Nevada Department of Wildlife

Upland Game Bird Stamp Program
Fiscal Year 2019

June 2018

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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 2018

Columbian Sharp-tailed Grouse Restoration Project

Other Funding Sources: NDOW's Game Management Grant (75%)
Project Start Date: April 2013
Estimated Completion Date: The fifth and final year of originally agreed upon translocations with the Idaho Department of Fish and Game was completed in April of 2017. We feel that it may be necessary to conduct additional augmentations of between 5-10 hens with broods each year for two years to establish a self-sustaining population. It would be preferable to collect birds from British Columbia; however, this may be too logistically challenging to implement.

In a collaborative, multi-agency effort to reestablish a viable population of CSTG in northeastern Nevada, 215 Columbian sharp-tailed grouse (CSTG) from 15 lek sites in southeastern Idaho were translocated to the Bull Run Basin in Elko County, NV, during April 2013 – 2017. Of these, 134 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). A CSTG lek survey conducted on April 18, 2018 found 14 males and 1 female were at the known main lek. Additionally, 2 males were observed to the north, 7 males were observed to the east and another 3 males were observed on a potential satellite lek further south of the main lek. In all, a minimum of 26 male CSTG were observed compared to 18 males at the main lek and associated satellite leks in 2017. A follow up survey conducted on May 5, 2018 documented 29 male CSTG at the lek sites described above.

Capture and Known Fate Results

During April of 2017, 24 females were captured and translocated to Nevada; however, two died in the release boxes prior to their actual release. Table 1 shows the complete release history for this five-year restoration effort.

Table 1. Summary of CSTG translocations from 2013-2017.

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

In 2017, research crews obtained 108 locations from 24 CSTG (n = 1 translocated in 2015; n = 11 translocated in 2016; n = 12 translocated in 2017). However, many of these were mortality locations from CSTG which perished overwinter. The average distance from the release location that a CSTG was found during the field season was 5.7 (± 9.0) km, and 95% of all locations were located within 3.9 (± 5.8) km of the release location. These values are larger than in previous seasons because the sample size in 2017 was smaller, and a few grouse were routinely located well away from the release site (e.g. one nest was located ~ 34 km from the release site). All telemetry locations are used to develop utilization distribution models which categorize high and low use areas (Figure 1).

Survival

Research crews radio-marked 14 of 24 translocated female grouse in 2017. Of those, two died during transport form the source site prior to release, and 6 died within the first 60 days post-release. In 2017, translocated female grouse had a 10-day probability of survival of 0.93 (95% CI 0.84 – 0.96), and a 0.32 (95% CI 0.08 – 0.55) cumulative probability of surviving the entire 150-day field season (April – September). In 2017, translocated grouse had a 0.80 (95% CI 0.60 – 0.89) monthly survival probability, and a 12-month annual probability of survival of 0.06 (95% CI 0.0 – 0.23). Through the end of October, 2017, there were an estimated 2 – 5 VHF collared CSTG alive at the release site.

When all grouse were pooled into one analysis regardless of release date, the monthly survival probability from April 2013 – October 2017 was 0.88 (95% CI 0.86 – 0.89; Table 1), and the cumulative annual survival probability for this period was 0.20 (95% CI 0.15 – 0.25).

Nest Survival

Six nests (n = two hatch; n = four failure) from six grouse (n = two translocated in 2016; n = four translocated in 2017 were monitored. While only two nests hatched, three of the four failures survived for 30+ days before failing. Two of those females were killed while on nest recess, and the third nest presumably failed while hatching. Because each nest survived for several weeks before failure, the modeled probability of nest survival is higher than the apparent nest survival of 33%. In 2017, CSTG nests had a daily survival rate of 0.98 (95% CI 0.95 – 0.99) and a cumulative probability of nest survival of 0.46 (95% CI 0.13 – 0.75).

Since the beginning of the project, 103 CSTG nests have been located within, near, and outside of the release area. Of these, 60 successfully hatched (58% apparent nest success). The cumulative daily survival probability of a CSTG nest across all years of the project was 0.98 (95% CI 0.97 – 0.98, Table 2) and the cumulative probability that a nest would survive the nesting season across all years was 0.46 (95% CI 0.35 – 0.56, Table 2).

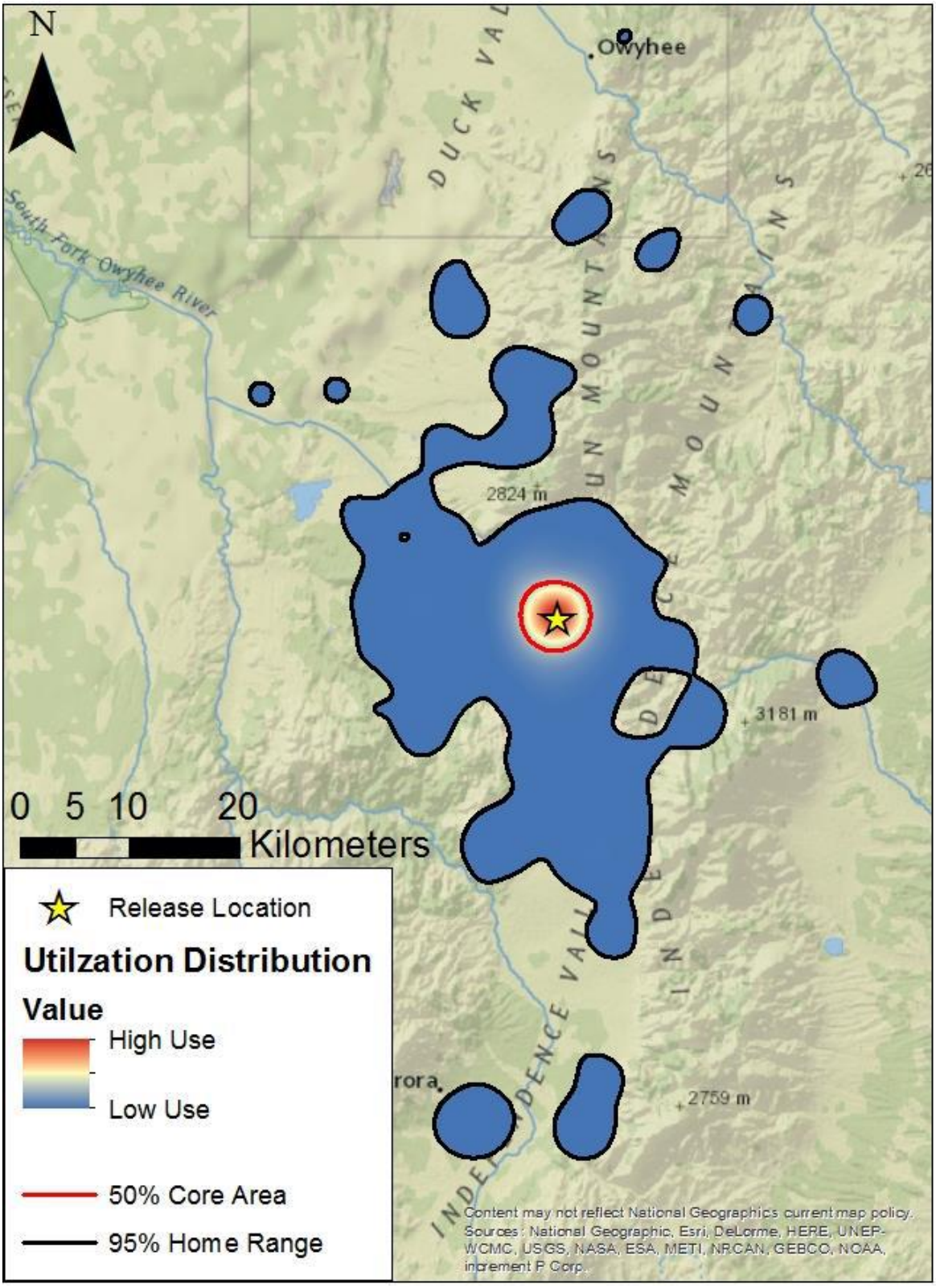


Figure 1. Utilization distribution of translocated Columbian sharp-tailed grouse from 2013-2017. Fifty percent of all telemetry locations are within the red line (high use area) and 95% are within the black line. This information is preliminary and subject to revision.

Table 2. Nesting survival statistics accumulated from 2013-2017.

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
2017	6	2	0.98	0.46	9.2
Average:	20.6	12.0	0.98	0.46	10.2

*The laying and incubation period is estimated to be 37 days.

Brood Survival

Only two broods were tracked in 2017, one succeeded, and one failed. The failed brood occurred when the female was killed, approximately nine days after hatch. The successful brood rearing female raised one chick to an age of 50-days post hatch. In 2017, broods had a daily survival rate of 0.98 (95% CI 0.88 – 0.99), and a cumulative probability of brood survival of 0.4 (95% CI 0.0 – 0.86). Cumulative brood survival statistics are provided in table 3.

During 2013 – 2017, 57 females with broods were tracked. Of these, 32 successfully reared a minimum of one chick to 50-days old (56% apparent brood success) bringing a minimum of 90 juveniles into the population. The daily survival probability of a CSTG brood across all years of the project was 0.99 (95% CI 0.98 – 0.99), and the cumulative survival probability that a brood would reach 50 days post-hatch across all years was 0.58 (95% CI 0.42 – 0.70).

After five years of translocations, initial modeling of population persistence indicates that while brood survival is within the normal range of established populations, the chick-survival rate is low. That is, the number of females that successfully reared ≥ 1 chick to an age of 50-days is normal, but in this population, each of those females is rearing on average 1 – 3 chicks, when on average they should be rearing at least 3 – 5 chicks according to published literature. However, many STG and CSTG projects perform their chick-counts at 35 days post-hatch, while we perform our chick counts on day 50. This discrepancy in methodology might account for lower chick survival rates reported.

Table 3. Cumulative brood survival statistics from 2013-2017.

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
2017	2	1	0.98	0.40	1
Total or Average:	12	32	0.99	0.58	90-96

Mountain Quail and Ruffed Grouse Translocation

Other Funding Sources: NDOW's Game Management Grant (75%)
Project Start Date: November 2017
Estimated Completion Date: March 2018 [for Fish Creek Range Mountain Quail release]

Mountain Quail Establishment Project

Over the last two years, the Nevada Department of Wildlife (NDOW) has been releasing mountain quail into the Fish Creek Mountains located in Lander County. During this period, 234 mountain quail have been released into a drainage on the western slope of the Fish Creek Mountains (Figure 2).

The first release occurred during the late winter of 2017 when 88 mountain quail were released after being held over at the Mason Valley Wildlife Management Area (MVWMA) for a period of about 2.5 months. This release was followed by two releases in 2018. The first group of mountain quail, which consisted of 100 banded birds, were retrieved from Oregon in November of 2017 and transported to the holding pens for overwintering at MVMWA. The second group of quail, consisting of 55 birds (all banded), were collected from Oregon on January 12, 2018 and released the next day. These birds were released more immediately due to limited remaining holding space at the MVWMA and the mild winter conditions that northern Nevada was experiencing during December and January. Subsequent to this release, 91 mountain quail that remained at MVWMA were released on February 6, 2018.

Quail call routes will be conducted at least twice during May and June of each year following release for a period of three years to help determine the sustainability of this population. Based on the habitat suitability compared to the Desatoya Range and the Clan Alpine Range, mountain quail should do well in the Fish Creek Mountains.

Figure 2. Fish Creek Mountains mountain quail release site in Lander County, NV.

Ruffed Grouse Establishment Project

A fairly intensive effort was conducted to locate and determine the status of ruffed grouse populations throughout northern Nevada during the spring and summer of 2017. Due to suppressed population sizes at potential source sites as indicated through various surveys, no birds were translocated during the fall of 2017. Drumming counts and summer brood surveys conducted in 2017 indicate that populations of ruffed grouse have still not recovered from lower numbers observed during 2015 and 2016. The status of the population has also been reflected in harvest data that indicated low overall harvest in 2016 (n=131 in 2016 compared to 10-year average of 385) and number of birds taken per hunter day (n=0.3 in 2016 compared to 10-year average of 0.5). Capture and translocation efforts will remain on hold until populations recover.

Figure 3. Strutting ruffed grouse photo taken by Sue Fox.

Greater Sage-grouse Population Monitoring

Other Funding Sources: NDOW's Sage-grouse Conservation Grant (75%)
USFS Good Neighbor Agreement
Project Start Date: July 1, 2017
Estimated Completion Date: June 30, 2018

Lek Count Technicians

We employed three seasonal lek count technicians from March through May of 2018 to assist with sage-grouse lek counts. Two technicians were assigned to the Western Region, but also contributed time to the Southern Region and one technician was assigned to the Eastern Region. Initially, two technicians were also to be assigned to the Eastern Region, but finding a candidate to fulfill that roll proved challenging. These technicians surveyed 7 leks in the Desatoya PMU, 5 leks in the Reese River PMU, 32 leks in Humboldt County (conducted 52 counts) and XX leks in Washoe County. Final data is not yet available to summarize for this report.

Aerial Lek Survey

Eight mornings of aerial helicopter lek surveys were conducted during the spring breeding season in 2018. Including ferry time, a total of 21.8 hours of helicopter time was expended. The areas surveyed include the following:

Humboldt County	Elko County
• Sonoma Range • Black Rock Range • Montana Mountains • Pine Forest Range • Santa Rosa Range	• Gollaher Mountain • O'Neil Basin

No survey results were available during this report writing period to summarize. Helicopter surveys allow biologists to survey several leks in an efficient manner and get to leks that would otherwise be inaccessible by vehicle.

Fixed Wing Infrared Surveys

Surveys to discover sage-grouse leks and to monitor existing known leks were conducted over two periods: late March (3/23 – 3/29) and mid-April (4/10 – 4/11) of 2018 using a fixed wing aircraft outfitted with an Integrated Infrared Imaging Supersystem (IRIS) contracted with Owyhee Air Research. Surveys were conducted during the early morning hours within the following areas:

Nye County	White Pine County	Elko County	Humboldt County	Washoe County
Monitor Range Toquima Range Toiyabe Range	Snake Range Schell Creek Range	Owyhee Desert	Jackson Mountains	Nut Mountain

Methods:

Lek Habitat Suitability Model

We used a Maxent model (version 3.3.3k) to evaluate the effects of various environmental variables contributing to sage-grouse lek habitat suitability. We used 716 active or pending active lek sites in Nevada as presence records for training while 238 leks were used for testing to determine which environmental variables were most predictive of sage-grouse lek sites. The environmental variables considered included aspect, vegetation type, elevation, herbaceous vegetation, shrub cover, shrub height, distance to wet vegetation, distance to flat water and distance to flowing water. The overall effect of each of these variables individually plus any correlations between a selected variable and other variables were presented as response curves by the Maxent model.

Lek Detection Surveys

Surveys were conducted with a P68 Observer aircraft (Figure 4) outfitted with an Integrated InfraRed Imaging Supersystem (IRIS). There are four integrated subsystems that constitute IRIS including 1) a multi-spectral imager mounted to the outside of the aircraft which is made up of a long-range cooled infrared camera, HD daylight camera, low-light camera, and electro-optical system, and a vibration isolator; 2) an augmented reality system computer which provides mapping information and incorporation of satellite and synthetic imagery, digital elevation models, etc.; 3) an Imaging System Interface (ISI) which houses the augmented reality system computer housed inside the aircraft which is equipped with digital video recorders, video converters, data downlink equipment, etc. and 4) high performance touchscreen monitors.

Figure 4. P68 Observer aircraft outfitted with multi-spectral camera.

Lek Detection and Count Results – 2018

Monitor Range

- No new detections during survey

Toiyabe Range

- No new detections during survey

Toquima Range

- Surveyed 5 known leks (2 active with 7 males total)
- Two new possible lek detections (or satellite leks) with 10 males total

North Snake Range

- One likely new lek detection (13 males, 9 females; Figure 5)

North Schell Creek Range

- No detections during survey

Jackson Mountains

- No detections during survey

Nut Mountain (northern Washoe County)

- Surveyed four known leks (1 active with 10 males, Wall Canyon Ranch);
- One new potential lek detection with 22 males (Hanging Rock Canyon)

East Owyhee Desert (Elko County)

- Surveyed 20 known leks (7 active with 68 males total)

Diamond A/Islands (Elko County)

- Surveyed 9 leks on the Diamond A Desert (1 active with 4 males)
- Surveyed 9 leks east of Jarbidge (Islands) (3 active with 48 males)

Figure 5. Potential new lek discovered in the north Snake Range north of Rye Grass Canyon.

<u>Fixed Wing Telemetry Surveys</u>

Fixed wing telemetry surveys are conducted during the fall and winter months when research crews have left the field. These surveys were contracted through Owyhee Air Research located in Murphy, Idaho. The surveys are conducted to not only determine the location of radio-marked sage-grouse, but also to determine whether or not birds are alive or have perished. This allows us to determine monthly, seasonal and annual survival rates. Through the end of April 2018, 23.3 hours of fixed wing flight time had been devoted to aerial survey. The areas surveyed include the following:

- Boulder Mountain - Hayes Canyon Range to Massacre Bench (Washoe County);
- Sheldon National Wildlife Refuge (Humboldt County);
- Santa Rosa Range/western Owyhee Desert (Humboldt County)

Estimating Greater Sage-grouse Vital Rates within Nevada's Most Novel Habitats

Other Funding Sources:	NDOW's Sage-grouse Conservation Grant (75%)
	Ruby Pipeline Mitigation Funding (12.5%)
Project Start Date:	September 2015
Estimated Completion Date:	December 2018

NDOW, the U.S. Geological Survey (USGS) - Western Ecological Research Center and Bureau of Land Management (BLM) initiated a study 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 three years (2016–2018). These two study areas serve as a control sites 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 2016–2017, 88 sage-grouse have been radio-marked in the Monitor Range and 65 sage-grouse in the Santa Rosa Mountains. In Monitor Valley, 33 nests have been documented (successful n = 17; unsuccessful n = 16) while 36 nests were located in the Santa Rosa Range (successful n = 14; unsuccessful n = 22). A total of 1,313 telemetry locations have been collected between both study areas. Research crews conducted 1,317 raptor, raven, and livestock surveys and detected 555 ravens during 301 surveys in both study areas. Primary data collection efforts include gathering baseline data on space use, habitat selection, and population vital rates.

Capture and Monitoring Results (2015-2017)

Monitor Valley

Capture efforts were initiated in the fall of 2015 and 27 VHF collars (n = 27 females) and 4 GPS backpacks (n = 2 females; n = 2 males) were deployed. During spring and fall 2016, 26 VHF collars were deployed on female sage-grouse. During spring and fall 2017, 30 VHF collars were placed on females and one GPS backpack on a male. A total of 693 telemetry locations from 62 radio-collared birds were obtained during 2015–2017. Additionally, 4,894 GPS locations were obtained during September 2015–October 2017. Aerial telemetry flights were conducted for monitoring during the fall and winter seasons and to help find missing birds.

Santa Rosa Range

During spring and fall of 2016, 42 females were captured and outfitted with VHF transmitters. This effort was followed by spring and fall capture efforts in 2017 in which 23 females were captured and radio-marked with VHF transmitters. We obtained 620 telemetry locations from 57 collared females during 2016–2017.

In early spring, female sage-grouse were observed utilizing lower elevation areas. Birds were localized in the area between Coyote Mountain and the North Fork of the Humboldt River. In the summer, females dispersed over a wider range, occupying higher elevation areas near Hinkey Summit and Cold Springs Butte. Females utilized a much greater area during summer, including some individuals that relocated near the Oregon border. Based on limited relocations

during fall, the sage-grouse distribution was spread east and west across the higher elevations of the Santa Rosa and Calico Mountain Ranges with concentrations near Goosey Lake Flat.

Nest Survival

Monitor Valley

Across all study years (2016–2017), the average daily nest survival probability was 0.972 (95% CI, 0.954–0.983) and the cumulative nest survival probability was 0.351 (95% CI, 0.128–0.411). In 2016, six nests were located of which one was successful and five failed. In 2017, 27 nests were located of which 16 were successful and 11 failed. One failed nest showed evidence of avian depredation, and one female abandoned her nest. In 2017, four of the failed nests appeared to be depredated. Three nests were abandoned and one female died on her nest.

Santa Rosa

Across all study years (2016–2017), the daily nest survival probability during the incubation phase was 0.964 (95% CI, 0.946–0.976), and the cumulative nest survival probability was 0.258 (95% CI, 0.128– 0.411).

Thirteen nests were discovered during the 2016 breeding season. Four nests were successful and nine failed. 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. In 2017, 23 nests were located of which 10 were successful and 13 failed. Seven of the failed nests appeared to have failed due to avian depredation, three due to mammalian depredation, and one due to depredation by an unidentified predator. One nest was abandoned, and one nest failed for unknown reasons.

Brood Survival

Monitor Valley

Across all study years (2016–2017), the estimated daily probability of brood survival during 2016−2017 was 0.987 (95% CI, 0.977−0.993), and the estimated probability of a brood surviving the 50-day brood-rearing period was 0.531 (95% CI, 0.309−0.712). Only one successful brood was monitored in 2016. In 2017, 16 broods were monitored of which six were successful, eight failed, and one's fate could not be determined due to collar failure. Of the eight broods that failed in 2017, two failed before the 10-day check, one failed before the 20-day check, one failed before the 30-day check, one failed before the 40-day check, and three failed before the 50-day check.

Santa Rosa

Across all study years (2016–2017), the estimated daily probability of brood survival was 0.975 (95% CI, 0.955–0.987), and the cumulative brood survival probability for the 50-day brood-rearing phase was 0.289 (95% CI, 0.100–0.514).

Thirteen brood-rearing females were monitored in 2016. One brood was successful, three failed, and one had an unknown fate. The successful brood was found at a lower elevation near a

stream in an area of lush vegetation. The research crew was unable to locate one of the females on the 50-day check, leaving the fate of the brood unknown. One brood failed before the 40-day check. The other two broods failed before the 10-day check. In 2017, 10 broods were monitored of which two were successful. Three broods failed before the 10-day check, one brood failed before the 20-day check, one brood failed before the 30-day check, one brood failed before the 40-day check, and one brood failed before the 50-day check.

Figure 6. Santa Rosa study site area photo taken by Sam Daley (USGS) and capture photo taken by Paige Lewandowski (USGS) showing a female sage-grouse being outfitted with a VHF radio transmitter.

Bi-State Sage-grouse Monitoring

Other Funding Sources: NDOW's Sage-grouse Conservation Grant (75%)
Project Start Date: September 2015
Estimated Completion Date: Estimated completion date is 2018 for this initial phase of monitoring. A subsequent phase will begin again after a three year reprieve in 2022.

This monitoring project was designed to measure the effectiveness of management actions developed in the Bi-State Action Plan (2012) and Monitoring Plan (2015) on Bi-State Greater sage-grouse populations. Sage-grouse population vital rates, space-use, habitat selection, and predator community composition are being measured across several study sites within the Bi-State region. Monitoring efforts in the Mount Grant and Desert Creek (hereafter, MG and DC, respectively) populations from 2015–2017 are summarized here, with an emphasis on efforts in 2017. During the fall of 2016, 19 grouse at DC and 23 grouse at MG were captured and radio-marked. In the spring of 2017, an additional 10 grouse at DC and 11 at MG were captured and radio-marked. Including surviving grouse from previous seasons, research crews tracked 40 grouse at DC, and 38 grouse at MG during the 2017 field season. Vital rates measured in 2017 as well as cumulatively across all years of the study are summarized here as well. The object of this research is to provide the most accurate science to guide management decisions.

Capture and Monitoring Results (2015-2017)
The following summarizes the capture and radio-marking work completed during each year of this project:

- Fall 2015 - 12 females captured and radio-marked in MG and 8 in DC;
- Spring 2016 - 10 females captured and radio-marked in MG and 13 in DC;
- Fall 2016 - 21 females captured and radio-marked in MG and 18 in DC;
- Spring 2017 - 9 females and one male were captured and marked at DC while 10 females and one male were captured and radio-marked at MG.
- Fall 2017 - 9 females were captured and marked at DC and an additional 15 females and one male were marked at MG.

During spring (March–May), summer (June–August), fall (September–November), and winter (December–February) of 2013–2017, we obtained 16,916 GPS locations or marked grouse at MG and DC. Utilization distributions were calculated by season for GPS and VHF-marked sage-grouse. The utilization distributions for MG and DC were jointly calculated and are presented on the same map (Figure 7). During the spring, DC and MG sage-grouse concentrated at Nine-mile Flat, a valley southeast of Bald Mountain and southwest of Mt. Grant. Many birds utilized the area surrounding the East Walker River and Rough Creek and some remained on Mt. Grant. Sage-grouse were primarily located at Nine-mile Flat during the summer as well, with the highest concentrations located near Rough Creek. During the fall, sage-grouse once again primarily used Nine-mile Flat, but also used Bald Mountain and the Wassuk Range. Sage-grouse again mainly congregated in Nine-mile Flat during the winter; they made less use of Bald Mountain, but made more use of areas within and around the Wassuk Range.

Adult Survival

In 2017, grouse at MG had a monthly probability of survival of 0.98 (95% CI 0.93–0.991), and a cumulative probability of annual survival of 0.75 (95% CI 0.42–0.90). In 2017, none of the female grouse captured in spring (n = 10) died; the only deaths known to occur in 2017 at MG were survivors from previous seasons. At DC, grouse had a monthly probability of survival of 0.98 (95% CI 0.95–0.99) and a cumulative probability of annual survival of 0.67 (95% CI 0.39–0.83).

Cumulatively (from 2015–2017), grouse at MG had a monthly probability of survival of 0.98 (95% CI 0.96–0.994), and an annual probability of survival of 0.80 (95% CI 0.60–0.93). At DC, the cumulative (from 2015–2017) monthly probability of survival of sage-grouse was 0.98 (95% CI 0.96–0.991) with an annual probability of survival of 0.75 (95% CI 0.56–0.86).

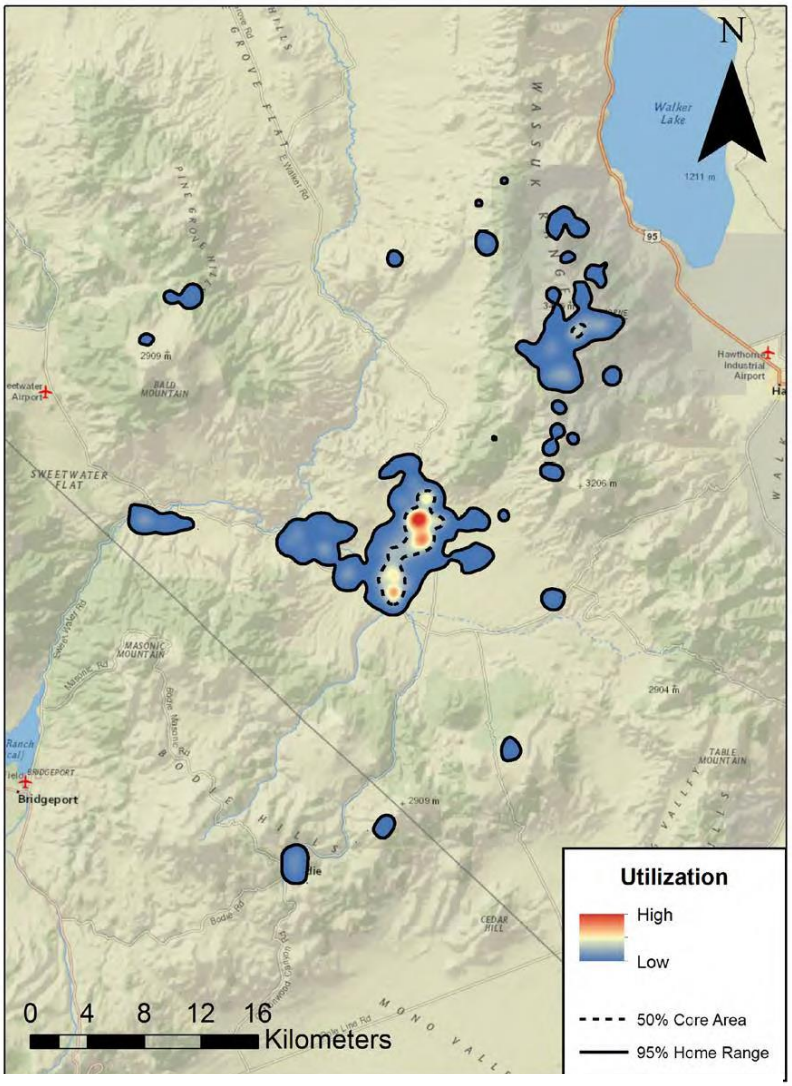


Figure 7. Cumulative utilization distribution of greater sage-grouse at the Mount Grant and Desert Creek study areas, NV/CA, during 2015-2017. Preliminary and subject to revision.

Nest Survival

In 2017, 10 nests were located at MG and 24 nests by 21 females at DC. At MG, nine nests hatched, while ten nests hatched at DC. Nests at MG had a daily probability of survival of 0.996 (95% CI 0.97–0.999) and a cumulative probability of nest survival of 0.86 (95% CI 0.32–0.96). At DC, nests in 2017 had a daily probability of nest survival of 0.95 (95% CI, 0.92–0.97) and a cumulative nest survival probability for the 37-day egg laying and incubation period of 0.17 (95% CI, 0.05–0.36).

Cumulatively (2016–2017), nests at MG had a daily probability of nest survival of 0.98 (95% CI 0.96–0.99), and a 37-day probability of nest survival of 0.47 (95% CI 0.20–0.69; Figure15A). At DC, the cumulative daily probability of nest survival was 0.96 (95% CI 0.94–0.97) with a cumulative 37-day probability of nest survival of 0.21 (95% CI 0.09–0.38).

Brood Survival

In 2017, nine broods at MG and nine broods at DC were monitored. Of the MG broods, five broods were successful, and four failed. At DC, four broods were successful and five failed. The daily probability of brood survival at MG was 0.99 (95% CI 0.97–0.996; Table 6) and the cumulative probability of brood survival for the 50-day brood rearing period was 0.58 (95% CI 0.24–0.82). At DC, females with broods had a daily probability of brood survival of 0.99 (95% CI 0.97–0.995) and a cumulative probability of brood survival across the 50-day brood rearing period of 0.52 (95% CI 0.18–0.78).

Cumulatively (2016–2017), females with broods at MG had a daily probability of brood survival of 0.99 (95% CI 0.97–0.993), and a cumulative 50-day probability of brood survival of 0.49 (95% CI 0.23–0.70). At DC, cumulatively (2016–2017), females with broods had a daily probability of brood survival of 0.99 (95% CI 0.98–0.996) and a cumulative probability of surviving the entire 50-day brood rearing period of 0.64 (95% CI 0.38–0.82).

Figure 8. The Mount Grant study site after a March 2018 snowstorm. Photo by Chris Wemmer.

Monitoring the Effects of Pinyon and Juniper Removal on Greater Sage-grouse in Southeastern Nevada

Other Funding Sources: NDOW's Sage-grouse Conservation Grant (75%)
Project Start Date: September 2015
Estimated Completion Date: December 31, 2019

NDOW and the BLM – Ely District have partnered on a monitoring project to determine the efficacy of various vegetative treatments, particularly pinyon and juniper removal, on small to moderately sized Greater sage-grouse populations within portions of Lincoln County and southern White Pine County. Population level impacts to sage-grouse can occur at very low level 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 canopy cover 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. Similar monitoring work is also ongoing in southern Utah in the Skutempah, Dog and Hamlin Valley areas by Dr. Nicki Frey with Utah State University. Information collected from Lincoln County in Nevada will help augment sample sizes and provide more robust results from the southern portion of the species range.

Hamlin Valley Study Area
There were four females with GPS satellite PTT transmitters in the southern end of Hamlin Valley in March 2018. Cursory investigation suggests most of their movements at the valley edges were in the evening and overnight, likely roosting. Each of those four females spent a substantial amount of time in the center of Hamlin Valley at known leks there. The male in the northern end of the valley also concentrated his movement at a lek in the center of the valley, with some possible diurnal pattern in when he was nearer the edges.

Cave Valley Study Area
In Cave Valley, there are two sage grouse with active transmitters—one male and one female. Both stayed fairly close to the center of Cave Valley near a lek site for most of the month, especially during the last week; neither had more than one sequential point more than about a mile from the center of their movements.

Steptoe Valley
During March of 2018, capture crews experienced suboptimal trapping conditions, yet trapped one female and one male in Steptoe Valley. Since then, the female has moved between several different leks within about 4 miles and in the eastern half of south Steptoe Valley. The male has stayed on one lek, though in the last week of the month may have dropped the transmitter or died, as all the points were within 30m.

Future Plans

Trapping efforts will continue this April in Steptoe and Hamlin valleys. It is important that we establish a sufficient sample size in this new study area to detect movements there and how it does or does not differ from others in the study.

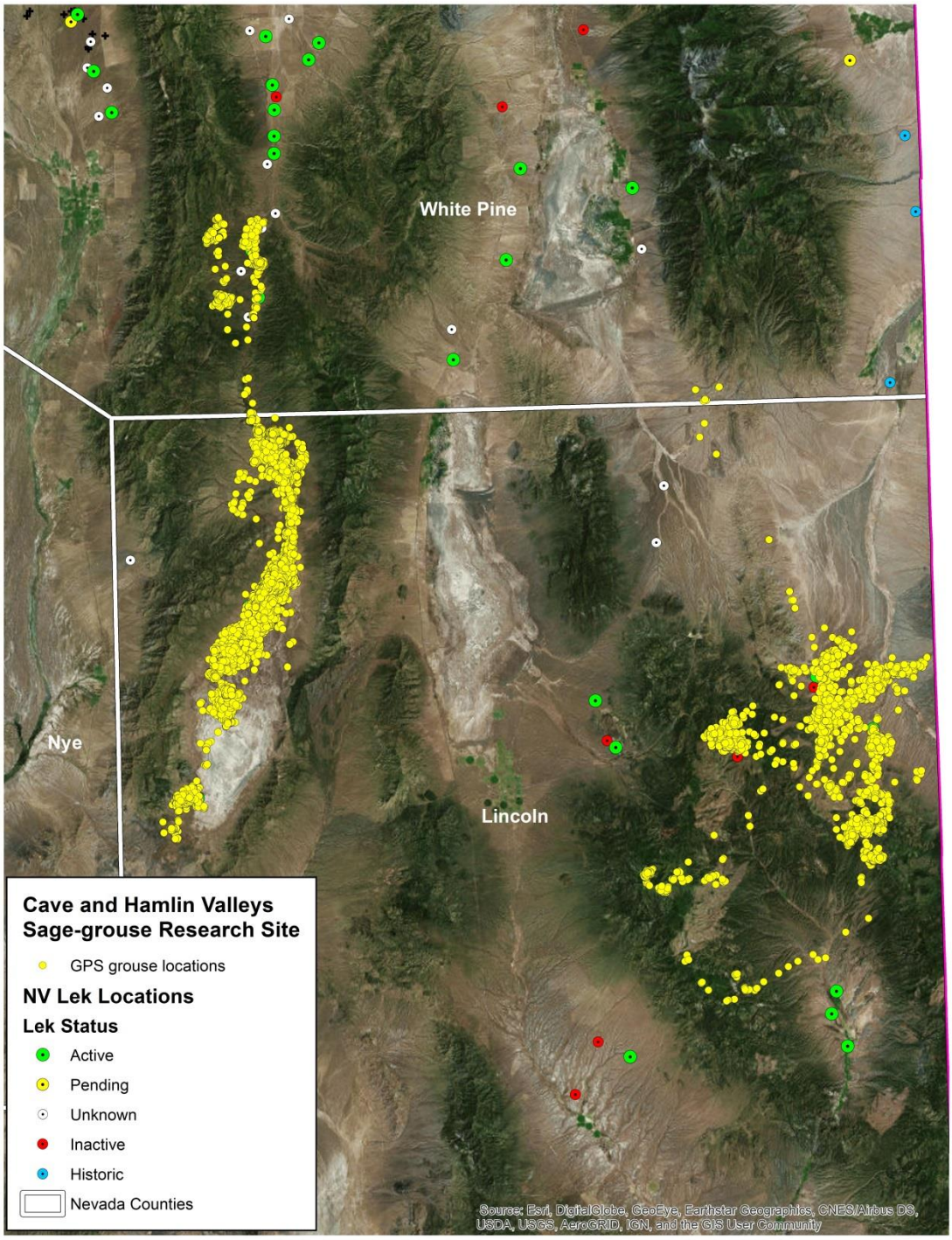


Figure 9. Greater sage-grouse GPS-PTT locations within the Cave and Hamlin Valley study areas (through November of 2017).

Monitoring the Effects of Landscape-Level Treatment on Greater Sage-grouse within the Desatoya Mountains of Central Nevada

Other Funding Sources: NDOW's Sage-grouse Conservation Grant (75%)
Carson Valley Chukar Club
Project Start Date: September 2013
Estimated Completion Date: December 31, 2019

NDOW, the USGS - Western Ecological Research Center and the BLM initiated a before-after study design to investigate potential effects of habitat enhancement and restoration on sage-grouse population vital rates, habitat selection, and movement patterns, as well as effects on predator community composition, in the Desatoya Mountains in central Nevada. During 2013–2017, 157 sage-grouse have been captured and radio- or GPS-marked within the study area. During 2014–2017, 78 nests were located, 43 broods were monitored, and 1,174 telemetry locations were obtained. A total of 1,686 raptor, raven, and livestock surveys were conducted and 1,523 ravens were detected during 668 surveys. Primary data collection efforts include gathering baseline data on space use, habitat selection, and population vital rates.

Capture and Monitoring Results

In the spring and fall of 2016, 32 sage-grouse were captured and marked 32 sage-grouse with VHF (n = 20; 20 females, 0 males), Dummy GPS (n = 4; 0 females, 4 males), or GPS (n = 8; 3 females, 5 males) transmitters. Finally, during the spring and fall of 2017, 39 sage-grouse were captured and marked with VHF (n = 34; 34 females, 0 males) or GPS (n = 5; 1 female, 4 males) transmitters.

In 2014, 168 telemetry locations from 29 collared females were obtained in 2014, 378 telemetry locations from 45 marked sage-grouse in 2015, 312 telemetry locations from 41 marked sage-grouse in 2016, and 316 telemetry locations from 45 marked sage-grouse in 2017. A total of 56,732 GPS locations were obtained during all years of study.

Movement Patterns

Two general patterns of sage-grouse movement were observed from spring breeding areas to summer habitat: grouse moved to either lowland riparian and agricultural complexes or to high-elevation areas within the Desatoya Mountains (Figures 10). Sage-grouse were observed congregating in the valley near Smith Creek and the surrounding agricultural fields. Grouse utilized resources near the creek during the day and roosted in the surrounding hills at night; they were regularly observed flying or walking back and forth at dawn and dusk. 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 moved from the valley to the mountains in 2014 following failure of their broods. In the Desatoya Mountains, it appears that birds use springs and other ephemeral water sources near Edwards Creek, Haypress, and Topia Creek leks.

During fall, sage-grouse activity was highly concentrated around Smith Creek, Edwards Creek, the Haypress lek, and along Smith Creek Valley toward the New Pass lek. However, during winter, sage-grouse began to congregate around lek sites and away from Smith Creek and high elevation areas. There may have been an undocumented or satellite lek between Smith Creek and New Pass leks, as a majority of sage-grouse marked during the spring of 2014 were approximately 8–10 km away from both of these leks. Females were captured at New Pass, Smith Creek, Haypress, and Rock Creek leks during all years of the study.

Nest Survival

The distribution of sage-grouse nest survival estimates for each year of the study is summarized in Table 4. During 2017, cumulative daily nest survival probability was 0.974 (95% CI, 0.951–0.986), and cumulative nest survival probability for the 37-day egg laying and incubation phase was 0.377 (95% CI, 0.154–0.603). During 2014–2017, cumulative daily nest survival probability was 0.972 (95% CI, 0.962–0.980), and cumulative nest survival probability for the 37-day egg laying and incubation phase was 0.356 (95% CI, 0.242–0.472).

In 2017, three of the failed nests showed signs of raven depredation, and four showed signs of depredation by an unknown predator. One failed nest presented evidence of depredation of both the eggs and female, and the final failed nest had intact eggs that appeared to be abandoned by the female.

Table 4. Estimated daily probability of nest survival, and estimated probability of a nest surviving the 37-day laying and incubation period.

Year	Daily Survival Probability	95% CI	Incubation Period Survival	95% CI
2014	0.963	0.930-0.981	0.248	0.069-0.485
2015	0.968	0.944-0.982	0.305	0.118-0.519
2016	0.980	0.961-0.989	0.468	0.233-0.674
2017	0.974	0.951-0.986	0.377	0.154-0.603
Average:	0.972	0.962-0.980	0.356	0.242-0.472

Brood Survival

The distribution of sage-grouse brood survival estimates for each year of the study is summarized in Table 5. During 2017, cumulative daily probability of brood survival was 0.986 (95% CI, 0.968–0.994), and cumulative survival probability for the 50-day brood rearing period was 0.504 (95% CI, 0.193–0.752). During 2014–2017, cumulative daily probability of brood survival was 0.979 (95% CI, 0.968–0.986), and cumulative survival probability for the 50-day brood rearing period was 0.338 (95% CI, 0.198–0.484).

In 2017, of the five known failed broods, one failed between the 10- and 20-day check and one failed between the 30- and 40-day checks. The remaining three failed between the 40- and 50-day checks.

Table 5. Estimated daily probability of brood survival, and estimated probability of a brood surviving the 50-day brood rearing period.

Year	Daily Survival Probability	95% CI	Brood Survival to 50-days	95% CI
2014	0.963	0.913-0.985	0.151	0.011-0.461
2015	0.978	0.942-0.992	0.324	0.051-0.657
2016	0.977	0.958-0.988	0.314	0.116-0.537
2017	0.986	0.968-0.994	0.504	0.193-0.752
Average:	0.979	0.968-0.986	0.338	0.198-0.484

Photo by David Parker

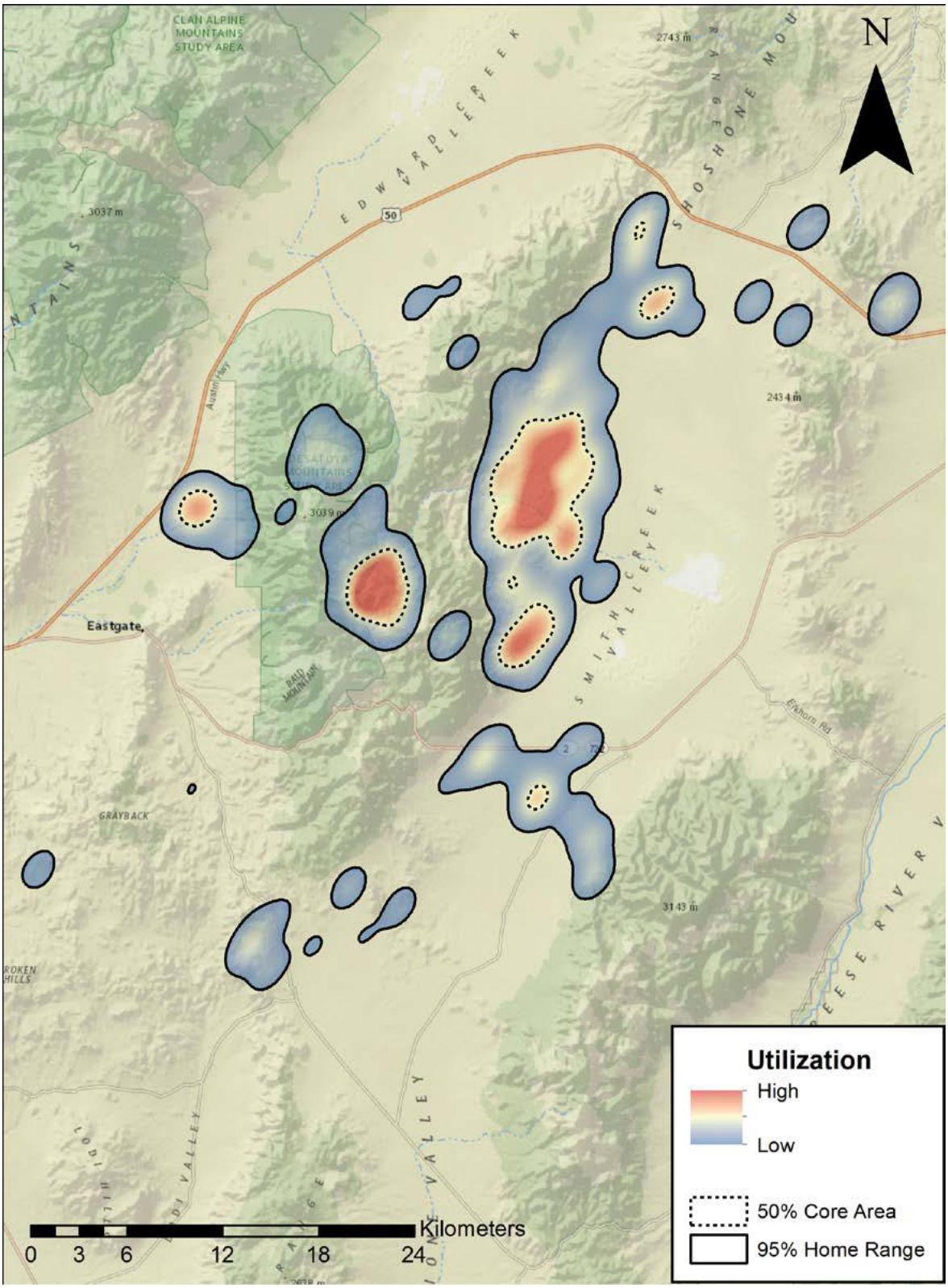


Figure 10. Utilization distribution for sage-grouse in the Desatoya Mountains, NV during spring (March – May) 2014-2017. Preliminary and subject to revision.

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

Other Funding Sources: NDOW's Sage-grouse Conservation Grant (75%)
Project Start Date: September 2015
Estimated Completion Date: December 2020

Common ravens (*Corvus corax*, hereafter ravens) are an important nest predator of sage-grouse, and raven nest sites have been shown to be associated with energy infrastructure. The Virginia Mountains study area of northwestern Nevada is a potential site for future solar energy and other developments. An option often considered by wildlife managers to reduce raven numbers is lethal removal. However, the success of this management action is often debated. 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 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).

Raven predation and the effects of raven removal on sage-grouse are currently being investigated within the Virginia Mountains through a before-after-control-impact (BACI) study design. Specifically, baseline data has been collected on space use, habitat selection, and population vital rates over eight years, which encompasses five years of pre-raven control and three years of post-raven control efforts. Recent large wildfires in parts of the study area partially coincide with raven control, and allow for a more complex experimental design. Our ultimate goal is to develop an integrated population model using the lek count and demographic data to investigate the effects of raven removal and interactions with wildfire on nest survival and population growth rates. In addition, we have collected videography at nest sites (n = 62) and conducted avian predator surveys (n = 2606) to identify sage-grouse nest predators common to this study site. These data will allow eventual investigation of raven predation rates and potential effects of compensatory predation (e.g., does removing ravens increase coyote predation?). The results summarized here are preliminary and further data are required before conclusions can be reached concerning this population of sage-grouse. Because this is an ongoing study and has not been finalized, the purpose of this document is to provide a project update and summary of data.

<u>Sage-grouse Monitoring</u>

From 2009 through 2017, a total of 298 sage-grouse with VHF transmitters have been monitored. The total number of males and females tracked by radio-telemetry were 7 and 291, respectively. Most sage-grouse were relocated in the Spanish Flat area (Figure 1). In each year, the core area was located at Spanish Flat in the Virginia Mountains. 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.

Sage-grouse Survival

Cumulative annual adult survival probability was 0.674 (95% CI, 0.585–0.748) during 2008–2017. Adult survival was lowest in 2017. 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). The average distance of the mortalities to the lek site was 2.4 ± 0.3 km (mean ± SE). One mortality was located on the eastern slope of Tule Ridge at a relatively high elevation. No mortalities were located near the Sheep Springs lek. Three mortalities appeared to be caused by mammalian predators, and one 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.

Nest Survival

Cumulative average nest survival probability for the 37-day egg-laying and incubation phase for study years 2009–2011 and 2013–2017 was 0.25 (95% CI, 0.18–0.33). The highest estimated nest survival probability was 0.56 in 2011 (95% CI, 0.35–0.73) and the lowest was 0.06 in 2009 (95% CI, 0.01–0.18). 2012 data was not used in this survival estimation because very few nests were found which were initially located during later stages of incubation due to field logistic constraints. Including these nests into the analysis may have biased the estimation high because daily nest survival probabilities have been shown to increase as incubation progresses (Coates and Delehanty, 2010).

During 2009–2017, 154 sage-grouse nests were monitored. Of these, 73 nests were successful (first attempt = 66, second attempt = 7) and 81 nests failed (first attempt = 73, second attempt = 8), of which 63 were depredated (first attempt = 58, second attempt = 5). Four nests were partially depredated with ≥ 1 chick hatched. Signals were lost for several female sage-grouse during the study, possibly due to radio failure or movement away from the region. Third nesting attempts were not documented during the study period.

Sage-grouse Nest Videography

Sixty-two nests were video-monitored during 2009 (n = 6), 2010 (n = 16), 2011 (n = 17), 2014 (n = 2), 2015 (n = 10), 2016 (n = 7), and 2017 (n = 4). Nest depredations, partial nest depredations, and successful hatches were recorded. Nest survival rates for video-monitored nests were 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 0.44 ± 0.10 (means ± SE), with yearly survival rates of: 0.22 ± 0.10 (2009), 0.35 ± 0.10 (2010), and 0.61 ± 0.10 (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 was not depredated and successfully hatched. Both partially depredated nests still hatched ≥ 1 egg following the predator 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 fox. 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. Four nests were monitored in 2017 with three being depredated. Of the four nests recorded, two nests were depredated by coyotes, one partially depredated by a raven, and the final nest successfully hatched. Video recordings for the 2017 nests have not been completely analyzed.

Brood Survival

During 2009–2017, 83 broods were monitored. Thirty-seven females with broods were confirmed successful (≥ 1 chick survived to 50-days post-hatch) and 36 broods failed. Of the 36 unsuccessful females, 23 were confirmed as failed on or before the 25-day post-hatch interval. The remaining ten 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 0.88 (95% CI, 0.84–0.91) during 2009–2017. The cumulative average brood survival probability for 50-day brood rearing phase (probability of success through the brood rearing period) was 0.53 (95% CI, 0.41–0.64) for 2009–2017. The highest brood survival was in 2013, 0.83 (95%CI, 0.28–0.98) while 2016 had the lowest brood survival with 0.21 (95% CI, 0.05–0.44).

Recent Fires

The 2016 Virginia Mountains Fire Complex burned approximately 59,727 acres, and the 2017 Long Valley Fire burned approximately 83,733 acres, totaling 143,460 acres burned within the Virginia Mountains study area. The proportion of pre-fire nest sites in burned areas totaled 60.1% (2016, 17.2%; 2017, 52.6%). The Virginia Mountains Fire Complex impacted nest survival, brood survival, and adult survival. Preliminary results are as follows: pre-fire nest survival was 0.34 (95% CI, 0.10–0.65), and post nest survival was 0.13 (95% CI, 0.00–0.47); pre-fire adult survival was 0.69 (95% CI, 0.50–0.89), and post fire adult survival 0.65 (95%CI, 0.36–0.88); pre-fire brood survival was 0.69 (95% CI, 0.50–0.89), and post fire adult survival 0.65 (95% CI, 0.36–0.88). The impact of the 2017 Long Valley Fire is unknown at this time.

Dusky Grouse Ecology and Management in Eastern Nevada

Other Funding Sources: NDOW's Game Management Grant (75%)
Project Start Date: March 2018
Estimated Completion Date: December 2021

This project is officially underway as Stephanie Landry was hired in January of 2018 as a Ph.D. student at Utah State University to research the ecology and management of dusky grouse in east-central Nevada. Stephanie received her bachelor's degree from Louisiana State University and master's degree from West Virginia University; where she conducted research on bobcats working closely with the West Virginia Division of Natural Resources.

On April 18, 2018, Stephanie and her field crew of technicians (Connor White, Andrew Byers and Macrae Windous) began their field season by getting to know the study areas and learning breeding survey protocols during their first week. The study area was divided into four sub-areas – 3 in the Schell Creek Range (i.e., Kalamazoo Creek, Indian Creek, Duck Creek) and one in the Egan Range (Bothwick Creek). Once technicians were fully trained, breeding surveys officially began. Male dusky grouse make three different sounds that can be detected by observers. Most frequently, males make a low, barely audible (to the human ear) booming or hooting sound. However, this call can only be detected within short distances (< 100 m). Males also make a much louder single note hoot that can be detected hundreds of meters away. When displaying males are very excited, usually when they detect the presence of a female dusky grouse, they jump in the air and make a loud wing clap that can also be detected hundreds of meters away. We have tailored our survey design to our study area by randomly delineating 4 separate breeding survey routes with 4 stops per route. Stops are a minimum of 500 m apart. Due to the topographic relief throughout the study area, only four stops per route are attainable before the grouse cease displaying.

Breeding surveys require the observer to arrive at the first stop 30 minutes before sunrise. At the first stop weather data (temp, cloud cover, etc.) is recorded. Each stop location is recorded for consistency. Listening intervals last 4 minutes each and are performed consecutively 4 times. The first 3 intervals are listening only, and the fourth interval is a callback survey where the cantus of a female dusky grouse is repeated twice at the top of each minute. If a grouse is detected during any interval, mapping software is used to estimate the location of the bird. If individual birds are detected multiple times they keep the same identification between intervals. Ambient noise is recorded after each interval, and the survey ends with an update on weather data. Our protocols will allow us to estimate detection rates and abundance. The locations of individual males can be used for further habitat selection analysis to help identify likely areas for displaying males in the future. Without having further analyzed the data, one thing is clear – males like to call for females from high vantage points, such as the top of rocks, jetties, or hill peaks. This is not surprising given the terrain they live in.

Photo by Teri Slatauski, NDOW 2013.

Thus far, we have had an apparent detection rate of 46% for male and/or female Dusky Grouse between all survey stops. This detection rate is relatively high compared to limited research on past dusky grouse breeding surveys. It is uncertain if the dusky grouse density is higher or if calling rates are more frequent, but we have been pleasantly surprised by the number of birds

we are detecting. All dusky grouse, both male and female, flushes and sightings are recorded, and male point locations are taken.

A behavioral observation that the field crew witnessed is that males may become territorial when another male approaches their vantage point, especially when a female is nearby. This is typical behavior for males of many species during breeding season. However, the team also noticed an increase in Dusky Grouse hen hostility while playing interval survey callbacks, especially near areas with a male present. Females will call back, and some will even begin to approach the observer (i.e., the "intruding female"). This aggressive territorial behavior has been noted by past researchers (i.e., Zwickle and Bendell) most notably on Vancouver Island, BC, Canada. They believed that hens were being territorial over available space for nesting habitat and that some subordinate hens did not nest in a given year because of this behavior.

Another behavior not well recognized in literature is the regular use of mountain mahogany (*Cercocarpus ledifolius*) by dusky grouse. Generally, dusky grouse are thought to use conifers over winter and into early spring as they transition to using lower-elevation hardwoods, such as aspen (*Populus tremuloides*) and maple (*Acer negundo*), prior to and during the breeding season. However, these habitat types are limited in east-central Nevada, and both sexes have been found roosting, displaying, and/or calling from the ground or tree limbs of mountain mahogany. Although, we have found them in other habitat (e.g., conifers and aspen) mahogany seems to be preferred. The mahogany stands seem to offer protective cover, shade, and access to a foraging source during early spring. It will be interesting to further analyze dusky grouse use and selection of mahogany stands, which may be unique to Nevada dusky grouse populations.

Walk-in traps have been set in areas with multiple displaying males. Locations have generally been in mahogany stands and available "pinch points" between conifer stands. Dogs have been used, primarily in aspen stands, to locate grouse and flush them into nearby trees. We have attempted noosing twice, but both grouse managed to remain just out of reach. In open areas, we have also tried net-gunning. We have caught 1 grouse with a net gun that somehow managed to carry the net to the nearest tree and walk out of it. Other attempts were halted by vegetation catching the net and providing a gap for grouse to escape.

Trapping in mahogany stands has proven the most difficult thus far. The mahogany provides the grouse with protective over story cover while allowing them to watch for ground predators. If a predator is observed, the grouse simply jump up into the mahogany, then flush out of the top and fly downhill to another mahogany or aspen. This makes capture very difficult, especially since the birds have been very flighty thus far. Capturing Dusky Grouse in such unique habitat types as found in east-central Nevada may require additional creativity and ingenuity compared to typical forest grouse capture methodology.

Bi-State Conifer Removal Project

This project consisted of hand cutting, lopping, and scattering all phase 1 and phase 2 pinyon pine and juniper trees on approximately 1,747 acres to improve sage-grouse habitat conditions and connectivity to previously completed sage-grouse projects in the Pine Nut Mountains of western Nevada. All of the work has been completed, resulting in greater connectivity for Bi-State sage-grouse movement. This project was part of BLM's Pine Nut Land Health Initiative, and was a collaborative effort between NDOW, BLM, NRCS, and the State of Nevada Smith Valley Conservation District. Fifty thousand dollars of Upland Game Bird Stamp funds were spent on this project and it is anticipated that follow up maintenance work will be needed in FY 2023.

Key Pittman WMA Wildlife Food Plots

A total of $3,900 of Upland Game Bird Stamp funds and $2,600 of Duck Stamp funds were spent on seeds for the food plots at the Key Pittman WMA. 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 at the 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, Ladak alfalfa, and native annual sunflower. The annual seeding projects were completed to increase forage production in wildlife feeding areas on the WMA and to enhance hunter opportunities. This project was completed by NDOW staff.

Cricket Springs Restoration

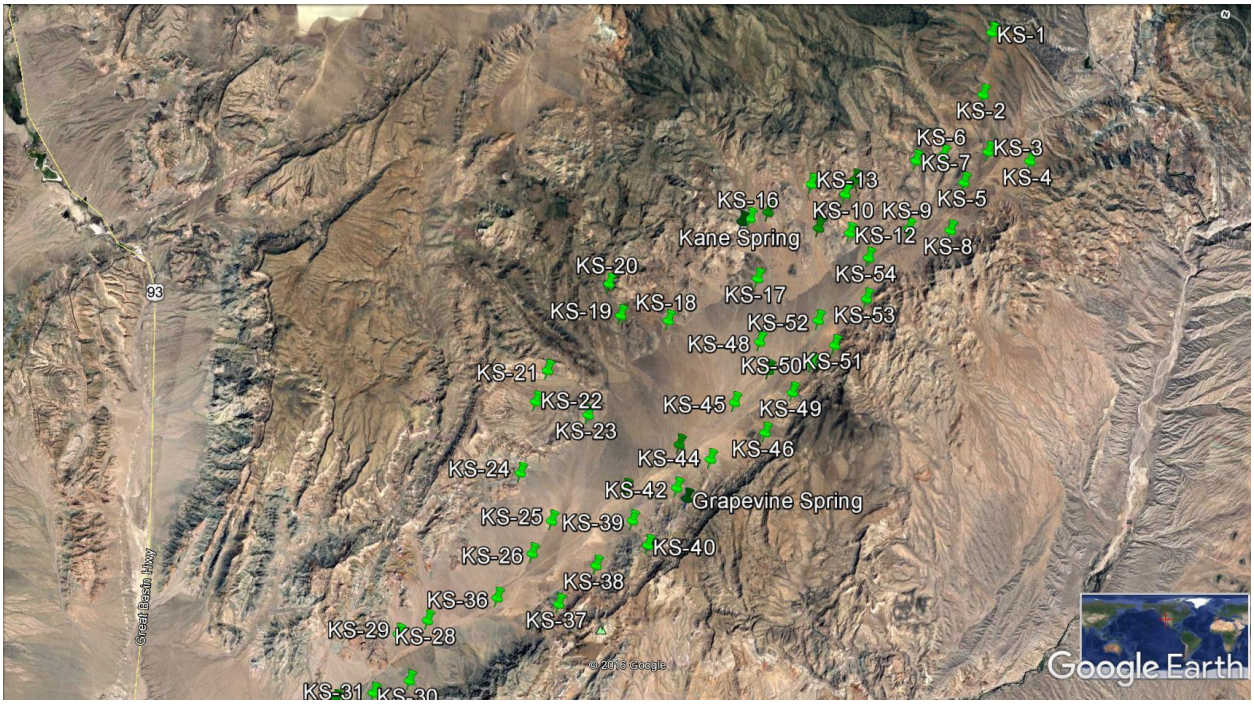
Phase one of the Cricket Springs Restoration Project was implemented in the spring of 2017 with the construction of a water development and the successive construction of two pipe rail fences around two spring sources. The water development was constructed as a part of the agreement with the private land owner in order to gain permission to preclude access by livestock to the spring sources after the fences were constructed.

Phase two of the project will include upland restoration within the fenced area that has been heavily disturbed and impacted by livestock overuse. Weed treatments and seeding will be implemented during the fall of 2018 and spring of 2019.

Cricket Springs - Lower Spring Site Pipe Rail Fence Enclosure

Post-Fire Upland Habitat Restoration - Kane Springs Valley

During the late fall of calendar year 2017 through the spring of calendar year 2018, this project spent approximately $11,500 on restoration activities near small game guzzler sites located in Lincoln County's Kane Springs Valley. Monitoring of the restoration sites revealed significant drought damage, including up to 40% mortality rates on the plantings for FY18 due to higher than normal temperatures, limited rainfall and cattle grazing. To replace drought-stricken plantings, restoration efforts included the replanting of 900 plants divided between three separate small game guzzler site locations, KS42, KS44 and KS46. Cattle grazing damage had occurred at KS42 and KS44 guzzler sites with impacts on plants and plant cages as well. Additional plant replacement, repairs and maintenance to plant cages may be necessary. Watering and monitoring are planned at all 10 project guzzler sites during the remainder of FY18. Work during FY18 included preparation of sites, planting of native plant stock at specified guzzler sites, installation of new cages and repair of existing plant cages, hand watering and project monitoring.



Location of Kane Springs Valley Small Game Water Developments

Eastern Nevada Properties Weed Control

Removal of noxious and other undesirable weeds enhances wildlife habitat, improves the appearance of an area and its public access, and limits the spread of weeds to other areas. The goal of this annual project is to remove noxious/invasive weeds such as Russian knapweed, hoary cress, perennial pepperweed (also known as tall whitetop), and Canada thistle found on several state-owned properties. The project is co-funded by the Duck Stamp and Upland Game Bird Stamp accounts since it benefits both waterfowl and upland species.

In the fall of 2017, NDOW hired the Tri-County Cooperative Weed Management Area to treat 330 acres on the Steptoe Valley and Wayne E. Kirch WMAs. An additional 387 acres were treated on these properties by NDOW staff, using herbicides purchased with Duck Stamp funds and funds from NDOW's Federal WMA grant.

Projects also were implemented on the Bruneau River WMA to treat bull thistle, Canada thistle, scotch thistle, perennial pepperweed, hoary cress, and black henbane. All treatments were implemented by NDOW biologists and fisheries Conservation Aids. Approximately 150 acres of thistle were treated in the Taylor Springs exclosure.

A week long treatment of a multitude of target species at the meadows on the state-owned Kingston Canyon property was treated in July of 2017, and a historic equine fence was removed. A contracted treatment of approximately 85 acres of meadow habitat on the Kingston

Canyon property will be conducted during the summer of 2018 and the target species will be perennial pepperweed.

Corners for Quail - Quinn River Valley – Van Der Hoek

In the fall of 2017, NDOW and the Van Der Hoek family formalized an agreement to have several of their pivot corners planted with a Canada wildrye (Elymus canadensis) and Blue flax (Linum lewisii) to provide additional cover and food resources for pheasant and quail. The seed mix used was ninety percent Canada wildrye and ten percent Blue flax purchased for $4777.50 through the Nevada Division of Forestry. The seed was delivered to Michael Van Der Hoek in late November and was drill seeded by him at approximately ~12 PLS lbs./acre at the end of November. The planting effort resulted in approximately 40 planted acres. This project has served as the first completed Corners for Quail project and will serve as a baseline for successfully partnering with landowners on habitat improvement on private lands.

It is too early in the growing season determine establishment and overall success but we can confirm some of the Canada wildrye has germinated and is taking, albeit there is a significant cheatgrass presence. Vegetation monitoring will be initiated summer 2018 to determine establishment and if further management efforts can be implemented to increase perennial grass and forb cover in the planted area.

Southern Nevada Small Game Water Developments

The majority of the Upland Game Bird Stamp funds spent on southern Nevada small game water developments (*hereafter*, guzzlers) during FY18 were allocated towards the purchase of materials to be used in the repair of existing small game 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. NDOW water development staff conducted 122 inspections on existing guzzlers in Clark, Lincoln, and Nye Counties and performed minor maintenance procedures on 25 of those units. Most of the maintenance activity included repair or replacement of exclusionary fencing, storage tanks, frames, collection aprons, and plumbing.

Gambel's quail and chukar partridge in the Mormon Mountains of Lincoln County, Nevada

Proposed Upland Game Bird Stamp Projects for State Fiscal Year 2019

Title of Proposed Project (and project ID number)	**Project Manager**	**$ Requested from UGBS Account**	**Other Funding Sources** (in-kind contributions not quantified)
Greater Sage-grouse Statewide Monitoring (373)	Shawn Espinosa	$55,000	NDOW's Federal Greater Sage-grouse Conservation Grant ($165,000)
Upland Game Translocation and Monitoring (368)	Shawn Espinosa	$14,264	NDOW's Federal Game Management Grant ($31,000)
Dusky Grouse Ecology and Management in Nevada (365)	Shawn Espinosa	$3,100	NDOW's Federal Game Management Grant ($79,764)
Monitoring the Effects of Landscape-Level Treatments on Greater Sage-grouse within the Desatoya Mountains (369)	Shawn Espinosa	$15,000	NDOW's Federal Greater Sage-grouse Conservation Grant ($45,000); BLM ($29,750)
Measuring Corticosterone Metabolites in Greater Sage-grouse (393)	Shawn Espinosa	$25,000	U.S. Geological Service ($60,000)
Estimating Sage-grouse Vital Rates within Nevada's Most Novel Habitats (367)	Shawn Espinosa	$53,470	Carson Valley Chukar Club ($7,090); Nevada Chukar Foundation ($7,090)
Effects of Conventional Raven Control and Wildfire on Greater Sage-grouse within the Virginia Mountains (370)	Shawn Espinosa	$25,000	NDOW's Federal Greater Sage-grouse Conservation Grant ($54,000)
Mason Valley WMA Upland Food Plots (383)	Isaac Metcalf	$10,000	NDOW personnel costs to be covered by NDOW's Federal WMA Grant
Key Pittman WMA Wildlife Food Plots (330)	Andrew Coonen	$3,900	NDOW's Duck Stamp Account ($2,600); NDOW personnel costs to be covered by NDOW's Federal WMA Grant

Proposed Upland Game Bird Stamp Projects for State Fiscal Year 2019

Title of Proposed Project (and project ID number)	**Project Manager**	**$ Requested from UGBS Account**	**Other Funding Sources** (in-kind contributions not quantified)
Edwards Creek Lek Pinyon Juniper Hand Removal Project (282)	Kenny Pirkle	$25,000	NDOW's Habitat Conservation Fee account ($25,000); National Fish and Wildlife Foundation ($50,000)
Eastern WMA Complex Weed Control (349)	Adam Henriod	$10,000	NDOW's Duck Stamp Account ($10,000); NDOW's Habitat Conservation Fee Account ($10,000); Nevada Dept. of Agriculture ($10,000)
Eastern Nevada Properties Restoration (390)	Matt Glenn	$12,500	NDOW's Habitat Conservation Fee Account ($27,500)
Totals		**$252,234**	**$613,794**

Upland Game Bird Stamp Account Budget Status

Balance in the Account at Start of FY 2018	$ 484,427
Plus Estimated Revenue Accrued During FY 2018	$ 266,026
Less Estimated Total FY 2018 Expenditures	($ 245,000)
Less Estimated Administrative Costs (10% of Revenue)	($ 26,602)
Estimated Balance at End of FY 2018 / Start of FY 2019	$ 478,851
Plus Estimated Revenue to be Accrued During FY 2019	$ 266,026
Less Estimated Administrative Costs (10% of Revenue)	($ 26,602)
Less Proposed New Project FY 2019 Expenditures	($ 252,234)
Estimated Balance at End of FY 2019	$ 466,041

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

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	**Greater Sage-grouse Statewide Monitoring**		
Project Manager:	Shawn Espinosa	Phone: 775-688-1523	Email sespinosa@ndow.org
Project Monitor:	Shawn Espinosa	Start Date:	7/1/2018
Implementation Lead:	Nevada Department of Wildlife	End Date:	6/30/2019
Partners:	U.S. Fish and Wildlife Service		
Project Category:	Wildlife Population Protection or Enhancement		
Project Category:	Wildlife Monitoring and Research		
Project Actions:	Aerial surveys, Ground surveys, Small game collaring		
Priority Resource:	Small game		
Priority Species:	Sage grouse		
County Location:	Elko, Eureka, Humboldt		
General Location:	Range of Greater Sage-grouse in Nevada		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Upland Game Stamp	$55,000		
USFWS Wildlife Restoration Grant	$165,000		
Project Totals	**$220,000**		

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 2017, there were 1,886 known lek locations identified in the Nevada Statewide Sage-grouse Database (Nevada portion only), of which 674 were considered active (defined as 2 or more males observed during 2 years in a 5 year period), 226 were considered “pending active”, meaning that an additional year of observing 2 or more males is necessary to be considered an active lek, and 542 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.

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 Surveys

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 and Helicopter Surveys

This relatively new survey technique has proved to be effective over the last two years given advancements in the system and the use of sage-grouse lek habitat modeling using maximum entropy (MaxEnt) methods. This survey technique allows for documenting presence or absence of birds at known leks, number of males and females and also has been effective at detecting new lek locations without disturbing birds as the elevation of the aircraft is generally about 1,000 above ground level. 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 help augment aerial lek surveys 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. Using a helicopter, and depending on the density of leks in a given area, approximately 16-20 leks can be surveyed in one morning during the protocol window of one half hour before to one and one half hours after sunrise.

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. These flights will largely occur once each month from October through February in various study areas 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.

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 (FLIR) 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.

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)

Not applicable

6. 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: **Greater Sage-grouse Statewide Monitoring**
Name of Proposed Project Manager: **Shawn Espinosa**
Project ID: **373**

Please provide a breakdown of your project's costs in the table below. Only include costs for the upcoming fiscal year for which you are applying. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be covered by any of our Special Reserve Accounts - 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		$ 100,000.00
B. Other Personnel (Lek Count Techs)	$8,700	
C. Total Personnel Costs	$ 8,700.00	$ 100,000.00
3. Travel Costs		
A. Per Diem		
B. Mileage		$ 15,000.00
C. Total Travel Costs	$ -	$ 15,000.00
4. Equipment		
A.		
B.		
C. Total Equipment Costs	$ -	$ -
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Helicopter Lek Survey	$ 13,500.00	$ 30,000.00
B. Infrared Survey Flights (Leks)	$ 19,800.00	$ 20,000.00
C. Fixed Wing Telemetry Survey	$ 13,000.00	
D.		
F. Total Miscellaneous Costs	$ 46,300.00	$ 50,000.00
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 55,000.00	$ 165,000.00
Total Project Costs	$	220,000.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	**Upland Game Translocation and Monitoring**		
Project Manager:	Shawn Espinosa	Phone: 775-688-1523 Email	sespinosa@ndow.org
Project Monitor:	Shawn Espinosa	Start Date:	11/5/2018
Implementation Lead:	Nevada Department of Wildlife	End Date:	3/31/2019
Partners:	Carson Valley Chukar Club, Nevada Chukar Foundation		
Project Category:	Wildlife Population Protection or Enhancement		
Project Category:	Species Re-Introduction		
Project Actions:	Trap and transplant		
Priority Resource:	Small game		
Priority Species:	Quail		
County Location:	White Pine, Humboldt, Elko		
General Location:	Snake Range - White Pine County		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Upland Game Stamp	$14,264		
USFWS Wildlife Restoration Grant	$31,000		
Project Totals	**$45,264**		

Project Proposal

1. Brief Purpose and Goal of the Project

The overall goal of this project is to increase population redundancy and resiliency of certain upland game species, particularly mountain quail, ruffed grouse, and wild turkey within suitable habitats across Nevada's landscape. Since 2008, the Nevada Department of Wildlife has released approximately 950 mountain quail (Churchill, Humboldt, Lander, Washoe and White Pine Counties), 203 ruffed grouse (Elko, Humboldt, Lander and Nye Counties), 251 Rio Grande turkeys (Douglas, Lander and Lincoln Counties) and 99 Merriam's turkeys (Lander County). These translocations, and subsequent augmentations, are conducted to fulfill the objective of expanding certain upland game species distribution and abundance 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 such as wild turkey and ruffed grouse viewing.

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. If the existing population in the Santa Rosa Range is not capable of providing a reliable source stock, alternative sites could be selected such as the Merritt Mountain area of northern Elko County.

A subset of captured and translocated 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 intermittently for the life of the units.

Merriam's Turkey

Source stock or Merriam's turkeys have been made available to Nevada through the Colville Confederated Tribe located in eastern Washington for the past two years. Ninety-nine turkeys were released into the northern Toiyabe Range in 2017 and 2018. The majority of capture work has been conducted by the Colville Confederated Tribal personnel with partial transportation of birds to a "halfway point". We hope to continue this relationship into 2018 and 2019.

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.

Likewise, expanding wild turkey populations in Nevada meets sportsman demand for this species. Only 158 turkey tags were available for the spring 2017 hunt and the number of applicants far exceeds that number. Providing sportsmen with alternative choices and expanded opportunity would be a benefit.

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.

Merriam's turkey capture efforts normally begin in December or January of each year. Capture work would likely begin in January of 2019 and releases would take place immediately after that. As in years past, two or three capture efforts and bird translocations are necessary to achieve the release complement objective of between 50 and 100 birds.

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

Various NEPA-related categorical exclusions are in place for the release of mountain quail and Merriam's turkey.

6. 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: **Upland Game Translocation and Monitoring**
Name of Proposed Project Manager: **Shawn Espinosa**
Project ID: **368**

Please provide a breakdown of your project's costs in the table below. Only include costs for the upcoming fiscal year for which you are applying. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be covered by any of our Special Reserve Accounts - 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		$ 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 (20 @ $200 ea.)	$ 2,000.00	$2,000
B.		
C. Total Equipment Costs	$ 2,000.00	$ 2,000.00
5. Materials		
A. Capture materials (ruffed grouse)		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Capture Vendor (Relocator LLC)	$7,000.00	
B. Telemetry Flights (14 hrs @ $376/hr.)	$5,264	
C.		
D.		
F. Total Miscellaneous Costs	$ 12,264.00	$ -
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 14,264.00	$ 31,000.00
Total Project Costs	$	45,264.00

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:	Kody Menghini	Start Date:	4/2/2018
Implementation Lead:	Nevada Department of Wildlife	End Date:	12/31/2021
Partners:	US Forest Service, Utah State University		
Project Category:	Wildlife Population Protection or Enhancement		
Project Category:	Wildlife Monitoring and Research		
Project Actions:	Ground surveys, Small game collaring		
Priority Resource:	Small game		
Priority Species:	Dusky Grouse		
County Location:	White Pine		
General Location:	Schell Creek, Egan and Cherry Creek Ranges - White Pine County, NV		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Upland Game Stamp	$3,100		
USFWS Wildlife Restoration Grant	$79,764		
Utah State University			$23,508
Project Totals	**$82,864**		**$23,508**

Project Proposal

1. Brief Purpose and Goal of the Project

Dusky grouse (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.

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 in April 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)

Not applicable. This is a wildlife research project.

6. Relationship to NDOW Plans, Policies, and Programs

This project was identified as a population management need identified in NDOW's 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**
Project ID: **365**

Please provide a breakdown of your project's costs in the table below. Only include costs for the upcoming fiscal year for which you are applying. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be covered by any of our Special Reserve Accounts - 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	$ 1,720.00	$ 47,024.00
C. Total Personnel Costs	$ 1,720.00	$ 47,024.00
3. Travel Costs		
A. Per Diem	$ 100.00	$ 900.00
B. Mileage		
C. Total Travel Costs	$ 100.00	$ 900.00
4. Equipment		
A. GPS Radios (10 @ $1,367/ea.)	$ 410.10	$ 13,259.90
B.		
C. Total Equipment Costs	$ 410.00	$ 13,260.00
5. Materials		
A. Trapping Materials (nets, nooses)	$ 100.00	$ 400.00
B. Other Materials (tools)	$ 200.00	$ 2,800.00
C.		
D. Total Materials Costs	$ 300.00	$ 3,200.00
6. Miscellaneous		
A. Truck - Monthly Fee (5@ $1,200)	$ 195.00	$ 6,305.00
B. ATV - Monthly Fee (15 @ 250/mo.)	$ 200.00	$ 3,550.00
C. Telemetry Flights (4 @ $800)	$ 100.00	$ 3,100.00
D. Housing	$ 75.00	$ 2,425.00
F. Total Miscellaneous Costs	$ 570.00	$ 15,380.00
7. In-Kind Services		
A. Indirect Cost Differential		$ 23,508.00
B.		
C. Total In-Kind Services	$ -	$ 23,508.00
Subtotals	$ 3,100.00	$ 103,272.00
Total Project Costs	$	106,372.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	**Monitoring the Effects of Landscape-Level Treatments on Greater Sage-grouse within the Desatoya Mountains**
Project Manager:	Shawn Espinosa Phone: 775-688-1523 Email sespinosa@ndow.org
Project Monitor:	Jason Salisbury Start Date: 5/22/2014
Implementation Lead:	Nevada Department of Wildlife End Date: 12/31/2020
Partners:	Bureau of Land Management, Smith Creek Ranch, U.S. Geological Service
Project Category:	Wildlife Population Protection or Enhancement
Project Category:	Wildlife Monitoring and Research
Project Actions:	Ground surveys, Small game collaring
Priority Resource:	Small game
Priority Species:	Sage grouse
County Location:	Churchill, Lander
General Location:	Desatoya Mountains - Churchill and Lander Counties

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
Bureau of Land Management		$29,750	
NDOW Upland Game Stamp	$15,000		
USFWS Wildlife Restoration Grant	$45,000		
Project Totals	**$60,000**	**$29,750**	

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). 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 rate

2. Project Approach and Tasks

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

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 2019 will be the sixth year of this monitoring effort. We anticipate this research effort to last approximately eight years.

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

Not applicable. This is a wildlife research project.

6. 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: **Monitoring the Effects of Landscape Level Treatments on Greater Sage-Grouse**
Name of Proposed Project Manager: **Shawn Espinosa**
Project ID: **369**

Please provide a breakdown of your project's costs in the table below. Only include costs for the upcoming fiscal year for which you are applying. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be covered by any of our Special Reserve Accounts - 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	$ 10,750.00	$ 32,250.00
C. Total Personnel Costs	$ 10,750.00	$ 32,250.00
3. Travel Costs		
A. Per Diem	$ 625.00	$ 1,875.00
B. Mileage		
C. Total Travel Costs	$ 625.00	$ 1,875.00
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)	$ 1,188.00	$ 3,562.00
C. Total Equipment Costs	$ 2,875.00	$ 8,625.00
5. Materials		
A. Trapping Supplies	$ 500.00	$ 1,500.00
B.		
C.		
D. Total Materials Costs	$ 500.00	$ 1,500.00
6. Miscellaneous		
A. Field Housing	$ 250.00	$ 750.00
B. BLM Small Grant Funding		$ 29,750.00
C.		
D.		
F. Total Miscellaneous Costs	$ 250.00	$ 30,500.00
7. In-Kind Services		
A.		
B.		
C.		
D. Total In-Kind Services	$ -	$ -
Subtotals	$ 15,000.00	$ 74,750.00
Total Project Costs	$	89,750.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name: **Measuring Corticosterone Metabolites in Greater Sage-grouse**

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

Project Monitor: Shawn Espinosa Start Date: 9/1/2018

Implementation Lead: Nevada Department of Wildlife End Date: 12/31/2020

Partners: U.S. Geological Service

Project Category: Wildlife Population Protection or Enhancement

Project Category: Wildlife Monitoring and Research

Project Actions: Ground surveys, Small game collaring

Priority Resource: Small game

Priority Species: Sage grouse

County Location: Humboldt, Elko, Nye

General Location: Montana Mountains and other Sage-grouse study sites in Nevada

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Upland Game Stamp	$25,000		
U.S. Geological Service	$60,000		
Project Totals	**$85,000**		

Project Proposal

1. Brief Purpose and Goal of the Project

The purpose of this project is to measure glucocorticoid hormone corticosterone (CORT) in sage-grouse from fecal, blood and potentially feather samples to help gage stress levels in various populations. We are particularly interested in collecting and analyzing CORT samples in the Montana Mountains or north central Nevada to establish baseline levels prior to the establishment of a proposed lithium mine in the Thacker Pass area of Humboldt County. Beyond sample collection here; however, funding for this proposal will also assist with analysis of CORT samples collected from various other study sites in Nevada (see project locations below).

Measurements of CORT can assist with determining sage-grouse physiological response to habitat

conditions in a relatively short time scale when compared to vital rate evaluations, thus providing a means to identify at risk populations (Ricklefs and Wikelski 2002). Chronic elevations of basal CORT can lead to reduced fecundity (Greenberg and Wingfield 1987). Post analyses, CORT level parameters can be used as an explanatory variable in population modeling and help better understand the effects of anthropogenic disturbances such as mines, transmission lines, energy development facilities and roads as well as natural disturbances such as fire.

2. Project Approach and Tasks

Sample collection in the Montana Mountains will begin with the capture and radio-marking of females (approximately 10-20) during the fall of 2018. Blood and feather samples can be collected at this time while fecal samples may be collected from roost piles subsequent to capture. Nighttime locations will be identified and samples collected early the next morning (preferable before full sunlight exposure). Samples will also be collected during winter and spring (lekking/nesting season) and potentially during the brood rearing period depending on survival. Fecal samples from various lek locations within the Montana Mountains will also be collected during the spring of 2019 per the methodology described below.

To assess variation in corticosterone levels within and among populations of sage-grouse across Nevada and California, we will collect fecal samples from 4–6 active leks per field site at multiple times during the lek survey season. Because male sage-grouse are "tied" to leks during early portions of the breeding season their corticosterone levels provide a reliable measure of geographically proximate stressors. That is, we are interested in answering the question, how does the distance to an environmental stressor (i.e. road, geothermal plant, cliff-face, etc) affect corticosterone levels in male sage-grouse during the lekking season.

For this study, we are collecting fecal samples from males only on leks. These collections can be paired with standard lek counts or the double-triple blind lek-counts and vegetation surveys. For the latter, recover feces from the lek when you are already there, performing habitat surveys. Imperative to this study is that only FRESH feces from the night before, or from the morning of, can be collected. Feces exposed to sunlight and environmental degradation for 16+ hours will provide misleading results, so collected samples MUST be from that morning or the night before. A single sample should consist of a minimum of 5 fecal pellets from roost piles, or single pellets separated by ~ 5m.

3. Anticipated Beneficial Effects of the Project

Monitoring stress levels in sage-grouse can help further our understanding of how the species is responding to certain perturbations on the landscape such as roads, geothermal facilities, mines and wildfire. Over time, thresholds may be able to be determined and potential "early warning signs" could trigger an active or passive management response, depending on habitat condition or activity taking place within proximity to a certain population.

Due to the presence of additional threats to sage-grouse populations on the landscape, we feel it behooves the Nevada Department of Wildlife and interested stakeholders to be as comprehensive as possible with respect to factors affecting the population performance of Greater sage-grouse in Nevada.

4. Project Schedule

Montana Mountains:
Fall 2018 –
- Capture and radio-mark 10-20 sage-grouse in the Montana Mountains;
- Collect feather and blood samples for CORT analysis
- Follow up with fecal sample collection for CORT analysis
- Conduct monthly aerial telemetry survey (October – February)

Spring 2019 –
- Collect fecal samples from lek sites within Montana Mountains

• Collect fecal samples from surviving radio-marked sage-grouse

Nevada Study Area Populations:
Fall/Winter
• Analyze samples collected from spring 2018 lekking period

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

Not applicable.

6. 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: **Measuring Corticosterone Metabolites in Greater Sage-grouse**
Name of Proposed Project Manager: **Shawn Espinosa**
Project ID: **393**

Please provide a breakdown of your project's costs in the table below. Only include costs for the upcoming fiscal year for which you are applying. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be covered by any of our Special Reserve Accounts - 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	$10,500	
C. Total Personnel Costs	$ 10,500.00	$ -
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A. VHF radio transmitters (20 @ $225/ea.)	$ 4,500.00	
B.		
C. Total Equipment Costs	$ 4,500.00	$ -
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. CORT analysis	$10,000	$ 60,000.00
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 10,000.00	$ 60,000.00
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 25,000.00	$ 60,000.00
Total Project Costs	$	85,000.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	**Estimating Sage-grouse Vital Rates within Nevada's Most Novel Habitats**		
Project Manager:	Shawn Espinosa	Phone: 775-688-1523	Email sespinosa@ndow.org
Project Monitor:	Shawn Espinosa	Start Date:	3/7/2016
Implementation Lead:	Nevada Department of Wildlife	End Date:	12/31/2020
Partners:	US Forest Service, Bureau of Land Management, U.S. Geological Service		
Project Category:	Wildlife Population Protection or Enhancement		
Project Category:	Wildlife Monitoring and Research		
Project Actions:	Ground surveys, Small game collaring		
Priority Resource:	Small game		
Priority Species:	Sage grouse		
County Location:	Nye, Eureka		
General Location:	Monitor Valley/Monitor Range - Nye County		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
Carson Valley Chukar Club	$7,090		
NDOW Upland Game Stamp	$53,470		
Nevada Chukar Foundation	$7,090		
U.S. Geological Service			$21,800
Project Totals	**$67,650**		**$21,800**

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.

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.milar 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 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)

Not applicable. This is a wildlife research project.

6. 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 Sage-grouse Vital Rates within Nevada's Most Novel Habitats**
Name of Proposed Project Manager: **Shawn Espinosa**
Project ID: **367**

Please provide a breakdown of your project's costs in the table below. Only include costs for the upcoming fiscal year for which you are applying. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be covered by any of our Special Reserve Accounts - 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	$ 32,700.00	$ -
C. Total Personnel Costs	$ 32,700.00	$ -
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ 1,200.00	$ 800.00
4. Equipment		
A. VHF transmitters (30 units @ $225/ea.)	$ 4,050.00	$ 2,700.00
B. Radio receiver/antenneas		
C. Total Equipment Costs	$ 4,050.00	$ 2,700.00
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Field Housing	$ 1,200.00	$ 800.00
B. Vehicles (4WD truck lease: 2 @ $10,500/ea.)	$ 12,600.00	$ 8,400.00
C. ATVs (1 ATV @ $2,000 ea.)	$ 1,000.00	$ 1,000.00
D. ATV Fuel and Vehicle Maintenance	$ 720.00	$ 480.00
F. Total Miscellaneous Costs	$ 15,520.00	$ 10,680.00
7. In-Kind Services		
A. USGS Research Wildlife Biologists		$ 21,800.00
B.		
C. Total In-Kind Services	$ -	$ 21,800.00
Subtotals	$ 53,470.00	$ 35,980.00
Total Project Costs	$	89,450.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	**Effects of Conventional Raven Control and Wildfire on Greater Sage-grouse within the Virginia Mountains**		
Project Manager:	Shawn Espinosa	Phone: 775-688-1523	Email sespinosa@ndow.org
Project Monitor:	Shawn Espinosa	Start Date:	10/15/2012
Implementation Lead:	Nevada Department of Wildlife	End Date:	10/31/2020
Partners:	U.S. Geological Service		
Project Category:	Wildlife Population Protection or Enhancement		
Project Category:	Wildlife Monitoring and Research		
Project Actions:	Ground surveys, Small game collaring		
Priority Resource:	Small game		
Priority Species:	Sage grouse		
County Location:	Washoe		
General Location:	Virginia Mountains - Washoe County		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Upland Game Stamp	$25,000		
USFWS Wildlife Restoration Grant	$54,000		
Project Totals	**$79,000**		

Project Proposal

1. Brief Purpose and Goal of the Project

Over the past eight 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. 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 have 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, (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 2019 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)

Not applicable. This is a wildlife research project.

6. 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).

Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Effects of Conventional Raven Control and Wildfire on Greater Sage-grouse**
Name of Proposed Project Manager: **Shawn Espinosa**
Project ID: **370**

Please provide a breakdown of your project's costs in the table below. Only include costs for the upcoming fiscal year for which you are applying. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be covered by any of our Special Reserve Accounts - 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	$ 12,000.00	$ 38,241.00
C. Total Personnel Costs	$ 12,000.00	$ 38,241.00
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A. VHF Radio Transmitters (30 units @ $225/ea.)	$ 3,040.00	$ 3,710.00
B. Vehicles (2 @ $10,500 per 6 month field season)	$ 9,500.00	$ 11,509.00
C. Total Equipment Costs	$ 12,540.00	$ 15,219.00
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Field Housing	$ 460.00	$ 540.00
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 460.00	$ 540.00
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 25,000.00	$ 54,000.00
Total Project Costs	$	79,000.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	**Mason Valley WMA Upland Food Plots**		
Project Manager:	Isaac Metcalf	Phone: 775-463-2741	Email imetcalf@ndow.org
Project Monitor:	Mike Zahradka	Start Date:	7/1/2018
Implementation Lead:	Nevada Department of Wildlife	End Date:	6/30/2019
Partners:			
Project Category:	Habitat Restoration		
Project Category:	Upland Habitat Improvement		
Project Actions:	Drill seeding		
Priority Resource:	Small game		
Priority Species:	Quail		
County Location:	Lyon		
General Location:	All of the proposed work will take place within the Mason Valley WMA boundaries near Yerington, NV		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Upland Game Stamp	$10,000		
Project Totals	**$10,000**		

Project Proposal

1. Brief Purpose and Goal of the Project

Planting food plots will enhance forage and cover for migratory and non migratory upland game birds on the Mason Valley WMA, as well as provide WMA users with more oportunities for harvest and bird watching.

2. Project Approach and Tasks

Mason Valley WMA crew members will plant various vegetation types consisting of millets, sorghums, wheat, and sunflowers. The seed mix will be drill seeded in the spring of 2019. 150 acres of upland seed mix will be planted and will consist of cereal grains in agricultural fields and designated food plot units located within the WMA. All of this project's funding will be used to purchase seed.

3. Anticipated Beneficial Effects of the Project

Quail, doves and turkeys will benefit from the increased forage and cover available to them. Mule deer and passerines will also benefit with the increased forage availability. Non-consumptive and consumptive WMA users will also benefit with more opportunities for wildlife viewing and hunting.

4. Project Schedule

This is an ongoing, recurring project that occurs at the WMA during the spring.

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

Not applicable

6. Relationship to NDOW Plans, Policies, and Programs

Annual vegetation control is identified in the Mason Valley WMA Conceptual Management Plan. 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 through 2009. (Comprehensive Strategic Plan-2004-2009 page –1).

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	**Key Pittman WMA Food Plots**		
Project Manager:	Andrew Coonen	Phone:	Email acoonen@ndow.org
Project Monitor:	Adam Henriod	Start Date:	7/1/2018
Implementation Lead:	Nevada Department of Wildlife	End Date:	4/28/2019
Partners:			
Project Category:	Habitat Restoration		
Project Category:	Upland Habitat Improvement		
Project Actions:	Drill seeding		
Priority Resource:	Small game		
Priority Species:	Waterfowl		
County Location:	Lincoln		
General Location:	The Key Pittman WMA is located in the north end of the Pahranagat Valley, approximately 110 miles north of Las Vegas and 135 miles south of Ely.		

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

The goal of this project is to provide an increase in waterfowl and upland game bird use, thus leading to an increase in hunter and public use and hunter success. This will be achieved by completing annual food plot plantings and vegetation manipulation, thus enhancing existing habitat on the WMA for the benefit of wildlife.

2. Project Approach and Tasks

In October, the food plot fields are 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. Grazing begins in mid-July. The desirable native vegetation (goose foot and alkali bulrush) has matured by mid-August 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.
All of the funds awarded to this project will be used to purchase seed for the food plots.

3. Anticipated Beneficial Effects of the Project

The food plot program includes the planting of forbs, grasses, nitrogen fixing plants, and cereal grains. These provide forage for wildlife, maintain and improve the soil for better production, reduce noxious and invasive weeds, and eliminate the need for commercial fertilizer. This results in increased use of waterfowl, quail, dove, cottontail rabbit, and mule deer, improved harvest of game species, and a reduced need for noxious and invasive weed control. This project also benefits non-game species such as small mammals, raptors, song birds, reptiles, and other species.

4. Project Schedule

The implementation schedule of this project was described in the approach section above.

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

Not applicable

6. 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).

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	**Edwards Creek Lek Pinyon Juniper Hand Removal Project**		
Project Manager:	Kenny Pirkle	Phone: 775-423-3171; 227	Email kpirkle@ndow.org
Project Monitor:	Mark Freese	Start Date:	8/1/2018
Implementation Lead:	Nevada Department of Wildlife	End Date:	12/31/2019
Partners:	Bureau of Land Management		
Project Category:	Habitat Restoration		
Project Category:	Conifer Removal: Phase 1 & 2		
Project Actions:	Hand-thinning		
Priority Resource:	Small game		
Priority Species:	Sage grouse		
County Location:	Lander, Churchill		
General Location:	Desatoya Mountains, Lander County, NV		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
National Fish and Wildlife Foundation	$50,000		
NDOW Habitat Conservation Fee	$25,000		
NDOW Upland Game Stamp	$25,000		
Project Totals	**$100,000**		

Project Proposal

1. Brief Purpose and Goal of the Project

The purpose of the Edwards Creek Lek Pinyon Juniper (PJ) Hand Removal Project is to enhance big and upland game habitat quality by removing PJ trees that have encroached into sagebrush, meadow, riparian and aspen communities.

2. Project Approach and Tasks

The Great Basin Institute (GBI) received $50,000 in National Fish and Wildlife Foundation funding for this project (i.e. similar to the 2016 Edwards Creek Lek PJ Cut project). NDOW plans to match their

funding with $25,000 from the Habitat Conservation Fee account and $25,000 from the Upland Game Bird Stamp account to remove low density (phase I and II) trees in the Desatoya Mountains. Funding will be used to cut the remaining 183 acres in the Edwards Creek Lek treatment area. Once the remaining acres have been treated, and assuming funding will be available, we will utilize existing Sage-grouse collar data to identify other high priority resource areas (e.g. The Edwards Creek Lek - Haypress Inter-tie project area, upper Porter Canyon watershed area, or Smith Creek Valley bench area) to treat, or will re-treat old treatments in high priority habitat.

3. Anticipated Beneficial Effects of the Project

Restoring degraded Wyoming big sagebrush, mountain big sagebrush, antelope bitterbrush, riparian, and aspen communities will improve the quality and increase the quantity of habitat for sage-grouse, mule deer and other wildlife. Improving the quality of habitat results in increased fitness levels, promoting greater survivability and reproductive rates. Furthermore, increasing the amount of suitable habitat decreases stress on sage-grouse, mule deer, and other wildlife by lowering the amount of inter- and intra-specific competition. Improving the quality and quantity of habitat will encourage wildlife population stability and growth within the Desatoya Mountains.

Specifically, removing PJ from the Desatoya Mountains will remove perch sites, sage-grouse's perception of risk associated with vertical structures, and ensure the sagebush and associated plant community understory is maintained while reducing the threat of catastrophic wildfire.

4. Project Schedule

The project will be initiated in 2018 and is expected to have a completion date of 12/31/2019.

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

A landscape Environmental Assessment has been completed for the proposed projects. A Determination of NEPA Adequacy (DNA) has been completed for the Edwards Creek Lek project area. A DNA may be necessary to permit other actions.

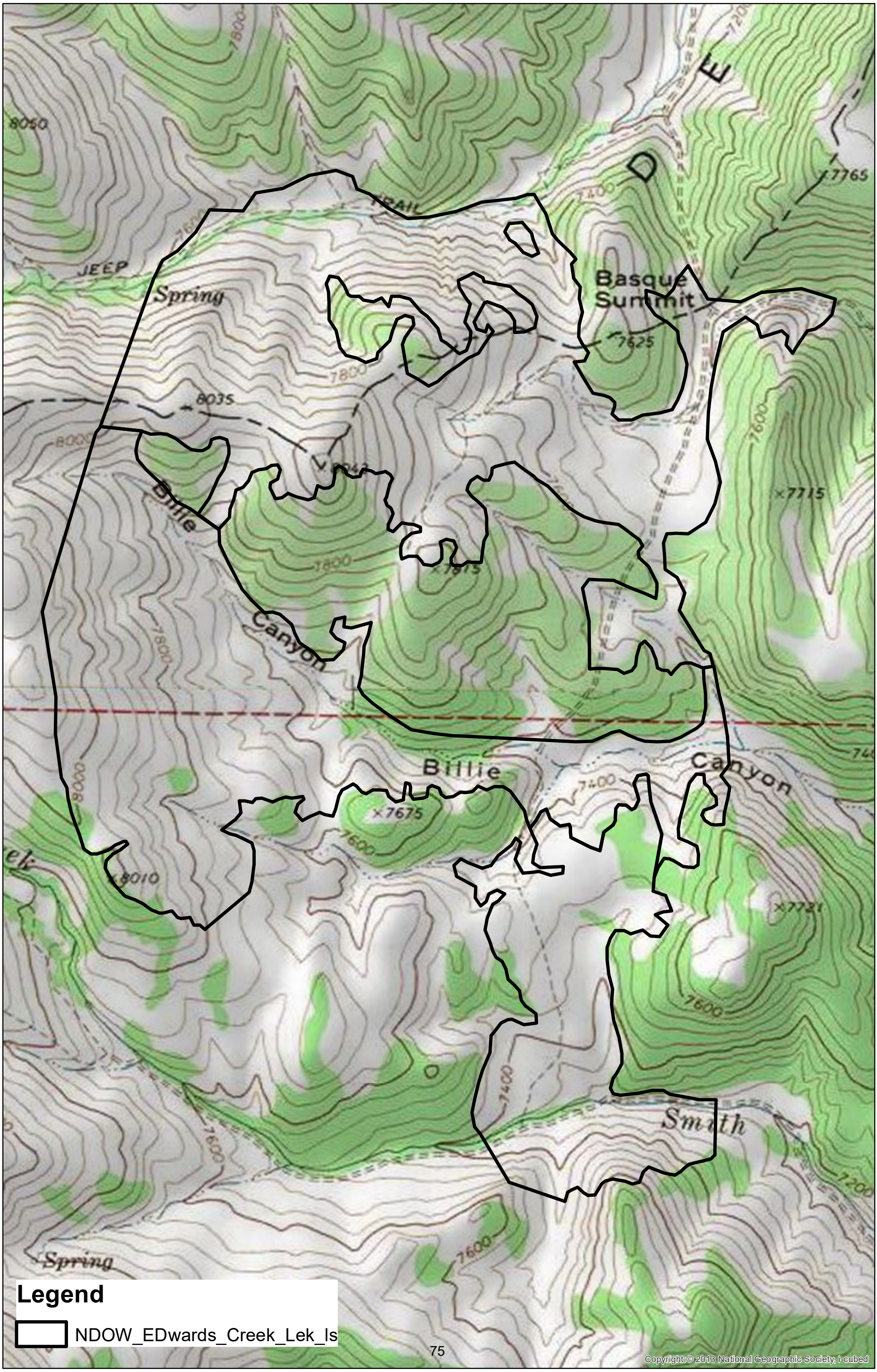
6. Relationship to NDOW Plans, Policies, and Programs

This project is consistent with NDOW's mission and charter:

1) "To protect, preserve, manage and restore wildlife and its habitat…"
2) "To the maintenance and enhancement of Nevada's diverse wildlife habitats."
3) "To the maintenance and enhancement of Nevada's wildlife diversity."
4) "To a management program which is carefully designed to result in healthy wildlife populations throughout the state." and
5) "To a leadership role in the conservation and management of the state's wildlife resources."

Desatyoa Population Management Unit Plan
"Conservation Goal – Increase the quality and quantity of sage grouse habitat in the PMU by implementing projects to restore and enhance sagebrush habitats" (page 11) where expanding PJ woodlands is considered a moderately high risk regarding habitat quality and quantity (pages 2 and 6).

The Nevada Wildlife Action Plan (2012) has a Conservation Strategy Objective for the key habitat Intermountain Rivers
and Streams to: limit the increase in weed-invaded and/or entrenched riparian systems to less than 10% through 2022 and the following two actions: restore fully-functioning riparian terrestrial wildlife habitats through…restoration of hydrologic function…and planting riparian vegetation" and restore riparian plant communities invaded by …non-native plants through aggressive removal of invasives and active restoration of native vegetation.



Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Edwards Creek Lek PJ Hand Removal Project**
Name of Proposed Project Manager: **Kenny Pirkle**
Project ID: **282**

Please provide a breakdown of your project's costs in the table below. Only include costs for the upcoming fiscal year for which you are applying. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be covered by any of our Special Reserve Accounts - 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. Contract Labor for Tree Cutting	$ 50,000.00	$ 50,000.00
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 50,000.00	$ 50,000.00
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 50,000.00	$ 50,000.00
Total Project Costs	$	100,000.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	**Eastern WMA Complex Weed Control**		
Project Manager:	Adam Henriod	Phone: 775-289-1690	Email ahenriod@ndow.org
Project Monitor:	Adam Henriod	Start Date:	7/2/2018
Implementation Lead:	Nevada Department of Wildlife	End Date:	6/30/2019
Partners:			
Project Category:	Habitat Restoration		
Project Category:	Riparian, Spring or Meadow Habitat Improvement		
Project Actions:	Herbicide application		
Priority Resource:	General Habitat Improvement		
Priority Species:			
County Location:	White Pine, Lincoln, Nye		
General Location:	Weed control activities will take place at the following WMAs in eastern Nevada: Steptoe Valley, Wayne E. Kirch and Key Pittman WMAs.		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Duck Stamp	$10,000		
NDOW Habitat Conservation Fee	$10,000		
NDOW Upland Game Stamp	$10,000		
Nevada Department of Agriculture	$10,000		
Project Totals	**$40,000**		

Project Proposal

1. Brief Purpose and Goal of the Project

NDOW is mandated by state law to control listed noxious weeds found on our properties. 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, phragmites, and Canada thistle from the following three state-owned Wildlife Management Areas (WMAs): Steptoe Valley, Wayne E. Kirch and Key Pittman WMAs.

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 wildlife management areas. 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. Tri-County Weed Control is most likely to be contracted to conduct the spraying.
Examples of specific tasks to be accomplished by this project are provided below.
A. Perennial pepperweed (Lepidium latifolium), and hoary cress (Cardaria draba) will be treated in the spring and summer of 2019 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 2019 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 2018 and spring of 2019 by applying appropriate herbicides from ATV, truck, and backpack sprayers.
D. Vegetation on wetland impoundments and reservoirs will be treated, as needed, with aquatic approved herbicides. Primary focus will be on phragmites (Phragmites australis) removal on the Key Pittman WMA. Treatments on reservoirs will be completed using a boat mounted sprayer, wetland impoundments will be treated with an ATV sprayer. Treatment of undesirable 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 on the WMAs will primarily occur in the late summer and fall of 2018 and the spring and summer of 2019. Please see the proposed tasks above for the timing of treatments for each type of targeted vegetation.

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

Not applicable

6. 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 Complex WMA Weed Control**
Name of Proposed Project Manager: **Adam Henriod**
Project ID: **349**

Please provide a breakdown of your project's costs in the table below. Only include costs for the upcoming fiscal year for which you are applying. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be covered by any of our Special Reserve Accounts - 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 (Tri-County Weed Control)	$ 26,000.00	$ 10,000.00
C. Total Personnel Costs	$ 26,000.00	$ 10,000.00
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A.		
B.		
C. Total Equipment Costs	$ -	$ -
5. Materials		
A. Herbicide	$ 4,000.00	
B.		
C.		
D. Total Materials Costs	$ 4,000.00	$ -
6. Miscellaneous		
A.		
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ -	$ -
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 30,000.00	$ 10,000.00
Total Project Costs	$	40,000.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	**Eastern Nevada Properties Restoration**		
Project Manager:	Matt Glenn	Phone: 775-777-2369	Email mglenn@ndow.org
Project Monitor:	Caleb McAdoo	Start Date:	5/1/2019
Implementation Lead:	Nevada Department of Wildlife	End Date:	10/31/2019
Partners:	Nevada Department of Wildlife		
Project Category:	Habitat Restoration		
Project Category:	Upland Habitat Improvement		
Project Actions:	Aerial seeding, Drill seeding, Herbicide application, Seedling planting		
Priority Resource:	Big game		
Priority Species:	Mule deer		
County Location:	Elko, Eureka, Lander		
General Location:	This project's habitat restoration activities will take place on the Bruneau River WMA and other NDOW-managed properties in Kingston Canyon and in the Snowstorm Mountains.		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
NDOW Habitat Conservation Fee	$27,500		
NDOW Upland Game Stamp	$12,500		
Project Totals	**$40,000**		

Project Proposal

1. Brief Purpose and Goal of the Project

NDOW's Eastern Region has the responsibility of overseeing management on nearly 30,000 acres of state-owned property. This responsibility falls to two individuals based in the Elko NDOW office. Management of these properties is a small aspect of the work for Elko habitat staff. In order to address increasing issues with weeds, maintenance of existing infrastucture (fences, buildings, bridges, etc.), and degraded riparian habitats, we are in need of additional monies to help fund various habitat restoration efforts.

The primary purpose for the funding awarded to this project would be to restore and improve existing

habitats on the Bruneau River WMA and state-owned property in Kingston Canyon in the Toiyabe Range, and the Snowstorm Mountains. These projects might include ground based or aerial application of herbicide, drill or aerial seeding, seeedling plantings, and riparian habitat restoration. In some instances specialized equipment will be necessary to rent or purchase in order to perfom work with skid steers and associated attachements, tractors, etc.

Infrastructure such as fences, cattle guards, existing buildings, irrigation, and bridges are in need of repair on many of the WMAs and other state-owned properties. Monies requested in this proposal would be utilized to repair and improve these components for wildlife and sportsmen.

2. Project Approach and Tasks

Awarded funds would be used to purchase herbicide, equipment, tools, seed, building materials, and/or contract labor to maintain and enhance the current condition of NDOW-managed lands in the Eastern Region. Additional monies would be used to significantly bolster current improvemnet efforts.
The proposed funding split between the Upland Game Bird Stamp and Habitat Conservation Fee accounts, was determined by estimating how much of the total project work will be conducted on important sage grouse habitat in the Snowstorm Mountains region v. work in other areas covered by the project. Proportions were then used to come up with the specific funding amounts.

3. Anticipated Beneficial Effects of the Project

NDOW wishes to expend additional efforts to improve wildlife habitat and infrastructure on State-owned property that NDOW manages. Additional funding will allow NDOW to do this while capitalizing on the fact that this beneficial work can be conducted without the need for lengthy and expensive NEPA analysis. The restoration activities covered by this project will benefit a wide range of non-game, big game, upland game bird and waterfowl species. Aquatic species will also benefit from riparian restoration activities in the Bruneau River WMA and Kingston Canyon areas.

4. Project Schedule

Priorities for improvement projects will be dependent on funding and availability of personnel and contractors. We typically establish priorities by the first of May and perform or contract out work throughout the year, but mostly during the summer and fall months.

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

NEPA analysis and subsequent decisions are not necessary on State-owned and private lands.

6. Relationship to NDOW Plans, Policies, and Programs

This project will help NDOW achieve its mission, and related management goals defined in Commission policies, related to protecting and restoring Nevada's wildlife habitat.

Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Eastern NV Properties Restoration**
Name of Proposed Project Manager: **Matt Glenn**
Project ID: **390**

Please provide a breakdown of your project's costs in the table below. Only include costs for the upcoming fiscal year for which you are applying. Only include in-kind services under item 7. NDOW personnel and travel expenses may not be covered by any of our Special Reserve Accounts - 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. Rental	$ 6,000.00	
B. Misc. hand Tools	$ 700.00	
C. Total Equipment Costs	$ 6,700.00	$ -
5. Materials		
A. Herbicides	$ 4,000.00	
B. Construction and Fence Materials	$ 3,000.00	
C. Seeds and Seedlings	$ 6,000.00	
D. Total Materials Costs	$ 13,000.00	$ -
6. Miscellaneous		
A. Contract Labor	$ 20,300.00	
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 20,300.00	$ -
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 40,000.00	$ -
Total Project Costs	$	40,000.00