

IDAHO DEPARTMENT OF FISH AND GAME

Cal Groen, Director

Project W-160-R-35

Progress Report



UPLAND GAME BIRD ECOLOGY

Study III: Translocation of Mountain Quail into Range in Idaho

July 1, 2007 to June 30, 2008

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**PROGRESS REPORT
STATEWIDE WILDLIFE RESEARCH**

STATE:	<u>Idaho</u>	JOB TITLE:	<u>Upland Game Bird Ecology</u>
PROJECT:	<u>W-160-R-35</u>		
SUBPROJECT:	<u></u>	STUDY NAME:	<u>Translocation of Mountain</u>
STUDY:	<u>III</u>		<u>Quail into Historic Range</u>
JOB:	<u>1</u>		<u>in Idaho</u>
PERIOD COVERED:	<u>July 1, 2007 to June 30, 2008</u>		

TRANSLOCATION OF MOUNTAIN QUAIL INTO SOUTH-CENTRAL IDAHO

Abstract

In 2003, the Idaho Department of Fish and Game, in cooperation with the U.S. Bureau of Land Management, began evaluating the Bennett Hills of south-central Idaho as a site for mountain quail (*Oreortyx pictus*) restoration. Calling surveys conducted during May and June of 2003 and 2004 in drainages known to have historical records of mountain quail failed to locate any mountain quail. Habitat suitability analysis conducted in the area during summer and fall 2004 indicated that habitat characteristics along riparian corridors of the Bennett Hills paralleled habitat characteristics of other areas that supported mountain quail. In fall and winter 2005-2006 and 2006-2007, mountain quail were trapped in the Coso Mountains of southern California and the Pacific and Cascade ranges of southwestern Oregon for translocation to the Bennett Hills. During winter 2008, quail were only trapped in southwestern Oregon. To control for pre-release diet and sociality, birds from both source populations were held communally at the Idaho State University Aviary in Pocatello, Idaho, through the winter. From mid April to early May, 2006-2008, 198 mountain quail were released into the King Hill Creek area of the Bennett Hills. Each year a sample of these birds (36-50 quail) were radio-marked and monitored intensively throughout the breeding season. In September and October 2006, most of the surviving quail were recaptured and new transmitters were installed for subsequent winter monitoring. Data from the 2007 and 2008 field seasons are also summarized but analyses are not yet complete.

Introduction

Mountain quail were petitioned to be listed as a threatened or endangered species in the eastern portion of their range in 2001 due to acute declines in populations (Howard 2003). Currently, mountain quail are classified as a "Species of Greatest Conservation Need" by The Idaho Department of Fish and Game (IDFG), and as a "Sensitive Species" by the Idaho Bureau of Land Management (BLM) and by Region 4 of the U.S. Forest Service (USFS). The purpose of this report is to summarize information obtained from an ongoing study of translocated mountain quail in south-central Idaho.

Mountain quail (*Oreortyx pictus*) are the largest of the six species of New World quail (Odontophoridae) that occur in the U.S. with a distribution consisting of the northern portion of

Baja California in Mexico and extending northward through California, Oregon, Washington, Nevada, and Idaho, and an introduced population in southwestern British Columbia, Canada (American Ornithologists' Union 1983). Mountain quail characteristically inhabit early seral stage brushy habitats within steep, rugged terrain (Gutierrez and Delehanty 1999).

Mountain quail are found in the moist western slopes of the Coast Ranges, Cascades, and Sierra Nevada Mountains and the higher elevations of the Sonoran Desert of Baja California and Mojave Desert of southern California. In much of their arid distribution, which includes the eastern slope of the Sierra Nevada, eastern Oregon, western Idaho, and eastern Washington, mountain quail rely heavily on brushy habitats within riparian corridors (Gutierrez and Delehanty 1999).

In Idaho, remnant populations of mountain quail currently inhabit tributaries of the Snake River in the western portion of the state north of the Boise Valley to the Palouse zone near Lewiston (Moser 2004). Historically, mountain quail occurred over a broader area including the Owyhee Mountains in southwestern Idaho and eastward through the Bennett Hills. Populations also occurred along the Nevada border in north sloping drainages of the Jarbidge Mountains.

Study Area

Mountain quail were translocated to the Bennett Hills from the Coso Mountains of southern California and from the Pacific and Cascade Mountains of southwest Oregon.. The Bennett Hills extend northeast of Mountain Home, Idaho, eastward until bisected by State Highway 46 approximately 32 km north of Gooding, Idaho. Elevation ranges from 1,067 m to 2,270 m with precipitation averaging approximately 36 cm annually. The southern slopes of the Bennett Hills consist of irregular drainages and canyons flowing south-southwest to the Snake River. Typical vegetation includes intermittent patches of Douglas fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*), and quaking aspen (*Populus tremuloides*) at higher elevations. Shrub species at these higher elevations include buckbrush (*Ceanothus* spp.), chokecherry (*Prunus virginiana*), snowberry (*Symphoricarpos* spp.), bitter cherry (*Prunus emarginata*), serviceberry (*Amelanchier* spp.), and antelope bitterbrush (*Purshia tridentata*). Lower elevation shrub steppe in the Bennett Hills is comprised largely of sagebrush (*Artemisia* spp.) with an understory of grasses, primarily cheat grass (*Bromus tectorum*). Steep drainages that are characteristic of the Bennett Hills possess riparian corridors vegetated with a variety of deciduous trees and shrubs including cottonwood (*Populus* spp.), quaking aspen, alder (*Alnus* spp.), willow (*Salix* spp.), red osier dogwood (*Cornus stolonifera*), mountain maple (*Acer* spp.), mock orange (*Philadelphus* spp.), wild rose (*Rosa* spp.), golden current (*Ribes* spp.), squaw current (*Ribes* spp.), black hawthorn (*Crataegus douglasii*), bitter cherry, and chokecherry.

Objective

Objectives of this study are 3-fold: (1) release mountain quail into the Bennett Hills to promote reestablishment in southern Idaho; (2) measure movement, survival, and reproduction of all radio-marked mountain quail and compare performance between the two source populations of mountain quail derived from Roseburg, Oregon, and China Lake, California; (3) compare performance between two different release sites in the Bennett Mountain study area; and

(4) identify any other important parameters affecting successful establishment of mountain quail in southern Idaho.

Methods

This project involves five stages: (1) the capture of wild mountain quail from the Mojave Desert of southern California and the Cascade and Pacific mountain ranges in southwest Oregon; (2) holding wild-trapped birds in captivity through the winter period so that they can be released during spring and to control for pre-release diet and sociality; (3) blood analysis which includes genetic testing to identify gender of released mountain quail and to preserve DNA for future analysis if necessary; (4) monitoring movements and vital rates of released quail; and (5) evaluating cause-specific mortality of mountain quail.

Capture

Mountain quail were trapped at watering sites in the Mojave Desert using modified walk-in funnel traps in fall 2005 and fall 2006 within the China Lake Naval Air Weapons Station near Ridgecrest, California. Trapping permits were obtained from the California Department of Fish and Wildlife in Sacramento, California. Trapping quail in southwest Oregon was coordinated by the Oregon Department of Fish and Wildlife. The mountain quail in the Pacific and Cascade mountain ranges in southwest Oregon are captured using modified treadle traps with grain bait in late December and early January.

Over-wintering

Mountain quail were maintained in captivity during winter in a large AAALAC-certified aviary at Idaho State University (ISU). Quail from both source populations were held communally and given commercial feed formulated for game birds. Supplemental greens and hard seed was included in the feeding program to simulate wild diet.

Genetic Testing

Blood samples were taken from all captive birds prior to release. These blood samples (approx. 1 ml) were drawn from the brachial artery and used for disease testing, and a small subsample was shipped to Avian Biotics in Tallahassee, Florida, where gender for each bird was identified genetically. In addition to gender testing, DNA was isolated and purified from a number of blood samples. This DNA can be used at a later date to determine origin of any mountain quail that become established in southern Idaho.

Monitoring Movement and Vital Rates

Prior to release, mountain quail were weighed and fitted with 4.3 g necklace-style radio collars with an estimated detection range of 6 km and minimum battery life of six months. The quail were released into a suitable drainage based on habitat suitability surveys completed in 2004 (Troy and Gamo 2004). We attempted to locate each radio-marked bird every seven days. Quail movements, nesting behavior, and brood rearing were documented by direct observation from

the ground by observers using handheld receivers and Yagi antennas. Aerial telemetry was used at various intervals when deemed necessary.

Movement analysis was done with use of straight-line analysis in GIS to determine distance from the release site to nest locations, mortalities, and areas of localization. Survival was estimated using the Kaplan Meier, non-parametric, maximum likelihood method (Kaplan and Meier 1958). With regard to reproduction, we attempted to ascertain the following for all radio-marked quail: (1) nest location, (2) nest initiation date and clutch size, (3) incubation duration, (4) gender of adult incubating nest, (5) nest fate, and (6) number of eggs hatched.

Mortality Analysis

Field necropsies were conducted on all mortalities and evidence was collected at the mortality site to help determine cause of death. In addition, carcasses were taken to a lab for further histological analysis when deemed appropriate.

Preliminary Results 2006

Capture

Due to low numbers of mountain quail at the Mojave trapping site, we removed only 18 mountain quail in fall 2005. In addition to the Mojave birds, Oregon provided 40 mountain quail from their trapping efforts. Mean dates for trapping were 10 September 2005 at the Mojave site and 27 December 2005 at the southwest Oregon site.

Over-wintering

During winter 2005-2006, 18 mountain quail from the Mojave population and 40 mountain quail from the southwest Oregon population were held communally at the ISU aviary in Pocatello, Idaho. During the winter, six mortalities occurred, three from each source population. Mojave birds were held in captivity for approximately 225 days and Oregon birds were held for approximately 105 days prior to release.

Genetic Testing

The Mojave quail consisted of 10 males and five females. The Oregon quail consisted of 18 males and 19 females. In addition, DNA from 20 mountain quail was isolated and preserved for future relatedness analysis, if necessary. These 20 quail were selected to represent the breadth of the captive population.

Movement and Vital Rates

Fifty-two mountain quail were released on 14 April 2006, and 36 of these quail were radio-marked. Fifteen quail originated from the Mojave population and 37 from the Oregon population. We were unable to locate three radio-marked mountain quail. The 33 quail that we monitored moved an average of 11.8 km from the release site (Table 1). Quail that were alive

subsequent to 1 September 2006 had moved an average of 12.9 km. Mountain quail moved upward in elevation and generally moved in a northeast direction (Figure 1). We did not detect significant differences in movement among source populations, age groups, or gender (Tables 2 and 3). Numerically, Mojave birds moved approximately 1.3 km further from the release site than did Oregon birds. Numerically, male birds moved an average of 3.6 km further from the release site than did females.

As with movement, we did not detect significant differences with regards to elevation use among source populations, age groups, or gender. Numerically, mean elevation of quail that experienced mortality prior to 1 September 2006 was 185 m less than that of surviving quail (Table 4).

Mean mass for all Mojave birds prior to release was 249.4 grams ($n = 15$) and the mean mass for all Oregon birds was 252.5 grams ($n = 40$). The Mojave birds were weighed on 10 February 2006, and the Oregon birds were weighed on 27 December 2006 \pm 9 days. We were able to take post release weights for seven birds (five Oregon birds and two Mojave birds) when they were recaptured in fall 2006 and found a slight increase in mean mass (approximately 1.5%) for recaptured quail. The two Mojave quail had lost approximately 4.5% in mass. The five Oregon quail had gained approximately 3.9% in mass.

On 1 September 2006, 13 of 33 (40%) monitored mountain quail were alive (Figure 2). Though there was no significant difference statistically, six of 13 (46%) of the Mojave quail had survived and seven of 20 (35%) of the Oregon quail had survived (Figure 3).

Reproduction

An adult Oregon female laid a clutch that was incubated by what we assume to be her non radio-marked mate and was raising seven young at first detection. We did not locate the nest and first observed the young when they were a few days old. Five young survived through late August and were able to fly well. The hen was killed by a predator in September and we were unable to continue to monitor progress of the brood.

We located one nest containing four eggs which appeared to have been abandoned within one week of initiation. The nest was situated at the base of sagebrush near Little Canyon Creek approximately 6.25 km from the release site. The nest was on flat terrain at an elevation of 1,042 m. The female that laid the clutch was an Oregon yearling that paired with an adult Oregon male. Another pair was regularly located together comprised of an adult Oregon female and a yearling Mojave male. A third apparent pair consisted of a juvenile Oregon male and an adult Oregon female.

Preliminary Results 2007

Capture

In fall 2006, 26 mountain quail were trapped on 27 August at the Mojave site and transported to the ISU aviary. Fifty quail were trapped in southwest Oregon. Two mortalities from the Mojave population occurred shortly after the birds arrived at the aviary.

Over-wintering

During winter 2006-2007, 24 mountain quail from the Mojave population and 50 mountain quail from the southwest Oregon population were held at the ISU aviary in Pocatello, Idaho. Mojave birds were held in captivity for approximately 230 days whereas the Oregon birds were held for approximately 50 days prior to release.

Genetic Testing

Mojave birds consisted of 16 males and seven females. Mountain quail from Oregon population consisted of 18 males, 30 females and two that were undeterminable. Blood and feather samples from all Year-Two birds are being preserved for future relatedness analysis, if necessary.

Movement and Vital Rates

During April 2007, 74 mountain quail were released into the Bennett Hills of south-central Idaho. Fifty of those quail were fitted with transmitters. In addition, we monitored three mountain quail from our initial release in 2006.

During the 95 days post release in 2007, we have been able to closely monitor 21 of 53 live collared birds. We suspect eight quail had malfunctioning transmitters that contained batteries that expired shortly after release. We also had 25 birds on private lands that could only be monitored aerially and from the perimeter fence line. We have some movement data for these 25 birds but very little reproductive and survival data. In mid-August, four of these birds traveled onto public lands momentarily and we were able to confirm their survival.

Based on movement data gained during our first year of research, release of birds in Year Two was at an elevation and in an area we felt would minimize post release movement. Though we have yet to analyze our movement data for 2007, it appears that in Year Two, post-release movement was minimized substantially and density of mountain quail in a given area increased.

Reproduction

As of mid-August, eight of the 25 birds being monitored have been confirmed alive for a survival rate of 32%. Based on movement data acquired through early July 2007, survival rate for the 25 birds on private land appears relatively high as well. The fact that we detected some distinct pairing via telemetry from the perimeter fence line and from aircraft telemetry suggests additional reproductive activity within this group of birds.

One bird that we have been able to closely monitor from our 2006 release was a male from China Lake that was a juvenile at time of capture. It paired with a yearling female from Oregon released in 2007. She laid 14 eggs in a nest that was then incubated by the male and hatched 13 chicks. At 28 days post hatching, all 13 chicks were alive. The female laid a second clutch containing nine eggs which she incubated, hatching out all nine eggs. As of 18 days post hatching, we were able to confirm that at least seven of those chicks were alive.

The other two recaptures from year one that received malfunctioning transmitters were paired with other mountain quail in early spring when they were last detected. These observations in the second year point to the importance of multiple years of introduction of birds into a given area. This may be especially important when working in the eastern-most portion of mountain quail historic range, as is the case in the Bennett Hills where longer winters persist. Stress associated with elevational migration due to late snow coupled with a novel environment may lead to poor reproductive success in the first year of release. These factors may not be as stressful for second year birds; hence, they may be able to expend more energy for reproduction.

Preliminary Results 2008

Capture

Seventy-five mountain quail were trapped in southwestern Oregon and transported to the ISU aviary during February 2008.

Over-wintering

During winter 2008, 75 mountain quail from the southwest Oregon population were held at the ISU aviary in Pocatello, Idaho. Three quail died prior to release. Birds were held for approximately 65 days prior to release.

Genetic Testing

These data have not yet been analyzed. Blood and feather samples from all Year-Two birds are being preserved for future relatedness analysis, if necessary.

Movement and Vital Rates

On 1 May 2008, 72 mountain quail were released into the Bennett Hills of south-central Idaho. Fifty of those quail were fitted with transmitters. Forty-six of the 75 birds received radio transmitters. We used two release sites this year on Bennett Mountain. Twenty-two birds were released at the 2007 release site and all of them were fitted with radio transmitters.

Approximately 12 miles east, the remaining 50 mountain quail were released and 24 of these quail were fitted with radio transmitters. As of 3 August, we have confirmed 20 mortalities of birds being monitored (56% survival rate thus far). Only four birds are on private property to date but we can still monitor their survival, as the radio transmitters are equipped with mortality signals this year. We also monitored over-winter survival of the 2007 birds, and all quail that we monitored died prior to the 2008 breeding season.

Reproduction

We have identified 10 nests of which six were successful. Of the four unsuccessful nests, two were abandoned, one female was killed off the nest, and the remaining failed nest is still being incubated but it is unlikely that it will hatch as she has been incubating for over 30 days. Females incubated eight of the nests while males incubated two.

Conclusion

Because of high over-winter mortality during 2007-2008, establishing a mountain quail population in the Bennett Hills still remains problematic. Nevertheless, the relatively high survival and production documented during the 2008 field season suggests that reestablishing quail in this area is possible.

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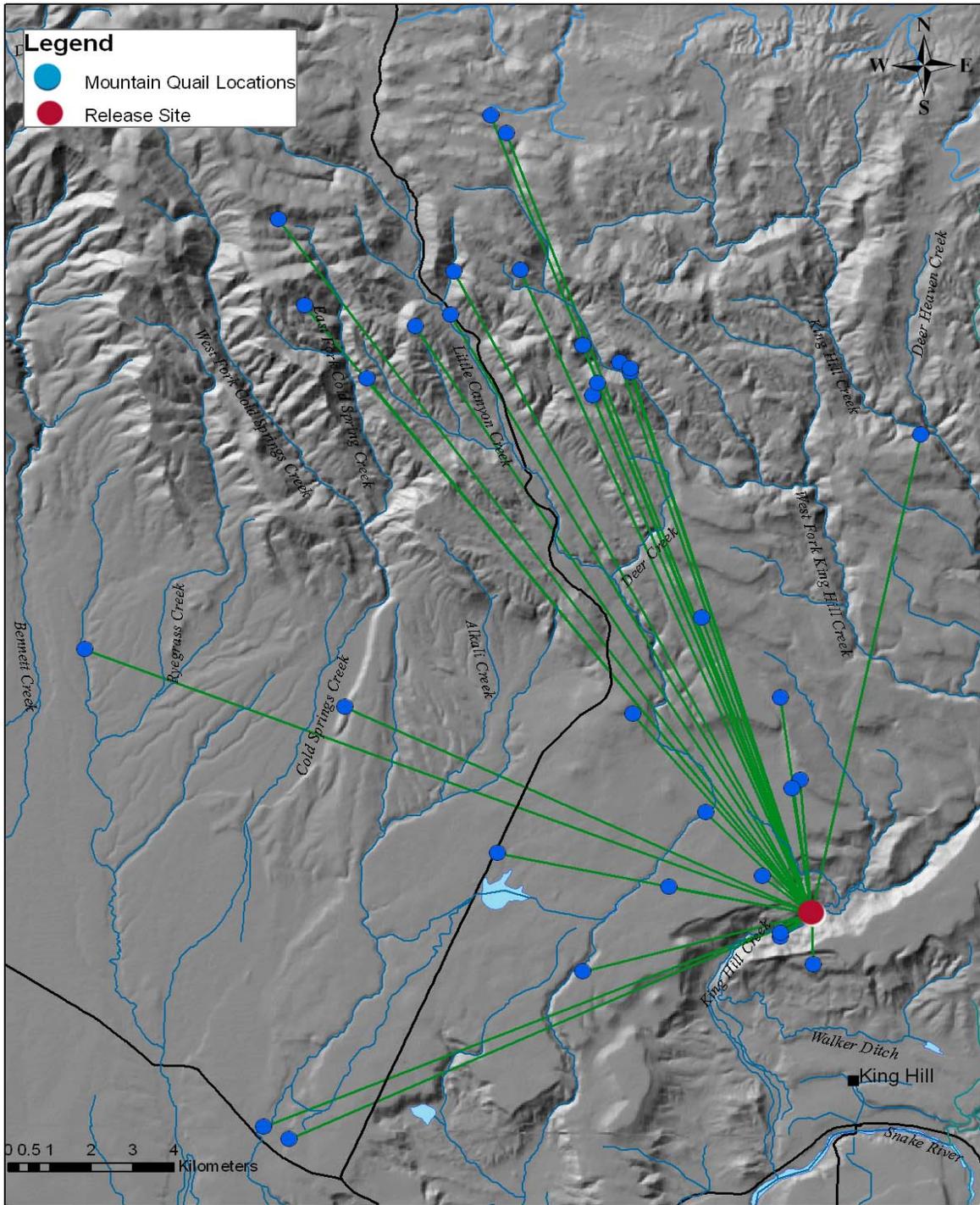


Figure 1. Movement of 33 radio-marked mountain quail released on 14 April 2006 at King Hill Creek, Bennett Hills, south-central Idaho.

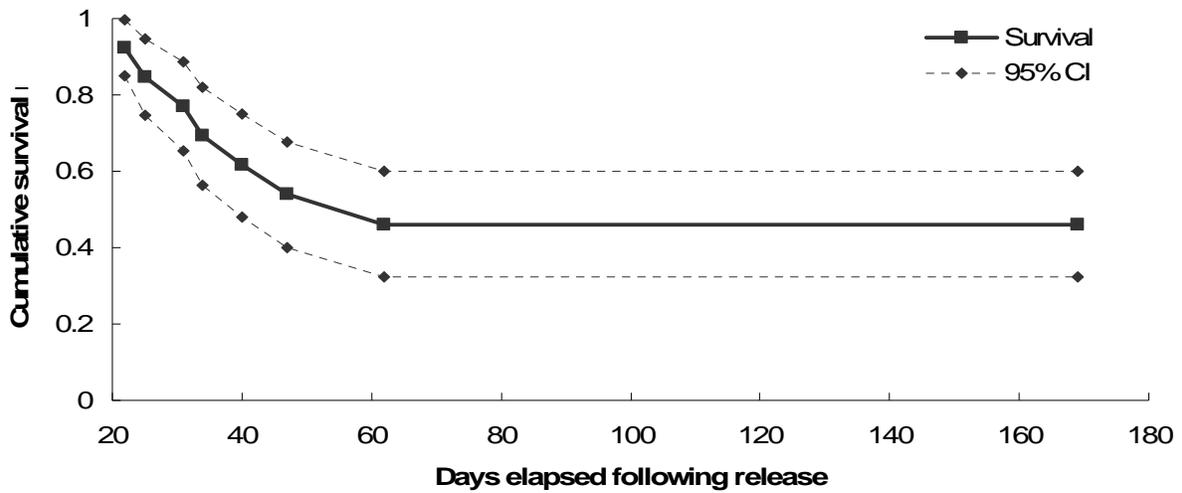


Figure 2. Cumulative survival rate and associated 95% confidence interval from 0-170 days post-release for mountain quail translocated to the Bennett Hills, south-central Idaho, 2006.

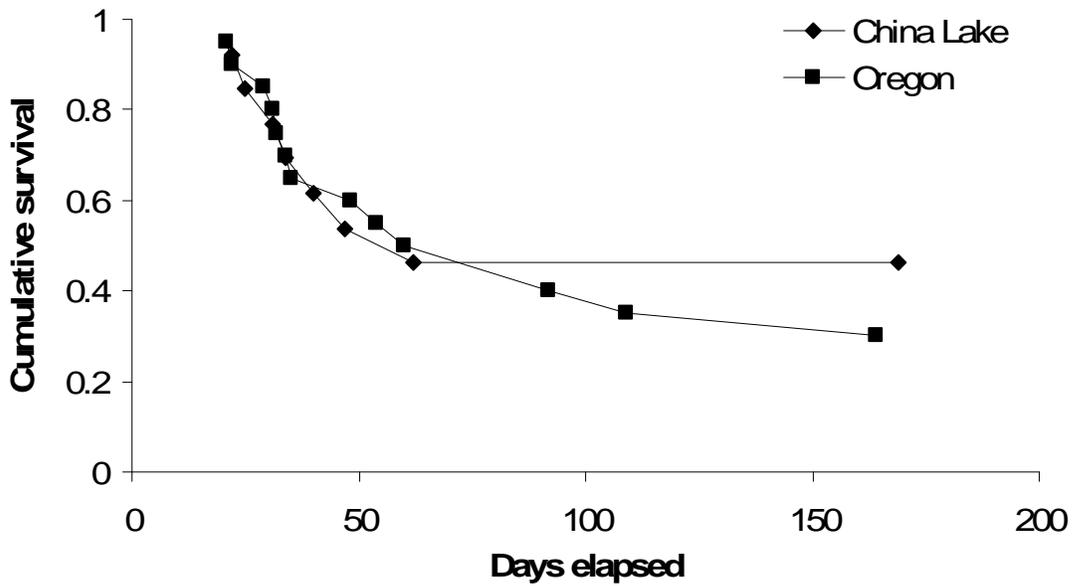


Figure 3. Cumulative survival rates from 0-170 days post-release comparing two mountain quail source populations translocated to the Bennett Hills, south-central Idaho, 2006.

Table 1. Mean distance from release site to areas of localization or mortality, elevation, and mass for 33 mountain quail released into the Bennett Hills, 2006.

Variable	Mean	SE
Distance (km)	11.8	1.2
Elevation (m)	1,415.7	62.4
Mass (g)	248.6	2.6

Table 2. Mean distance from release site to areas of localization or mortality, elevation, and mass between age groups within source populations of mountain quail released into the Bennett Hills, 2006.

Variable	Mojave				Oregon					
	Yearling (<i>n</i> = 13)		Adult		Yearling (<i>n</i> = 13)		Adult (<i>n</i> = 7)		Pooled	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Distance (km)	12.53	1.85	n/a	n/a	12.62	1.97	8.76	2.73	11.27	1.61
Elevation (m)	1,438.3	302.1	n/a	n/a	1,439.9	108.9	1,328.5	472.9	1,400.9	85.5
Mass (g)	247.6	4.4	n/a	n/a	251.5	3.7	245.1	6.3	249.3	3.2

Table 3. Mean distance from release site to areas of localization or mortality, elevation, and mass for different gender within source populations of mountain quail released into the Bennett Hills, 2006.

Variable	Mojave						Oregon					
	Male (<i>n</i> = 9)		Female (<i>n</i> = 4)		Pooled		Male (<i>n</i> = 7)		Female (<i>n</i> = 13)		Pooled	
	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE	Mean	SE
Distance (km)	13.54	2.05	10.28	4.09	12.53	1.85	13.72	3.26	9.94	1.74	11.27	1.61
Elevation (m)	1,520.8	95.0	1,252.7	198.6	1,438.3	92.1	1,470.9	162.9	1,363.3	101.6	1,400.9	85.5
Mass (g)	250.3	5.7	241.5	6.4	247.6	4.4	253.0	5.5	247.2	4.0	249.3	3.2

Table 4. Summary of mean elevation and distance from release site for source, gender and age of mountain quail released into the Bennett Hills, south-central Idaho, 2006.

Mountain quail released	Number	Mean elevation (m)	Mean distance from release site (km)
All radio-marked birds	33	1,415.80	11.77
Mojave birds	13	1,438.35	12.53
Oregon birds	20	1,401.17	11.27
All females	17	1,337.34	9.98
Mojave females	4	1,252.73	10.26
Oregon females	13	1,363.37	9.90
All males	16	1,499.08	13.62
Mojave males	9	1,520.95	13.54
Oregon males	7	1,470.96	13.72
Yearling birds	26	1,439.27	12.57
Adult birds	7	1,328.62	8.76
Mortalities prior to 1 Sep	20	1,342.95	11.01
Birds surviving past 1 Sep	13	1,527.66	12.93

Submitted by:

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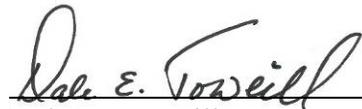
Principal Wildlife Research Biologist

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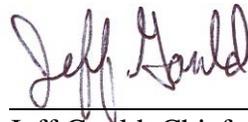
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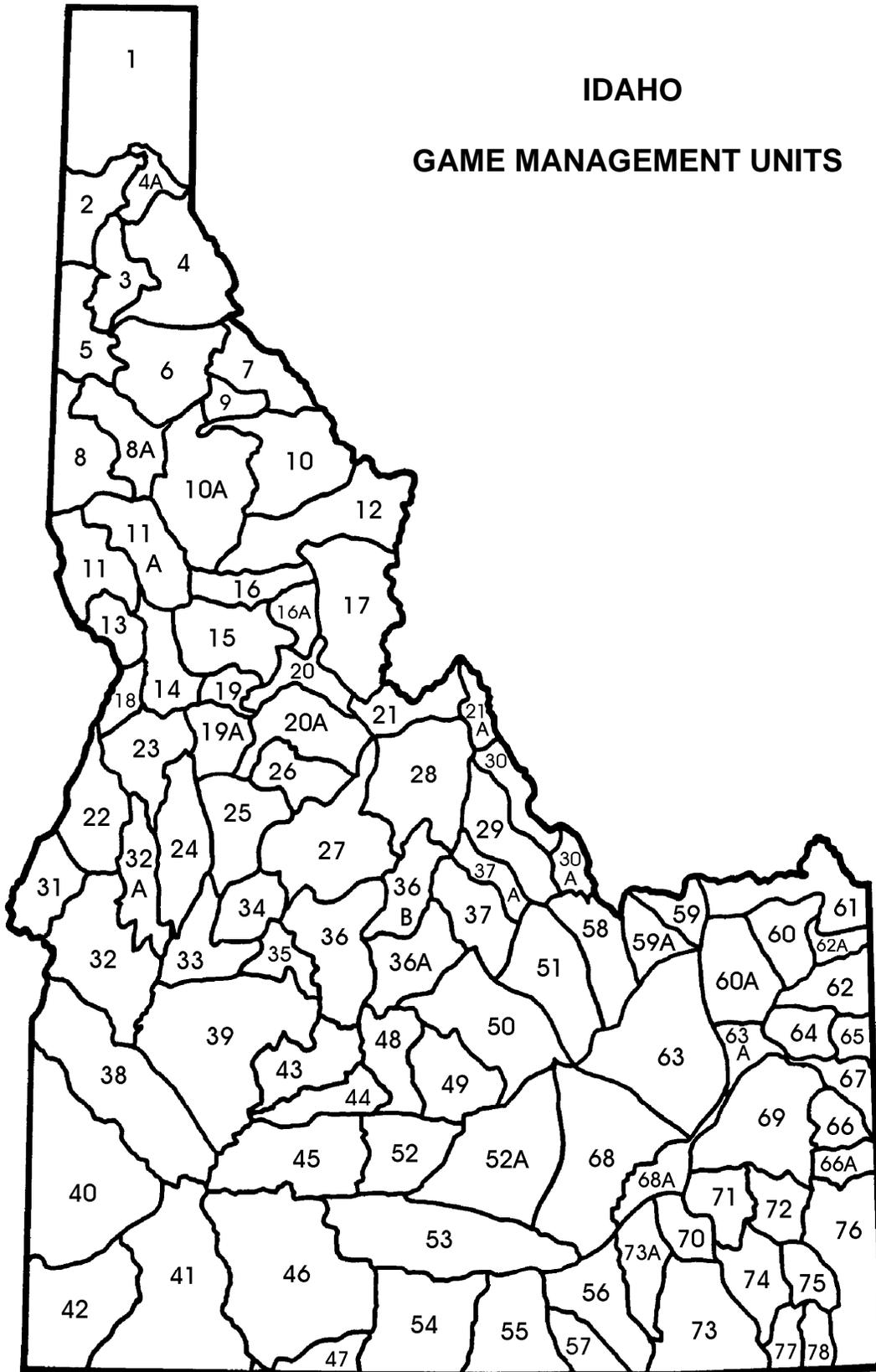
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IDAHO

GAME MANAGEMENT UNITS



FEDERAL AID IN WILDLIFE RESTORATION

The Federal Aid in Wildlife Restoration Program consists of funds from a 10% to 11% manufacturer's excise tax collected from the sale of handguns, sporting rifles, shotguns, ammunition, and archery equipment. The Federal Aid program then allots the funds back to states through a formula based on each state's geographic area and the number of paid hunting license holders in the state. The Idaho Department of Fish and Game uses the funds to help restore, conserve, manage, and enhance wild birds and mammals for the public benefit. These funds are also used to educate hunters to develop the skills, knowledge, and attitudes necessary to be responsible, ethical hunters. Seventy-five percent of the funds for this project are from Federal Aid. The other 25% comes from license-generated funds.

