
Implementation Lead:	Nevada Department of Wildlife	End Date:	11/30/2017
Partners:	Nevada Department of Wildlife		
Project Category:	Habitat Creation or Enhancement		
Project Category:			
Project Actions:			
Priority Resource:	Small game		
Priority Species:	Quail		
County Location:	Humboldt		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
Michael Vanderhoke			$110
National Wild Turkey Foundation	$5,000		
NDOW Upland Game Stamp	$11,000		
Project Totals:	**$16,000**		**$110**

Project Proposal

1. Brief Purpose and Goal of the Project

To create cover and nesting habitat for upland game bird species in the Quinn River Valley on private land. Specifically quail and pheasent populations have been on the decline for a number of years in this valley and that decline has been attributed to a lack of resources one of the most notable being a lack of cover. In an effort to revive populations in the area we are looking to create more nesting habitat by planting pivot corners with Canada wildrye (Elymus canadensis) a plant species that will provide quail and pheasant with cover they currently lack and will help limit the encroachment of undesirable non-native plant species.

2. Project Approach and Tasks

Working with a willing private landowner to plant pivot corners with Canada wildrye. This plant species has proven that once established in this valley it can persist even through significant periods of drought.

3. Anticipated Beneficial Effects of the Project

This Canada wildrye planting will provide cover and feed as well as brood, and nesting habitat for a number of upland game bird species; the main target species being quail and pheasent. After establishment this species is able to outcompete less desireable non-native invasive annual grass species most notably cheatgrass and medusahead. It's rapid establishment will help resist less desirable non-native encroachment, and will persist for years to come providing reliable cover that is also reasonably drought tolerant. The pivot corners we are planting are currently barren and provide no value to the landowner or wildlife. This project is the first of its kind proposed in the Quinn River Valley, but the aim is that it will be the pilot for other similar projects in the valley.

Unfortunately even with flushing bars on the front of swathers and cutting from the inside to the outside of a field most equipment travels too fast for nesting bird species to escape irrigated fields in the valley. These corners will provide an alternative to birds nesting in the fields and are within close proximity of a good water source. Establishing the appropriate resources in areas like this will provide strongholds for these species and can in the future act as small source populations to augment spread throughout the valley.

4. Project Schedule

This project will consist of a fall planting in October 2017 and serve as a pilot project in the Quinn River Valley. It is a one-year project, but will serve as test case for other similar projects.

5. Required Clearance Activities and Schedule (NEPA, other permits, authorizations)

Not Applicable - the project is on private property

6. Monitoring Plan

Monitoring would consist of vegetation monitoing through multiple years, and photopoints. We want to measure the relative success of the Canada rye revegetation as well as quantify how resistant Canada rye is to undesirable non-native plant species encroachment.

7. Relationship to NDOW Plans, Policies, and Programs

Corners for Quail is an NDOW sponsored program established to work with private landowners to improve upland game bird resources.

Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Corners for Quail - Quinn River Valley - Vanderhoke**

Name of Proposed Project Manager: **Bobby Jones**

Please provide a breakdown of the project's total costs over the life of the project in the table below. If your project is expected to last more than one fiscal year, define the total to be spent during each fiscal year in your response to question XI in the project's proposal form and not in this table. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be included in your cost estimate.

Project Components	*Costs to be Paid by NDOW Special Reserve Account(s)*	*Costs to be Paid by Other Sources*
1. Land Acquisitions		
2. Personnel Costs		
A. NDOW Personnel		
B. Other Personnel - Drill Seeding Labor	$ 1,100.00	$ 5,000.00
C. Total Personnel Costs	$ 1,100.00	$ 5,000.00
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A.		
B.		
C. Total Equipment Costs		
5. Materials		
A. Canada wildrye seed	$ 9,900.00	
B.		
C.		
D. Total Materials Costs	$ 9,900.00	$ -
6. Miscellaneous		
A.		
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ -	$ -
7. In-Kind Services		
A. Labor - Mike Vanderhoke		$ 110.00
B.		
C. Total In-Kind Services	$ -	$ 110.00
Subtotals	$ 11,000.00	$ 5,110.00
Total Project Costs	$	16,110.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	Key Pittman WMA Wildlife Food Plots			
Project Manager:	Ron Mills	Phone: 7757253521	Email	rmills@ndow.org#mailto:rmills@ndow.org#
Project Monitor:	Mike Zahradka		Start Date:	8/15/2017
Implementation Lead:	Nevada Department of Wildlife		End Date:	6/1/2018
Partners:	Nevada Department of Wildlife			
Project Category:	Habitat Creation or Enhancement			
Project Category:				
Project Actions:				
Priority Resource:				
Priority Species:				
County Location:	Lincoln			

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Duck Stamp	$2,600		
NDOW Upland Game Stamp	$3,900		
Project Totals:	**$6,500**		

Project Proposal

1. Brief Purpose and Goal of the Project

To complete annual plantings and vegetation manipulation, and to enhancing existing habitat on the management area for the benefit of wildlife. The food plot program incorporates forbs, grasses, nitrogen fixing plants and cereal grains to provide forage for wildlife and maintain and/or improve the soil for better production, reduce noxious and invasive weeds and eliminate the need for commercial fertilizer.

To provide a measurable increase of wildlife use with increased hunter and public use and hunter success.

2. Project Approach and Tasks

Duck Stamp and Upland Game Bird Stamp funds will be used to purchase the seed to be planted as part of this project. Then on October first, the food plot fields will be mowed, disked, seed drilled (fall/winter cereal grains and legumes) and irrigated. At the same time the NW corner of the Frenchy Unit is mowed.

In December and January grass seed is broadcast in deficient habitats mostly created by noxious weed treatments or other mechanical disturbances such as fuel/fire breaks. In February or March the food plots are seeded again with additional cereal grains, forbs, legumes and sunflower. At this time the northern impoundments are drained. In June millet and sunflower is broadcast along portions of the pond edges. In mid-July grazing begins. In mid-August the desirable native vegetation (goose foot and alkali bulrush) has matured and the northern impoundments are mowed and filled with water. During the last week of August the food plots are strip mowed for the dove season. At the end of September the dove season ends and the grazing lease ends and the cycle starts again. Due to the extended dove season conflicting with the waterfowl season opener, the food plots have to be mowed, disked, seeded and irrigated prior to the waterfowl opener starting around October 1st.

3. Anticipated Beneficial Effects of the Project

The food plot program incorporates forbs, grasses, nitrogen fixing plants and cereal grains to provide forage for wildlife and maintain and/or improve the soil for better production, reduce noxious and invasive weeds and eliminate the need for commercial fertilizer.

4. Project Schedule

The project schedule is described in the project approach section above.

5. Required Clearance Activities and Schedule (NEPA, other permits, authorizations)

N/A

6. Monitoring Plan

The use of the area by waterfowl, quail, dove, cottontail rabbit and deer will be documented, as will the expected improvement in harvest of game species. Benefits to non-game species such as small mammals, raptors, song birds, reptiles and other species is another bonus of this project but is difficult to quantify. The KPWMA Food Plot program is an ongoing, yearly habitat management activity. The results of food plots in FY18 will be evaluated for their effectiveness and benefit to wildlife and sportsmen.

7. Relationship to NDOW Plans, Policies, and Programs

Annual habitat maintenance and enhancement is identified in all of the current WMA Conceptual Management Plans. Desired Outcome: Wildlife habitats that are in good ecological condition, capable of supporting a diverse array of wildlife species. Goal: Habitat is the key to the success of all wildlife populations. Effective habitat is an integral function of the Department of Wildlife. NDOW will preserve and protect quality habitat and enhance deficient
habitats. Objective: Maintain, protect and enhance wildlife habitats on wildlife management areas (WMA's) by applying good science and best management practices through implementation of Comprehensive Management Plans on all WMA's (Comprehensive Strategic Plan). Achieve an overall goal of no net loss of wetland area or function and the long-term goal to enhance and increase wetland quantity and quality within the WMA (Wetland Conservation Plan).

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Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	Bi-State Conifer Removal Project - Pine Nut Mtns
Project Manager:	Jasmine Kleiber Phone: 775-688-1444 Email jkleiber@ndow.org
Project Monitor:	Jasmine Kleiber Start Date: 9/1/2016
Implementation Lead:	Nevada Department of Wildlife End Date: 6/30/2018
Partners:	Bureau of Land Management, Smith Valley Conservation District, Nevada Department of Wildlife
Project Category:	Habitat Restoration
Project Category:	Conifer Removal: Phase 1 & 2
Project Actions:	
Priority Resource:	Small game
Priority Species:	Sage grouse
County Location:	Lyon

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
Bureau of Land Management	$124,984	$124,984	$0
Conservation District			$12,000
atural Resources Conservation Servic			$8,000
NDOW Habitat Conservation Fee	$77,016	$27,016	$0
NDOW Upland Game Stamp	$50,000		$0
Project Totals:	**$252,000**	**$152,000**	**$20,000**

Project Proposal

1. Brief Purpose and Goal of the Project

The purpose of this project is to restore and maintain sagebrush habitats by improving habitat for bi-state sage-grouse. The focus of this project is the complete removal of pinyon-juniper trees in sagebrush areas in order to create additional sage-grouse habitat and movement corridors. This is planned to occur on approximately 1,750 acres in areas where sage-grouse have been identified as present by telemetry studies (see the attached map). Approximately half of the area will be completed in FY18. This project has

been coordinated with BLM and NRCS, and will be completed in close collaboration with both agencies. NRCS has invested over $870,000 to-date on Bi-State sage-grouse projects in the Pine Nut mountain range, and completed the tree density surveys in 2017 for this project.

2. Project Approach and Tasks

1. Project Scoping/Planning – NRCS/NDOW collaboration. This step has been completed in order to assess current conditions of site including conifer density and understory conditions. Meetings have occurred with NDOW, NRCS, Smith Valley Conservation District (SVCD) and BLM permittee for planning purposes. NDOW and SVCD are communicating with the BLM directly. This project is planned over the course of FY17 and FY18.
2. Sub-Grant Agreement: Subgrant Agreement NPCD-1029 is currently in place with SVCD to execute this work.
3. NRCS/NDOW Planning: NRCS planning will be coordinated with NDOW and SVCD to establish course of action for treatment and post-treatment data collection.
4. FY17 Treatment Approval: SVCD and NDOW will receive approval to begin conifer removal treatments. Treatments are currently scheduled to begin after sage-grouse brood-rearing season and migratory bird season ends and are in coordination with NDOW game and non-game biologists for the area. No fisheries are in or near the project area.
5. Invoices: SVCD will submit invoice(s) to NDOW for reimbursement for services rendered for conifer removal.
6. Field Verification NRCS & NDOW will perform post-treatment verification after each treatment to determine compliance with agreed upon treatment protocols and treatment completion. Verification outcome will determine if invoice(s) will be approved and reimbursement will be issued.
7. Payment for Services: NDOW will be responsible for issuing payment.
8. Post-Treatment Monitoring: NRCS and NDOW will be collaborating on post-treatment vegetation data collection.
9. FY17 Mapping & Reporting: All mapping and reporting on funds and acreages will performed by NDOW and submitted to appropriate partners/agencies after each treatment as required. These partners/agencies may include NDOW, NRCS, SVCD, the Sage Grouse Initiative, Bi-State Local Area Working Group, BLM, NDF, and USFS.
10. FY18: FY18 tasks will include Treatment Approval, Treatment, Invoicing, and NRCS/NDOW Field Verification. Project completion is estimated to be end of FY18.

3. Anticipated Beneficial Effects of the Project

This area is identified as core habitat for Bi-State sage-grouse and has had numerous vegetation treatments completed previously by NRCS, NDOW, BLM, and USFS (see figure above) to improve habitat conditions and movement for sage-grouse in the area. Restoring habitat for sage grouse also helps many other sagebrush-dependent species. More than 350 species of wildlife, plants, and invertebrates depend on sagebrush habitat and many species have experienced population declines due to environmental factors including conifer encroachment.

4. Project Schedule

Fiscal Year 2017
Spring, 2017 Monitoring - NDOW
June 30, 2017 FY17 Reporting - NDOW

Fiscal Year 2018
Timeframe Task Responsible Parties
July, 2017 FY18 NRCS/NDOW Planning NRCS, NDOW
September-October, 2017 FY18 Treatments SVCD
September-December, 2017 Invoices Submitted to NDOW SVCD
September-October, 2017 Field Verification NDOW, BLM
January-February, 2018 Payment(s) Issued NDOW
Spring, 2018 Post-Treatment Monitoring NDOW

5. Required Clearance Activities and Schedule (NEPA, other permits, authorizations)

DNA signed August 17, 2016

6. Monitoring Plan

This project will assess and treat (remove) Phase I and Phase II pinyon and juniper stands within the Pine Nut mountains in the Bi-State area. This area is identified as core habitat for Bi-State sage-grouse and has had numerous vegetation treatments completed previously by NRCS, NDOW, BLM, and USFS (see figure above) to improve habitat conditions and movement for sage-grouse in the area. Restoring habitat for sage grouse also helps many other sagebrush-dependent species. More than 350 species depend on sagebrush habitat and many species have suffered population declines due to environmental factors including conifer encroachment. The project reflects ongoing cooperative efforts with state and federal agencies to develop and implement landscape-level conservation for the Bi-State sage-grouse.

Effectiveness of the project will be measured using quantitative data collection methods consistent with BLM, NRCS and NDOW vegetation data collection. Tree density has been determined by NRCS during scoping/planning to more accurately estimate project costs. Methods for collecting pre-treatment tree/conifer density were consistent with NRCS quantitative methods. Post-treatment tree/conifer monitoring will occur through photo documentation, understory plant inventories and pre- and post-treatment mapping. Vegetative understory will be measured pre- and post-treatment using the BLM Assessment, Inventory, and Monitoring methodology, consistent with NDOW Partners for Conservation & Development practices. Monitoring project success will occur through collaborative efforts between Jasmine Kleiber (NDOW) and the NRCS Minden Field Office, in direct communication with the SVCD, BLM, and BLM permittee for the allotment within the project area.

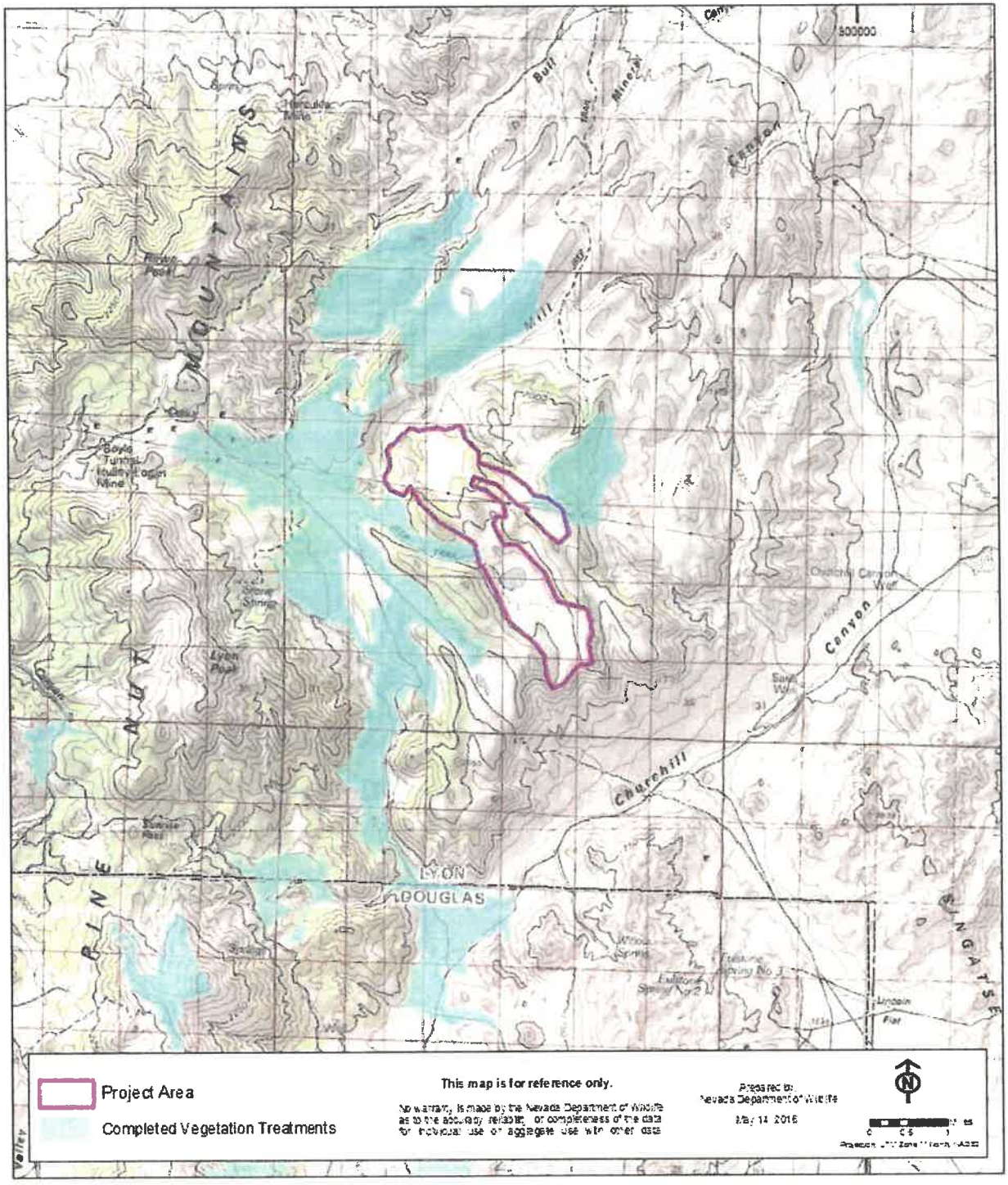
7. Relationship to NDOW Plans, Policies, and Programs

NDOW strives to work with multiple stakeholders to assess key habitats and species likely to be affected by varying stressors, including habitat degradation and/or loss, and to develop effective strategies and plans for managing Nevada's wildlife resources. This project aims to improve habitat conditions for the Bi-State sage-grouse and other species dependent on sagebrush ecosystems, while working collaboratively as a partner with multiple interested parties including private landowners/permittees and state and federal agencies. The BLM is currently working on implementing several conifer removal and enhancement projects in the Pine Nuts. NRCS has cooperated previously with private landowners and permittees to remove conifer and improve Bi-State sage-grouse habitat utilizing both Sage Grouse Initiative (SGI) and EQIP funding and will be providing CTA assistance through SGI. The Smith Valley Conservation District is likewise working with private landowners and permittees, as well as state and federal agencies to provide on-the-ground assistance advising on and executing project work.

NDOW biologists from the Game and Diversity divisions were consulted to assess any concerns with removing conifer in the proposed project area. All concerns were oriented around migratory bird nesting seasons and bear use in the area. Concerns were addressed through timing restrictions for activity in the area and through the modification of planned tree removal areas

Location of Bi-State Conifer Removal Project

Eastern Slope of Pine Nut Mountains, Lyon County, Nevada



Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Bi-State Conifer Removal Project - Pine Nut Mtns**

Name of Proposed Project Manager: **Jasmine Kleiber**

Please provide a breakdown of the project's total costs over the life of the project in the table below. If your project is expected to last more than one fiscal year, define the total to be spent during each fiscal year in your response to question XI in the project's proposal form and not in this table. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be included in your cost estimate; you must use alternative funding sources to cover these types of costs.

Project Components	*Costs to be Paid by NDOW Special Reserve Account(s)*	*Costs to be Paid by Other Sources*
1. Land Acquisitions		
2. Personnel Costs		
A. NDOW Personnel		
B. Other Personnel		
C. Total Personnel Costs	$ -	$ -
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A.		
B.		
C. Total Equipment Costs	$ -	$ -
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Conifer Removal (Phase I) 720 ac	$ 88,508.00	$ 17,000.00
B. Conifer Removal (Phase II) 155 ac	$ 38,508.00	$ 10,000.00
C. FY17 Costs already paid by BLM		$ 124,984.00
D.		
F. Total Miscellaneous Costs	$ 127,016.00	$ 151,984.00
7. In-Kind Services		
A. Smith Valley Cons. District		$ 12,000.00
B. NRCS		$ 8,000.00
C. Total In-Kind Services	$ -	$ 20,000.00
Subtotals	$ 127,016.00	$ 171,984.00
Total Project Costs	$	299,000.00

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Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	Gold Butte Post-Fire Upland Habitat Restoration Project		
Project Manager:	Anthony Miller	Phone: 702-280-1177 Email ajmiller	
Project Monitor:	Matt Flores	Start Date:	10/2/2017
Implementation Lead:	Nevada Department of Wildlife	End Date:	12/31/2020
Partners:	Nevada Department of Wildlife, Bureau of Land Management		
Project Category:	Habitat Restoration		
Project Category:	Fire Rehabilitation - Upland Habitat		
Project Actions:			
Priority Resource:	Small game		
Priority Species:	Quail		
County Location:	Clark		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Upland Game Stamp	$25,000		
Project Totals:	**$25,000**		

Project Proposal

1. Brief Purpose and Goal of the Project

The purpose of this project is to restore habitat at guzzlers within burned areas while utilizing native cover plants that benefit wildlife. By increasing the amount of vegetation near guzzlers, NDOW hopes to increase wildlife use of the guzzlers and adjacent areas. Primary species that will benefit include Gambel's quail, chukar, mourning dove, desert cottontail, and likely will benefit multiple other wildlife species dependent on free water.

2. Project Approach and Tasks

In conjunction with fire prevention projects associated with the BLM's Healthy Lands Initiative and the Mojave Desert Initiative, NDOW proposes to augment those efforts by furthering NDOW's 2006 Habitat Headstart at guzzler locations affected by wildfire. Results from NDOW's 2006 Headstart project are promising for restoring habitat structure at guzzlers within burned areas utilizing native cover plants that benefit wildlife using guzzlers. To reduce wildfire potential, BLM will be creating fuel breaks by treating brome grasses with herbicide along roads and subsequently seeding for green stripping. The

roadways will include access roads leading to area guzzlers. During implementation of the project NDOW will subsequently plant perennial native vegetation at or adjacent to described small game water developments. Plantings will be protected from herbivores and monitoring of the planting sites will be necessary to ensure the survival of new plants.

3. Anticipated Beneficial Effects of the Project

Restoration of strategically located islands of habitat, and connectivity of intact habitats. Establishing and maintaining habitat corridors is key for plants and wildlife. An increase in wildlife usage at and near the small game guzzlers located near the restoration sites.

4. Project Schedule

Multi-year project - 3 years
Fall 2017– BLM application of herbicide for fuel break. Winter 2017 – BLM seeding for restoration.
Winter 2017 / Spring 2018 – NDOW habitat restoration planting.

5. Required Clearance Activities and Schedule (NEPA, other permits, authorizations)

The BLM Southern District Office has prepared a Determination of NEPA Adequacy (DNA) document for the above described federal actions and it includes NDOW's restoration work at selected sites on BLM-managed lands.

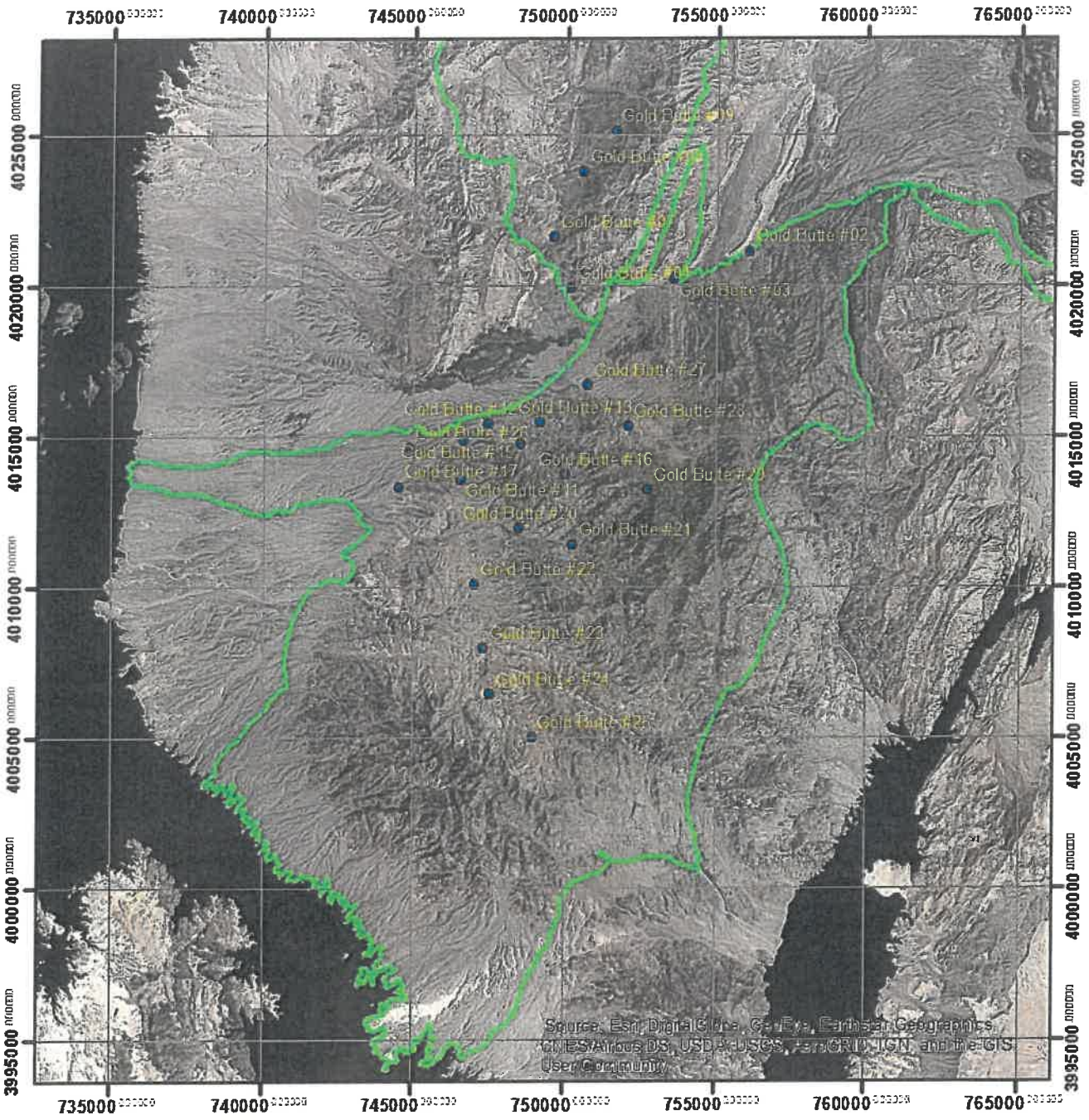
6. Monitoring Plan

Regular site assessment of plant health and size, water requirements, and herbivore protection cages. Presence of wildlife and targeted species will be assesed in relationship to habitat enhancement.

7. Relationship to NDOW Plans, Policies, and Programs

This project is consistent with NDOW Habitat Division's program emphasis: 1) Protect, enhance, and rehabilitate wildlife habitats throughout the State; 2) Enhance water deficient habitat for wildlife through the effective development and maintenance of water sources;, 3) Develop positive communication with partner governmental agencies having land management or wildlife habitat responsibilities.

Gold Butte Small Game Guzzler Fire Rehab Map



Legend

- Gold Butte guzzlers restoration sites
- Gold Butte Fires Boundary

Map indicates small game guzzlers located within the Fork and Tramp fires of 2005. These guzzlers have been identified as targets for restoration planting efforts up to 50m from the guzzler itself.

Matt Flores 5/9/17
1:200,000 scale map
Nad 83 Zone 11N

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W E
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Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Gold Butte Post-Fire Upland Habitat Restoration Project**

Name of Proposed Project Manager: **Anthony Miller**

Please provide a breakdown of the project's total costs over the life of the project in the table below. If your project is expected to last more than one fiscal year, define the total to be spent during each fiscal year in your response to question XI in the project's proposal form and not in this table. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be included in your cost estimate; you must use alternative funding sources to cover these types of costs.

Project Components	*Costs to be Paid by NDOW Special Reserve Account(s)*	*Costs to be Paid by Other Sources*
1. Land Acquisitions		
2. Personnel Costs		
A. NDOW Personnel		
B. GBI Personnel	$ 15,000.00	
C. Total Personnel Costs	$ 15,000.00	$ -
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A.		
B.		
C. Total Equipment Costs	$ -	$ -
5. Materials		
A. Dri-Water Irrigation	$ 3,000.00	
B. Plant cages	$ 3,200.00	
C. Plants	$ 3,300.00	
D. Total Materials Costs	$ 9,500.00	$ -
6. Miscellaneous		
A. Misc. supplies	$ 500.00	
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 500.00	$ -
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 25,000.00	
Total Project Costs	$	25,000.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	Kane Springs Valley Post-Fire Upland Habitat Restoration Project		
Project Manager:	Anthony Miller	Phone: 702-280-1177 Email ajmiller	
Project Monitor:	Matt Flores	Start Date:	10/1/2017
Implementation Lead:	Nevada Department of Wildlife	End Date:	4/30/2018
Partners:	Nevada Department of Wildlife, Bureau of Land Management		
Project Category:	Habitat Creation or Enhancement		
Project Category:	Small game water development		
Project Actions:			
Priority Resource:	Small game		
Priority Species:	Quail		
County Location:	Lincoln		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
Bureau of Land Management	$235,000	$235,000	
NDOW Upland Game Stamp	$29,700		
USFWS Wildlife Restoration Grant	$5,300	$5,300	
Project Totals:	**$270,000**	**$240,300**	

Project Proposal

1. Brief Purpose and Goal of the Project

The purpose of this project is to restore wildlife habitat at guzzlers within burned areas. The restoration work will use native cover plants that benefit wildlife using nearby guzzlers. It is anticipated that wildlife usage will increase at the guzzlers near the restoration sites. The primary species that will benefit include Gambel's quail, chukar, mourning dove, desert cottontail, and multiple other wildlife species dependent on free water.

2. Project Approach and Tasks

To reduce wildfire potential, BLM will be creating fuel breaks by treating brome grasses with herbicide along roads and subsequently seeding for green stripping. The roadways will include access roads leading to area guzzlers. During implementation of the project NDOW will subsequently plant perennial

native vegetation at or adjacent to described small game water developments. Plantings will be protected from herbivores and monitoring of the planting sites will be necessary to ensure the survival of new plants and viability of wildlife habitat.

3. Anticipated Beneficial Effects of the Project

Restoration of strategically located islands of habitat, and connectivity of intact habitats. Establishing and maintaining habitat corridors is key for plants and wildlife. An increase in wildlife usage at the guzzlers located near the restoration sites.

4. Project Schedule

Fall 2017 - BLM application of herbicide for fuel break.
Fall/Winter 2017- BLM seeding for restoration.
Winter 2017/Spring 2018 – NDOW habitat restoration planting.

5. Required Clearance Activities and Schedule (NEPA, other permits, authorizations)

The BLM Ely District Office has prepared a Determination of NEPA Adequacy (DNA) document for the above described federal actions and include NDOW's restoration objectives at selected sites on BLM-managed lands.

6. Monitoring Plan

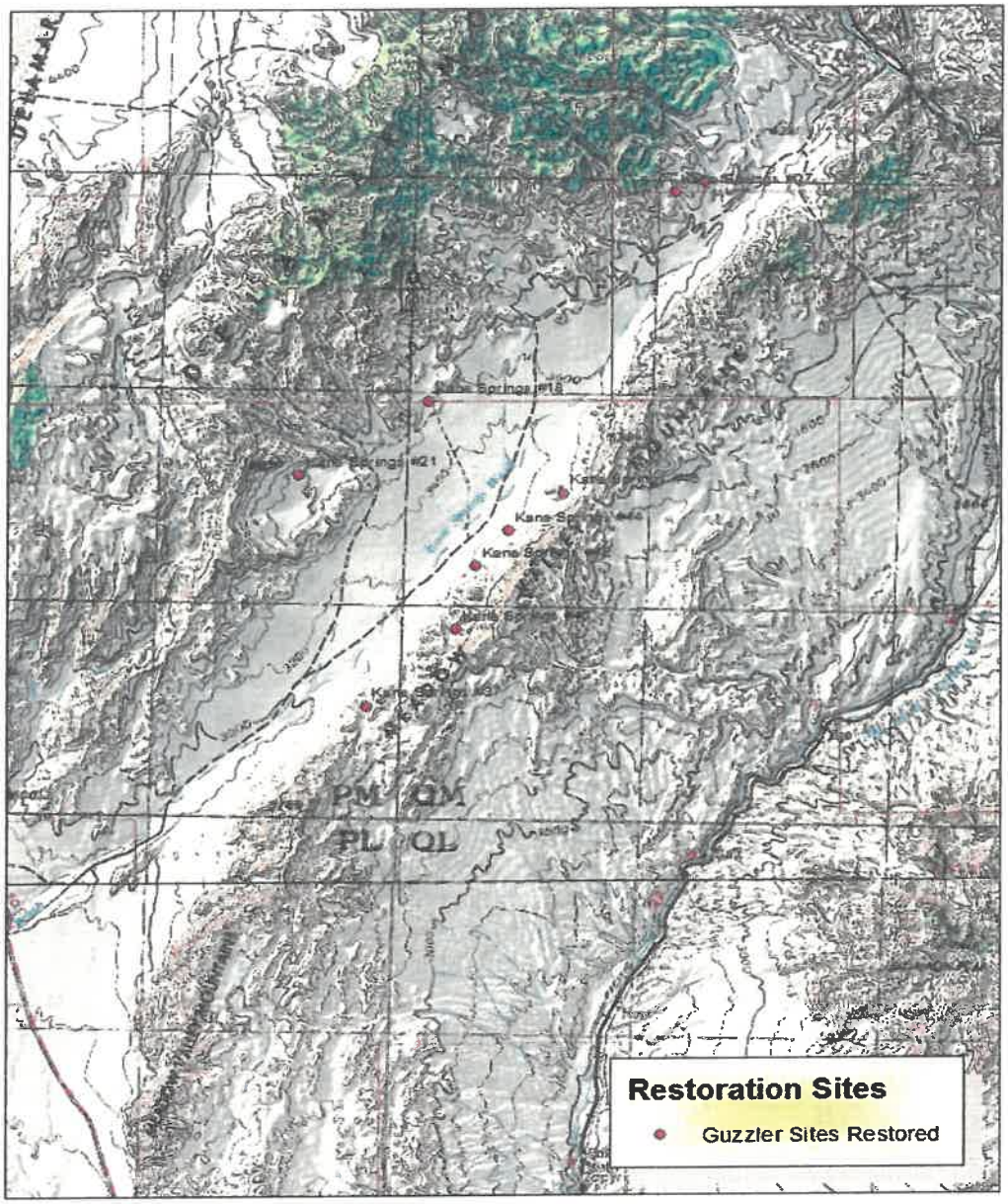
Regular site assessment of plant health and size, water requirements, and herbivore protection cages. Presence of wildlife and targeted species will be assesed in relationship to habitat enhancement.

7. Relationship to NDOW Plans, Policies, and Programs

This project is consistent with NDOW Habitat Division's program emphasis: 1) Protect, enhance, and rehabilitate wildlife habitats throughout the State; 2) Enhance water deficient habitat for wildlife through the effective development and maintenance of water sources;, 3) Develop positive communication with partner governmental agencies having land management or wildlife habitat responsibilities.

Location of Kane Springs Valley Guzzler Restoration Sites

Lincoln County, Nevada



Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Kane Springs Valley Post-Fire Upland Habitat Restoration Project**

Name of Proposed Project Manager: **Anthony Miller**

Please provide a breakdown of the project's total costs over the life of the project in the table below. If your project is expected to last more than one fiscal year, define the total to be spent during each fiscal year in your response to question XI in the project's proposal form and not in this table. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be included in your cost estimate; you must use alternative funding sources to cover these types of costs.

Project Components	*Costs to be Paid by NDOW Special Reserve Account(s)*	*Costs to be Paid by Other Sources*
1. Land Acquisitions		
2. Personnel Costs		
A. NDF Personnel	$ 8,500.00	
B. GBI Personnel	$ 8,500.00	
C. Total Personnel Costs	$ 17,000.00	$ -
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A. Hand and Power Tools		$ 1,500.00
B. Utility Trailer		$ 3,800.00
C. Total Equipment Costs	$ -	$ 5,300.00
5. Materials		
A. Dri-water Irrigation	$ 3,500.00	
B. Plant cage materials	$ 3,200.00	
C. Plants	$ 5,500.00	
D. Total Materials Costs	$ 12,200.00	$ -
6. Miscellaneous		
A. Misc. supplies	$ 500.00	
B. BLM creation of fuelbreaks & seeding		$ 235,000.00
C.		
D.		
F. Total Miscellaneous Costs	$ 500.00	$ 235,000.00
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 29,700.00	$ 240,300.00
Total Project Costs	$	270,000.00

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Wildlife Reserve Account Project Proposal

Project Summary

Project Name: Eastern Nevada Properties Weed Control

Project Manager: Matt Glenn Phone: 775-777-2369 Email mglenn@ndow.org

Project Monitor: Steve Foree Start Date: 7/1/2017

Implementation Lead: Nevada Department of Wildlife End Date: 6/30/2018

Partners: Nevada Department of Wildlife, Cooperative Weed Management Areas

Project Category: Habitat Restoration

Project Category: Upland Habitat Improvement

Project Actions:

Priority Resource: General Habitat Improvement

Priority Species:

County Location: Elko, Nye, White Pine

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Duck Stamp	$25,000		
NDOW Upland Game Stamp	$25,000		
Project Totals:	**$50,000**		

Project Proposal

1. Brief Purpose and Goal of the Project

NDOW is mandated by state law to control listed noxious weeds found on our property. Removal of noxious and undesirable weeds improves the appearance of the treated area and public access, limits the spread of these weeds to other areas, and enhances wildlife habitat. The goal of this project is to realize these benefits by removing such noxious/invasive weeds as Russian knapweed, hoary cress, perennial pepperweed, and Canada thistle from eight NDOW-owned properties in eastern Nevada.

2. Project Approach and Tasks

Awarded funds will be used to purchase herbicides and hire contract labor to maintain and enhance current weed control efforts on NDOW-managed lands. NDOW's Habitat Division staff in the Eastern Region, and related WMA staff in the Eastern Region and northern portion of the Southern Region have

the responsibility to oversee management of over 50,000 acres of State owned property. This responsibility falls to two individuals based in the Elko NDOW office and Kirch and Steptoe WMA staff. In order to address increasing issues with weeds, and given the substantial duties of NDOW staff related to tasks other than fighting weeds, we are in need of additional monies to contract out much of the weed spraying to improve the effectiveness of weed control efforts. NDF crews and Tri-County weed contractors are the most likely contractors to conduct the spraying.

Examples of specific tasks to be accomplished by this project are provided below.

A. Perennial pepperweed (Lepidium lotifolium), and hoary cress (Cardaria draba) will be treated in the spring and summer of 2018 by applying appropriate herbicides from ATV, truck, and backpack sprayers. The chemicals chosen for control of these species will be determined by the characteristics of the site and the life stage of the plant; all chemicals are applied according to their labels.

B. Ditches, water control structures, boating access points, parking lots and right-of-ways will be treated, as needed, in the summer of 2018 by applying glyphosate herbicide from ATV, truck, and backpack sprayers. Control of undesirable vegetation in ditches and water control structures is essential for water delivery to reservoirs, wetland impoundments, and irrigation of food plots.

C. Russian knapweed (Acroptilon repens), and Canada thistle (Cirsium arvense) will be treated in the fall of 2017 and spring of 2018 by applying appropriate herbicides from ATV, truck, and backpack sprayers.

D. Emergent vegetation on wetland impoundments and reservoirs will be treated, as needed, with aquatic approved glyphosate in late summer 2017. Treatments on reservoirs will be completed using a boat mounted sprayer, wetland impoundments will be treated with an ATV sprayer. Treatment of emergent vegetation in these areas will improve feeding, resting, nesting, and brood rearing habitat for waterfowl.

3. Anticipated Beneficial Effects of the Project

There will be a major reduction in noxious and other types of invasive weed species at the treated areas, thus improving the quality of wildlife habitat.

4. Project Schedule

This project is an ongoing, yearly habitat management activity. Herbicide treatments to vegetation on the WMAs will primarily occur in the late summer and fall of 2017 and the spring and summer of 2018. Please see the proposed tasks above for the timing of treatment for each type of targeted vegetation.

5. Required Clearance Activities and Schedule (NEPA, other permits, authorizations)

N/A

6. Monitoring Plan

Monitoring through yearly inspections will determine the effectiveness of our treatments. Treated sites will be evaluated after application of herbicides to determine the effectiveness of the timing, method and chemicals chosen for the treatment. Effective treatments will show a significant die-off of targeted vegetation after treatment and reduced regrowth the following growing season. The vegetation control will improve habitat values and public access.

7. Relationship to NDOW Plans, Policies, and Programs

This program certainly falls within NDOW's general goal of maintaining and enhancing habitats. More specifically, the Conceptual Management Plans for the WMAs all contain goals and objectives such as the following: "Goal: Habitat is the key to the success of all wildlife populations. Effective habitat is an integral function of the Department of Wildlife. NDOW will preserve and protect quality habitat and

enhance deficient habitats. Objective: Maintain, protect and enhance wildlife habitats on wildlife management areas (WMA's) by applying good science and best management practices through implementation of Comprehensive Management Plans."

Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Eastern Nevada Properties Weed Control**

Name of Proposed Project Manager: **Matt Glenn**

Please provide a breakdown of the project's total costs over the life of the project in the table below. If your project is expected to last more than one fiscal year, define the total to be spent during each fiscal year in your response to question XI in the project's proposal form and not in this table. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be included in your cost estimate; you must use alternative funding sources to cover these types of costs.

Project Components	*Costs to be Paid by NDOW Special Reserve Account(s)*	*Costs to be Paid by Other Sources*
1. Land Acquisitions		
2. Personnel Costs		
A. NDOW Personnel		
B. Other Personnel (NDF crews or other weed spraying contractors)	$ 41,000.00	
C. Total Personnel Costs	$ 41,000.00	$ -
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A.		
B.		
C. Total Equipment Costs	$ -	$ -
5. Materials		
A. Herbicides, dye & surfactants	$ 9,000.00	
B.		
C.		
D. Total Materials Costs	$ 9,000.00	$ -
6. Miscellaneous		
A.		
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ -	$ -
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 50,000.00	
Total Project Costs	$	50,000.00