Upland Game Bird Stamp Program Report

Nevada Department of Wildlife

June 2019

Male Dusky Grouse; photo by S. Farnsworth, Utah State University

Table of Contents

Progress Report on Upland Game Bird Stamp Projects Funded in FY 2019

Greater Sage-grouse Statewide Monitoring

The accomplishments of this project are summarized below.

Lek Count Technicians

Three seasonal sage-grouse lek count technicians were employed from March through May of 2019 to assist Nevada Department of Wildlife (NDOW) Game Division biologists. One technician was assigned to the Western Region through Manpower and two technicians were assigned to the Eastern Region. Lek counts normally continue through May of each year, so final data summarization was not possible for this report.

Aerial Lek Survey

Aerial lek surveys using a helicopter were performed throughout portions of the sage-grouse range in Nevada during the spring of 2019. Contracted services were not used this year as our own internal flight services to perform the surveys were used. Aerial lek surveys were conducted in the following areas:

1) Elko County including the Owyhee Desert, O'Neil Basin, Gollaher Mountain, East Humboldt and Ruby Mountains (west side), and the Pinyon Range
2) Eureka County including the Cortez Range, Roberts Creek Mountains and the Diamond Mountains;
3) Humboldt County including the Black Rock, Santa Rosa, Montana Mountains, and Pine Forest Range
4) Northern Nye County including the Monitor and Toiyabe Mountain Ranges;
5) Northern Washoe County including the Sheldon National Wildlife Refuge;

There were a number of surveys that were conducted in conjunction with spring deer surveys (Humboldt and Nye County) for efficiency purposes. Complete data were not available to summarize for this report; however, the data will be placed into the Nevada Sage-grouse Lek Database by June 30, 2019.

Fixed Wing Infrared Surveys

Owyhee Air Research, Inc. (OAR) conducted a multi-point Aerial Infrared (AIR) mission for greater sage grouse (*Centrocercus urophasianus)* lek search and survey. Surveys began on March 25 and concluded on April 4, 2019. The survey was conducted in seven (7) distinct survey plots throughout the state. Survey plots were designated as either 'search' or 'survey' as designated by NDOW personnel. Some survey plots were characterized by many known lekking locations within a given geographic region. In these areas, known lekking locations were surveyed for sage grouse activity up to and including 1.5 miles in all directions of the provided lek site. No search patterns were initiated to find potential new leks within these polygons. Search plots that were

characterized by relatively few known lekking locations in a larger geographic region were surveyed for current activity and search patterns were initiated to locate and document possible new leks. Search patterns consisted of flying linear transects spaced 400 meters (0.25 miles) apart. Transects were flown at an approximate altitude of 1500 ft above ground level (AGL), at an approximate speed of 100 mph ensuring 100% AIR coverage of the search area. All flights were conducted in the early morning hours beginning approximately 45 minutes before sunrise and concluding approximately 1.5 – 2 hours after sunrise.

Results

During the course of the survey, 98 known leks were surveyed with 24 of those being active with males in attendance. A total of 382 males were observed on the active leks. Six potentially new leks were discovered during the survey. A summary of survey results is provided in Table 1.

Table 1. Fixed-wing infrared lek search and survey results conducted during the spring of 2019.

Survey Area	Plot Size (ac.)	Known Leks Surveyed	New Leks	Active Leks	Number Observed
Santa Rosa (east)	45,600	6	1	3	29
Santa Rosa (west)	74,743	22	-	3	31
Montana Mountains	54,155	36	-	5	90
Nut Mountain	27,367	5	1	1	49
Black Rock	55,693	18	-	6	42
Pine Nut	47,394	6	1	1	14
Reese River	26,589	5	1	2	57
North Monitor Valley	25,190	3	2	3	70
Totals:	356,731	98	6	24	382

Project Highlights

Nut Mountain

This area was designated as a "search" area by NDOW staff with five (5) previously identified leks included in the search. The area was searched using the transecting method described above during a single flight on the morning of 3/30/2019. A new lek, located in the southwestern corner of the survey area was discovered by an OAR flight crew during the 2018 survey. This lek was active and re-detected by OAR flight crews on the present survey with a total of 45 grouse in attendance.

Reese River

Sage-grouse were detected on Mitchell Canyon, which was active in 2018, and Deep Canyon which was last listed as active in 1972. Fifty-one grouse were observed on the Deep Canyon lek along what appeared to be an old road or mowing (figure 1). A possible new lek was detected between the two known Spanish Ranch Canyon leks and may be a satellite lek.

Figure 1. Infrared video view of the Deep Canyon Lek in Reese River Valley showing a segment of displaying males (n=5) along a two-track dirt road and associated mow strip.

North Monitor

Of the three known leks, all were in the northern portion of the search area, but only one, Grimes Hill 1, had grouse on it at the time of the flight. A new lek location was detected in the southern portion of the search area. One group of grouse (n = 34) were lekking in a clearing on the west bank of the probable channel remaining from a dried-up creek bed. Another group of grouse (n=18) were observed lekking in slightly thicker cover on the east side of the channel, approximately 0.1 miles from the larger group.

Discussion

Detection rates in the Montana Mountains and other high elevation lek sites during this survey were far lower than expected and significantly lower than the previous year's survey. The primary cause for reduced detectability is believed to be reduced lek attendance due to persistent snow levels on popular lekking grounds. Northern Nevada and much of the great basin experienced higher than average snow accumulate in the high elevations during the 2018/2019 winter and much of this snow remained at the time of the survey flights. It is possible that the reduced count seen in this year's survey can partially be explained by decreased migratory movement of birds from their wintering grounds into breeding grounds due to the persistent snow cover. Connelly et al. (2011) describes grouse seasonal movements as highly variable with peak migratory movement for sage grouse from wintering to breeding grounds occurring between mid-February and mid-March. It is possible environmental factors play an undermined role in the timing of these movements. Personal communication with NDOW personnel indicated that at the time of this survey, some grouse were still being detected on the wintering grounds.

Given the persistence of the snow cover in the higher elevations, and the fact that this survey was conducted relatively early in the lekking season. It is possible that some grouse are remaining in wintering grounds longer than normal and that peak lek attendance for the present season has not yet been attained.

Snow levels during winter 2016/2017 were also significantly above average while snow fall levels for winter 2017/2018 were significantly lower than average for much of the great basin. It may be worth comparing lek counts for the surveyed areas in this report to lek counts conducted in 2017. Any detected correlation may serve as supporting evidence indicating snow level persistence as a contributing factor influencing lek timing and attendance.

Upland Game Translocation and Monitoring

Mountain Quail Establishment

NDOW, working in conjunction with the U.S. Forest Service – Ely Ranger District, released 105 mountain quail into Hendry's Creek (figure 2) in the northern portion of the Snake Range in White Pine County during November of 2018. An additional release will be conducted in late fall of 2019.

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 new population. Habitat suitability and availability of cover and steep, rocky slopes should be conducive to mountain quail needs.

Figure 2. Mountain quail seeking cover at Hendry's Creek.

Ruffed Grouse Establishment

The short-term objective for this project is to augment the Pine Forest population in Humboldt County. Game Division biologists conducted spring and summer population monitoring in the Santa Rosa Range to determine whether or not populations were at a level to implement a capture and translocation project. Ultimately, it was determined that numbers of birds were not at a level where a capture would be successful enough for translocation of birds to the Pine Forest Range.

Despite this, drumming counts conducted during May of 2018 were somewhat encouraging. Field biologists and technicians performed surveys at 107 points at six different locations including Tennessee Mountain, Yankee Bill Summit, Columbian Creek and Toe Jam Creek in Elko

County as well as one survey route each in the Pine Forest and Santa Rosa Mountains of Humboldt County. Overall, detection rates of ruffed grouse across all survey transects was 43% (n=46 listening points). This represents a notable improvement over 2017, when detection rates were just 23% across 87 transects.

Wild Turkey Establishment

We continue to monitor the distribution and survival rates of Merriam's turkeys that were released into the northern portion of the Toiyabe Range during the winter of 2017-2018. Twelve birds were radio-marked during the second release and we have been monitoring locations using aerial fixed wing follow-up surveys on an intermittent basis (figure 3). Upon the last survey (4/23/2019) just four birds remained alive while seven birds are suspected to have perished. Two birds have either gone missing or their transmitter's battery life has expired. Nevertheless, the locations obtained have indicated that birds have established a home range that encompasses both the east and west flanks of Mount Callaghan in the northern Toiyabe Range.

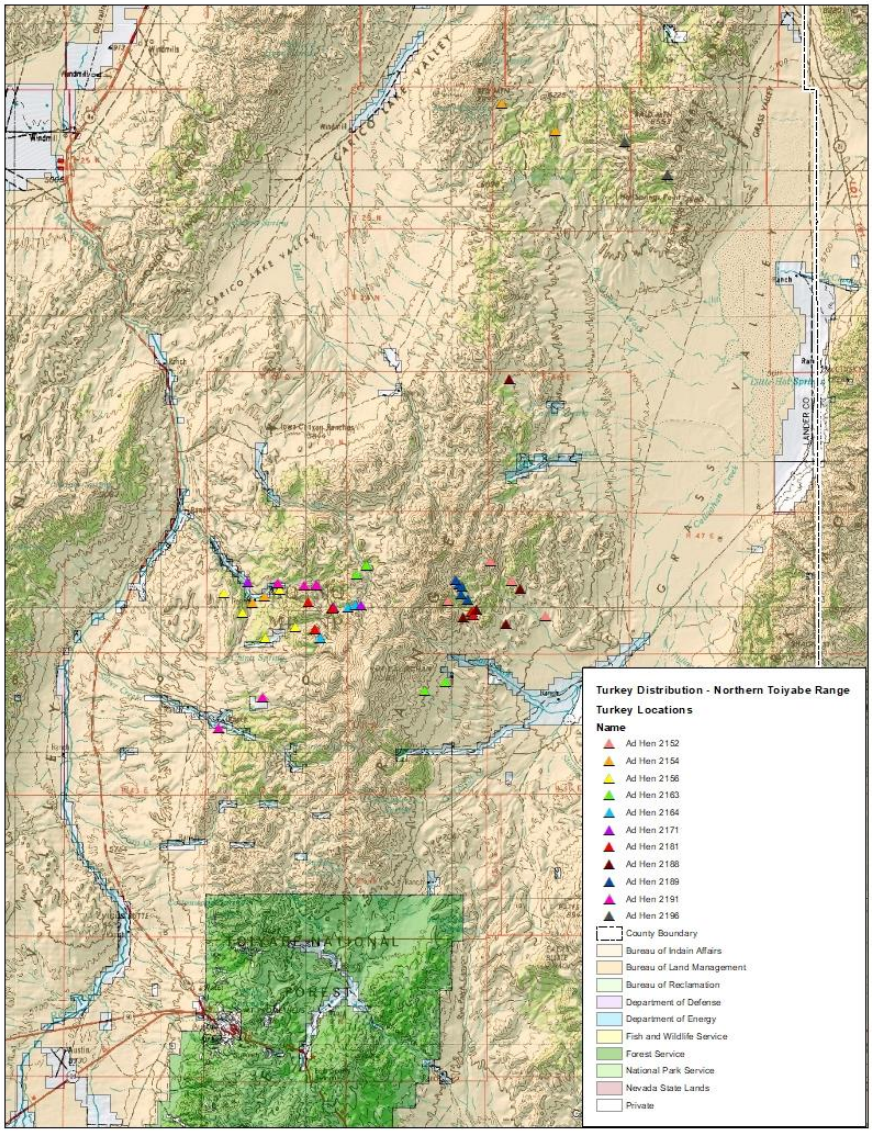


Figure 3. Telemetry locations obtained from VHF radio-marked turkeys in the Toiyabe Range.

Dusky Grouse Ecology and Management in Nevada

Population surveys

Breeding surveys for dusky grouse began on April 24 and continued until May 22, 2018. There were 64 total survey locations – 4 stop locations per survey site, 4 survey sites per field site, and 4 total field sites – with each survey location sampled twice for a total of 128 survey stops completed in 2018. During the breeding surveys, technicians detected over 90 male dusky grouse, with peak activity occurring from April 26 – May 1. Forty-six dusky grouse were identified during regular intervals, while 44 were detected during playback call intervals only. We have not yet analyzed the detection probabilities and location estimation error of marked males for the 2018 season.

Survival, reproduction, and harvest rates

Forty-seven dusky grouse were captured during the 2018 field season. Eight males and 34 females were banded, while 23 hens received GPS tags (15 store-on-board solar backpacks, 2 Argos solar backpacks, and 6 store-on-board necklace-style). There were a total of 29 adults and 18 chicks captured in 2018. Incidental mortalities consisted of 8 individuals lost during capture and killed prior to the handling, and 4 known radio-marked individuals were beginning of the hunting season, one of which seemed to have been killed by a golden eagle.

Figure 5. Female Dusky grouse seeking cover (Slatauski, NDOW)

No active nests were located during the nesting season, even after spending many hours and days searching. However, three nest sites were located post-hatch: one under sagebrush ~75 yards from an aspen stand, and two in aspen stands within ~6 m of the forest-sagebrush edge. Despite our lack of nesting hen locations, days spent afield with dogs (n = 70) were 66% more successful for locating dusky grouse than days spent afield by humans alone (n = 32).

During the first week of June, dusky grouse hens were displaying brooding behaviors and chicks were sighted and heard calling to their mothers. We located ~88 brooding dusky grouse hens, with broods ranging from 1–8 chicks per hen. Locations were recorded for each brood.

Habitat selection

No microhabitat vegetation measurements were taken during the 2018 field season due to the primary task of locating and capturing dusky grouse. Capturing dusky grouse and deploying GPS tags on hens was the most important factor for the 2018 field season and prepares us for success over the next two field seasons. Vegetation sampling will occur in the 2019 and 2020 field seasons.

Miscellaneous Observations

Several interesting observations were recorded during the first field season. Anecdotally, there seemed to be a displacement of dusky grouse once domestic sheep herds moved into certain areas. The relationship between dusky grouse and livestock is relatively unstudied and this may provide an opportunity to understand how livestock and dusky grouse interact. We also observed several instances of dusky and sage-grouse broods in close proximity to each other at multiple sites within the broader study area. Although the inter-specific brooding habitat selection has been observed by other biologists in the past, there has been no quantifiable research to better understand this overlap between these two related species. This information could lead to important habitat conservation measures in the future.

Male Dusky grouse; S. Farnsworth, Utah State University

Conclusions

The first field season was primarily focused on breeding bird surveys and dusky grouse captures. Due to logistical factors of starting a field project, we experienced a late start to our breeding bird surveys, which began after the breeding season had already started. Disregarding potential re-sights, ~695 dusky grouse detections were made over the entire 2018 field season and between all field sites; i.e., the north Schell Creek, Duck Creek Basin, and Egan study areas. Without having harvest and mortality estimates from 2018, harvest and survival rates cannot be calculated to date. We will attempt to locate all 2018 radio-marked individuals during the 2019 field season and will estimate mortality from fall and winter once we have retrieved the store-on-board data, or GPS tags themselves, from the field. Additionally, we will be able to use the surviving radio-marked hens to determine when their migration occurs, when and where they begin nesting, and where they move with their broods (assuming nesting is successful). This will allow us to identify their life history requirements, determine habitat selection while breeding, nesting, and brooding, and achieve each of our objectives over the next 2 field seasons.

Future Plans and Revised Objectives

For the 2019 field season, the start date for breeding bird surveys will be accelerated. In addition to our current sample of radio-marked dusky grouse, we will deploy up to 13 ARGOS-enabled solar rump-mount 22 g GPS-PTT radios (GeoTrak™). In addition to our primary objectives mentioned above, evaluating the thermal ecology of dusky grouse habitat selection will also be included. Lastly, a number of secondary objectives will be incorporated as described below.

Primary Objectives – Revisions:

- *Population surveys*. Breeding bird surveys will begin the last week of March and extend until the end of breeding season (~mid-May). This will allow us to properly determine the environmental conditions required for males to begin their reverse migrations into their

breeding habitats and to estimate the length of time that males exhibit their breeding behaviors in relation to differing environmental variables.

- *Survival, reproduction, and harvest rates*. We will measure microhabitat characteristics of nest locations ≤ 5 days post-hatch, including operative thermal ranges throughout the nesting period. Similarly, we will measure microhabitat and thermal characteristics of GPS-identified brooding locations within ≤ 3 days of initial use.
- *Habitat selection*. Vegetation and environmental characteristics will be surveyed for each identified location, including proportions of predominant grass, forb, and woody plant species, percent canopy cover, vegetation density, categorical vertical cover descriptions, line-of-sight to and from identified locations, percent bare ground, micro-terrain measurements (i.e., minute slope and elevation changes), and thermal ranges.

Secondary Objectives:

- *Baseline diet and cortisol levels between sites*. Fecal samples will be collected from captured grouse to determine a baseline for dusky grouse cortisol levels. We will also collect two saliva swab samples from captured during grouse to determine their reactive cortisol levels as affected by capture. We will use the collected fecal samples to also determine seasonal dietary habits of dusky grouse throughout the Schell Creek, Duck Creek Basin, and Egan study sites. When funding becomes available, we will identify the stomach and intestinal contents of dusky grouse using samples sent to Utah State University from the veterinary labs that NDOW uses to assess parasites and diseases.
- *Displacement by sheep herding*. We will record shepherds' detailed herding paths and timelines of their movements throughout the Schell Creek, Duck Creek Basin, and Egan study sites during the summer months and compare the data to radio-marked dusky grouse movements during overlapping timelines to determine the impact of sheep presence on dusky grouse activity.
- *Sage-grouse brooding habitat overlap*. Brooding locations will be recorded as observed during our field studies. We will compare their locations to known dusky grouse brooding locations to identify overlapping habitat use between the two species. This can help identify key areas of habitat for conservation management of both species.
- *Use of dogs for scientific research*. We will record all tracks of dog movements when performing dusky grouse searches for capture and nest locations. We will also record all successful points and flushes performed by each dog for comparison to successful, human-only dusky grouse searches. This will give us a measurement of success for the use of dogs in dusky grouse scientific research.

Monitoring the Effects of Landscape Level Treatments on Sage-grouse in the Desatoya Mountains

Sage-grouse demographic rates and spatial use were measured at the Desatoyas study area from 2014 to 2018 as part of a broad, long-term collaborative research program. General goals of this project are aimed at providing managers with information on population trajectories and threats to sage-grouse across the Great Basin. Specific to the Desatoyas study area, goals of this project are to evaluate the potential effects of habitat restoration and enhancement (that is, riparian

restoration, removal of singleleaf pinyon pine and Utah juniper (hereafter referred to as P-J) on sage-grouse demographic rates, movement patterns, and predator community composition. To date, 170 sage-grouse have been fitted with very high frequency (VHF) and Global Positioning System (GPS) transmitters. Annual population rate of change (λ) derived from an integrated population model utilizing vital rates measured during this study and longer lek count data starting in 2011 was estimated at 0.91 (95 percent CRI 0.81–1.02). This estimate was largely reflective of drought-like conditions.

Introduction

The U.S. Geological Survey (USGS) along with agency and stakeholder partners that include NDOW, Bureau of Land Management (BLM), Smith Creek Ranch, and Great Basin Bird Observatory, are collaborating on an intensive effort to monitor populations of sage-grouse in the Desatoya Mountain Range. Large expanses of P-J within the Desatoya Mountains may inhibit sage-grouse movement and act as barriers between seasonally used habitats. Loss of sagebrush, wet meadows, and riparian habitats also may contribute to population decreases. Therefore, we initiated a before-after study designed to investigate potential effects of habitat restoration and enhancement (e.g. P-J removal, riparian restoration) on sage-grouse population vital rates, habitat selection, and movement patterns, as well as effects on predator community composition. Our goals are to evaluate sage-grouse response to restoration activities by monitoring seasonal movements, estimating vital rates (for example, individual, nest, and brood survival), and measuring changes in habitat selection and predator communities.

This report presents updated findings regarding the Desatoyas study area from 2011– 2018, and incorporates data reported by Coates and others (2016*b*) as part of an ongoing long-term research effort. Intensive field studies of radio-marked sage-grouse span 2014–18, while lek counts span the entire study period. Specific to this report are demographic and population growth rate estimates derived from the integrated population model (hereafter, "IPM"), as well as a summary statistics describing sage-grouse space use and avian predator abundance throughout the study site. The findings contained in this report are preliminary and are meant to provide managers with timely science from this ongoing research effort and are subject to change.

Preliminary Results

From fall 2013 to fall 2018,170 sage-grouse were captured at the Desatoyas study site (n=99 fall, n=71 spring captures). Of those, 151 were female and 19 were male. GPS transmitters provided 57,481 locations of marked sage-grouse at the Desatoyas study area from 2014 to 2018. These data, coupled with VHF data, also allowed for the development of seasonal habitat distribution layers. During the spring (nesting) season, the 50 percent core area of sage-grouse activity and the 95 percent population level home-range were 8,715 and 47,265 ha, respectively (figure 7). During the summer (brood-rearing) season, the 50 percent core area and the 95 percent population level home-range were 1,465 and 18,423 ha, respectively.

Seasonally, sage-grouse use of the landscape changed as marked individuals utilized distinctly different areas throughout different seasons. The season that sage-grouse were most concentrated was the summer. During that season, sage-grouse were localized to a 50 percent core area of only 1,465 hectares compared to the winter, where they used 12,559 hectares. Differences among

seasonal habitat area estimates can be partly attributed to variation in location frequency and corresponding adjustments of bandwidths used to smooth habitat edges.

Information collected from radio and GPS marked grouse also allows researchers to estimate several different demographic rates that not only provide important insights into certain life stages (e.g. nesting, brood rearing and survival rates), but also factors into integrated population models. Survival rate information for the study period so far is provided in Table 2 while nesting, brood rearing and population growth rates are provided in Table 3.

Table 2. Estimated survival rates of adult, yearling and juvenile sage-grouse from 2014-2018.

Year	Adult Survival	Yearling Survival	Juvenile Survival
2014	0.66	0.68	0.92
2015	0.69	0.71	0.93
2016	0.69	0.71	0.93
2017	0.47	0.50	0.87
2018	0.61	0.63	0.91
Average:	*0.62*	*0.65*	*0.91*

Table 3. Estimated nest survival for adults, probability of a chick surviving the 50-day brood rearing period and population growth rate estimates from 2014-2018.

Year	Incubation Period Survival	Brood Survival to 50-days	Lambda (λ)
2014	0.32	0.33	1.06
2015	0.30	0.29	1.01
2016	0.35	0.20	0.99
2017	0.29	0.22	0.77
2018	0.34	0.23	0.91
Average:	*0.32*	*0.25*	*0.95*

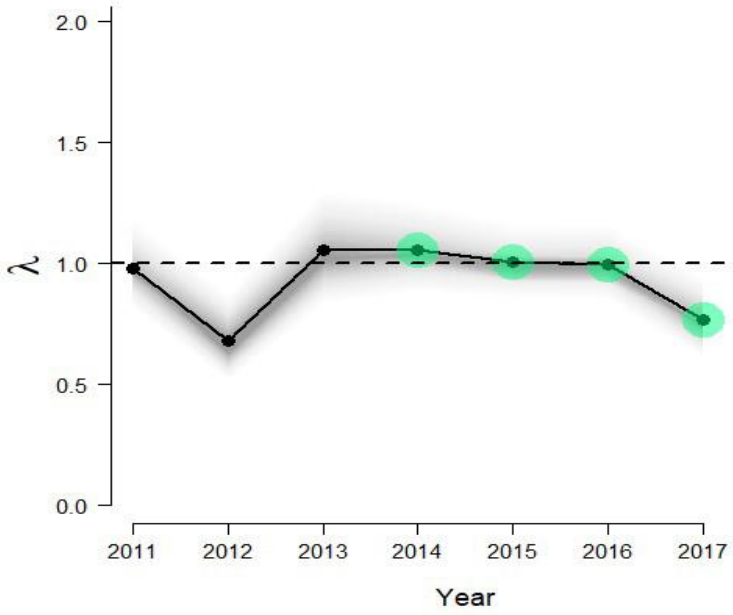
Avian Predator Monitoring

Over 300 raptor and raven surveys were conducted throughout the Desatoyas study area in 2018 for a total of 1,992 surveys during March–August 2014–18. In 2018, a total of 486 ravens were observed during the 317 surveys which yielded 1.53 ravens per survey. We detected 0.91 ravens per RRHL survey at nest sites, which was lower than the number of ravens that we detected per each random survey (n=2.09). Livestock were encountered at 108 surveys, and raven detections per survey were lower during surveys in which livestock were detected (1.20), compared with surveys in which livestock were not detected (1.70). When ravens were detected in 2018, the median number of observed ravens was 1 per survey, and the maximum number of ravens detected in any survey was 117.

Population Growth Estimated from an Integrated Population Model

Estimated population demographic rates, IPM-derived estimates of N, λ, and probability that the population is increasing versus declining for the Desatoyas study area cumulatively, and annually from 2011–18 was determined. Derived parameters were averaged across years to evaluate overall averages of recruitment (hereinafter; R) and all subcomponents for adult (α) and yearling (y) sage-grouse when estimation by age was appropriate. Some parameters did not have enough data to derive annual estimates (for example, clutch size), and those parameters were pooled with data from other sites across central and northern Nevada to produce estimates. From 2011–18, the Desatoyas study area had a median λ estimate of 0.91 (95 percent CRI=0.81–1.02). Estimated declines in population sizes are reflected by a trend of decreasing lek counts (figure 6). At the Desatoyas study area, the 8-year log of the odds ratio indicates that there is more evidence of population decrease than that of population increase. We also determined that adult sage-grouse had similar median annual survival (0.61, 95 percent CRI=0.51–0.70) as yearlings (0.63, 95 percent CRI=0.53–0.73), but lower recruitment (0.37, 95 percent CRI=0.23–0.58) than yearlings (0.44, 95 percent CRI=0.25–0.71).

Figure 6. Annual population growth rates estimated from 2011-2017. Gray shading represents years wherein only lek count data was collected. Green shading represents years that lek count and demographic data were collected.



While the overall estimate of lambda across the study period (2011-2018) reflects population decline, results need to be interpreted with the following caveats. Sage-grouse populations in the Great Basin are known to exhibit population cycles, which typically range in duration from 10-12 years (Row and Fedy 2017) and are strongly correlated with annual changes in precipitation (Coates and others, 2018). Accordingly, the 8-year duration of our study to date primarily spanned periods of drought, so reported lambda estimates are most reflective of long-term drought conditions. While current sage-grouse population cycles in the Great Basin may be

decreasing in both duration and amplitude (Row and Fedy 2017), longer term lambda estimates may increase when future years could potentially experience and realize above average precipitation, fueling bursts of population growth.

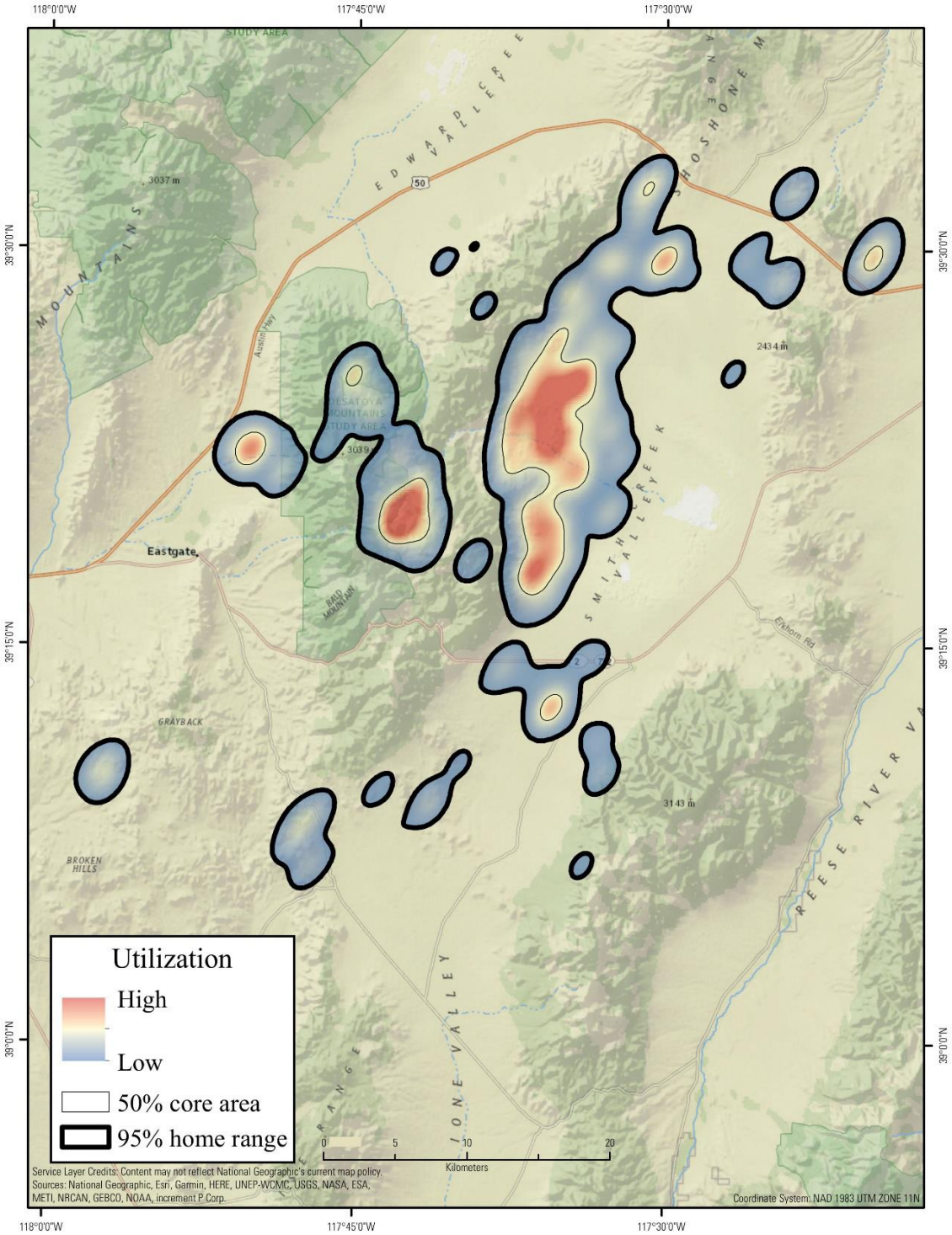


Figure 7. Cumulative utilization distribution of sage-grouse during the spring season from 2014-2018.

Estimating Vital Rates within Nevada's Most Novel Habitats

Demographic rates and spatial use of greater sage-grouse (*Centrocercus urophasianus*; hereinafter, sage-grouse) were measured in the Monitor Range during 2015-2018 as part of a broad, long-term collaborative research program. General goals of this project are to provide a control site with low anthropogenic disturbance that will allow comparisons of demographic trends in sage-grouse populations in populations with anthropogenic surface disturbances. To date, 113 sage-grouse have been captured and outfitted with very high frequency and global positioning system transmitters. Annual population rate of change (λ) derived from an integrated population model utilizing vital rates measured during this study and longer lek count data was estimated at 0.87 (95 percent CRI 0.78 – 0.98) from 2011 to 2018.

Introduction

In the Great Basin, understanding how relationships between habitat selection and population vital rates are altered by threats from anthropogenic surface disturbance (e.g. mine, geothermal, oil and gas, or infrastructure development) is important to help facilitate effective management of primary threats to sage-grouse populations (Connelly and others, 2000). However, effectiveness of management actions aimed at ameliorating these threats cannot be fully evaluated without information of sufficient time duration on population performance and habitat associations in areas that are relatively undisturbed and relatively intact sagebrush ecosystems. For example, increased development of energy infrastructure within sage-grouse habitat can alter vegetation communities to change predator composition, particularly common ravens, as transmission lines and other tall structures used for nesting and perching become more prevalent across the landscape (Howe and others, 2014). Evaluating metrics of sage-grouse population performance, spatial utilization, and predator abundance at control sites can better help quantify relative impacts of anthropogenic disturbance.

The Monitor Range study area is located approximately 110 kilometers southeast of Austin, Nevada, and includes the mountains in the Monitor Range and adjacent Monitor Valley to the west. The area represents a valuable control site owing to a paucity of anthropogenic disturbance and infrastructure compared to other field sites in Nevada and California monitored by USGS and collaborators. Moreover, data obtained from the Monitor Range can help provide a baseline for comparing effects of energy development on sage-grouse monitored at the McGinnis Hills and Tuscarora study sites.

This report presents updated findings regarding the Monitor Range study area from 2015–2018 and incorporates data reported by Coates and others (2016*b*) as part of an ongoing long-term research effort. Intensive field studies of radio-marked sage-grouse span 2015–2018, while lek counts span the entire study period. Specific to this report are demographic and populations growth rate estimates derived from the integrated population model (hereafter, "IPM").

Preliminary Results

From fall 2015 to fall 2018, 113 sage-grouse were captured in the fall (n=71) and spring seasons (n=42). Of those, 108 were female and 5 were male. Over 9,000 GPS locations of marked sage-grouse were obtained at the Monitor Range from 2015–18. During the spring (nesting) season, the

50 percent core area of sage-grouse activity and the 95 percent population level home-range were 6,763 ha and 54,435 ha, respectively. During the summer (brood-rearing) season, the 50 percent core area and the 95 percent population level home-range were 5,123 ha and 28,918 ha, respectively.

Seasonally, sage-grouse use of the landscape changed as marked individuals utilized distinctly different areas throughout different seasons. The season that sage-grouse were most concentrated was the winter. During that season, sage-grouse were localized to a 50 percent core area of only 1,164 ha compared to the spring, where they used 6,763 ha (figures 9 and 10). We note, however, that differences among seasonal UD estimates can be partly attributed to variation in location frequency and corresponding adjustments of bandwidths used to smooth UDs.

Information collected from radio and GPS marked grouse also allows researchers to estimate several different demographic rates that not only provide important insights into certain life stages (e.g. nesting, brood rearing and survival rates), but also factors into integrated population models. Survival rate information for adults, yearlings and juveniles is provided in Table 4 while nesting, brood rearing and population growth rates are provided in Table 5 for the duration of the study.

Table 4. Estimated survival rates of adult, yearling and juvenile sage-grouse from 2016-2018.

Year	Adult Survival	Yearling Survival	Juvenile Survival
2016	0.61	0.64	0.91
2017	0.58	0.61	0.90
2018	0.56	0.58	0.90
Average:	0.58	0.61	0.90

Table 5. Estimated nest survival for adults, probability of a chick surviving the 50-day brood rearing period and population growth rate estimates from 2016-2018.

Year	Incubation Period Survival	Brood Survival to 50-days	Lambda (λ)
2016	0.27	0.29	0.94
2017	0.29	0.32	0.85
2018	0.33	0.33	0.88
Average:	0.30	0.31	0.89

Avian Predator Monitoring

A total of 366 Raven, Raptor, Horse and Livestock (RRHL) surveys were conducted throughout the Monitor Range in 2018 for a total of 1,001 surveys during March–August 2016–18 In 2018, ravens were detected during 114 surveys. We detected 0.29 ravens per RRHL survey at nest sites, which was identical to the number of ravens detected per random survey (0.29) Livestock were encountered at 30 surveys, and raven detections per survey were noticeably higher during

surveys in which livestock were detected (0.60), compared with surveys in which livestock were not detected (0.29. When ravens were detected in 2018, the median number of observed ravens was 1 per survey, and the maximum number of ravens detected in any survey was 8.

Population Growth Rates Estimated from an Integrated Population Model

From 2011–18, the Monitor Range had a median λ estimate of 0.87 (95 percent CRI=0.78–0.98). Estimated declines in population sizes are reflected by a trend of decreasing lek counts (figure 8). At the Monitor Range, the eight-year log of the odds ratio indicates that there is more evidence of population decline than that of population increase or neutrality. Adult sage-grouse had similar median estimates of annual survival (0.60, 95 percent CRI=0.48–0.69) and recruitment (0.35, 95 percent CRI=0.20–0.58) as compared to yearlings (survival=0.62, 95 percent CRI=0.50–0.72; recruitment = 0.38, 95 percent CRI=0.19–0.73).

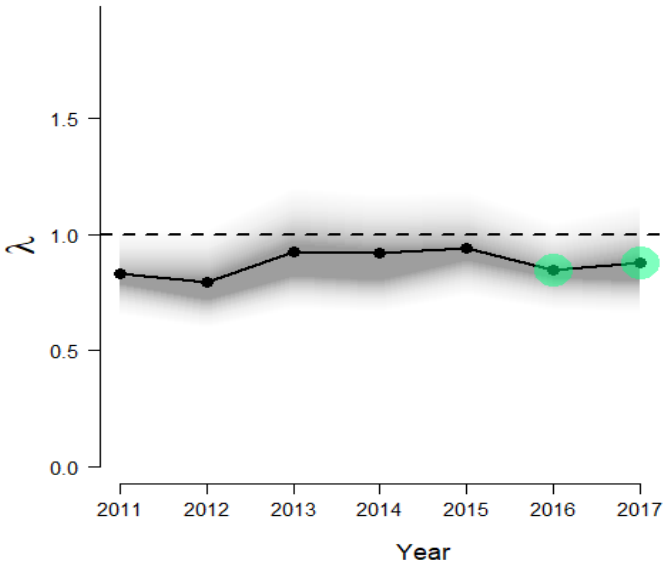
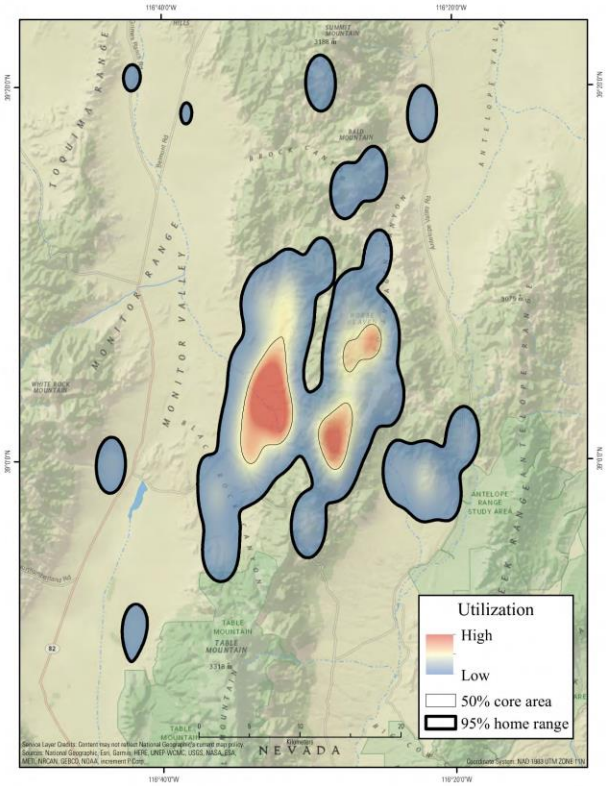
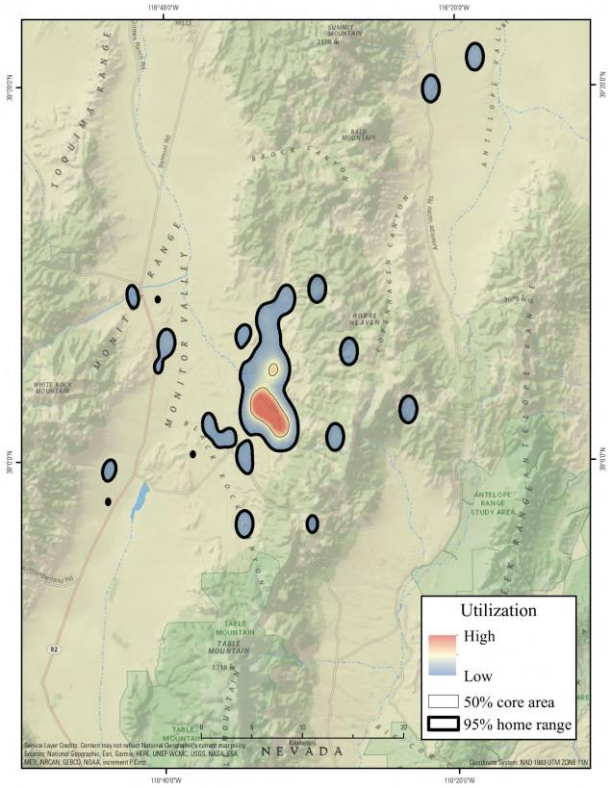


Figure 8. Annual population growth rates estimated from 2011-2017.

While the overall estimate of λ across the study period (2011-2018) reflects population decline, results need to be interpreted with the following caveats. Sage-grouse populations in the Great Basin are known to exhibit population cycles, which typically range in duration from 10-12 years (Row and Fedy 2017) and are strongly correlated with annual changes in precipitation (Coates and others, 2018). Accordingly, the 8 year duration of our study to date primarily spanned periods of drought, so reported lambda estimates are most reflective of long term drought conditions. While current sage-grouse population cycles in the Great Basin may be decreasing in both duration and amplitude (Row and Fedy 2017), longer term lambda estimates may increase when future years that could experience above average precipitation fueling bursts of population growth are incorporated into the IPM time series.





Figures 9 and 10. Seasonal utilization distributions for spring (left) displaying a rather large area versus more limited distribution of marked sage-grouse during the winter (right).

Measuring Corticosterone Metabolites in Greater Sage-grouse

This project is being conducted in conjunction with an associated noise monitoring study being performed at seven different lek locations representative of northwestern, north-central and central Nevada. Sound monitoring devices (Larson-Davis sound level meters) capable of measuring noise at the 6.5 ambient decibel level were deployed near Nellie Springs Mountain and Bitner Table in northern Washoe County, Crowley Creek in the Montana Mountains of Humboldt County, Vigus Butte, east bench of Mount Callaghan and Ackerman Creek in Lander County. This investigation is being conducted to gain a better understanding of baseline noise levels at leks with relatively little to no anthropogenic disturbances nearby.

Measuring corticosterone metabolites allows researchers to gain a better understanding of stress levels at these sites. Glucocorticoid hormones and their metabolites are often used to measure stress responses either from blood or fecal samples. These hormones are integral to allocating energy and prolonged exposure due to chronic stress can affect fitness by inhibiting resource allocation to reproductive or immune activities (Wikelski and Cooke, 2006). In a study conducted in Fremont County, Wyoming, Blickley et al. (2012) found strong support for an impact of noise playback on stress levels, with 16.7% higher mean corticosterone metabolite levels in samples from noise leks compared to paired control leks. We want to gain a better understanding of cortisol levels exhibited by sage-grouse at areas that are considered relatively quiet with intact habitat and potentially compare these results to certain leks exposed to current or future anthropogenic disturbance (e.g. additional vehicle trips, energy development, mine construction, etc.).

Our initial objective is to obtain 15 fecal samples (figure 11) consisting of 5 pellets each per lek (105 samples) for laboratory analysis. Table 6 below indicates the samples that have been collected as of this report writing for each one of the study lek complexes.

Table 6. Sage-grouse fecal sample collection distribution during the spring of 2019.

Lek Name/Complex	Region	County	Samples
Twin Lakes	Northwest	Washoe	14
Fatty Martin	Northwest	Washoe	10
Crowley Creek (1 & 2)	North-central	Humboldt	16
Mount Callaghan (east)	Central	Lander	23
Ackerman Creek	Central	Lander	21
Vigus Butte	Central	Lander	1
		Total Samples:	86

The collection of samples will continue through mid-May of 2019, with the potential for additional samples to be collected during the spring breeding season of 2020 from these sites plus additional areas subject to heightened anthropogenic disturbance. Results are intended to assist managers with making future management action recommendations that benefit sage-grouse health. Samples will be analyzed either at Idaho State University, the University of California at Davis or the University of Nevada, Reno depending on lab capabilities and workload.

Figure 11. Example of typical sage-grouse roost droppings including cecal deposit at left.

Effects of Conventional Raven Control and Wildfire on Greater Sage-grouse within the Virginia Mountains

Demographic rates and spatial use of greater sage-grouse (*Centrocercus urophasianus*; hereinafter, sage-grouse) were measured in the Virginia Mountains from 2008–18 as part of a broad, long-term collaborative research program. General goals of this project are aimed at providing managers with information on population trajectories and threats to sage-grouse across the Great Basin. Specific to Virginia Mountains, goals of this project are to evaluate the effect of raven removal and wildfire effects on sage-grouse demographic rates. To date, 313 sage-grouse have been captured and outfitted with very high frequency (VHF) and global positioning system (GPS) transmitters. An average annual population rate of change (λ) derived from an integrated population model which utilized demographic and lek count data measured during this study from 2011 to 2018 was estimated to be 0.93 (95 percent credible interval 0.81–1.05), reflecting a population decline of about seven percent annually. This estimate may be reflective of drought-like conditions, but could also be related to the tremendous amount of wildfire this study site has experienced from 2016-2018.

Introduction

The Virginia Mountains in northwestern Nevada consists of exurban areas, which include sporadic ranching operations and numerous anthropogenic structures. Ravens were reported as an important nest predator at this study site (Lockyer and others, 2013). Raven numbers are thought to be moderately high at this site compared to other areas in Nevada (Tyrell pers. comm,

2018) so reducing raven numbers using lethal techniques was considered an appropriate management action. Although a few studies have quantified the effects of raven removal on sage-grouse nest survival (for example, Dinkins and others, 2016), we are currently unaware of any studies that evaluate evidence of whether raven removal influences population growth rates. Scientific findings regarding effects on specific life-stages, such as nesting, as well as population growth would be beneficial to help guide decisions regarding lethal removal. Furthermore, we are unaware of any studies that have empirically evaluated the impacts of ravens on sage-grouse populations in years after removal activities have concluded. Recent fires at this study site (Virginia Mountains Fire Complex - 59,727 acres, 2016; and Long Valley Fire - 83,733 acres, 2017) may also provide additional research opportunities to examine interactions between ravens and wildfire.

The USGS has been collecting data at the study site since 2008 while the United States Department of Agriculture Animal and Plant Health Inspection Service initiated raven removal activities using the pesticide DRC-1339 during 2014–18 with an extension through 2019. Research objectives are therefore focused on the effects of ravens and raven removal on sage-grouse populations within the Virginia Mountains. Specifically, we are conducting a before-after-control-impact study design to investigate potential effects of raven removal on sage-grouse population vital rates, population growth, and effects on predator community composition. This report presents updated findings regarding the Virginia Mountains from 2008–18 and is part of an ongoing long-term research effort. Specific to this report are demographic and populations growth rate estimates derived from the integrated population model (hereinafter, "IPM"), a summary of sage-grouse space use throughout the study site, and an overview of avian predator surveys. The findings contained in this report are preliminary and are meant to provide managers with timely science from this ongoing research effort and are subject to change.

Preliminary Results

From 2008 to 2018, 313 sage-grouse were captured in the fall (n=198) and spring seasons (n=115; table 1). Of those, 285 were female and 28 were male. Seasonally, sage-grouse use of the landscape remained relatively constant as marked individuals utilized similar areas throughout different seasons. The season that sage-grouse were most concentrated was the summer. During that season, sage-grouse were localized to a 50 percent core area of only 6,218 ha compared to the winter season where they used 41,995 hectares (figure 13). Differences among seasonal distribution estimates can be partly attributed to variation in location frequency and corresponding adjustments of bandwidths used to smooth UDs.

Information collected from radio and GPS marked grouse also allows researchers to estimate several different demographic rates that not only provide important insights into certain life stages (e.g. nesting, brood rearing and survival rates), but also factors into integrated population models. Survival rate information for the duration of the study is provided in Table 7 while nesting, brood rearing and population growth rates are provided in Table 8.

Table 7. Estimated survival rates of adult, yearling and juvenile sage-grouse from 2011-2018.

Year	Adult Survival	Yearling Survival	Juvenile Survival
2011	0.57	0.59	0.90
2012	0.41	0.44	0.85
2013	0.59	0.62	0.91
2014	0.69	0.71	0.93
2015	0.72	0.74	0.94
2016	0.61	0.63	0.91
2017	0.60	0.62	0.91
2018	0.56	0.58	0.90
Average:	0.59	0.62	0.91

Table 8. Estimated nest survival for adult hens, probability of a chick surviving the 50-day brood rearing period and population growth rate estimates from 2011-2018.

Year	Incubation Period Survival	Brood Survival to 50-days	Lambda (λ)
2011	0.42	0.31	0.86
2012	0.26	0.48	0.63
2013	0.25	0.57	1.04
2014	0.34	0.45	1.30
2015	0.31	0.42	1.14
2016	0.36	0.30	0.94
2017	0.19	0.33	0.92
2018	0.30	0.34	N/A
Average:	0.30	0.40	0.98

Nest Videography

Remote video cameras were placed at 73 nests from 2009—11 and from 2014—18, during which all depredations and successful hatches were recorded. Predators associated with partial and complete depredations were categorized as ravens (n=8), coyotes (n=8), American badgers (n=2), long-tailed weasel (n=1), bobcat (n=1), and fox (n=1). Successful hatches were recorded at 45 nests and five nests were abandoned, one of which was due to a hen that was killed during an incubation recess.

Population Growth Rates

Summary information was reported for observed lek counts, population vital-rate estimates, IPM-derived estimates of N (number), λ (population growth rate), and probabilities of increasing population growth versus declining population growth (odds ratios) for the Virginia Mountains cumulatively, and annually from 2011–18. Derived parameters were averaged across years to evaluate overall averages of recruitment (R) and all subcomponents for adult (a) and yearling (y)

sage-grouse when estimation by age was appropriate. Some parameters did not have enough data to derive annual estimates (for example, clutch size), and those parameters were pooled with data from other sites across central and northern Nevada to produce estimates.

From 2011–18, the Virginia Mountains has a median λ of 0.93 (95 percent credible interval=0.81–1.05; hereinafter, CRI). Estimated declines in population sizes are reflected by a trend of decreasing lek counts (figure 12). At Virginia Mountains, the 8-year log of the odds ratio indicates that there is more evidence of population decrease than that of population increase. We also observed that adult sage-grouse averaged similar survival (0.59, 95 percent CRI=0.50–0.68) compared with yearlings (0.62, 95 percent CRI=0.52–0.71), but exhibited lower recruitment (adult R=0.43, 95 percent CRI=0.28–0.64; yearling R=0.51, 95 percent CRI=0.29–0.83).

While the overall estimate of lambda across the study period (2011–2018) reflects population decline, results need to be interpreted with the following caveats. Sage-grouse populations in the Great Basin are known to exhibit population cycles, which typically range in duration from 10–12 years (Row and Fedy 2017) and are strongly correlated with annual changes in precipitation (Coates and others, 2018).

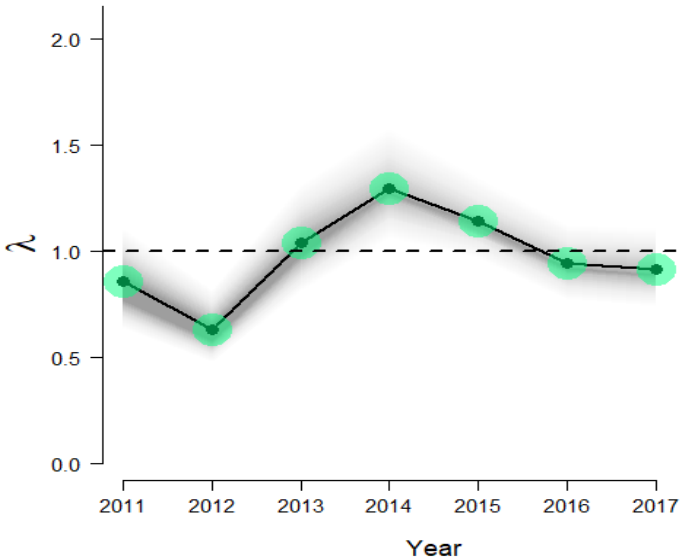


Figure 12. Population growth rates estimated from corrected lek counts from 2011-2018.

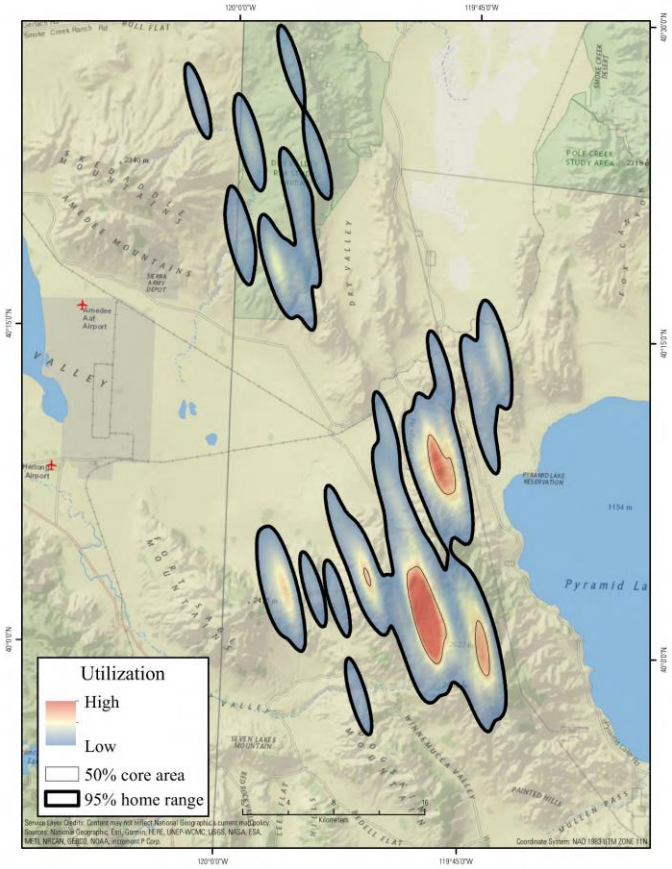


Figure 13. Cumulative utilization distribution of sage-grouse during the winter season at the Virginia Mountains study area from 2009-2018.

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

NDOW and the BLM's Ely District have partnered on a monitoring project to determine the efficacy of various vegetative treatments, particularly pinyon and juniper removal via several different treatment methodologies (e.g. chaining, mastication, hand thinning, etc.), 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 levels of conifer encroachment. For example, in a study conducted in south-central Oregon, Baruch-Murdo et al. (2013) found that no sage-grouse leks remained active when canopy cover exceeded 4 percent. 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.

Across all three distinct study areas, over 21,000 locations from 36 individual greater sage-grouse have been collected over the course of more than two years of study. Formal analyses have been initiated, but patterns of habitat selection have already been detected. Areas that apparently are keys to sage-grouse persistence year-round have also been identified.

Hamlin Valley Study Area

In Hamlin Valley, 5,751 points were collected from 6 males and 1 female. A similar pattern to Steptoe Valley was observed here where all grouse used the valley for most of the year but several of them moved 8-10 kilometers over unsuitable pinyon-juniper woodlands to higher elevation sagebrush patches during summer. Within each seasonal habitat patch, individual grouse often didn't cover more than about 5 km (figure 14), suggesting either that suitable habitat was spatially limited (i.e., the habitat is good enough that they don't have to move within seasons) or some combination of those two modulated by environmental covariates. In any of these cases, these grouse are likely still at risk of predation moving between seasonal habitats.

Cave Valley Study Area

In Cave Valley, 12,184 points were collected from 7 males, 7 females, and 2 where sex was not recorded. GPS data from sage-grouse in Cave Valley suggests that they may face even more significant spatial limitations than in other parts of this fragmented southern range margin. While there is grouse activity in the valley (figure 15), most of it is limited in both space and time, with a majority of the valley unused by any grouse carrying a transmitter. When sage-grouse are in the main part of the valley, it's usually in winter and in a corridor less than half the width of the valley. The driest, most barren segment of the valley—the wide southern half—has almost never been used by grouse during the period of our study. The exception is a small area at the very southern end, which seems to have served as recurrent winter habitat. One of the areas of Cave Valley most commonly and broadly used by grouse is Cave Valley Ranch, where apparent water sources may provide suitable refuge during summer extremes.

Steptoe Valley

Trapping efforts were initiated in Steptoe Valley in March 2018. Since then, 6,740 points have been collected from 4 female and 7 male GPS marked individuals. During the fall months, individual grouse exhibited different strategies and use the landscape differently. The main, wide part of the valley, especially where there is grass cover in addition to sagebrush, was used often by grouse throughout the year. In the summertime, about half of the grouse with transmitters stayed in the valley, with some making very little change to their overall home range. Two individuals using the valley moved and stayed almost exclusively in or near the marsh area near Comins Lake. The other half of the grouse moved to high elevation patches of sagebrush, many of which were encircled by pinyon-juniper forest (figure 16). There was no apparent difference between sexes in these movements. To reach and stay in those patches, grouse may have been exposed to greater risk of predation due to movement through or over pinyon-juniper woodlands than those that stayed in the valley. Those movements between apparent seasonal habitats demanded shifting their approximate home range by 10-25 kilometers.

Additionally, the research crew in Steptoe Valley has begun investigating potential thermal refugia across the landscape and throughout the year. Compelled by observations of grouse

moving to high elevations in summer, and the potential threats of extreme temperatures to both adults and chicks, researchers are examining the role that temperature regimes at fine scales drive individual grouse habitat selection. It is suspected that sage-grouse are able to persist in areas of both extreme hot and cold in part because of behavior to seek more stable microrefugia. With ongoing habitat treatments in Nevada and other states largely to create more breeding and brood-rearing habitat, understanding landscape impacts on thermal regimes and grouse responses to them will be an essential part of managing habitat for year-round sage-grouse persistence. We hypothesize that factors of terrain and land cover will foster more stable microclimate and that grouse seek those microclimates during extreme temperatures. In particular, more topographic heterogeneity may foster more stable microhabitat and more sage-grouse habitat use, especially when correlated with NDVI.

For each individual grouse, resource selection functions (RSFs) models are being built in order to understand the factors of landscape, climate, habitat, and management that impact their habitat selection. These analyses are in their infancy, but are expected to deliver clear results showing what measurable factors of their environment drive grouse behavior. In particular, one of our first objectives is to analyze the impact of habitat treatments conducted by the BLM, USFS and NDOW. Data loggers and GPS location data will help show what impact those treatments have on grouse habitat selection and whether the impacts are uniform. Because of the apparent difference in seasonal habitats, the amount of data that has been collected, and occasional gaps in GPS coverage, dynamic Brownian Bridge Movement Models will be used to analyze patterns of movement and habitat selection.

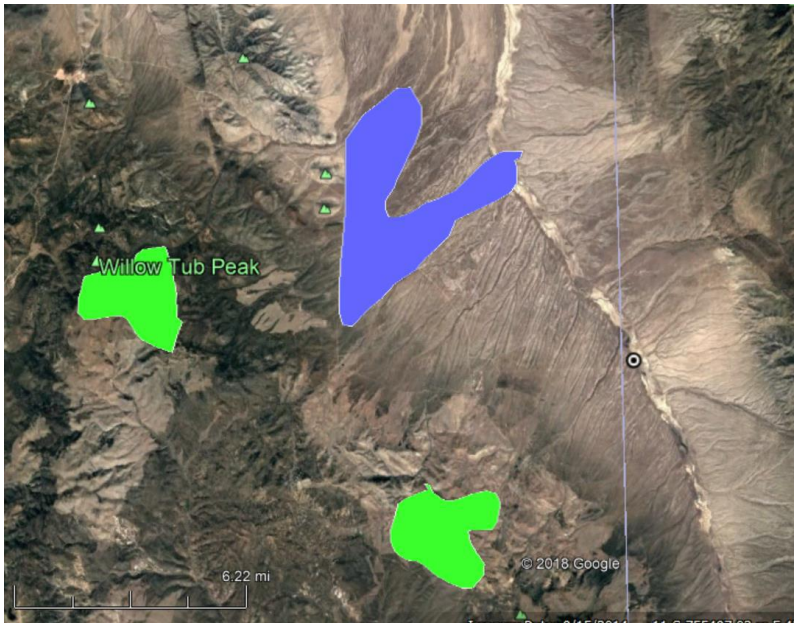


Figure 14. Areas of high overall use (blue) and apparent summer habitat (green) in Hamlin Valley.

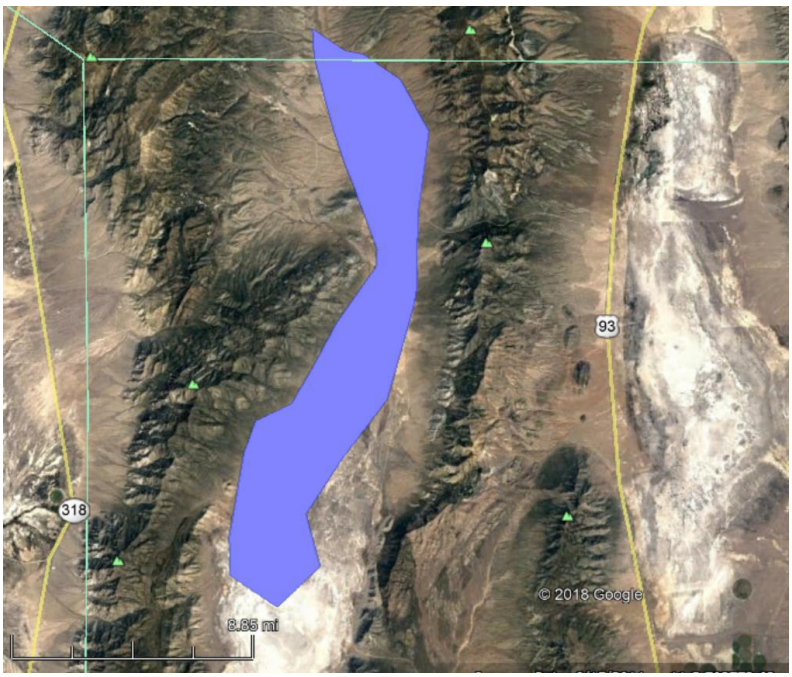


Figure 15. Corridor of most dense sage-grouse habitat use in Cave Valley.

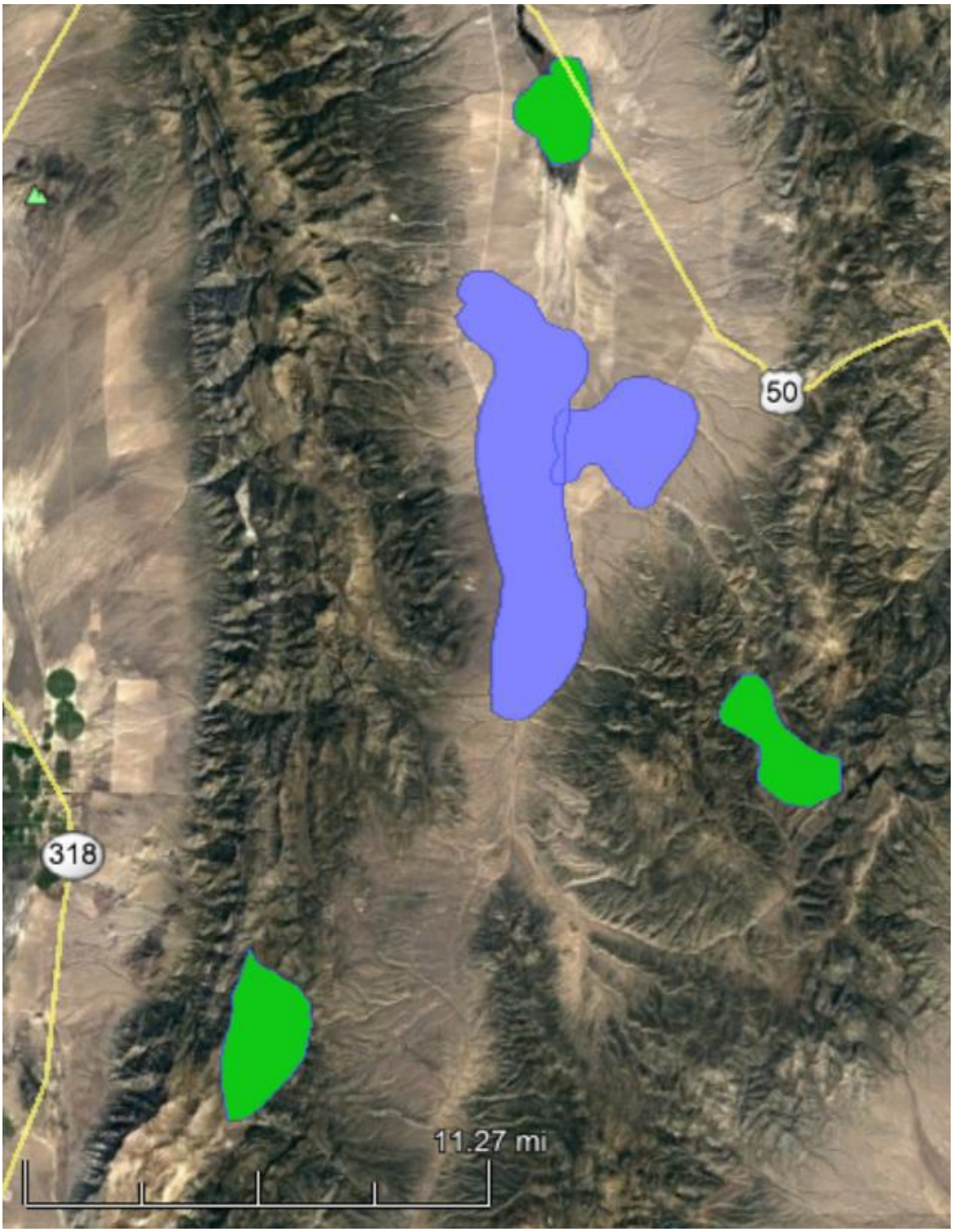


Figure 16. Seasonal distribution of sage-grouse use within Steptoe Valley (green-summer; blue-breeding/winter).

Italian Creek/Eagle Butte/McGinness Hills Habitat Enhancement Project

This project consisted of hand cutting, lopping, and scattering all phase 1 and phase 2 pinyon pine and juniper trees (PJ) on approximately 3,850 acres within the Toiyabe Sage Grouse Population Management Unit (PMU). This PMU is on BLM- and U.S. Forest Service (USFS) - administered land. More specifically, the work was completed in the Italian Creek, Eagle Butte, and McGinness Hills areas. This project was done to enhance sage grouse habitat by removing encroaching PJ. This treatment will help maintain and enhance the sagebrush-grass vegetative community in the Toiyabe PMU. This project was a collaborative effort between NDOW, BLM, ORMAT-McGinness Hills Wildlife Working Group, and the USFS. A total of $504,405 was spent on this project, including $42,500 of Upland Game Bird Stamp funds that were awarded to the McGinness Hills PJ Removal Project and the related PJ Thinning with Bootstraps Crew Project.

PJ hand thinning in Italian Canyon

Statewide Water Development Maintenance

The majority of the Statewide Water Development Maintenance funding from the Upland Game Bird Stamp account was allocated towards the purchase of materials to be used in the repair of existing small game water developments (*hereafter*, guzzlers), including guzzlers recently damaged by wildfire. A smaller amount of funding was allocated towards tools needed to complete repairs, and maintenance of state-owned ATVs/UTVs used by state personnel to access remote sites where small game guzzlers are located. NDOW water development staff conducted 443 aerial inspections, 27 ground inspections, and one major maintenance or rebuild. Inspections often include completion of minor maintenance activities

that commonly includes mucking out tanks/drinkers, clearing brush, and tightening fences or aprons.

Post- Fire Upland Habitat Restoration – Gold Butte

During the late fall of calendar year 2018 through the spring of calendar year 2019, this project's expenditures were approximately $16,000 on restoration work near small game guzzler sites located in Clark County's Gold Butte region. A total of 7 Gold Butte guzzler sites were determined to be candidates for post-fire restoration. These sites included GB01, GB04, GB07, GB09, GB11, GB26, and GB27. Habitat Staff worked with the Friends of Gold Butte organization to implement a volunteer event in conjunction with the BLM for National Public Lands Day. Habitat staff provided materials, plants, water, equipment, labor, technical and logistical support. The species that were planted were grown with BLM specified hyper local seed (seed from the actual area). These species include: catclaw acacia, white bursage, burro bush, creosote, threadleaf ragwort, globemallow, and Mojave aster. An additional 410 plants were installed within 4 sites utilizing contracted crews from the National Conservation Corps/Great Basin Institute. In the future, additional plant replacements, repairs and maintenance to plant cages may be necessary. Planting, watering, maintenance, and monitoring are planned for project guzzler sites during the remainder of FY19 and into FY20 and beyond. Work completed during FY19 is listed below:

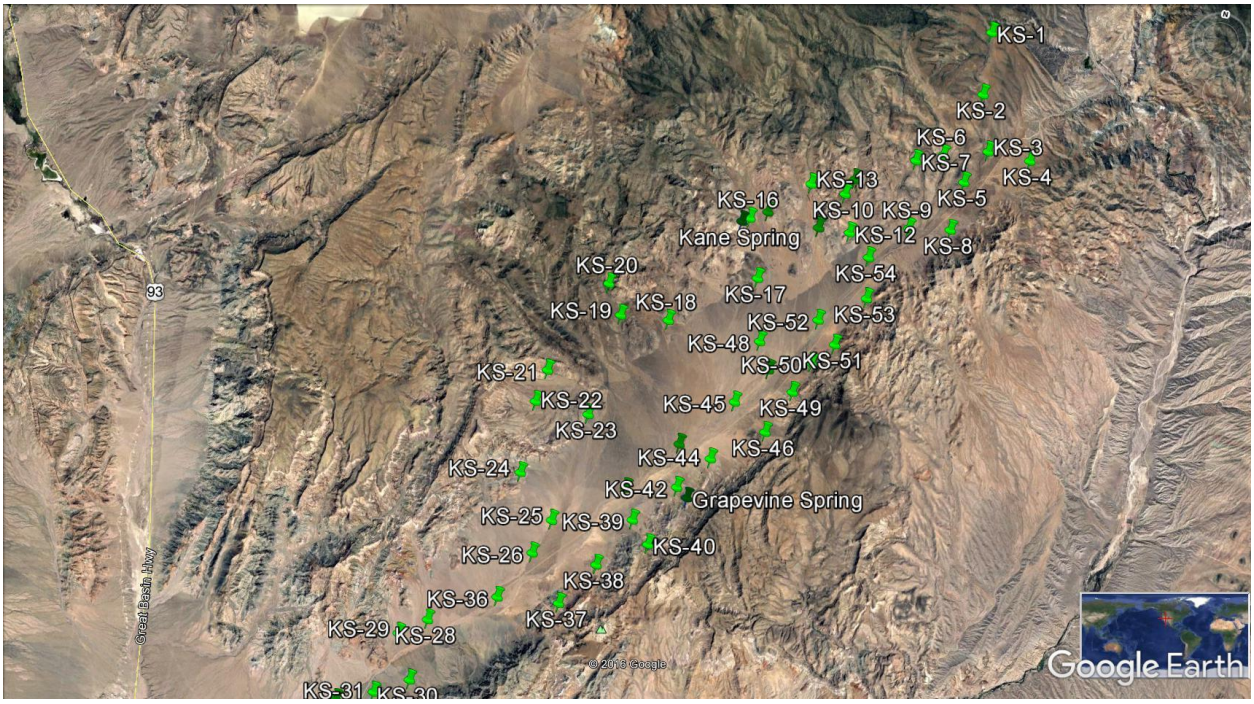
- Preparation of sites and planting of 610 native plants divided between specified guzzler sites.
- Installation of new cages and repair of existing plant cages, replacement of dead or damaged plants and hand watering.
- Project monitoring.

Gold Butte Guzzler #01

Post-Fire Upland Habitat Restoration - Kane Springs Valley

During the late fall of calendar year 2018 through the spring of calendar year 2019, this project spent approximately $11,000 on restoration activities near small game guzzler sites located in Lincoln County's Kane Springs Valley (see the map below). Monitoring of the restoration sites revealed significant drought damage of up to 60% mortality of the plantings for the FY19 year due to the higher than normal temperatures, limited rainfall, and cattle grazing. However, previous year plantings that have survived are well established. To replace drought-stricken and cattle-damaged plantings, restoration efforts included the replanting of 400 plants divided between four separate small game guzzler site locations, KS37, KS42, KS44 and KS46. Similar to last year, cattle grazing damage had occurred at KS42 and KS44 guzzler sites with impacts on plants and plant cages. In the future, additional plant replacement, repairs and maintenance to plant cages may be necessary. Planting, watering, maintenance, and monitoring are planned for project guzzler sites during the remainder of FY19 and into FY20 and beyond. Work completed during FY19 is listed below:

- Preparation of sites and planting of 400 native plants at specified guzzler sites.
- Installation of new cages and repair of existing plant cages, replacement of dead or damaged plants and hand watering.
- Project monitoring.



Guzzler Sites in Kane Springs Valley, Lincoln County

Evans Creek and Indian Springs Fencing Projects

In the summer of 2018, the Evans Creek Fencing Project was completed protecting approximately 100 acres of crucial riparian and wet meadow habitat. Construction took one month and required all the available funding that was awarded for both the Evans Creek and Indian Springs Fencing Projects. The Indian Springs Fencing Project is still a priority, however the livestock pressure and use at Evans Creek necessitated swifter action.

Efficient access to the interior of the fenced area was made easier for sportsmen and outdoor enthusiasts by installing a cattle guard thereby eliminating many of the associated issues of gate opening and closure. The entirety of the fence was constructed with wildlife-friendly specifications utilizing three strand range fence for those areas away from water and pipe rail fencing where pressure would be greatest close to or in water.

Though funding was depleted before the Indian Springs Fencing Project could be implemented, the project remains a priority and funding requests will be submitted at a later date to complete the project. Funding shortfalls were partly caused by underestimating contract labor costs in remote locations.

Eastern WMA Complex Weed Control

NDOW is mandated by state law to control listed noxious weeds found on its property. Removal of noxious and other undesirable weeds improves appearance, public access, limits the spread of these weeds to other areas and enhances wildlife habitat. The goal of this project was

to remove noxious/invasive weeds found on the Steptoe Valley, Wayne E. Kirch and Key Pittman Wildlife Management Areas (WMAs).

This project was awarded $30,000 total ($10,000 from Habitat Conservation Fee, $10,000 from Duck Stamp, $10,000 from Upland Game Bird Stamp). It also utilized funding from a Nevada Department of Agriculture (NDA) grant, funding from Cooperative Weed Management Areas, and funding from NDOW's WMA Federal Grant. Tri-County Weed Control was contracted to assist NDOW personnel in weed control efforts. In total over $65,000 has been spent on weed treatments on the Steptoe, Kirch, and Key Pittman WMAs so far. It is estimated that an additional $20,000 ($10,000 from NDOW's Upland Game Bird Stamp account & $10,000 from a NDA grant) will be spent this spring bringing the total project cost to just over $85,000 for this fiscal year. To date, over 800 acres have been treated. Over 1,000 acres will have been treated by the conclusion of the project. Major weeds treated include hoary cress, Canada thistle, Russian knapweed, bull thistle, and phragmites. Other weeds such as Johnson grass, Russian thistle, Scotch thistle, and puncture vine were also treated using this funding.

Mason Valley WMA Upland Wildlife Food Plots

The Mason Valley WMA staff planted 175 total acres of upland food plots during the fall of 2018 and the spring of 2019. Winter wheat was planted in the Mason Valley 9 and Mason Valley 7 units during the fall. Spring food plots were planted in April 2019. Spring food plots consist of 7 units found throughout the WMA. The 7 upland food plots were planted with Millets, sunflowers, and sorghums. A total of $6,847 of Upland Game Bird Stamp funds was spent on seed as part of this project.

Key Pittman WMA Food Plots

A total of $3,900 was expended on seed from Upland Game Bird Stamp funds and $2,600 from Duck Stamp funds. Approximately 60 acres were planted in October with winter wheat, fall cereal rye, barley, alfalfa, Austrian winter pea and hairy vetch as a winter cover crop and to enhance hunter success while hunting the fields on the Key Pittman WMA. An additional 40 acres were planted in January with intermediate wheat grass, sand dropseed and sandberg bluegrass to enhance desirable vegetation in areas where the removal of noxious weeds left areas that were lightly vegetated or in areas where improved vegetation cover and variety is needed. Approximately 70 acres were seeded in late February with spring wheat, oats, Ladak alfalfa, and native annual sunflower. The annual seeding projects are completed to increase forage production in wildlife feeding areas on the WMA and to enhance hunter opportunities. This project was completed by NDOW staff.

Proposed Upland Game Bird Stamp Projects for State Fiscal Year 2020

Title of Proposed Project	**Project Manager**	**$ Requested from UGBS Account**	**Other Funding Sources** (in-kind contributions included only if quantified)
Greater Sage-grouse Statewide Monitoring	Shawn Espinosa	$48,710	NDOW's Federal Sage-grouse Conservation Grant ($202,400); Carson Valley Chukar Club ($5,000); Nevada Chukar Foundation ($5,000)
Upland Game Bird Translocation and Monitoring	Shawn Espinosa	$13,640	NDOW's Federal Game Management Grant ($31,000); Carson Valley Chukar Club ($4,464); Nevada Chukar Foundation ($5,000)
Dusky Grouse Ecology and Management in Nevada	Shawn Espinosa	$20,000	NDOW's Federal Game Management Grant ($96,382); Carson Valley Chukar Club ($4,530); Nevada Chukar Foundation ($7,598)
Monitoring the Effects of Landscape-Level Treatments on Greater Sage-grouse within the Desatoya Mountains	Shawn Espinosa	$18,000	NDOW's Federal Sage-grouse Conservation Grant ($67,500); Carson Valley Chukar Club ($4,500); USGS in-kind services ($18,242)
Measuring Corticosterone Metabolites in Greater Sage-grouse	Shawn Espinosa	$25,000	Nevada Chukar Foundation ($2,500); Carson Valley Chukar Club ($2,500); USGS ($8,000) and in-kind services ($49,500)
Estimating Sage-grouse Vital Rates within Nevada's Most Novel Habitats	Shawn Espinosa	$22,500	NDOW's Federal Sage-grouse Conservation Grant ($67,500); USGS in-kind services ($22,684)
Effects of Conventional Raven Control and Wildfire on Greater Sage-grouse within the Virginia Mountains	Shawn Espinosa	$22,500	NDOW's Federal Sage-grouse Conservation Grant ($67,500); USGS in-kind services ($11,342)
Monitoring Greater Sage-grouse and Habitat Post-Martin Fire	Shawn Espinosa	$25,000	Nevada Chukar Foundation ($25,000); Carson Valley Chukar Club ($5,000); BLM small grant ($5,000)
Bi-State Sage-grouse Coordinator	Shawn Espinosa	$5,000	U.S. Forest Service ($5,000); BLM ($5,000); Intermountain West Joint Venture ($52,775)
Columbian Sharp-tailed Grouse Restoration Project – Population Modeling and Publications	Shawn Espinosa	$22,250	Carson Valley Chukar Club ($2,500); Nevada Chukar Foundation ($5,000); USGS in-kind services ($62,250)

Proposed Upland Game Bird Stamp Projects for State Fiscal Year 2020

Title of Proposed Project	**Project Manager**	**$ Requested from UGBS Account**	**Other Funding Sources** (in-kind contributions included only if quantified)
Response of Greater Sage-grouse to Vegetation Treatments in South Cave, Hamlin and Steptoe Valleys	Shawn Espinosa	$7,500	NDOW's Federal Sage-grouse Conservation Grant ($17,500)
Wildfire and Geomorphology Effects on Riparian Habitats and Related Restoration Implications	Jasmine Kleiber	$10,000	NDOW's Habitat Conservation Fee Account ($10,000); USDA Agricultural Research Station in-kind services ($30,000)
A Framework for Restoring and Conserving Great Basin Wet Meadows and Riparian Ecosystems	Jasmine Kleiber	$10,000	NDOW's Habitat Conservation Fee Account ($10,000 of new funding; $40,000 in previously approved funding); BLM ($60,000); Great Basin Landscape Conservation Cooperative ($100,000)
Eastern WMA Complex Weed Control	Adam Henriod	$10,000	NDOW's Duck Stamp Account ($10,000); NDOW's Habitat Conservation Fee Account ($10,000); Nevada Dept. of Agriculture ($25,000)
Post-Fire Upland Habitat Restoration - Tule Springs	Anthony Miller	$12,500	BLM ($235,000); NDOW's Habitat Conservation Fee Account ($12,500)
Post-Fire Upland Habitat Restoration - Kane Springs	Anthony Miller	$12,500	BLM ($237,000); NDOW's Habitat Conservation Fee Account ($12,500)
Quinn River Valley Habitat Enhancement - Vanderhoek Property	Bobby Jones	$10,000	N/A
Totals		**$295,100**	**$1,660,167**

Upland Game Bird Stamp Account Budget Status

Balance in the Account at Start of FY 2019	$ 528,011
Plus Estimated Revenue Accrued During FY 2019	$ 266,026
Less Estimated Total FY 2019 Expenditures	($ 390,213)
Less Estimated Administrative Costs (10% of Revenue)	($ 26,602)
Estimated Balance at End of FY 2019 / Start of FY 2020	$ 377,222
Plus Estimated Revenue to be Accrued During FY 2020	$ 266,026
Less Estimated Administrative Costs (10% of Revenue)	($ 26,602)
Less Proposed New Project FY 2020 Expenditures	($ 295,100)
Estimated Balance at End of FY 2020	$ 321,546

Notes: The budget information in this table is preliminary and subject to change. The amount of Upland Game Bird Stamp revenue accrued during FY 2019 was not available when this report was prepared; therefore, the FY 2018 revenue number was used for both FY 2019 and 2020.

Fiscal Year 2020 Wildlife Reserve Account Project Proposal

Project Summary

Project Title: ***Greater Sage-grouse Monitoring***

Special Reserve Account(s) that Would Fund this Project: Upland Game Bird Stamp

NDOW Project Manager (PM): Shawn Espinosa

Funds Requested from Each Special Reserve Account: $48,710
Funds to be Used from Other Funding Sources (please itemize the amount by source):
Additional State Matching Funds:

1) Carson Valley Chukar Club: $5,000
2) Nevada Chukar Foundation: $5,000

Wildlife Restoration Federal Funds:
Nevada Sage-grouse Conservation Grant (W-64) – Federal Match (75%): $202,400

Total Project Cost Not Including In-Kind Donations: $236,110

Total Project Cost Including In-Kind Donations: $236,110

Project Proposal

I. Purpose of Project and Goals to be Achieved:
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 technician, fixed-wing aircraft with infrared telephoto capabilities, and fixed-wing telemetry (VHF) follow-up surveys. As of 2018, there were 1,981 known lek locations identified in the Nevada Statewide Sage-grouse Database (Nevada portion only), of which 745 were considered active (defined as 2 or more males observed during 2 years in a 5 year period), 243 were considered "pending active", meaning that an additional year of observing 2 or more males is necessary to be considered an active lek, 344 were considered "inactive" status, and 519 were considered "unknown" status leks. This volume of lek locations requires that some part-time seasonal, volunteer and aerial resources are dedicated to support on the ground efforts.

II. Project Location including County (include a map if available):
This work will take place across the range of Greater sage-grouse in Nevada.

III. Land Status: Private or Public? Predominately public lands

IV. If Public, Which Agency Manages the Land? (Name the District if Managed by the BLM or USFS): Multiple BLM and USFS Ranger Districts across the range of the species.

V. UTM Coordinates if Known: range of Greater Sage-grouse in Nevada

VI. Project Approach Including Tasks to be Accomplished:

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.

Fixed Wing Infrared Surveys

This relatively new survey technique has proved to be effective over the last three 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 may 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.

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.

VII. Describe the Beneficial Effects of the Project and How they Will be Measured and Monitored:

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.

Fixed Wing Infrared Lek Detection and Wintering Ground Survey:
Cooled infrared camera technology with a telephoto lens used on a fixed wing aircraft has the ability to detect the presence/absence of sage-grouse at leks without invoking disturbance. The technique allows observers to obtain counts of individuals at leks and potentially 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.

Fixed Wing Telemetry Surveys:
These surveys greatly increase the strength of our telemetry location 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.

VIII. 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.

Fixed wing infrared 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 on a monthly basis when research crews are out of service.

IX. 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).

X. NEPA Compliance or other Activities that Need to be Accomplished Before this Project Can be Completed and their Status: No NEPA compliance is necessary for this particular project.

Project Costs and Funding

XI. Cost Summary

Please provide a breakdown of the project's costs in the attached table.

XII. Is this Project Going to Continue After FY20? Yes __X__ No _____

XIII. If Yes, is this Going to be an Annual, Recurring Project? Yes __X__ No _____

XIV. If it is Going to Continue After FY20, Define the Total Dollars to be Spent During Each Fiscal Year: We anticipate that approximately $62,000 is necessary for implementing the four specific activities outlined above each year.

XV. Would Funds from this Program Be Used as State Match for Federal Grant Funding?

Yes _X_ No ___

XVI. If Yes, Which Federal Grant Would the Matching Funds be Used For? Federal funding for this project would be made available by Pittman-Robertson Sport Fish and Wildlife Restoration. Specifically, the Nevada Department of Wildlife-administered grant labeled "Nevada Sage-grouse Conservation Program" would contribute 75% of the funds for this project.

XVII. Describe What Type of Contract(s) Will be Needed or Currently Exists (if any) to Complete Work Under this Project (Independent Contract, Sub-grant Agreement, Inter-local Agreement or Good of the State Contract): We would be using an existing independent contract with Owyhee Air Research for some of the work. In addition, we would use a State Contract with Man Power for hiring seasonal lek count technicians.

XVIII. If a Contract Exists, or is Needed, Define the Contract Amount, Contractor/Sub-grantee, and Start and End Dates

Project Cost Breakdown

Please provide a breakdown of the project's costs over the life of the project in the table below. Define the total to be spent during each fiscal year in your response to question XI. Only include in-kind services under item 7. While NDOW personnel and travel expenses may be included in your cost estimate, you should use alternative funding sources to cover these types of costs as much as possible.

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		$ 121,400.00
B. Other Personnel (Lek Count Techs.)	$12,960	$ 5,000.00
C. Total Personnel Costs	$ 12,960.00	$ 126,400.00
3. Travel Costs		
A. Per Diem		$ 2,000.00
B. Mileage		$ 32,000.00
C. Total Travel Costs	$ -	$ 34,000.00
4. Equipment		
A.		
B.		
C. Total Equipment Costs	$ -	$ -
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Infrared Imagery Flights (Lek Search & Survey)	$ 22,100.00	$ 17,000.00
B. Fixed-wing Telemetry Survey	$ 13,650.00	$ 10,000.00
C. Fixed-wing Telemetry Survey		
D.		
F. Total Miscellaneous Costs	$ 35,750.00	$ 27,000.00
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 48,710.00	$ 187,400.00
Total Project Costs	$	236,110.00

Fiscal Year 2020 Wildlife Reserve Account Project Proposal

Project Summary

Project Title: ***Upland Game Bird Translocation and Monitoring***

Special Reserve Account(s) that Would Fund this Project: Upland Game Bird Stamp

NDOW Project Manager (PM): Shawn Espinosa

Funds Requested from Each Special Reserve Account(s): $13,640

Funds to be Used from Other Funding Sources (please itemize the amount by source):
Carson Valley Chukar Club: $4,464
Nevada Chukar Foundation: $5,000
(NDOW) USFWS-WSFR Federal Game Management Grant: $31,000

Total Project Cost Not Including In-Kind Donations: $54,104

Total Project Cost Including In-Kind Donations (if applicable): $54,104

Project Proposal

I. Purpose of Project and Goals to be Achieved:

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 and appropriate habitats across Nevada's landscape. Since 2008, the Nevada Department of Wildlife has released approximately 1,050 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.

II. Project Location including County (include a map if available):

Mountain Quail

The priority release site for 2018/2019 is the Snake Range within Hunt Unit 114 situated in the eastern portion of White Pine County. Habitat conditions during the fall/winter of 2018 will dictate whether or not a release is warranted. Proposed release sites include Hendry's Creek, Silver Creek or Negro Creek in this mountain range. A final determination on which of these three canyons will be selected will be made during further habitat evaluation during the summer of 2018.

Ruffed Grouse

Two sites are considered a priority for augmentation. The first being the Pine Forest Range located in northwestern Humboldt County. This augmentation would follow an initial release conducted in 2014. Subsequent monitoring has documented the presence of birds in low numbers and an augmentation is recommended for this population to help achieve sustainability.

Merriam's Turkey

There are also two areas identified in the biennial upland game release plan (FY2018 & 2019) for release of Merriam's turkeys. The highest priority release site is Hendry's Creek in the Snake Range located in Hunt Unit 114 of eastern White Pine County. This is an extensive drainage system with a perennial water source and diverse habitat. Given the success of Merriam's turkeys in neighboring Hunt Unit 115 and similarity of habitat, it is believed that turkeys will do well in Hendry's Creek as well.

The second release site is within the south Ruby Mountains in Hunt Unit 103 in southern Elko County. There is currently an existing population of turkeys in this area; however, their population is considered somewhat low for the available habitat. An augmentation of Merriam's turkeys into this population is likely to have a positive effect.

III. Land Status: Private or Public? Most of the releases described above will take place on public lands; however, some have the potential to take place on private lands in collaboration with specific landowners.

IV. If Public, Which Agency Manages the Land? (Name the District if Managed by the BLM or USFS)

V. UTM Coordinates if Known: (see project location description in line II above)

VI. Project Approach Including Tasks to be Accomplished:

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 to monitor for survival and dispersal from the release site.

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 2019 and 2020.

Monitoring activities will include aerial telemetry surveys of radio-marked birds within both the Toiyabe Range and the northern Snake Range. In addition, intermittent ground follow-up monitoring will take place following flights, especially during the nesting season to determine nest location and habitat selection.

VII. Describe the Beneficial Effects of the Project and How they Will be Measured and Monitored:

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 177 turkey tags were issued for the spring 2018 hunt and the number of applicants far exceeds that number. Providing sportsmen with alternative choices and expanded opportunity would help alleviate the demand deficit.

VIII. Project Schedule:

Mountain quail 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 2019, 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 forage availability, moderate weather conditions, etc.).

Ruffed grouse capture efforts would commence in late summer or early fall of 2019 (August/September) if habitat conditions and bird numbers 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 December of 2019 or January of 2020 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.

IX. 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);

X. NEPA Compliance or other Activities that Need to be Accomplished Before this Project Can be Completed and their Status:

A BLM Categorical Exclusion was obtained for the mountain quail release within Hendry's Creek of the Snake Range. Ruffed grouse releases would take place on private lands within the Pine Forest Range in Humboldt County.

Project Costs and Funding

XI. Cost Summary

Please provide a breakdown of the project's costs in the attached table.

XII. Is this Project Going to Continue After FY20? Yes __X__ No _____

XIII. If Yes, is this Going to be an Annual, Recurring Project? Yes __X__ No _____

Until objectives are fulfilled

XIV. If the Project is Going to Continue After FY20, Define the Total Dollars to be Spent During Each Fiscal Year of the Project's Lifespan: We estimate that the cumulative annual expenditure on this project is approximately $25,000 to $35,000.

XV. Would Funds from this Program Be Used as State Match for Federal Grant Funding?

Yes __X__ No ___

XVI. If Yes, Which Federal Grant Would the Matching Funds be Used For? Federal funds would be made available through the Pittman-Robertson Sport Fish and Wildlife Restoration Program. More specifically the Nevada Federal Game Management grant (W-48).

XVII. Describe What Type of Contract(s) Will be Needed or Currently Exists (if any) to Complete Work Under this Project (Independent Contract, Sub-grant Agreement, Inter-local Agreement or Good of the State Contract):
A sub-grant agreement is currently in place with The Relocator, LLC located in Myrtle Creek, OR to conduct mountain quail capture work.

XVIII. If a Contract Exists, or is Needed, Define the Contract Amount, Contractor/Sub-grantee, and Start and End Dates:

Project Cost Breakdown

Please provide a breakdown of the project's costs over the life of the project in the table below. Define the total to be spent during each fiscal year in your response to question XI. Only include in-kind services under item 7. While NDOW personnel and travel expenses may be included in your cost estimate, you should use alternative funding sources to cover these types of costs as much as possible.

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	$ 2,000.00
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)	$ 8,000.00	
B. Telemetry Flights (24 hours @ $364)	$ 3,640.00	$ 9,464.00
C.		
D.		
F. Total Miscellaneous Costs	$ 11,640.00	$ 9,464.00
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 13,640.00	$ 40,464.00
Total Project Costs	$	54,104.00

*NDOW personnel and per diem costs will be covered by the Game Management Grant funded through the USFWS Wildlife Restoration Program. Transmitters will be covered by a combination of NDOW Special Reserve and Sportsmen's Organizations such as the Nevada Chukar Foundation or Carson Valley Chukar Club.

Fiscal Year 2020 Wildlife Reserve Account Project Proposal

Project Summary

Project Title: Dusky Grouse Ecology and Management in Nevada

Special Reserve Account(s) that Would Fund this Project: Upland Game Bird Stamp

NDOW Project Manager (PM): Shawn Espinosa

Funds Requested from Each Special Reserve Account: $20,000

Funds to be Used from Other Funding Sources (please itemize the amount by source): $97,104; Indirect costs applied by Utah State University will be reduced by 22.1% from 39.6% down to 17.5%. This 22.1% can be considered an applicable match requirement for U.S. Fish and Wildlife Service – Wildlife Restoration Grant funding; therefore, just 2.9% state match is required to meet the 25% match requirement.

Other sources of funding include:

- Nevada Chukar Foundation - $7,598
- Carson Valley Chukar Club - $4,530

Total Project Cost Not Including In-Kind Donations: $128,510

Total Project Cost Including In-Kind Donations (if applicable): $128,510

Project Proposal

I. Purpose of Project and Goals to be Achieved:

Dusky grouse (*Dendragapus obscurus*) are currently an important upland game resource in Nevada whose ecology is not well understood. 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 including

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 are few dusky grouse nesting studies, which would 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 eastern 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 also a lack of life history and population trend information on dusky grouse throughout their range, 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.

This project is proposed to be 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. We are particularly interested in the use of limber pine and sub-alpine fir (*Abies lasiocarpa*) patches during the winter in relation to beetle kill, and overall use of mountain mahogany.

Our goal for this research project is the long-term conservation of dusky grouse populations through increased knowledge of the species.
Our specific objectives for this study are:

- Survival, Reproductive, and Harvest Rates – determine life stage annual and seasonal survival rates, including harvest rate during the fall hunting season, and female reproductive (i.e., nest initiation, clutch size, nest success, and brood success) rates of dusky grouse for radio-marked and banded dusky grouse and assess environmental factors that affect these vital rates.
- Population Surveys - develop a rigorous protocol to index breeding populations of dusky grouse and use male display location information to help characterize breeding habitats.
- Habitat Selection – utilize location data of individually radio-marked dusky grouse to perform resource selection functions (RSFs) to characterize annual and seasonal habitat use. Specifically, to assess use of limber pine sub-alpine fir habitats during winter months and

year-round use of mountain mahogany habitats. We will also characterize micro-habitats (within 50 m) for nest and brood locations.

II. Project Location including County (include a map if available):
Our primary study areas will be located in the U.S. Forest Service, Humboldt-Toiyabe National Forest - Ely Ranger District in the Schell Creek and Ranges located in White Pine County (Figure 1).

III. Land Status: Private or Public? Public Lands

IV. If Public, Which Agency Manages the Land? (Name the District if Managed by the BLM or USFS): See item II above.

V. UTM Coordinates if Known: This project encompasses a fairly broad area within the Schell Creek and Egan Ranges in White Pine County, NV.

VI. Project Approach Including Tasks to be Accomplished and Target Species:
Survival, Reproductive, and Harvest Rates – we will use walk-in traps and noose poles to catch, band (aluminum leg bands), radio-mark 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 25-30 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 $\geq$ 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.

VII. Describe the Beneficial Effects of the Project and How they Will be Measured and Monitored:

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 dusky grouse diet rely on pine needles as a food source, 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.

VIII. Project Schedule (including start and end dates and major milestones):

This project was initiated with the hiring of a graduate student (Stephanie Landry) in January of 2018 followed by trapping in April of that year. Breeding surveys were conducted from mid to late April and continued through early June in 2018. Trapping efforts will continue throughout the field season from April to September (2019-2020). 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.

IX. Relationship to NDOW Plans, Policies and Programs:

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

X. NEPA Compliance or other Activities that Need to be Accomplished Before this Project Can be Completed and Their Status: No NEPA documents were required by the U.S. Forest Service for this particular project, categorized as a research and monitoring project.

Project Costs and Funding

XI. Cost Summary (briefly describe the project's major types of spending):

The total budget for this 4-year project would be $457,990. Utah State University's standard overhead rate of 39.6% will be reduced to 17.5% for the project, waiving 22.1% points of the regular overhead. The waived overhead can be used as non-federal match for PR funding.

Hourly wages will be paid to several technicians each year over the course of the two year project. The student will be paid a monthly stipend and tuition costs will be covered. Travel will consist of daily trips in two rental trucks within the study area, as well as travel to and from Logan, UT and the study area. Within the study area we will use ATVs and UTVs, monthly fee, to access remote areas. Additionally, travel will include professional meetings and conferences to present study results. For materials and supplies we will purchase items such as: GPS units, walk-in traps, trapping implements (noose poles, bags, scales, scissors, pliers, etc.), GPS/GIS mapping software, paper and printing materials for data sheets, field note books, first aid kits, backpacks, hammers, vegetation measuring tools, batteries etc.

XII. Is this Project Going to Continue After FY20? Yes __X__ No _____

XIII. If Yes, is this Going to be an Annual, Recurring Project? Yes ____ No __X___

XIV. If the Project is Going to Continue After FY20, Define the Total Dollars to be Spent During Each Fiscal Year of the Project's Lifespan:

- FY2018 = $108,690
- FY2019 = $134,879
- FY2020 = $132,269
- FY2021 = $82,152

XII. Would Funds from this Program Be Used as State Match for Federal Grant Funding?

Yes _X_ No ___

XIII. If Yes, Which Federal Grant Would the Matching Funds Be Used For?

Nevada Game Management Grant – Upland Game Management (U.S. Fish and Wildlife Service Wildlife Restoration Grant) (W-48)

Project Cost Breakdown

Please provide a breakdown of the project's *total costs over the life of the project* in the table below. Define the total to be spent during each fiscal year in your response to question XI on the previous page. Only include in-kind contributions under item 7 in the table below. While NDOW personnel and travel expenses may be included in your cost estimate, you should use alternative funding sources to cover these types of costs as much as possible.

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	$9,484.00	$ 48,929.00
C. Total Personnel Costs	$ 9,484.00	$ 48,929.00
3. Travel Costs		
A. Per Diem	$ 150.00	$ 850.00
B. Mileage		
C. Total Travel Costs	$ 150.00	$ 850.00
4. Equipment		
A. GPS Radios (5 @ $3,525)	$2,644.00	$14,981.00
B. GPS Refurbs (5 @ $500 ea.)	$ 375.00	$ 2,125.00
C. Total Equipment Costs	$ 3,019.00	$ 17,106.00
5. Materials		
A. Trapping Materials (nets, nooses)	$ 38.00	$ 212.00
B. Other Materials (tools)	$ 300.00	$ 1,700.00
C.		
D. Total Materials Costs	$ 338.00	$ 1,912.00
6. Miscellaneous Costs		
A. Truck - Monthly Fee (2 trucks, 5 mo/ea. @ $2,000)	$ 3,000.00	$ 17,000.00
B. ATV - Monthly Fee (3 ATVs - 5 mo/ea @ 250)	$ 563.00	$ 3,188.00
C. ARGOS Woodshole Download Fees	$ 720.00	$ 4,080.00
D. 17.5% Indirect Costs	$ 2,726.00	$ 15,445.00
F. Total Miscellaneous Costs	$ 7,009.00	$ 39,713.00
7. In-Kind Contributions		
A.		
B.		
C. Total In-Kind Contributions	$ -	$ -
Subtotals	$ 20,000.00	$ 108,510.00
Total Project Costs	$	128,510.00

Fiscal Year 2020 Wildlife Reserve Account Project Proposal

Project Summary

Project Title: ***Monitoring the Effects of Landscape-Level Treatments on Greater Sage-grouse within the Desatoya Mountains of Central Nevada***

Special Reserve Account(s) that Would Fund this Project: Upland Game Bird Stamp

NDOW Project Manager (PM): Shawn Espinosa

Funds Requested from each Special Reserve Account(s): $18,000

Funds to be Used from Other Funding Sources (please list by source):

- Carson Valley Chukar Club: $4,500
- Nevada Sage-grouse Conservation Grant (W-64) – Federal Match (75%): $67,500

Total Project Cost Not Including In-Kind Donations: $90,000

Total Project Cost to be Funded by All Sources: $108,242

Project Proposal

I. Purpose of Project and Goals to be Achieved:

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 rates

II. Project Location including County (include a map if available):

The Desatoya Range is located on the border of Churchill and Lander County in central Nevada. The preponderance of the project area will be located on the eastern slope of the range (Lander County). Much of the radio-marking work will take place within the vicinity of the Smith Creek Ranch with some work taking place on the western flank of the range near Rock Creek and in the southern portion of the range near Buffalo Creek.

III. Land Status: Private or Public? The study area is mostly composed of public lands; however, a proportion is private associated with the Smith Creek Ranch. This is a collaborative project with the Smith Creek Ranch.

IV. If Public, Which Agency Manages the Land? (Name the District if Managed by the BLM or USFS)

Public lands associated with the Desatoya Mountains are managed by the BLM – Carson City District

V. UTM Coordinates if Known: This is a fairly large study area that would best be described by a polygon.

VI. Project Approach Including Tasks to be Accomplished:

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.

VII. Describe the Beneficial Effects of the Project and How they Will be Measured and Monitored:

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.

VIII. Project Schedule (including start dates and end dates and major milestones):

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 2020 will be the seventh year of this monitoring effort. We anticipate this research effort to last eight to ten years.

IX. 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).

X. NEPA Compliance or other Activities that Need to be Accomplished Before this Project Can be Completed and their Status:

National Environmental Policy Act compliance for sage-grouse monitoring has been addressed in NDOW's Sage-grouse Conservation Project grant program. Habitat improvement projects taking place on public lands within the project area have been documented through the BLM Carson City District and Battle Mountain District offices.

Project Costs and Funding

XI. Cost Summary

Please provide a breakdown of the project's costs in the attached table.

XII. Is this Project Going to Continue After FY20? Yes __X__ No _____

XIII. If Yes, is this Going to be an Annual, Recurring Project? Yes ____ No __X___

XIV. If it is Going to Continue After FY20, Define the Total Dollars to be Spent During Each Fiscal Year: Approximately $90,000 per year (75%Wildlife and Sport Fish Restoration = $67,500: 25% State Match = $22,500) will be spent on this project for up to a 10-year period.

XV. Would Funds from this Program Be Used as State Match for Federal Grant Funding?
Yes _X_ No ___

XVI. If Yes, Which Federal Grant Would the Matching Funds be Used For? Federal funding for this project will be made available through the Pittman-Robertson Sport Fish and Wildlife Restoration Program. Specifically, the federal match (75%) will be made available through the Nevada Department of Wildlife administered "Nevada Sage-grouse Conservation Program" grant.

XVII. Describe What Type of Contract(s) Will be Needed or Currently Exists (if any) to Complete Work Under this Project (Independent Contract, Sub-grant Agreement, Inter-local Agreement or Good of the State Contract): A subgrant with Great Basin Bird Observatory is in place to fund research technician crews working under the U.S. Geological Survey – Western Ecological Research Center.

XVIII. If a Contract Exists, or is Needed, Define the Contract Amount, Contractor/Sub-grantee, and Start and End Dates

Project Cost Breakdown

Please provide a breakdown of the project's costs over the life of the project in the table below. Define the total to be spent during each fiscal year in your response to question XI. Only include in-kind services under item 7.

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	$10,813.00	$ 50,438.00
C. Total Personnel Costs	$ 10,813.00	$ 50,438.00
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A. VHF Transmitters (30 @ $225/ea.)	$ 1,687.00	$ 5,062.00
B. Vehicles (2 @ 10,500 per 6 month field season lease)	$ 5,250.00	$ 15,750.00
C. Total Equipment Costs	$ 6,937.00	$ 20,812.00
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Field Housing	$ 250.00	$ 750.00
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 250.00	$ 750.00
7. In-Kind Services		
A. USGS Research Wildlife Biologist (Permanent, 0.1 FTE)		$ 6,417.00
B. USGS Wildlife Biolgist (Term, 0.1 FTE)		$ 4,925.00
C. Travel (Per-diem)		$ 1,500.00
D. Additional equipment (radio receivers, antennas, banding supplies, etc)		$ 5,400.00
Total In-Kind Services	$ -	$ 18,242.00
Subtotals	$ 18,000.00	$ 90,242.00
Total Project Costs	$	108,242.00

Fiscal Year 2020 Wildlife Reserve Account Project Proposal

Project Summary

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

Special Reserve Account(s) that Would Fund this Project: Upland Game Bird Stamp

NDOW Project Manager (PM): Shawn Espinosa

Funds Requested from Each Special Reserve Account(s): $25,000

Funds to be Used from Other Funding Sources (please itemize the amount by source):
Additional State Matching Funds:

1) Carson Valley Chukar Club: $2,500
2) Nevada Chukar Foundation: $2,500

Federal Funds:

1) USGS: $8,000 for lab work
2) USGS In-kind Services: $49,500

Total Cost Not Including In-Kind Donations: $35,500

Total Project Cost Including In-Kind Donations (if applicable): $85,000

Project Proposal

I. Purpose of Project and Goals to be Achieved:

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.

II. Project Location (include a map if available):

The majority of collection work associated with this proposal will take place in the Montana Mountains located in Humboldt County, Nevada. However, funding from this proposal would also assist with the analysis of samples collected from various other sage-grouse study sites across Nevada including the following:

- Virginia Mountains (Washoe County);
- Mount Grant and Desert Creek PMUs within the Bi-State Distinct Population Segment (Lyon and Mineral County);
- Desatoya Mountains (Churchill and Lander County);
- Massacre/Sheldon (Washoe County);
- McGinness Hills (Lander County);
- Monitor Valley (Nye County);
- Montana Mountains (Humboldt County);
- Santa Rosa Range (Humboldt County);
- Tuscarora/Independence Valley (Elko County)

III. Land Status: Private or Public?

Study areas are located predominately on public lands managed by the BLM.

IV. If Public, Which Agency Manages the Land? (Name the District if Managed by the BLM or USFS):

The northwestern Nevada monitoring site is managed by the BLM – Susanville District.
The Montana Mountains study site is managed by the BLM – Winnemucca District.
The Toiyabe Range study site is managed by the BLM – Battle Mountain District.

V. UTM Coordinates if Known: these project areas are better represented by polygons rather than points.

VI. Project Approach Including Tasks to be Accomplished:

Sample collection in the Montana Mountains will begin with the capture and radio-marking of females (approximately 10-20) during the fall of 2019. 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.

VII. Describe the Beneficial Effects of the Project and How they Will be Measured and Monitored:

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.

VIII. 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 2019 lekking period

IX. 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).

X. NEPA Compliance or other Activities that Need to be Accomplished Before this Project Can be Completed and their Status:

No NEPA compliance is necessary for this particular project.

Project Costs and Funding

XI. Cost Summary

Please provide a breakdown of the project's costs in the attached table.

XII. Is this Project Going to Continue After FY20? Yes __X__ No _____

XIII. If Yes, is this Going to be an Annual, Recurring Project? Yes ____ No __X__

XIV. If it is Going to Continue After FY20, Define the Total Dollars to be Spent During Each Fiscal Year:

We anticipate that approximately $65,000 is necessary for implementing the four specific activities outlined above each year.

XV. Would Funds from this Program Be Used for State Matching Purposes? Yes _X_ No ___

XVI. If Yes, Which Federal Grant Would the Matching Funds be Used For? Federal funding for this project would be made available by Pittman-Robertson Sport Fish and Wildlife Restoration. Specifically, the Nevada Department of Wildlife administered grant labeled "Nevada Sage-grouse Conservation Program" would contribute 75% of the funds for this project.

XVII. Describe What Type of Contract(s) Will be Needed or Currently Exists (if any) to Complete Work Under this Project (Independent Contract, Sub-grant Agreement, Inter-local Agreement or Good of the State Contract):

XVIII. If a Contract Exists, or is Needed, Define the Contract Amount, Contractor/Sub-grantee, and Start and End Dates

Project Cost Breakdown

Please provide a breakdown of the project's costs over the life of the project in the table below. Define the total to be spent during each fiscal year in your response to question XI. Only include in-kind services under item 7.

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		$ 2,500.00
C. Total Travel Costs	$ -	$ 2,500.00
4. Equipment		
A. VHF radio transmitters (20 @ $225/ea.)	$4,500	
B.		
C. Total Equipment Costs	$ 4,500.00	$ -
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Cort Analysis	$8,000	$ 8,000.00
B.		
C.		
D.		
F. Total Miscellaneous Costs	$10,000	$ 8,000.00
7. In-Kind Services		
A. USGS Personnel Services		$ 49,500.00
B.		
C. Total In-Kind Services	$ -	$ 49,500.00
Subtotals	$ 25,000.00	$ 60,000.00
Total Project Costs	$	85,000.00

Fiscal Year 2020 Wildlife Reserve Account Project Proposal

Project Summary

Project Title: ***Estimating Greater Sage-grouse Vital Rates within Nevada's Most Novel Habitats***

Special Reserve Account(s) that Would Fund this Project: Upland Game Bird Stamp

NDOW Project Manager (PM): Shawn Espinosa

Funds Requested from Each Special Reserve Account: $22,500

Funds to be Used from Other Funding Sources (please itemize the amount by source):
Nevada Sage-grouse Conservation Program Grant (W-64) – Federal Match (75%): $67,500

Total Project Cost Not Including In-Kind Donations: $90,000

Total Project Cost to be Funded by All Sources: $112,684

Project Proposal

I. Purpose of Project and Goals to be Achieved:

Much of the recent research that has been conducted on Greater sage-grouse in Nevada has been in response to some form of anthropogenic structure or disturbance such as the development of utility scale transmission lines, geothermal energy facilities, or mine development and processing. 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 describe 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.

II. Project Location including County (include a map if available):
This work will take place in central Nevada in northern Monitor Valley and the north-central portion of the Monitor Range including Butler Basin in Nye County.

III. Land Status: Private or Public? Public Lands managed by the Bureau of Land Management – Battle Mountain District and U.S. Forest Service – Humboldt-Toiyabe National Forest, Tonopah Ranger District.

IV. If Public, Which Agency Manages the Land? (Name the District if Managed by the BLM or USFS): See item III above.

V. UTM Coordinates if Known: The study area cover a fairly broad portion of central Nevada.

VI. Project Approach Including Tasks to be Accomplished and Target Species:
Field work for this project will be conducted by the USGS Western Ecological Research Center in Dixon, California. Match funding for this project is being provided by the Nevada Upland Game Stamp program ($22,500) allowing for the expenditure of $67,500 of WSFR-PR funds for a total project cost of $90,000. This will be a multi-year effort (3-5 years) in order to gain enough data from a large enough sample of birds to mitigate the influences of natural variability due to factors such as weather, climate and predation.

Radio-Telemetry. We are proposing to capture approximately 20-30 female and up to 10 male sage-grouse annually over a three to five 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. Throughout the nesting and brood-rearing period, researchers will attempt 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%). 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 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.

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

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

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

used by broods (within a 24 hour period), as well as, one observation of a random location within 200 m of the brood (dependent) to estimate disproportionate use to availability.

Predator Monitoring

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

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

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

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

VII. Describe the Beneficial Effects of the Project and How they Will be Measured and Monitored:

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.

VIII. 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.

IX. 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).

X. NEPA Compliance or other Activities that Need to be Accomplished Before this Project Can be Completed and their Status: N/A - This is a research and monitoring project.

Project Costs and Funding

XI. Cost Summary

Please provide a breakdown of the project's costs in the attached table.

XII. Is this Project Going to Continue After FY20? Yes _X__ No _____

XIII. If Yes, is this Going to be an Annual, Recurring Project? Yes ____ No __X__

This research and monitoring project is scheduled to take place over an eight year period from FY16 through FY23.

XIV. If the Project is Going to Continue After FY20, Define the Total Dollars to be Spent During Each Fiscal Year of the Project's Lifespan:

This project is expected to cost approximately $90,000 per year to implement.

XV. Would Funds from this Program Be Used as State Match for Federal Grant Funding?

Yes _X_ No ___

XVI. If Yes, Which Federal Grant Would the Matching Funds be Used For?

Federal funding would be made available through the Pittman-Robertson Sport Fish and Wildlife Restoration grant program. More specifically, this project would be 75% funded by the Nevada Sage-grouse Conservation Grant.

XVII. Describe What Type of Contract(s) Will be Needed or Currently Exists (if any) to Complete Work Under this Project (Independent Contract, Sub-grant Agreement, Inter-local Agreement or Good of the State Contract): A current sub-grant exists with the Great Basin Bird Observatory to fund research technicians crews to conduct capture and field monitoring.

XVIII. If a Contract Exists, or is Needed, Define the Contract Amount, Contractor/Sub-grantee, and Start and End Dates.

Project Cost Breakdown

Please provide a breakdown of the project's costs over the life of the project in the table below. Define the total to be spent during each fiscal year in your response to question XI. Only include in-kind services under item 7.

Project Components	*Costs to be Paid by NDOW Special Reserve Account(s)**	*Costs to be Paid by Other Sources**
1. Land Acquisitions		
2. Personnel Costs		
A. NDOW Personnel		
B. Other Personnel	$13,687.00	$ 41,063.00
C. Total Personnel Costs	$ 13,687.00	$ 41,063.00
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ 625.00	$ 1,875.00
4. Equipment		
A. VHF transmitters (30 units @ $225/ea.)	$ 1,688.00	5,062.00
B. Radio receivers/antenneas		
C. Total Equipment Costs	$ 1,688.00	$ 5,062.00
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Field Housing	$500	$1,500.00
B. Vehicles (4WD truck lease: 2 @ $10,500/ea.)	$ 5,250.00	$ 15,750.00
C. ATVs (1 ATV @ $2,000 ea.)	$ 500.00	$ 1,500.00
D. ATV Fuel and Vehicle Maintenance	$ 250.00	$ 750.00
E. Total Miscellaneous Costs	$6,500	$ 19,500.00
7. In-Kind Services		
A. USGS Research Wildlife Biologist (Permanent, 0.2 FTE)		$ 12,834.00
B. USGS Wildlife Biologist (Term, 0.2 FTE)		$ 9,850.00
C. Total In-Kind Services	$ -	$ 22,684.00
Subtotals	$ 22,500.00	$ 90,184.00
Total Project Costs	$ 112,684.00	

Fiscal Year 2020 Wildlife Reserve Account Project Proposal

Project Summary

Project Title: ***Effects of Conventional Raven Control and Wildfire on Greater Sage-grouse Vital Rates within the Virginia Mountains of Northwestern Nevada***

Special Reserve Account(s) that Would Fund this Project: Upland Game Bird Stamp

NDOW Project Manager (PM): Shawn Espinosa

Funds Requested from Each Special Reserve Account: $22,500

Funds to be Used from Other Funding Sources (please list by source):
Nevada Sage-grouse Conservation Grant (W-64) – Federal Match (75%): $67,500

Total Project Cost not including In-Kind Donations: $90,000

Total Project Cost Including In-Kind Donations (if applicable): $101,342

Project Proposal

I. Purpose of Project and Goals to be Achieved:

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 has indicated that ravens are a causal factor contributing to low nest survival rates in the Virginia Mountains (Lockyer et al. 2012). Thus, we decided to conduct intensive raven control work using USDA Wildlife Services and placement of corvicide injected eggs at strategic locations for three years to determine its effectiveness. Further, a major wildfire burned approximately 60,000 acres during the summer of 2016 and greatly impacted available suitable habitat for sage-grouse in the Virginia Mountains. We feel it is important to continue monitoring sage-grouse in this study area to determine the response to this fire.

Research conducted by Lockyer et al. (2012) found that the cumulative nest survival for the Virginia Mountain population (22.4%) was substantially lower than other published results within the Great Basin of 36% (Rebholz et al. 2009) and 42% (Coates and Delehanty 2010). Vital rates for other life

stages of this population have not been analyzed, but such low nest survival could limit potential population size. Nest survival rates are highly variable across sage-grouse populations (Taylor et al. 2011), and such a low nest survival rate for a small population such as the Virginia Mountains is of considerable concern.

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

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

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

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

This project is intended to better understand the effects of raven control on a localized sage-grouse population where the extant habitat condition has been compromised by wildfire (1999 & 2016). We intend to fulfill the following objectives through the implementation of this project:

1) Radio-mark a minimum of 20 sage-grouse hens annually to determine habitat utilization, nest site selection, nest initiation rates and nest survival rates;
2) Conduct lek counts on at least two leks within the study area to help determine population trend;
3) Place at least six to eight cameras at nest sites to determine type of predator and predation rates;

4) Determine recruitment rates through follow-up brood surveys;
5) Place corvicide laced chicken-egg baits within identified nesting habitat to reduce raven numbers (this task is covered under a Nevada Predator Management Plan project.

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

II. Project Location including County (include a map if available):

This site is located in the Virginia Mountains located in southern Washoe County just west of Pyramid Lake. This area includes the Virginia portion of the Virginia/Pah Rah Population Management Unit. More specifically, the study area includes the Spanish Flat/Tule Ridge and the Sheep Springs/Vinegar Peak regions of the mountain range.

III. Land Status: Private or Public?

The study area encompasses mostly public lands; however, some private and tribal lands are also within the study area.

IV. If Public, Which Agency Manages the Land? (Name the District if Managed by the BLM or USFS):

The majority of the study area is managed by the Carson City District of the BLM.

V. UTM Coordinates if Known:

The study area covers a rather broad area that is better represented by a polygon.

VI. Project Approach Including Tasks to be Accomplished and Target Species:

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 R^2, and likelihood ratio tests to evaluate models. Model averaged parameter estimates will be used to develop resource selection functions.

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

Predator Monitoring and Control

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

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

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

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

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

VII. Describe the Beneficial Effects of the Project and How they Will be Measured and Describe Your Monitoring Plan:

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.

VIII. Project Schedule (including start and end dates and major milestones):

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

IX. 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).

X. NEPA Compliance or other Activities that Need to be Accomplished Before this Project Can be Completed and their Status:

Project Costs and Funding

XI. Cost Summary (briefly describe the project's major types of spending):

XII. Is this Project Going to Continue After FY20? Yes ____ No __X__

XIII. If Yes, is this Going to be an Annual, Recurring Project? Yes ____ No __X__

XIV. If it is Going to Continue After FY20, Define the Total Dollars to be Spent During Each Fiscal Year of the Project's Lifespan:

XV. Would Funds from this Program Be Used as State Match for Federal Grant Funding?

Yes _X_ No ___

XVI. If Yes, Which Federal Grant Would the Matching Funds be Used For?

Federal funds for this project are being provided by the Pittman-Robertson Wildlife Restoration program administered by the USFWS. Specifically, funding will be provided by the Nevada Greater Sage-grouse Conservation Program grant.

XVII. Describe What Type of Contract(s) Will be Needed or Currently Exists (if any) to Complete Work Under this Project (Independent Contract, Sub-grant Agreement, Inter-local Agreement or Good of the State Contract):

A sub-grant will be necessary to continue this work for FY2020. A sub-grant is in place with Great Basin Bird Observatory to provide field research crews working under the supervision of the U.S. Geological Survey's Western Ecological Research Center in Dixon, CA. so it is possible that this work would be covered under an amendment to the existing sub-grant.

XVIII. If a Contract Exists, or is Needed, Define the Contract Amount, Contractor/Sub-grantee, and Start and End Dates

See above.

Project Cost Breakdown

Please provide a breakdown of the project's costs over the life of the project in the table below. Define the total to be spent during each fiscal year in your response to question XI. Only include in-kind services under item 7.

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	$ 15,312.50	$ 45,937.50
C. Total Personnel Costs	$ 15,312.50	$ 45,937.50
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A. VHF Radio Transmitters (30 units @ $225/ea.)	$ 1,687.50	$ 5,062.50
B. Vehicles (2 @ $10,500 per 6 month field season)	$ 5,250.00	$ 15,750.00
C. Total Equipment Costs	$ 6,937.50	$ 20,812.50
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Field Housing	$ 250.00	$ 750.00
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 250.00	$ 750.00
7. In-Kind Services		
A. USGS Research Wildlife Biologist (Permanent, 0.1 FTE)		$ 6,417.00
B. USGS Wildlife Biologist (Term, 0.1 FTE)		$ 4,925.00
C. Total In-Kind Services	$ -	$ 11,342.00
Subtotals	$ 22,500.00	$ 78,842.00
Total Project Costs	$	101,342.00

Fiscal Year 2020 Wildlife Reserve Account Project Proposal

Project Summary

Project Title: ***Monitoring Greater Sage-grouse and Habitat Post Martin Fire***

Special Reserve Account(s) that Would Fund this Project: Upland Game Bird Stamp

NDOW Project Manager (PM): Shawn Espinosa

Funds Requested from Each Special Reserve Account: $25,000

Funds to be Used from Other Funding Sources (please itemize the amount by source):
Nevada Chukar Foundation: $25,000
Carson Valley Chukar Club: $5,000
BLM – Small Grant Provision: $5,000

Total Project Cost Not Including In-Kind Donations: $90,540

Total Project Cost Including In-Kind Donations (if applicable): $90,540

Project Proposal

I. Purpose of Project and Goals to be Achieved

This project is intended to determine key demographic parameters and gain a better understanding of habitat utilization and movement patterns after the 2018 Martin Fire. Pre-fire data was collected from 2016-2018 within this study area as it served as a representative control site within the Great Basin that exhibited characteristics of quality sage-grouse habitat free from moderate to significan anthropogenic disturbances. Further monitoring at this study sites provides a great opportunity to determine the effects of fire on sage-grouse population and also help determine the recovery of habitat under varying treatment scenarios (e.g. herbicide/fallow/seed, seed only, and natural recovery). The following describe 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.

II. Project Location including County (include a map if available):

The study site is located in the Santa Rosa Population Management Unit (PMU) on the east side of the Santa Rosa Range in Humboldt County as it transitions into the Owyhee Desert lying to the east.

III. Land Status: Private or Public?

Much of the study area is public land.

IV. If Public, Which Agency Manages the Land? (Name the District if Managed by the BLM or USFS)

A majority of these lands are managed by the Bureau of Land Management – Winnemucca District; however, some land in the study area is also managed by the U.S. Forest Service, Humboldt-Toiyabe National Forest - Santa Rosa Ranger District.

V. UTM Coordinates if Known: the study area is better represented by a polygon rather than a point.

VI. Project Approach Including Tasks to be Accomplished and Target Species. Also Include Acres to be Treated or Restored or Any Other Measurable Factors:

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. A similar habitat measurement protocol is conducted at brood sites as that at nest sites. However, transects maximum extent is 25 m for broods sites. Canopy cover is measured along three 25 m transects, which extended from the brood location every 120° with random orientation. The width (cm) of each shrub species is measured along the three transect lines within 5, 10, and 25 m from the brood location. Because habitat changes through time and broods are mobile, measurements are collected at each 10-day interval. Differences in vegetation use between night (roosting) and day (foraging) hours are also investigated. These surveys included one day and one night observation of habitat used by broods (within a 24 hour period), as well as, one observation of a random location within 200 m of the brood (dependent) to estimate disproportionate use to availability.

Predator Monitoring

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

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

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

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

VII. Describe the Beneficial Effects of the Project, How they Will be Measured and Describe Your Monitoring Plan:

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) in response to the Martin Fire. These data can be used for comparison purposes for other ongoing research projects that are currently investigating sage-grouse and habitat response to mega-fires.

VIII. Project Schedule (including start and end dates and major milestones):

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.

IX. 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).

X. NEPA Compliance, Archeological Clearances, or other Authorizations that are Needed Before this Project Can be Completed and Their Status: None

Project Costs, Funding and Contracting

XI. Cost Summary (briefly describe the project's major types of spending):

The upland game stamp program and Nevada Chukar Foundation will provide a majority of funding with the Carson Valley Chukar Club and perhaps Nevada Bighorns Unlimited also contributing. Other sources of funding could also include the Ruby Pipeline Mitigation Fee or other sources to make up the remaining $30,000 needed for this project for FY20.

XII. Is this Project Going to Continue After FY20? Yes __X__ No _____

XIII. If Yes, is this Going to be an Annual, Recurring Project? Yes ___ No __X__

XIV. If the Project is Going to Continue After FY20, Define the Total Dollars to be Spent During Each Fiscal Year of the Project's Lifespan:

XV. Would Funds from this Program Be Used as State Match for Federal Grant Funding?

Yes ___ No _X__

XVI. If Yes, Which Federal Grant Would the Matching Funds Be Used For?

These funds would have been used as match for Wildlife and Sport Fish Restoration funding; however, there is a reduced amount of federal aid funding available currently.

XVII. Describe What Type of Contract(s) Will be Needed or Currently Exists (if any) to Complete Work Under this Project (Independent Contract, Sub-grant Agreement, Inter-local Agreement or Good of the State Contract):

A sub-grant agreement would need to be developed.

XVIII. If a Contract Exists, or is Needed, Define the Contract Amount, Contractor/Sub-grantee, and Start and End Dates

Project Cost Breakdown

Please provide a breakdown of the project's *total costs over the life of the project* in the table below. If your project is a multi-year project, define the total to be spent during each fiscal year in your response to question XIV on the previous page. Only include in-kind contributions under item 7 in the table below. Any NDOW personnel or travel expenses should be covered by funding sources other than the Special Reserve Accounts.

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	$ 15,687.00	$ 37,603.00
C. Total Personnel Costs	$ 15,687.00	$ 37,603.00
3. Travel Costs*		
A. Per Diem		
B. Mileage	$ 625.00	$ 1,875.00
C. Total Travel Costs	$ 625.00	$ 1,875.00
4. Equipment		
A. VHF transmitters (30 units @ $225.ea.)	$ 1,688.00	$ 5,062.00
B.		
C. Total Equipment Costs	$ 1,688.00	$ 5,062.00
5. Materials		
A. Trapping supplies	$ 500.00	$ 1,500.00
B.		
C.		
D. Total Materials Costs	$ 500.00	$ 1,500.00
6. Miscellaneous Costs		
A. Field Housing	$500	$1,500
B. Vehicles (4WD truck lease: 2 @ $10,500/ea.)	$ 5,250.00	$ 15,750.00
C. ATV (1 ATV @ $2,000 ea)	$ 500.00	$ 1,500.00
D. ATV Fuel and Maintenance	$ 250.00	$ 750.00
F. Total Miscellaneous Costs	$ 6,500.00	$ 19,500.00
7. In-Kind Contributions		
A.		
B.		
C. Total In-Kind Contributions	$ -	$ -
Subtotals	$ 25,000.00	$ 65,540.00
Total Project Costs	$	90,540.00

Fiscal Year 2020 Wildlife Reserve Account Project Proposal

Project Summary

Project Title: ***Bi-State Sage-grouse Coordinator***

Special Reserve Account(s) that Would Fund this Project: Upland Game Bird Stamp

NDOW Project Manager (PM): Shawn Espinosa

Funds Requested from Each Special Reserve Account: $5,000

Funds to be Used from Other Funding Sources (please itemize the amount by source):
U.S. Forest Service = $5,000
Bureau of Land Management = $5,000
Intermountain West Joint Venture = $52,775

Total Project Cost Not Including In-Kind Donations: $67,775 each year for 3 years

Total Project Cost Including In-Kind Donations (if applicable): $67,775 each year for 3 years

Project Proposal

I. Purpose of Project and Goals to be Achieved:

Creating and filling a Bi-State Communication and Data Coordinator position will increase our effectiveness and efficiency in meeting reporting and accountability requirements. It will allow us to broaden our outreach to more of our community, and it will free up precious time for our professionals allowing them to focus on their primary job of getting conservation done on the ground. Also, because much of this work is happening across agency, private and nonprofit ownership boundaries, having a person who is not tied to a specific agency would help improve the seamlessness of the communication effort.

II. Project Location including County (include a map if available):

The Bi-State covers an area approximately 170-miles long and up to 60 miles wide. It includes portions of five counties in western Nevada: Douglas, Lyon, Carson City, Mineral, and Esmeralda; and three counties in eastern California: Alpine, Mono, and Inyo.

III. Land Status: Private or Public?

Lands within the Bi-State sage-grouse conservation area include public, private and military managed lands.

IV. If Public, Which Agency Manages the Land? (Name the District if Managed by the BLM or USFS)

The Bi-State Sage-grouse Conservation Area includes lands managed by the following BLM Districts:

- Carson City
- Bishop Field Office

The area also includes lands managed by the following U.S. Forest Service Ranger Districts:

- Humboldt-Toiyabe
- Inyo

V. UTM Coordinates in Known:

This is a fairly broad area covering portion of west-central Nevada and east-central California east of the Sierra Nevada Mountains.

VI. Project Approach Including Tasks to be Accomplished and Targe Species:

Base of operation: Bishop, CA, but frequent travel throughout the Bi-State and to Reno

Duties, responsibilities and type of work to be performed

The Bi-State Sage-grouse Executive Oversight Committee has agreed that the communication and outreach coordinator could be responsible for the following duties:

- Development and completion of annual and 5 year accomplishment reports;
    - Develop template for reports;
    - Compile information and data from LAWG members, and write and editing of reports;
    - Coordinate the annual data call;
    - QA/QC of data
- Facilitate and schedule LAWG meetings and Conferences (e.g. conifer workshop, Traditional Ecological Knowledge (TEK) Forum);
- Create and manage files related to the Bi-State such as meeting notes, agendas, research, news etc.
- Manage the Bi-State Website
- Communicate to LAWG and public about BSSG accomplishments and ongoing work
    - Website posts and updates;
    - Newsletter/mailchimp for relevant projects;
    - Leading and coordinating volunteer projects and field trips;
    - Writing success stories and developing outreach products (brochures, videos, merchandise, posters, giveaways, etc.);
    - Giving or scheduling for others presentations about sage-grouse/sagebrush systems
    - Staffing booths at local events such as Earth Day;
    - Photographic projects, events and gatherings.

The position would facilitate the reporting on all the actions identified in the Bi-State Action Plan (BSAP) and through reducing these outreach and communication tasks for agency staff, would increase completion of on the ground accomplishments. Specific actions this position would help achieve in the action plan are:

- Action CIA1-1: Implement a "Sage-Grouse Service Team" approach to support sage-grouse conservation and management in Bi-State area. Provide cross-jurisdictional staff support to facilitate coordinated interagency effort to conserve Bi-State DPS and its habitat.
- Action CIA1-2: Provide multi-jurisdictional funding to support sage-grouse conservation and management in Bi-State area. Establish process to identify and support cross-jurisdictional funding opportunities to facilitate coordinated interagency effort to conserve Bi-State DPS and its habitat.
- Action CIA1-3: Annually engage Bi-State Local Area Working Group (LAWG) via Technical Advisory Committee (TAC) to develop proposed program of work for upcoming calendar year based on available staff and funding. Proposed annual program of work should be completed by January 31 each calendar year.
- Action MSI1-3: Conduct Bi-State LAWG planning meetings on semi-annual basis to review status of greater sage-grouse populations and habitats in Bi-State area and to identify, prioritize, and coordinate implementation of annual conservation actions. Continue University of NV Cooperative Extension facilitation of Bi- State LAWG meeting.
- Action MSI2-1: Conduct workshops to provide information about programs available to assist ranchers/ private landowners that may be interested in implementation of sage-grouse conservation projects and to explore opportunities for cooperative conservation of sage-grouse in Bi-State area.
- Action MSI2-2: Develop and publish a Bi-State LAWG sage-grouse conservation newsletter.
- Action Action MSI2-3: Develop and implement a publically accessible Bi-State LAWG Sage-Grouse Conservation webpage to facilitate the sharing and distribution of information specific to greater sage-grouse conservation efforts in Bi-State area.

VII. Describe the Beneficial Effects of the Project and How they Will be Measured and Describe Your Monitoring Plan:

Up to now, we have had remarkable support for scheduling and running our meetings from our UNCE facilitator, Steve Lewis, who will be moving out of the area in June 2018. The LAWG will need to find someone to replace the duties he has been doing which include facilitating at least 2-4 meetings or field trips a year for the LAWG, keeping the email list, sending emails about meetings, action items, and important Bi-State news, and keeping meeting notes and agendas.

Annual reporting and record keeping and is currently completed by agency biologists. The Bi-State has its own project database which requires yearly data entry and analysis. Every partner in the LAWG with work to report currently enters data into this database. Having one person who is dedicated to managing this database would improve data quality and consistency. The Bi-State completes yearly accomplishment reports and is working on a 5-year accomplishment report for 2018. Taking the information from the project database and using it to more effectively communicate the accomplishments of the LAWG would improve accountability for the funding that is received in the Bi-State and help more effectively tell the conservation success story. Additionally, staffing this position would allow agency biologists more time to design rehabilitation projects and monitor treatment results and management actions.

Despite a decade of success in conservation work, the LAWG finds that many people in the communities near Bi-State sage-grouse habitat remain unaware of the LAWG's efforts and the importance of the sagebrush ecosystem. Communication and outreach duties fall to members of the LAWG who lack both the time and expertise to do a good job. A new communications and

outreach coordinator would allow all LAWG members and staff to use their skills more effectively to contribute to conservation success. The coordinator would improve internal and external communication. This work includes updating the Bi-State website, developing success stories, leading field trips and volunteer events, and coordinating among partners about current projects. Also, at every LAWG meeting in the last 2 years, there have been new people attending who are interested in the Bi-State and have a lot of questions. These new potential partners need an orientation to the LAWG to ensure that they understand the purpose of the group and then can hopefully become invested in this work.

Improved communication about the Bi-State sage-grouse and the sagebrush ecosystem (both outside and inside the LAWG) would lead to more community support, a better appreciation for the sagebrush ecosystem, and more on the ground accomplishments. The importance of accountability to ourselves and to our supporting agencies cannot be overstated. Regular reporting to the LAWG, the public, and state and federal agencies on grant spending, future budgeting, and monitoring results for effectiveness and implementation takes more time than one would think, but is imperative for the long-term conservation of the Bi-State sage-grouse.

VIII. Project Schedule:

Initially, this is expected to be a 3-year position; the duration of this position after 3 years will be dependent upon the availability of funding.

IX. 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).

X. NEPA Compliance or other Activities that Need to be Accomplished Before this Project Can be Completed and their Status: No NEPA compliance is necessary for this particular project.

Project Costs and Funding

XI. Cost Summary

Please provide a breakdown of the project's costs in the attached table.

XII. Is this Project Going to Continue After FY20? Yes __X__ No _____

XIII. If Yes, is this Going to be an Annual, Recurring Project? Yes __X__ No _____

XIV. If it is Going to Continue After FY20, Define the Total Dollars to be Spent During Each Fiscal Year: We anticipate funding this project for up to 5 years at the current rate of $5,000 per year.

XV. Would Funds from this Program Be Used for State Matching Purposes? Yes _X_ No ___

XVI. If Yes, Which Federal Grant Would the Matching Funds be Used For? Federal funding for this project is being made available through the Intermountain West Join Venture.

XVII. Describe What Type of Contract(s) Will be Needed or Currently Exists (if any) to Complete Work Under this Project (Independent Contract, Sub-grant Agreement, Inter-local Agreement or Good of the State Contract):

A sub-grant agreement would need to be developed to provide funding to the Eastern Sierra Interpretive Association which houses the position.

Project Cost Breakdown

Please provide a breakdown of the project's costs over the life of the project in the table below. Define the total to be spent during each fiscal year in your response to question XI. Only include in-kind services under item 7. While NDOW personnel and travel expenses may be included in your cost estimate, you should use alternative funding sources to cover these types of costs as much as possible.

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	$5,000	$ 58,138.00
C. Total Personnel Costs	$ 5,000.00	$ 58,138.00
3. Travel Costs		
A. Per Diem		$ 3,887.00
B. Mileage		
C. Total Travel Costs	$ -	$ 3,887.00
4. Equipment		
A.		
B.		
C. Total Equipment Costs	$ -	$ -
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Training		$ 750.00
B.		
C.		
D.		
F. Total Miscellaneous Costs		$ 750.00
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 5,000.00	$ 62,775.00
Total Project Costs	$	67,775.00

Fiscal Year 2020 Wildlife Reserve Account Project Proposal

Project Summary

Project Title: ***Columbian Sharp-tailed Grouse Restoration Project – Population Modeling and Publications***

Special Reserve Account(s) that Would Fund this Project: Upland Game Bird Stamp

NDOW Project Manager (PM): Shawn Espinosa

Funds Requested from the Wildlife Reserve Account(s): $22,250

Funds to be Used from Other Funding Sources (please itemize the amount by source):
The following are possibilities that are subject to review and approval by each entity. Contributions would reduce the match requirement from Nevada Upland Game Stamp funds:

1) Carson Valley Chukar Club: $2,500
2) Nevada Chukar Foundation: $5,000

USGS In-kind services: $62,250

Total Project Cost not Including In-Kind Donations: $29,750

Total Project Cost Including In-Kind Donations: $92,000

Project Proposal

I. Purpose of Project and Goals to be Achieved:

During a five-year period from 2013-2017, the Nevada Department of Wildlife (NDOW) translocated 212 Columbian sharp-tailed grouse (CSTG) from southeastern Idaho into the Bull Run Basin located in Elko County, Nevada. During this restoration effort into historically occupied habitat, NDOW partnered with the U.S. Geological Survey (USGS) Western Ecological Research Center in Dixon, California to monitor the success of the project. A significant amount of data was collected during the project from which publications can be developed to help inform future conservation efforts for the species and improve translocation techniques.

There are four main products associated with this project that have been identified including:

1) Development of an integrated population model for the translocated population;
2) A manuscript on the effectiveness of artificial insemination techniques used during the original translocation project;

3) A manuscript on habitat selection by Columbian sharp-tailed grouse during the nesting phase and factors that affect nest site selection and success;
4) A manuscript on the performance of translocated

To date, an integrated population model has been established which suggested that the translocation project was a success. However, the South Sugarloaf fire that burned during the summer of 2018 affected approximately half or more of the species habitat and the long-term sustainability of the population is in jeopardy. The continued development and official publication of the latter three products will assist in future translocation efforts here and elsewhere across the species range.

II. Project Location (include a map if available): (See Figure 1 at end of document)

Columbia Basin Release Site: Located between the Bull Run and Independence Mountains, this release site is characterized by rolling hills with considerable forb cover. A mixture of shrub-steppe and mountain-shrub communities are interspersed throughout the area. This release site is approximately 67 km^2 or 6700 hectares.

III. Land Status: Private or Public?

Columbian sharp-tailed grouse were released on a fairly extensive piece of private land within the Bull Run Basin in Elko County, NV. However, birds use adjacent lands managed by the U.S. Forest Service and Bureau of Land Management as well.

IV. If Public, Which Agency Manages the Land? (Name the District if Managed by the BLM or USFS):

U.S. Forest Service – Humboldt-Toiyabe National Forest Service, Mountain City Ranger District
Bureau of Land Management – Elko District

V. UTM Coordinates if Known: The project area is best described by a polygon as the grouse have used a fairly broad area.

VI. Project Approach Including Tasks to be Accomplished:

1) Develop an integrated population model (IPM) for CSTG at the translocation site;
    a. Integrate the following demographic parameters into the IPM:
        i. Nest propensity;
        ii. Clutch size;
        iii. Nest survival;
        iv. Hatchability;
        v. Chick survival;
        vi. Juvenile survival
    b. Summarize or explain the results in an associated discussion
2) Develop a manuscript on the effectiveness of artificial insemination techniques used during the translocation effort;
    a. Further analyze the results of parentage through genetic analysis of eggshells from individual nests to determine effectiveness of artificial insemination;
3) Develop a manuscript on performance of translocated CSTG during the nesting stage and factors that affect selection and success;

a. Estimate the effects of habitat characteristics and predator abundance on nest survival rates;
b. Develop a resource selection function model based on habitat use by radio-marked grouse and vegetative information collected during the nesting phases;
    i. Conduct multi-scale habitat selection analysis using random and used points;
    ii. Calculate the kernel home-ranges of male and female grouse during the nesting season;
    iii. Measure the habitat characteristics (field and GIS) at random points that are spatially dependent and independent from the nest site;
c. Use morphometric measurements to develop a body condition index and relate those results to survival;
    i. Determine the effects of grouse age (adult vs. yearling) on nest survival rates

4) Develop a manuscript on performance of translocated CSTG during the brood rearing stage and factors influencing brood survival;
    a. Summarize habitat measurements (field and GIS) from subsample of brood locations during day and night and dependent random locations for each 10-day interval;
    b. Develop and compare brood survival models that include vegetation characteristics as covariates to identify the effects of vegetation factors;
    c. Develop a resource selection function model based on habitat use by radio-marked grouse and vegetative information collected during the brood rearing phases;
        i. Conduct multi-scale habitat selection analysis using random and used points;
        ii. Calculate the kernel home-ranges of male and female grouse during the nesting season;
        iii. Measure the habitat characteristics (field and GIS) at random points that are spatially dependent and independent from the nest site;
            1. Summarize results in an associated discussion.

VII. Describe the Beneficial Effects of the Project and How they Will be Measured and Monitored:

Publication of the results of this project into formal wildlife management journals memorializes these efforts and helps ensure that future work can be more successful given the results of this project.

VIII. Project Schedule:

1) Development of an Integrated Population Model for translocated Columbian sharp-tailed grouse – June 30, 2019;
2) Submission of artificial insemination manuscript (final) – September 30, 2019;
3) Submission of nest site selection (associated resource selection function model) and survival of translocated female Columbian sharp-tailed grouse manuscript (draft) – December 31, 2019;
4) Submission of brood site selection (associated resource selection function model) and survival by translocated female Columbian sharp-tailed grouse – June 30, 2020;

IX. Relationship to NDOW Plans, Policies and Programs:

The following documents were used while developing this proposal:

- Nevada Upland Game Species Management Plan (2008);
- Upland Game Release Plan for FY2016-17;

- NDOW's W-48 Federal Assistance Grants (Pittman-Robertson);
- Data Summary of a Columbian Sharp-tailed Grouse Habitat Suitability Examination between Idaho and Nevada (Coates et al. 2011).
- Guidelines for the Management of Columbian Sharp-tailed Grouse Populations and Their Habitats (Hoffman et al. 2015).

X. NEPA Compliance or other Activities that Need to be Accomplished Before this Project Can be Completed and their Status: This project is primarily taking place on private lands. However, a U.S. Forest Service Categorical Exclusion was obtained for this project to address an additional release site and the potential for the translocated birds to use Forest Service administered lands.

Project Costs and Funding

XI. Cost Summary

Please provide a breakdown of the project's costs in the attached table.

XII. Is this Project Going to Continue After FY20? Yes ____ No __X__

FY 2020 is likely going to be the last year of the project until we can further determine the success or failure of the project within the Bull Run Basin. Given current fire suppression efforts and priorities of federal land management agencies, future translocations of the species may not be cost or resource effective.

XIII. If Yes, is this Going to be an Annual, Recurring Project? Yes ____ No __X__

XIV. If it is Going to Continue After FY20, Define the Total Dollars to be Spent During Each Fiscal Year:

XV. Would Funds from this Program Be Used for State Matching Purposes? Yes _X_ No ___

XVI. If Yes, Which Federal Grant Would the Matching Funds be Used For? Pittman-Robertson Sport Fish and Wildlife Restoration – Game Management Grant.

XVII. Describe What Type of Contract(s) Will be Needed or Currently Exists (if any) to Complete Work Under this Project (Independent Contract, Sub-grant Agreement, Inter-local Agreement or Good of the State Contract):

XVIII. If a Contract Exists, or is Needed, Define the Contract Amount, Contractor/Sub-grantee, and Start and End Dates

Project Cost Breakdown

Please provide a breakdown of the project's costs over the life of the project in the table below. Define the total to be spent during each fiscal year in your response to question XI. Only include in-kind services under item 7. While NDOW personnel and travel expenses may be included in your cost estimate, you should use alternative funding sources to cover these types of costs as much as possible.

3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A. VHF Transmitters (30@$225/unit)		
B. Handheld GPS (2 @ $250/ea.)		
C. Total Equipment Costs	$ -	$ -
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Additional Costs (workshop presentations, publication and printing fees, etc.)	$ 1,500.00	$ 7,500.00
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 1,500.00	$ 7,500.00
7. In-Kind Services		
A. Research Wildlife Biologist (Permanent, 0.2 FTE)		$ 62,250.00
B.		
C.		$ -
Total In-Kind Services	$ -	$ 62,250.00
Subtotals	$ 22,250.00	$ 69,750.00
Total Project Costs	$	92,000.00

*Note: if you are proposing to use more than one NDOW Special Reserve Account to pay for this project, or plan to use more than one other type of funding source, please describe in this location which specific sources will pay for the cost components included in the table above:

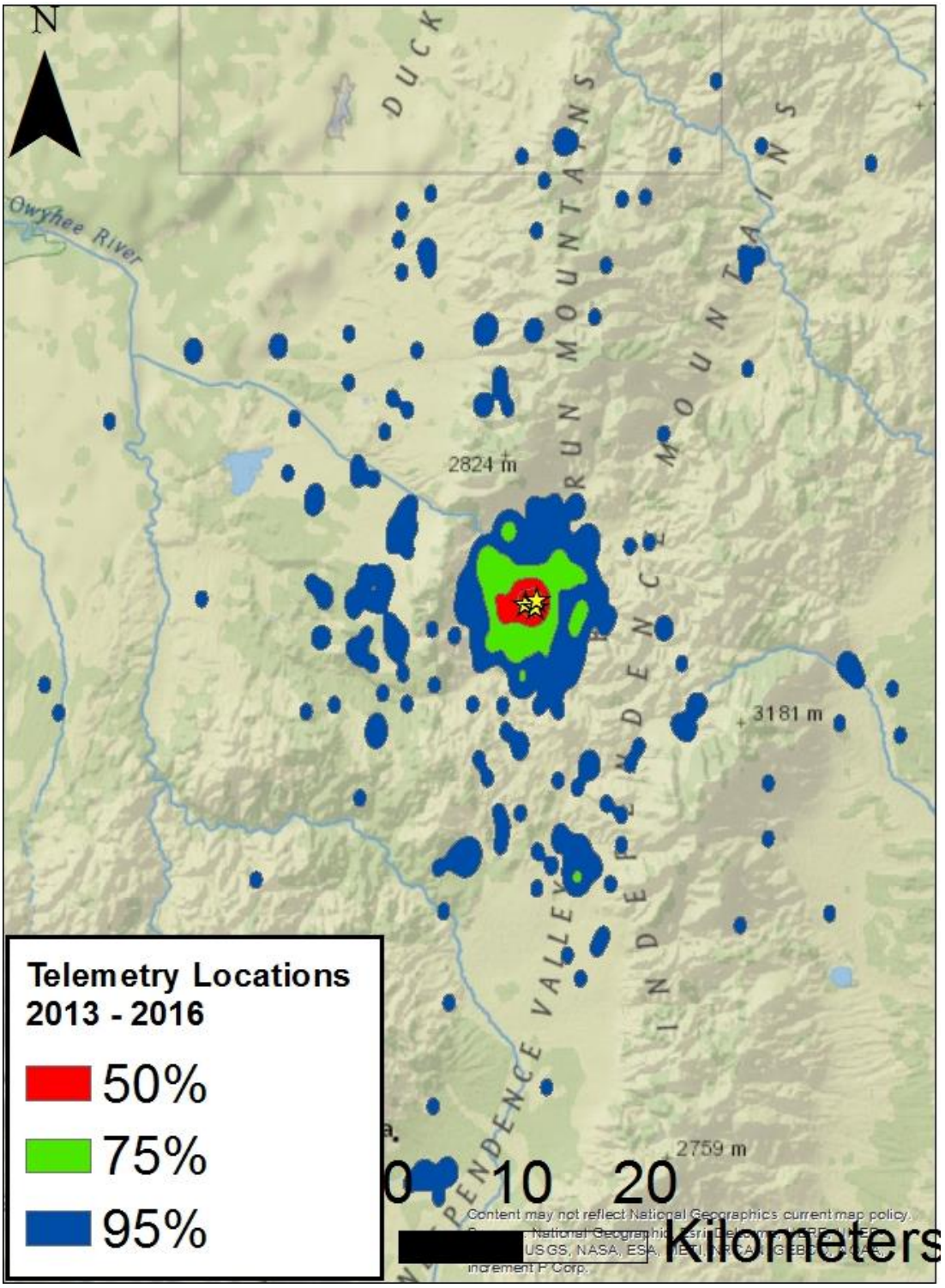


Figure 1. Utilization distribution of translocated Columbian sharp-tailed grouse within the Independence and Bull Run Mountains of Elko County from 2013-2016. Ninety-five percent of all telemetry locations are within the blue area. The majority of birds remain concentrated around the release area which is indicated by the yellow stars.

Fiscal Year 2020 Wildlife Reserve Account Project Proposal

Project Summary

Project Title: Response of Greater Sage-grouse to Vegetation Treatments in South Cave, Hamlin and Steptoe Valleys

Special Reserve Account(s) that Would Fund this Project: Upland Game Bird Stamp

NDOW Project Manager (PM): Shawn Espinosa

Total Funds Requested from the Wildlife Reserve Account(s): $7,500

Total Cash to be Used from Other Funding Sources (please list by source):
Nevada Sage-grouse Conservation Grant (W-64) – Federal Match (75%): $17,500

Total In-Kind Donations by Source (please list by source): N/A

Total Project Cost to be Funded by All Sources: $25,000

Project Proposal

I. Purpose of Project and Goals to be Achieved:

The Nevada Department of Wildlife (NDOW) and the Bureau of Land Management – Ely District (BLM) are partnering on a Greater Sage-grouse (hereafter referred to as "sage-grouse") monitoring project to determine general habitat use, identification of key areas during certain seasons and the efficacy of various vegetative treatments, particularly pinyon and juniper removal, on local sage-grouse populations within portions of Lincoln (Hamlin Valley) and southern White Pine County (South Steptoe and Cave Valley). Baruch-Murdo et al. (2013) suggests that population level impacts to sage-grouse can occur at very low levels of conifer encroachment, whereas no sage-grouse leks remained active when conifer canopy exceeded 4%. 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.

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 within southeastern Nevada and southwestern Utah, but also help understand the response to various treatments or management actions including pinyon/juniper removal, meadow enhancement and other management actions. Sage-grouse monitoring work is currently ongoing in southern Utah in the Skutempah, Dog Valley and Hamlin Valley (Utah) areas by Dr. Nicki Frey with Utah State University. This project expands upon her ongoing efforts and includes study sites in Lincoln and

southern White Pine Counties. Some of Dr. Frey's monitoring work in southern Utah has actually trickled into this portion of Nevada because sage-grouse are using habitats in both states. This work will help to further evaluate the effectiveness of pinyon and juniper removal and other conservation actions on sage-grouse habitat use and potentially, population response. This monitoring effort is expected to span a five year period beginning in State Fiscal Year 2016 and conclude in 2020.

This project is intended to better understand habitat utilization, identify key habitats and determine movement patterns of sage grouse as well as determine vital rates within areas of southeastern Nevada and southwestern Utah where conifer removal treatments are being conducted to improve habitat conditions for sage-grouse. Objectives include the following:

1. Determine habitat use and specific vital rates of female grouse during the nesting period, especially in relation to those areas that have been treated through conifer removal efforts;
2. Identify specific use areas during the brood-rearing period and estimate brood survival, especially with respect to conifer treatment areas or proximity to those areas;
3. Estimate differences between male and female (with broods) departure dates to wintering areas;
   a) Identify wintering grounds and attempt to develop a winter seasonal habitat map;
4. Calculate Brownian bridge movement path models to identify corridors between seasonal use areas;
5. Calculate seasonal and annual survival rates and identify differences between sexes;
6. Determine habitat characteristics of used versus random points, especially with respect to treated areas.

II. Project Location (include a map if available):

This work will take place within South Cave and Hamlin Valley in Lincoln County and south Steptoe Valley in White Pine County. Other areas could be included based upon bird use of adjacent habitats.

III. Land Status: Private or Public?

This project is taking place on public lands.

IV. If Public, Which Agency Manages the Land? (Name the District if Managed by the BLM or USFS):

Bureau of Land Management – Ely District

V. UTM Coordinated if Known:

VI. Project Approach Including Tasks to be Accomplished:

This work will take place within South Cave and Hamlin Valleys in Lincoln County and south Steptoe Valley in White Pine County, Nevada, but could include overlap into other adjacent valleys or mountain ranges based upon bird movement. This work is expected to involve one principal investigator and one field technician plus associated travel and lodging expenses.

1) Sage-grouse Monitoring:

a. Capture and GPS satellite Platform Transmitter Terminal (PTT) mark up to 15 female sage-grouse initially at each study site and maintain that approximate sample size over the course of the 5-year study;
b. Dropped transmitters will be refurbished (if possible) and redeployed during the second and third breeding season.
c. Capture and band any male sage-grouse encountered during trapping efforts;
d. Periodically download and categorize data obtained from GPS satellite PTT transmitters;
    i. Determine approximate nest initiation dates of female grouse;
    ii. Identify movement patterns during the nesting season;
    iii. Determine nest fate of female grouse and estimate daily nest survival probabilities;
    iv. Estimate the effects of environmental characteristics on nest survival rates;
    v. Calculate kernel home-ranges of female grouse during the nesting season;
    vi. Identify specific use areas during the brooding period;
    vii. Conduct brood counts every 10-d interval through the brood-rearing period to document brood success. Broods with no chicks will be scored unsuccessful and confirmed within 48-hours;
    viii. Calculate 10-day interval brood survival rate;
    ix. Identify late-fall feeding area for congregated broods;
    x. Estimate differences between male and female (with broods) departure dates to wintering areas;
    xi. Identify wintering grounds and attempt to develop a winter seasonal habitat map;
    xii. Calculate Brownian bridge movement path models to identify corridors between seasonal use areas;
    xiii. Calculate seasonal and annual survival rates and identify differences between sexes.

2) Habitat Measurements and Analyses
a. Within 48 hours of nest fate, measure multiple microhabitat characteristics at each nest site, including total shrub cover, sagebrush cover, perennial and annual grasses, perennial and annual forbs, vertical cover, and horizontal cover (measured at 5, 10, 25, 50, 100 m from nest site);
    i. Place four perpendicular transects centered at the nest and record the percent shrub cover for each meter along the transect at scales of 5, 10, 25 m;
    ii. In addition, place two 20 X 50 cm Daubenmire plots along each transect and one at the nest center where percent cover is estimated and all plants are measured and keyed as annual or perennial;
    iii. Use three methods, including Jones cover, board to estimate vertical and horizontal cover at each point of subplots and at the nest bowl;
b. Conduct multiple measurements to quantify the amount of conifers within the nesting area (Monitor study site);
c. Use maps of vegetation types derived from remote sensing data in a Geographical Information System (GIS) to measure habitat characteristics at larger spatial scales;
d. Measure the habitat characteristics (field and GIS) at random points that are spatially dependent and independent from the nest site;

e. Develop a cover class layer of conifers using 1-m resolution NAIP and NDVI data (Monitor study site);
f. Conduct multi-scale habitat selection analysis using random and used points;
g. Estimate the effects of grouse age and body condition on nest survival rates;
h. Conduct habitat measurements (field and GIS) at a subsample of brood locations dependent random locations for each 10-day interval;
i. Develop and compare brood survival models that include vegetation characteristics as covariates to identify the effects of vegetation factors;

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

VII. Describe the Beneficial Effects of the Project and How they Will be Measured and Monitored:

Over the course of this monitoring effort (3 years), we will be able to determine certain population characteristics such as:

a) Seasonal use areas and seasonal habitat maps;
b) Important movement corridors calculated through Brownian bridge movement pathways, which could subsequently lead to the identification of treatment areas (conifer removal);
c) Potential connectivity with other adjacent sage-grouse populations not only in Nevada, but between Nevada and Utah;
d) In addition, we will be able to estimate vital rates among individual birds such as nest initiation rates, nest survival, adult and juvenile survival rates, brood survival rates and potential differences in mortality between seasons. Below normal rates for any of these periods may indicate a potential management action change or habitat restoration or enhancement project.

These data, collected before, during and after implementation of several projects, and in the NEPA planning stages, will serve as one mechanism to monitor the overall effectiveness of the proposed habitat enhancement projects.

VIII. Project Schedule:

This project was initiated in State Fiscal Year 2016 and will continue through State Fiscal Year 2020. Year One – Year Five: (SFY 2016 - 2020) Capture and radio or GPS mark individuals. Conduct follow-up and habitat measurements. Develop data summary and progress report.

Year Five (SFY 2020): Develop publications (pertinent journal articles)

IX. 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).

X. NEPA Compliance or other Activities that Need to be Accomplished Before this Project Can be Completed and their Status:

National Environmental Policy Act compliance for sage-grouse monitoring has been addressed in NDOW's Sage-grouse Conservation Project grant program. Habitat improvement projects taking

place on public lands within the project area have been documented through the BLM Ely District Office.

Project Costs and Funding

XI. Cost Summary

Please provide a breakdown of the project's costs in the attached table.

XII. Is this Project Going to Continue After FY20? Yes ____ No __X__

XIII. If Yes, is this Going to be an Annual, Recurring Project? Yes ____ No __X___

XIV. If it is Going to Continue After FY20, Define the Total Dollars to be Spent During Each Fiscal Year:

XV. Would Funds from this Program Be Used for State Matching Purposes? Yes _X_ No ___

XVI. If Yes, Which Federal Grant Would the Matching Funds be Used For?

Federal funding for this project will be made available through the Pittman-Robertson Sport Fish and Wildlife Restoration Program. Specifically, the federal match (75%) will be made available through the Nevada Department of Wildlife administered "Nevada Sage-grouse Conservation Program" grant.

XVII. Describe What Type of Contract(s) Will be Needed or Currently Exist (if any) to Complete Work Under this Project (Independent Contract, Sub-grant Agreement, Inter-local Agreement or Good of the State Contract):

A sub-grant agreement is currently in place with Utah State University to complete this research and monitoring project.

XVIII. If a Contract Exists, or is Needed, Define the Contract Amount, Contractor/Sub-grantee, and Start and End Dates

A sub-grant agreement is currently in place with Utah State University to complete this research and monitoring project.

Project Cost Breakdown

Please provide a breakdown of the project's costs over the life of the project in the table below. Define the total to be spent during each fiscal year in your response to question XI. Only include in-kind services under item 7. While NDOW personnel and travel expenses may be included in your cost estimate, you should use alternative funding sources to cover these types of costs as much as possible.

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	$6,250	$ 7,250.00
C. Total Personnel Costs	$ 6,250.00	$ 7,250.00
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A. GPS Transmitters		$ 7,000.00
B. Vehicles	$ 1,000.00	$ 2,500.00
C. Total Equipment Costs	$ 1,000.00	$ 9,500.00
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Field Housing	$ 250.00	$ 750.00
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 250.00	$ 750.00
7. In-Kind Services		
A.		
B.		
C. Travel (Per-diem)		
D. Additional equipment (radio receivers, antennas, capture and banding supplies, etc)		
Total In-Kind Services	$ -	$ -
Subtotals	$ 7,500.00	$ 17,500.00
Total Project Costs	$	25,000.00

Fiscal Year 2020 Wildlife Reserve Account Project Proposal

Project Summary

Project Title: ***Wildfire and Geomorphology Effects on Riparian Habitats and Related Restoration Implications***

Wildlife Reserve Account(s) that Would Fund this Project: Upland Game Bird Stamp and Habitat Conservation Fee

NDOW Project Manager (PM): Jasmine Kleiber

Total Funds Requested from the Wildlife Reserve Account(s):
$10,000.00 – Upland Game Bird Stamp account
$10,000.00 – Habitat Conservation Fee account

Total Cash to be Used from Other Funding Sources (please list by source):
N/A

Total In-Kind Donations by Source (please list by source): $30,000 in-kind services from USDA Agricultural Research Station in Reno

Total Project Cost to be Funded by All Sources: $50,000

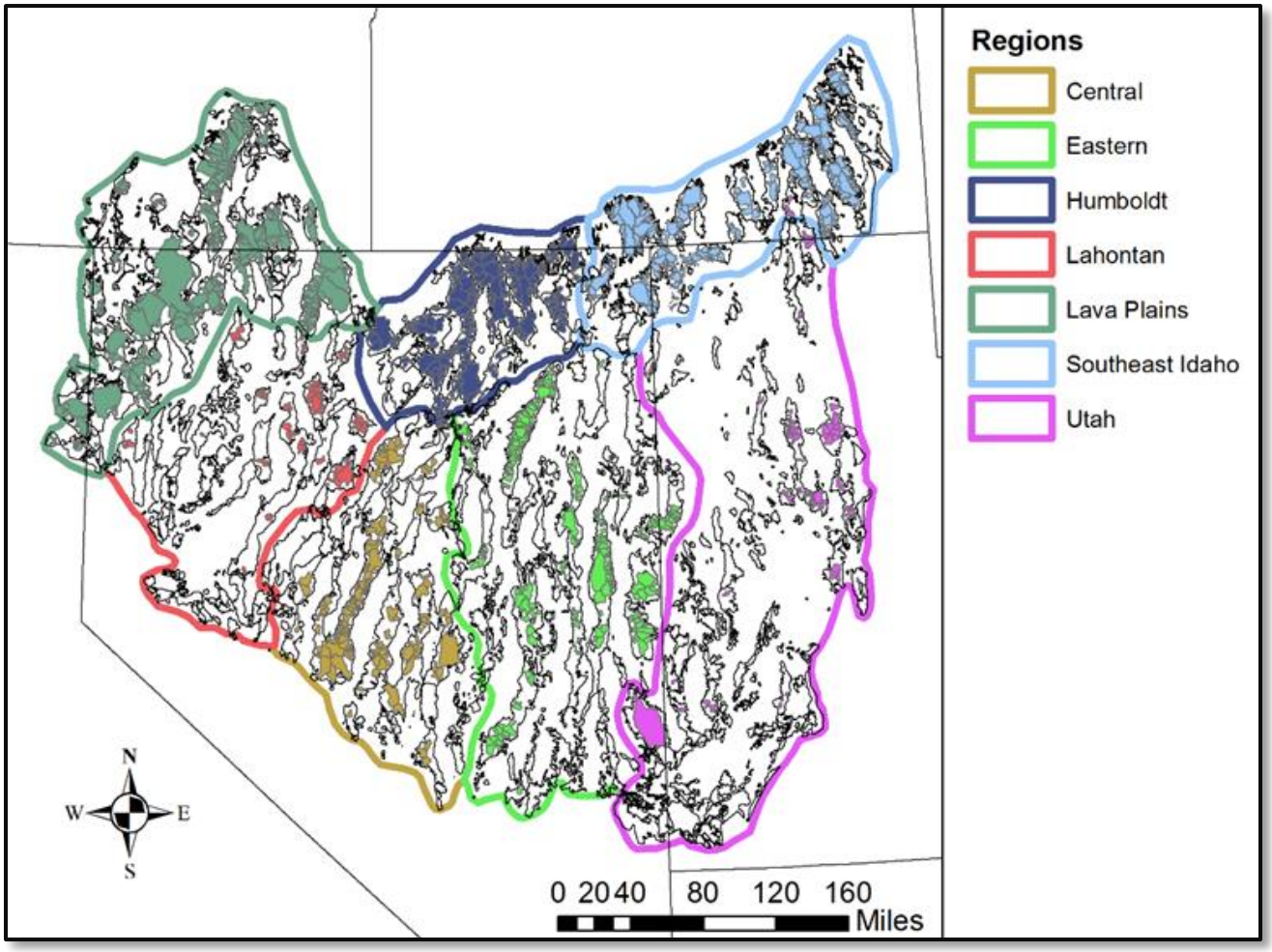
Project Proposal

I. Purpose of Project and Goals to be Achieved:

Considerable attention has been devoted in recent years to the management of wet meadow ecosystems that serve as important riparian habitats within upland basins of the Great Basin. Where they do exist, they tend to be severely degraded by incision or gully erosion, over-use, wildfire, or invasive annual plant species, and they can be difficult to restore once degraded. These habitats, within basins that exhibit a low degree of connectivity and high sediment storage-to-transport ratios on hillslopes, may be more responsive to management activities because of the reduced threats of channel incision and, presumably, a larger supply of groundwater flow to the meadows created by an extensive network of recharge sites. Importantly, human activities that lead to an increase in basin connectivity can negatively impact downstream meadows through a decrease in groundwater recharge and an increase in stream dynamics, although these activities may be physically separated from the wet meadow areas. This project aims to provide a better approach to understanding geomorphology in a given watershed, and how the geomorphology affects watersheds, wet meadows, and riparian areas specifically in response to wildfire.

II. Project Location (include a map if available): See the figure below.

The project covers all of the mountain ranges with watersheds that have perennial stream systems in Nevada and the majority of the floristic Great Basin. This project will focus on Nevada.



III. Project Approach Including Tasks to be Accomplished:

This project will tie into the work currently underway for developing a strategic, multi-scale framework for assessing resource values, climate vulnerability, and other threats to Great Basin riparian and meadow ecosystems using resilience science.

Products will provide the capacity to (1) prioritize riparian ecosystems for management based on watershed and riparian ecosystem characteristics and sensitivity to disturbance, primarily that of wildfire, and (2) determine effective management strategies based on ecosystem resilience and resource values.

Prior funding has been used to develop data collection protocols, collect data, develop a database, and analyze and categorizing watershed and riparian meadow characteristics. Additional funding is needed to finalize the analyses and develop the necessary tools for managers to effectively use this information in targeting areas for management and determining appropriate conservation and restoration strategies. Additional project aims include:

1. Assessment of Watershed, Meadow, and Riparian Ecosystem Sensitivity to Disturbance, primarily that of wildfire. Data will be collected on the geomorphological processes that determine meadow ecosystem resilience to disturbance for several focal systems in the central Great Basin. The types of watersheds, meadows, and riparian areas are being categorized according to their hydrogeologic setting, hydrology, vegetation, and stream connections.
2. Incorporation of this data into the workbook/field guide developed for evaluating (1) the differences in meadow responses to disturbance and the causes of those differences and (2) the process of collecting and interpreting the necessary data to describe meadow resilience to disturbance. Selecting appropriate management strategies based on the relative resilience of the systems will be discussed.

IV. Describe the Beneficial Effects of the Project and How they Will be Measured and Monitored:

This project is being conducted in collaboration with a diverse management and research group with knowledge of Nevada watersheds and conservation issues to ensure that it will have strong utility for management. Stakeholders/project participants include the Great Basin Landscape Conservation Cooperative (John Tull), Bureau of Land Management (Karen Prentice, Sarah Peterson), National Forest Systems (R4 and Humboldt-Toiyabe National Forest; Mark Muir), US Fish and Wildlife Service (Chad Mellison), Nevada Division of Wildlife (Jasmine Kleiber and Shawn Espinosa), and The Nature Conservancy (Laurel Saito). Research partners include Rocky Mountain Research Station (Jeanne Chambers, David Board), Western Carolina University (Jerry Miller, Mark Lord), University of Nevada, Reno (Peter Weisberg, Tom Dilts, Anna Knight), Desert Research Institute (Rosemary Caroll), Agricultural Research Service (Kierith Snyder), UC Davis (Erica Fleishman), and USGS (Jason Dunham). The project has face-to-face meetings twice a year in addition to routine (every 4-6 weeks) calls and webexs. In January 2018, we organized a symposium on the results and management applications of the project that was held at the Society for Range Management meeting in Reno, Nevada, and we plan to look for similar opportunities in the future. In July 2017, we held a field tour of the study watersheds and meadows and held a second field tour in summer 2019. Also, on-going development of educational materials and a workshop for managers on using the tools we are developing for assessing watershed and meadow ecosystem resilience. Specific products will include:

- A management-friendly manuscript describing the differences in baseflows for watersheds with different characteristics and projected future changes (Desert Research Institute – Rosemary Carroll; ARS – Keirith Snyder)
- A General Technical Report (GTR) that describes the differences among watersheds across the region and provides implications for climate change and management (RMRS – Jeanne Chambers and David Board).
- A field guide designed to provide an understanding of differences in watershed resilience to disturbance and that steps managers through the process of assessing resilience to disturbance and determining management strategies (Western Carolina University – Jerry Miller; RMRS – Jeanne Chambers; University of Nevada, Reno – Peter Weisberg).
- A similar field guide to the one for the watersheds for meadow ecosystems (Western Carolina University – Mark Lord and Jerry Miller; RMRS – Jeanne Chambers).

V. Project Schedule:

Summer-Fall 2019/ Compile GIS datasets; conduct initial categorizations of

Winter 2020	watersheds; develop models of watershed resilience
Spring/Summer 2020	Field visits to evaluate watershed categorizations and resilience models and develop sampling protocols Finalize datasets; finalize watershed categorizations and conduct geomorphological analyses
Summer/Fall 2020	Complete management field guides on determining watershed and meadow resilience and developing management strategies; write manuscripts; hold second field tour
Fall/Winter 2020/2021	Hold workshop on resilience assessment; Complete project

VI. Relationship to NDOW Plans, Policies and Programs:

NDOW strives to work with multiple stakeholders to assess key habitats and species likely to be affected by varying stressors, including habitat degradation and/or loss, and to develop effective strategies and plans for managing Nevada's wildlife resources. This project aims to continue development of a strategic, multi-scale framework for assessing resource values and threats to Great Basin riparian and meadow ecosystems using resilience science that includes capacity to (1) prioritize riparian ecosystems for management based on ecosystem characteristics and sensitivity to disturbance, and (2) determine effective management strategies based on ecosystem resilience and resource values. Focal species identification is guided by the State Wildlife Action Plan, with benefits to species managed within NDOW Upland Game, Big Game, Diversity and Fisheries programs. Outcomes from this work will benefit and help guide the Nevada Partners for Conservation and Development program's restoration activities on riparian and meadow systems.

VII. NEPA Compliance or other Activities that Need to be Accomplished Before this Project Can be Completed and their Status:

No NEPA compliance is necessary.

Project Costs and Funding

VIII. Cost Summary

Please provide a breakdown of the project's costs in the attached table.

IX. Is this Project Going to Continue After FY20? Yes _X__ No ____

X. If Yes, is this Going to be an Annual, Recurring Project? Yes ____ No __X__

XI. If it is Going to Continue After FY20, Define the Total Dollars to be Spent During Each Fiscal Year: This project will conclude at the end of State Fiscal Year 2021.

XII. Would Funds from this Program Be Used for State Matching Purposes? Yes _X_ No ___

XIII. If Yes, Which Federal Grant Would the Matching Funds be Used For? No

Project Cost Breakdown

Please provide a breakdown of the project's costs over the life of the project in the table below. Define the total to be spent during each fiscal year in your response to question XI. Only include in-kind services under item 7. While NDOW personnel and travel expenses may be included in your cost estimate, you should use alternative funding sources to cover these types of costs as much as possible.

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	$ 20,000.00	
C. Total Personnel Costs	$ 20,000.00	$ -
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A. VHF Radio Transmitters (30 units @ $225/ea.)		
B. Vehicles (2 @ $10,500 per 6 month field season)		
C. Total Equipment Costs	$ -	$ -
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Field Housing		
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ -	$ -
7. In-Kind Services		
A. ARS Researcher (2)		$30,000
B.		
C. Total In-Kind Services	$ -	$ 30,000.00
Subtotals	$ 20,000.00	$ 30,000.00
Total Project Costs	$	50,000.00

Fiscal Year 2020 Wildlife Reserve Account Project Proposal

Project Summary

Project Title: ***A Framework for Restoring and Conserving Great Basin Wet Meadows and Riparian Ecosystems***

Special Reserve Account(s) that Would Fund this Project: Upland Game Bird Stamp and Habitat Conservation Fee

NDOW Project Manager (PM): Jasmine Kleiber

Total Funds Requested from the Wildlife Reserve Account(s):
$10,000.00 – Upland Game Bird Stamp account
$10,000.00 – Habitat Conservation Fee account

Total Cash to be Used from Other Funding Sources (please list by source):
Previously awarded NDOW funds - HCF - ($40,000)
Great Basin Landscape Conservation Cooperative ($100,000)
Bureau of Land Management ($60,000)

Total In-Kind Donations by Source (please list by source): N/A

Total Project Cost to be Funded by All Sources: $220,000

Project Proposal

I. Purpose of Project and Goals to be Achieved:

Riparian and wet meadow ecosystems provide critical habitats for both terrestrial and aquatic wildlife in the semiarid Great Basin. Many of these ecosystems have been degraded by various anthropogenic activities and are further threatened by climate warming. Successful restoration and conservation requires prioritizing areas for management and determining the best management strategies. This ongoing, collaborative project is developing a strategic approach for conservation of wet meadows and riparian ecosystems and the species they support for mountain watersheds with perennial streams in the Great Basin. The analyses focus on threats caused by natural and anthropogenic disturbance, including climate change, on wet meadow and riparian ecosystems and their resilience to disturbances, such as wildfires and climate change at watershed and meadow or riparian ecosystem scales. Products include a web-based GIS that will allow managers to visualize, subset, and extract a wide range of geomorphic, hydrologic, and climatic data, along with range maps and habitat models for species of

conservation concern. Field guides will step managers through the process of evaluating watershed, stream system, and riparian ecosystem and meadow resilience to natural and anthropogenic disturbance and then determining the most appropriate management strategies. Educational materials and a field workshop will be developed for managers to facilitate use of the tools. All products will be made available on Forest Service webpage and linked to NDOW and other agency websites.

II. Project Location (include a map if available):

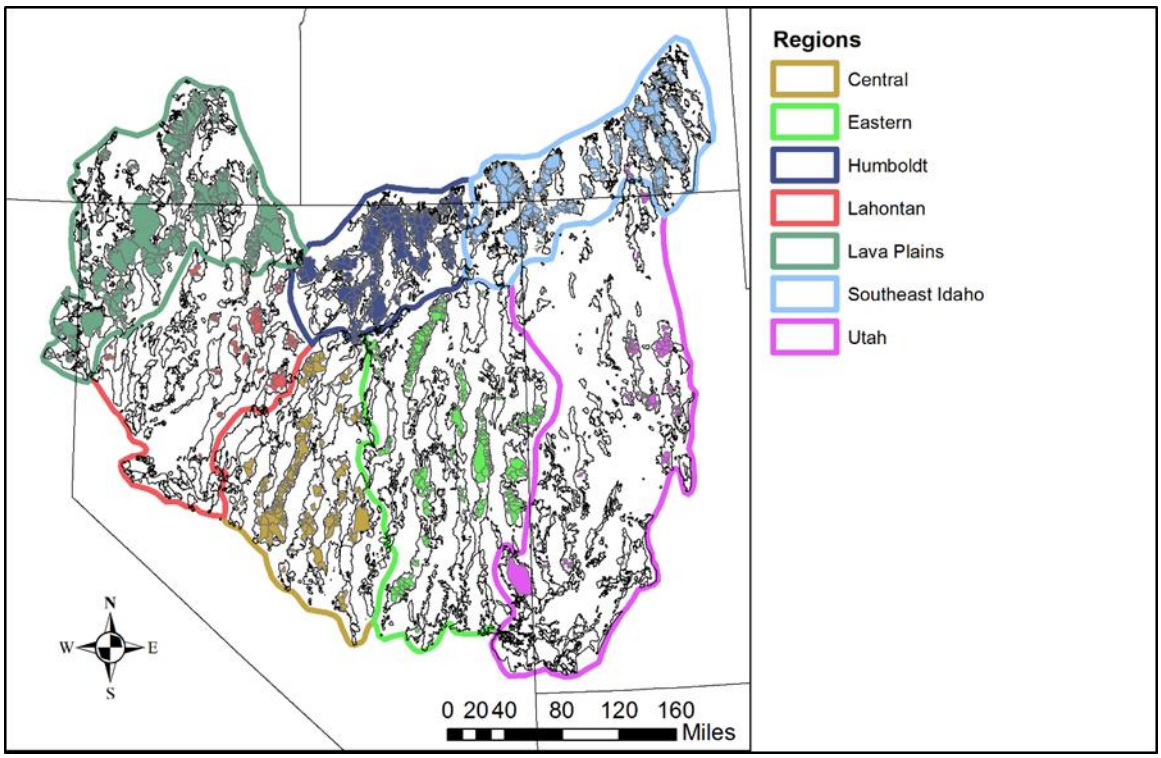


Figure 1. Map of the study area showing the regions included, the mountain ranges, and the focal watersheds.

III. Project Approach Including Tasks to be Accomplished:

This ongoing project is developing a strategic, multi-scale framework for assessing resource values, climate vulnerability, and other threats to Great Basin riparian and meadow ecosystems using resilience science. Products will provide the capacity to (1) prioritize riparian ecosystems for management based on watershed and riparian ecosystem characteristics and sensitivity to disturbance, and (2) determine effective management strategies based on ecosystem resilience and resource values. Prior funding has been used to develop data collection protocols, collect data, develop a database, and analyze and categorizing watershed and riparian meadow characteristics. Additional funding is needed to finalize the analyses and develop the necessary tools for managers to effectively use this information in targeting areas for management and determining appropriate conservation and restoration strategies. The remaining analyses and tools to be developed include:

(1) ***Web Product and Data Archive.*** A database of geomorphic, hydrologic, and climatic characteristics (Germanoski et al. 2004, Miller et al. 2011, Engelhardt et al. 2012), threats, and range maps and habitat models for species of conservation concern is being developed for most upland watersheds with third order or greater streams in the Great Basin (see Figure 1, Table 1).

Projected changes in baseflow for the watersheds based on geomorphic, hydrologic and climatic characteristics will also be included. The web-based product and data archive are in the final stages of development. These will allows users to (1) select one or more focal watersheds within the assessment area for analysis, and (2) subset and extract data from the watersheds in order to prioritize them for management based on their geomorphic characteristics, current and future baseflows, dominant threats, and at-risk species. The intent is for this large-scale assessment to be followed by field assessments of resilience to disturbance and determinations of the appropriate management strategies using the field guides described below. The additional funding will be used to help develop Forest Service Web Pages that explain and provide links to the databases, publications, and field guides and tools being provided by the project.

(2) ***Assessment of Watershed and Riparian Ecosystem Sensitivity to Disturbance.*** A process-based classification of the watersheds has been developed based on their resilience to disturbance. The classification builds on our prior work (Germanoski et al. 2004, Miller et al. 2011, Engelhardt et al. 2011), is based on the geomorphic and hydrologic characteristics of the watersheds and stream systems, and was verified during field visits in summer 2017. It considers the watershed type, the dominant processes within the watershed, and the relative tendency of stream channels to remain stable, avulse (move outside of their channel) or incise (downcut) (Table 2, Figure 2). A field guide is being developed that describes (1) the differences in watershed responses to disturbance and the causes of those differences, (2) the linkages between the watershed geomorphic and hydrologic characteristics and reach-scale response(s), (3) the linkages between the geomorphic and hydrologic characteristics and vegetation characteristics, and (4) the process of collecting and interpreting the necessary data to describe watershed and riparian ecosystem resilience to disturbance. Selecting appropriate management strategies based on the relative resilience of the systems will be emphasized. Additional funding will be used to offset the publication costs for the field guides and to host a field tour in 2020.

(3) ***Assessment of Meadow Ecosystem Sensitivity to Disturbance.*** Data are being collected on the processes that determine meadow ecosystem resilience to disturbance for 56 focal systems in the central Great Basin described in Trowbridge et al. (2011). The types of meadows are being categorized according to their hydrogeologic setting, hydrology, vegetation, and stream connections. A field guide is being developed for evaluating (1) the differences in meadow responses to disturbance and the causes of those differences and (2) the process of collecting and interpreting the necessary data to describe meadow resilience to disturbance. Selecting appropriate management strategies based on the relative resilience of the systems will be discussed. Additional funding will be used to offset the publication costs for the field guides and to host a field tour in 2020.

IV. Describe the Beneficial Effects of the Project and How they Will be Measured and Monitored:

This project is being conducted in collaboration with a diverse management and research group with knowledge of Nevada watersheds and conservation issues to ensure that it will have strong utility for management. Stakeholders/project participants include the Great Basin Landscape Conservation Cooperative (John Tull), Bureau of Land Management (Karen Prentice, Sarah Peterson), National Forest Systems (R4 and Humboldt-Toiyabe National Forest; Mark Muir and John McCann), US Fish and Wildlife Service (Chad Mellison), Nevada Division of Wildlife (Shawn Espinosa), and The Nature Conservancy (Laurel Saito). Research partners include Rocky Mountain Research Station (Jeanne Chambers, David Board), Western Carolina

University (Jerry Miller, Mark Lord), University of Nevada, Reno (Peter Weisberg, Tom Dilts, Anna Knight), Desert Research Institute (Rosemary Caroll), Agricultural Research Service (Kierith Snyder), UC Davis (Erica Fleishman), and USGS (Jason Dunham). The project has face-to-face meetings once a year in addition to monthly calls and webexs. In January 2018, we organized a symposium on the results and management applications of the project that was held at the Society for Range Management meeting in Reno, Nevada, and we plan to look for similar opportunities in the future. In July 2017, we held a field tour of the study watersheds and meadows and we will hold a second field tour in spring/summer 2020. Also, we will develop educational materials and hold a workshop for managers on using the tools we are developing for assessing watershed and meadow ecosystem resilience in 2020. Specific products from additional funding will include:

- A web-based GIS that allows managers to visualize and download all available data for the watersheds and that has tutorials describing how to use the data and maps (University of Nevada, Reno – Tom Dilts, Anna Knight and Peter Weisberg).
- A field guide designed to provide an understanding of differences in watershed resilience to disturbance and that steps managers through the process of assessing resilience to disturbance and determining management strategies (Western Carolina University – Jerry Miller; RMRS – Jeanne Chambers; University of Nevada, Reno – Peter Weisberg).
- A similar field guide to the one for the watersheds for meadow ecosystems (Western Carolina University – Mark Lord and Jerry Miller; RMRS – Jeanne Chambers).
- A Forest Service Web Page that explains and provides the databases, field guides and tools being provided by the project.

V. Project Schedule:

Spring/Summer 2019	Complete web-based GIS datasets and tool
Summer/Fall 2019	Complete management field guides on determining watershed and meadow resilience and developing management strategies
Fall/Winter 2019/2020	Develop Forest Service Web Pages and manager tutorials
Spring/Summer 2020	Hold field workshop; complete project.

VI. Relationship to NDOW Plans, Policies and Programs:

NDOW strives to work with multiple stakeholders to assess key habitats and species likely to be affected by varying stressors, including habitat degradation and/or loss, and to develop effective strategies and plans for managing Nevada's wildlife resources. This project aims to finalize development of a strategic, multi-scale framework for assessing resource values and threats to Great Basin riparian and meadow ecosystems using resilience science that includes capacity to (1) prioritize riparian ecosystems for management based on ecosystem characteristics and sensitivity to disturbance, and (2) determine effective management strategies based on ecosystem resilience and resource values. Focal species identification is guided by the State Wildlife Action Plan, with benefits to species managed within NDOW Upland Game, Big Game, Diversity and Fisheries programs. Outcomes from this work will benefit and help guide the Nevada Partners for Conservation and Development program's restoration activities on riparian and meadow systems.

VII. NEPA Compliance or other Activities that Need to be Accomplished Before this Project Can be Completed and their Status: N/A

Project Costs and Funding

VIII. Cost Summary

Please provide a breakdown of the project's costs in the attached table.

IX. Is this Project Going to Continue After FY20? Yes ____ No __X__

X. If Yes, is this Going to be an Annual, Recurring Project? Yes ____ No __X__

XI. If it is Going to Continue After FY20, Define the Total Dollars to be Spent During Each Fiscal Year:

XII. Would Funds from this Program Be Used for State Matching Purposes? Yes ___ No _X__

XIII. If Yes, Which Federal Grant Would the Matching Funds be Used For?

Project Cost Breakdown

Please provide a breakdown of the project's costs over the life of the project in the table below. Define the total to be spent during each fiscal year in your response to question XI. Only include in-kind services under item 7. While NDOW personnel and travel expenses may be included in your cost estimate, you should use alternative funding sources to cover these types of costs as much as possible.

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	$ 20,000.00	$ 200,000.00
C. Total Personnel Costs	$ 20,000.00	$ 200,000.00
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A. VHF Radio Transmitters (30 units @ $225/ea.)		
B. Vehicles (2 @ $10,500 per 6 month field season)		
C. Total Equipment Costs	$ -	$ -
5. Materials		
A.		
B.		
C.		
D. Total Materials Costs	$ -	$ -
6. Miscellaneous		
A. Field Housing		
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ -	$ -
7. In-Kind Services		
A. USGS Research Wildlife Biologist (Permanent, 0.1 FTE)		
B. USGS Wildlife Biologist (Term, 0.1 FTE)		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 20,000.00	$ 200,000.00
Total Project Costs	$ 220,000.00	

List of Relevant References:

Chambers, J. C. and J. R. Miller, eds. 2004. Great Basin Riparian Ecosystems - Ecology, Management and Restoration. Island Press, Covelo, CA. 303 pages.

Chambers, J. C. and J. R. Miller, eds. 2011. Geomorphology, hydrology, and ecology of Great Basin meadow complexes—implications for management and restoration. Gen. Tech. Rep. RMRS-GTR-258.

Chambers, J. C., J. R. Miller, D. Germanoski, D. A. Weixelman. 2004. Process based approaches for managing and restoring riparian ecosystems. Pages 196-231 in J. C. Chambers, J. R. Miller (eds). Great Basin Riparian Ecosystems - Ecology, Management and Restoration. Island Press, Covelo, CA.

Engelhardt, B. M., P. J. Weisberg and J. C. Chambers. 2012. Influences of watershed geomorphology on extent and composition of riparian vegetation. J. Veg. Sci. DOI: 10.1111/j.1654-1103.2011.01328.

Germanoski, D., J. R. Miller. 2004. Basin sensitivity to channel response to natural and anthropogenic disturbance. Pages 88-123. in J. C. Chambers, J. R. Miller (eds). Great Basin Riparian Ecosystems - Ecology, Management and Restoration. Island Press, Covelo, CA.

Lord, M. L., D. W. Jewett, J. R. Miller, et al. 2011. Hydrologic processes affecting meadow ecosystems. in: J. C. Chambers and J. R. Miller (eds). Geomorphology, Hydrology and Ecology of Great Basin Meadow Complexes: Implications for Management and Restoration. Gen. Tech. Rep. RMRS-GTR-258 Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 44-66.

Trowbridge, W., J. C. Chambers, D. Germanoski, M. L. Lord, J. R. Miller and D. W. Jewett. 2011. Classification of meadow ecosystems based on watershed and valley segment/reach characteristics. in: J. C. Chambers and J. R. Miller (eds). Geomorphology, Hydrology and Ecology of Great Basin Meadow Complexes: Implications for Management and Restoration. Gen. Tech. Rep. RMRS-GTR-258 Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station: 95-112.

Fiscal Year 2020 Wildlife Reserve Account Project Proposal

Project Summary

Project Title: Eastern WMA Complex Weed Control

Special Reserve Account(s) that Would Fund this Project: Habitat Conservation Fee, Duck Stamp, Upland Game Bird Stamp

NDOW Project Manager (PM): Adam Henriod

Funds Requested from Each Special Reserve Account: $10,000 Habitat Conservation Fee, $10,000 Duck Stamp, $10,000 Upland Game Bird Stamp

Funds to be Used from Other Funding Sources (please itemize the amount by source):
A Nevada Department of Agriculture (NDA) grant awarded to Tri-County Weed Control: This grant will be used on the Steptoe Valley WMA and will match 50:50 all (in-kind included) dollars spent on weed control at Steptoe Valley WMA. It is estimated this grant will contribute close to $25,000 towards weed removal.

Total Project Cost Not Including In-Kind Donations: $55,000

Total Project Cost Including In-Kind Donations (if applicable): $55,000

Project Proposal

I. Purpose of Project and Goals to be Achieved

NDOW is mandated by state law to control listed noxious weeds found on its property. Removal of noxious and undesirable weeds improves appearance, public access, limits the spread of these weeds to other areas and enhances wildlife habitat. The goal of this project is to remove noxious/invasive weeds such as Russian knapweed, hoary cress, perennial pepperweed, phragmites and Canada thistle found on the Steptoe Valley, Wayne E. Kirch and Key Pittman WMAs. This will be accomplished through the application of herbicides to noxious and other invasive weeds in upland areas, riparian areas, parking lots and right of ways.
WMA staff has engaged heavily in efforts to eradicate invasive vegetation on these properties; however, the magnitude of weed infestations currently exceeds the staff's ability to provide the treatments needed to have a long-term impact. This project seeks reserve account funding for additional resources needed to apply herbicide on the Kirch, Key Pittman and Steptoe Valley WMAs.

II. Project Location including County (include a map if available):

The Steptoe Valley WMA is located in White Pine County. It is composed of 12,806 acres. Comins Lake and 13 seasonal ponds are located on the property. Wayne E. Kirch Wildlife Management Area is located in the White River Valley in northeastern Nye County. The Kirch WMA is composed of a total of 14,815 acres, including five reservoirs and five wetland impoundments. Key Pittman WMA is located in Lincoln County with two reservoirs and two wetland impoundments within the 1,332 acres managed by NDOW.

III. Land Status: Private or Public?

Public

IV. If Public, Which Agency Manages the Land? (Name the District if Managed by the BLM or USFS)

State of Nevada

V. UTM Coordinates if Known:

N/A

VI. Project Approach Including Tasks to be Accomplished and Target Species. Also Include Acres to be Treated or Restored or Any Other Measurable Factors:

Awarded funds will be used to purchase herbicides and hire contract labor to maintain and enhance current weed control efforts on NDOW-managed WMAs. 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 additional 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 lotifolium), and hoary cress (Cardaria draba) will be treated in the spring and summer of 2020 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 rights-of-way will be treated, as needed, in the summer of 2020 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 2019 and spring of 2020 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 emergent vegetation in these areas will improve feeding, resting, nesting, and brood-rearing habitat for waterfowl.

VII. Describe the Beneficial Effects of the Project, How They Will be Measured and Describe Your Monitoring Plan:

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 habitats.

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

VIII. Project Schedule (including start and end dates and major milestones):

This project is an ongoing, yearly habitat management activity. Herbicide treatments to vegetation on the WMAs will primarily occur in the late summer and fall of 2019 and the spring and summer of 2020. Please see the proposed tasks above for the timing of treatment for each type of targeted vegetation.

IX. Relationship to NDOW Plans, Policies and Programs:

This program certainly falls within NDOW's general goal of maintaining and enhancing wildlife 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 (WMAs) by applying good science and best management practices through implementation of Comprehensive Management Plans."

X. NEPA Compliance, Archeological Clearances, or other Authorizations that are Needed Before this Project Can be Completed and Their Status:
None

Project Costs, Funding and Contracting

XI. Cost Summary (briefly describe the project's major types of spending):
All funds will be used to purchase herbicide and to contract for weed spraying with Tri-County Weed Control.

XII. Is this Project Going to Continue After FY20? Yes __x__ No _____

XIII. If Yes, is this Going to be an Annual, Recurring Project? Yes _x__ No _____

XIV. If the Project is Going to Continue After FY20, Define the Total Dollars to be Spent During Each Fiscal Year of the Project's Lifespan:

This project will seek $30,000 every fiscal year until weed treatment on the Key Pittman, Wayne E. Kirch and Steptoe Valley WMAs can be adequately handled by WMA staff.

XV. Would Funds from this Program Be Used as State Match for Federal Grant Funding?
Yes _x_ No ___

XVI. If Yes, Which Federal Grant Would the Matching Funds Be Used For?
NDOW's WMA Federal Grant

XVII. Describe What Type of Contract(s) Will be Needed or Currently Exists (if any) to Complete Work Under this Project (Independent Contract, Sub-grant Agreement, Inter-local Agreement or Good of the State Contract):

Inter-local Agreement #19-06 is currently in place and will used to complete this project.

XVIII. If a Contract Exists, or is Needed, Define the Contract Amount, Contractor/Sub-grantee, and Start and End Dates

The current contract with Tri-County Weed Control was approved in October 2018 and will expire on June 30, 2020. The total cost of the contract was not to exceed $120,000. Approximately $92,000 will be available on the contract at the close of the current fiscal year.

Project Cost Breakdown

Please provide a breakdown of the project's *total costs over the life of the project* in the table below. If your project is a multi-year project, define the total to be spent during each fiscal year in your response to question XIV on the previous page. Only include in-kind contributions under item 7 in the table below. Any NDOW personnel or travel expenses should be covered by funding sources other than the Wildlife Reserve Accounts.

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. Herbicide	$ 4,000.00	
B.		
C.		
D. Total Materials Costs	$ 4,000.00	$ -
6. Miscellaneous Costs		
A. Tri-County Weed Control contract for weed spraying	$ 26,000.00	$ 25,000.00
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 26,000.00	$ 25,000.00
7. In-Kind Contributions		
A.		
B.		
C. Total In-Kind Contributions	$ -	$ -
Subtotals	$ 30,000.00	$ 25,000.00
Total Project Costs	$	55,000.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	Post-Fire Upland Habitat Restoration - Tule Springs		
Project Manager:	Anthony Miller	Phone: 702-280-1177 Email ajmiller@ndow.org	
Project Monitor:	Matt Flores	Start Date:	11/1/2019
Implementation Lead	Nevada Department of Wildlife	End Date:	12/31/2020
Partners:	Bureau of Land Management, Nevada Department of Wildlife		
Project Category:	Habitat Restoration		
Project Category:	Upland Habitat Improvement		
Project Actions:	Seedling planting		
Priority Resource:	Small game		
Priority Species:	Quail		
County Location:	Lincoln		
General Location:	Southeastern Nevada in Lincoln County		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
Bureau of Land Management	$235,000		
NDOW Habitat Conservation Fee	$12,500		
NDOW Upland Game Stamp	$12,500		
Project Totals:	**$260,000**		

Project Proposal

1. Brief Purpose and Goal of the Project

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

2. Project Approach and Tasks

To reduce wildfire potential, BLM will be creating fuel breaks by treating brome grasses with herbicide along roads and subsequently seeding for green stripping. The roadways will include access roads leading to area guzzlers. During implementation of the project NDOW will subsequently plant perennial native vegetation at or adjacent to described small game water developments. Plantings will be protected from herbivores and monitoring of the planting sites will be necessary to ensure the survival of new plants and viability of wildlife habitat.

3. Anticipated Beneficial Effects of the Project

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

4. Project Schedule

Fall 2019 - BLM application of herbicide for fuel break.
Fall/Winter 2019- BLM seeding for restoration.
Spring 2020 – NDOW habitat restoration planting.
Fall 2020 - NDOW habitat restoration planting.

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

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

6. Monitoring Plan

Regular site assessment of plant health and size, water requirements, and cages to protect plants from herbivores. Presence of wildlife and targeted species will be assesed in relationship to habitat enhancements.

7. Relationship to NDOW Plans, Policies, and Programs

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

Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Post-Fire Upland Habitat Restoration - Tule Springs**
Name of Proposed Project Manager: **Anthony Miller**
Project ID: **444**

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. NDF Personnel	$ 7,000.00	
B. GBI Personnel	$ 8,000.00	
C. Total Personnel Costs	$ 15,000.00	$ -
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A.		
B.		
C. Total Equipment Costs	$ -	$ -
5. Materials		
A. Plants	$ 5,000.00	
B. Plant Cage material	$ 4,000.00	
C.		
D. Total Materials Costs	$ 9,000.00	$ -
6. Miscellaneous		
A. BLM fuelbreaks ansd seeding		$ 235,000.00
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 1,000.00	$ 235,000.00
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 25,000.00	$ 235,000.00
Total Project Costs	$	260,000.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	Post-Fire Upland Habitat Restoration - Kane Springs		
Project Manager:	Anthony Miller	Phone: 702-280-1177	Email ajmiller@ndow.org
Project Monitor:	Matt Flores	Start Date:	3/2/2020
Implementation Lead	Nevada Department of Wildlife	End Date:	5/3/2021
Partners:	Nevada Department of Wildlife, Bureau of Land Management		
Project Category:	Habitat Restoration		
Project Category:	Upland Habitat Improvement		
Project Actions:	Seedling planting		
Priority Resource:	Small game		
Priority Species:	Quail		
County Location:	Lincoln		
General Location:	Southern Lincoln County, Nevada		

Project Funding Request

Funding Source	Amount Requested	Existing Budget Approval	In Kind Contribution
Bureau of Land Management	$237,000		
NDOW Habitat Conservation Fee	$12,500		
NDOW Upland Game Stamp	$12,500		
Project Totals:	**$262,000**		

Project Proposal

1. Brief Purpose and Goal of the Project

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

2. Project Approach and Tasks

To reduce wildfire potential, BLM will be creating fuel breaks by treating brome grasses with herbicide along roads and subsequently seeding for green stripping. The roadways will include access roads leading to area guzzlers. During implementation of the project NDOW will subsequently plant perennial native vegetation at or adjacent to described small game water developments. Plantings will be protected from herbivores and monitoring of the planting sites will be necessary to ensure the survival of new plants and viability of wildlife habitat.

3. Anticipated Beneficial Effects of the Project

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

4. Project Schedule

Fall 2019 - BLM application of herbicide for fuel break.
Fall/Winter 2019- BLM seeding for restoration.
Winter 2019/Spring 2020 – NDOW habitat restoration planting.

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

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

6. Monitoring Plan

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

7. Relationship to NDOW Plans, Policies, and Programs

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

Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Post-Fire Upland Habitat Restoration - Kane Springs**
Name of Proposed Project Manager: **Anthony Miller**
Project ID: **445**

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. NDF Personnel	$ 8,000.00	
B. Other Personnel	$ 8,000.00	
C. Total Personnel Costs	$ 16,000.00	$ -
3. Travel Costs		
A. Per Diem		
B. Mileage		
C. Total Travel Costs	$ -	$ -
4. Equipment		
A.Hand and Power tools		$ 2,000.00
B.		
C. Total Equipment Costs	$ -	$ 2,000.00
5. Materials		
A. Plant Cage Materials	$ 4,000.00	
B. Plants	$ 4,000.00	
C.		
D. Total Materials Costs	$ 8,000.00	$ -
6. Miscellaneous		
A. BLM fuelbreaks and seeding		$ 235,000.00
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 1,000.00	$ 235,000.00
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 25,000.00	$ 237,000.00
Total Project Costs	$	262,000.00

Wildlife Reserve Account Project Proposal

Project Summary

Project Name:	Quinn River Valley Habitat Enhancement - Vanderhoek Property		
Project Manager:	Bobby Jones	Phone: 775-688-1444 Email bsjones@ndow.org	
Project Monitor:	Mark Freese	Start Date:	10/7/2019
Implementation Lead	Nevada Department of Wildlife	End Date:	11/30/2020
Partners:	Nevada Department of Wildlife		
Project Category:	Habitat Restoration		
Project Category:	Upland Habitat Improvement		
Project Actions:	Drill seeding, Herbicide application		
Priority Resource:	Small game		
Priority Species:	Quail		
County Location:	Humboldt		
General Location:	Quinn River Valley ~ 7 miles NW of Orovada		

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

This project's goal is to create 50 acres of cover and nesting habitat for quail and pheasant on private land. This would be accomplished by treating 50 acres of pivot corners cropland with a pre-emergent herbicide during the fall of 2019 and subsequently drill seeding desirable species in the fall of 2020.

The total potential area that we can operate within is approximately 70 acres but since we want to allow for buffer zones for equipment access to pivots, and to allow for pest control (ground squirrels) for the private landowner, we are proposing to enhance 50 acres of habitat for upland game species.

2. Project Approach and Tasks

In 2017 this site was drill seeded with Canadian wildrye (Elymus canadensis) and Blue Flax (Linum lewisii) at 10 lbs PLS (pure live seed) per. acre. as per USDA plants database recommendations (see:

https://plants.usda.gov/plantguide/pdf/pg_elca4.pdf). Unfortunately, in 2018 we did not see a significant amount of Canada wildrye or Blue flax emergence. The over-winter precipitation was below average with most of the precipitation received in the form of rain in spring 2018. The spring precipitation also helped to fuel competition from weedy species that was much higher than we anticipated. We are hopeful for increased establishment of the drill seeded desirable species in 2019. Oftentimes establishment after two growing seasons is a much better indicator of success compared to determinations being made after only one growing season. Although we anticipate increased establishment of desirable species we don't expect these species will be able to outcompete the weedy species on-site long term without additional intervention. That is why we are proposing to apply a pre-emergent herbicide this fall subsequently followed by drill seeding the following year.

3. Anticipated Beneficial Effects of the Project

Quail and pheasant populations have been on the decline for several years in this valley and that decline has been attributed to a lack of necessary resources. The two most limited and critically important resources being cover and water. This project was identified to take advantage of an area with a good water resource that currently lacks the necessary cover.

By restoring cover and nesting habitat in the Quinn River Valley on pivot corners in the Quinn River Valley we would increase the carrying capacity for upland game bird species to persist in the valley in greater numbers than they do today. Cover and nesting habitat is limited and without coming up with new methods to increase habitat availably we cannot expect the populations to rebound. Long-term the goal is to identify how to establish desirable vegetation on pivot corners and to replicate that many times over.

4. Project Schedule

Fall 2019 - Pre-emergent Herbicide Treatment
Fall 2020 - Drill seeding desirable speices

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

Not applicable; this project is on private property.

6. Monitoring Plan

Monitoring would consist of vegetation monitoring through multiple years, and photo points. We want to measure the success of the pre-emergent herbicide treatment, and quantify the establishment of drill seeded species.

7. 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."
5) "To a leadership role in the conservation and management of the state's wildlife resources."
6) "Work with state, federal and local agencies, as well as, private landowners, industry and conservation organizations through the Nevada Partners for Conservation and Development to preserve and protect quality habitats and enhance deficient habitats."
7) "Strategically employ and leverage special reserve account revenues to acquire, protect, treat and restore wildlife habitats."

Special Reserve Account Project Cost Estimate Table

Name of Proposed Project: **Vanderhoek Habitat Enhancement - Quinn River Valley**
Name of Proposed Project Manager: **Bobby Jones**
Project ID: **446**

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. Seed	$7,000.00	
B. Herbicide	$ 500.00	
C.		
D. Total Materials Costs	$ 7,500.00	$ -
6. Miscellaneous		
A. Herbicide Application	$ 2,500.00	
B.		
C.		
D.		
F. Total Miscellaneous Costs	$ 2,500.00	$ -
7. In-Kind Services		
A.		
B.		
C. Total In-Kind Services	$ -	$ -
Subtotals	$ 10,000.00	$ -
Total Project Costs	$	10,000.00