Ruffed Grouse Trend Monitoring Design and Implementation

Amount Requested: $55,020

Applicant Contact Information

Applicant: Department of Wildlife, Humboldt State University, Arcata, CA 95521

Contact Person(s): Daniel C. Barton, PhD and W. Tim Bean, PhD

Phone: (707) 826-3430 E-mail: daniel.barton@humboldt.edu

Authorized signer: Steve Karp, Director, HSU Sponsored Programs Foundation

Phone: (707) 826-4190 E-mail: karp@humboldt.edu

Introduction

The proposed project "Ruffed Grouse Trend Monitoring Design and Implementation" is an Upland Game Bird Account research proposal. Upland game birds are an important biological and recreationally-harvested resource in California, with more than 150,000 upland game bird stamps sold per year. Yet, many gallinaceous gamebird species are often difficult to monitor or ineffectively monitored (Sands and Pope 2010) partly due to their montane distributions and limited seasonal availability to surveys. Ruffed Grouse (*Bonasa umbellus*) in particular are an important recreationally-harvested game bird species – nearly 5,000 hunters were estimated to have engaged in Ruffed Grouse hunting in 2014-15 (Responsive Management 2015). However, the abundance, distribution, and habitat use of Ruffed Grouse are not adequately monitored by available programs, a problem recognized for over 20 years (Bland 1992).

Ruffed Grouse occur only in the far northwestern portion of California, a relatively mountainous, remote, and sparsely populated region. Ruffed Grouse were described as more widespread and fairly common locally by Grinnell and Miller (1944) but as an uncommon breeder by Yocum (1978). Habitat use of this species in California is only known from anecdotal or descriptive studies (Bland 1992). Currently, only hunter return data are available as an index of population size, trend, or distribution in this species, which could lead to apparently erroneous conclusions regarding the distribution and number of animals harvested, including highly unlikely reports of hunting and take, for example, in Los Angeles and San Bernardino counties (Responsive Management 2015). While hunter returns can clearly provide a useful index of population size and trend under some conditions, montane populations of Ruffed Grouse appear to be a species in which this is unlikely to be the case (Jones et al. 2005). We thus propose a one-year research project with development of a field-tested species distribution model and a field-validated trend monitoring program as the overarching goals.

We propose the use of available presence-only data from Breeding Bird Survey routes (Pardieck et al. 2015), museum specimens, and filtered expert reports with species distribution modeling

(SDM; Elith and Leathwick 2009) to generate a predictive model of the habitat suitability of Ruffed Grouse throughout their range in northwestern California (Objective 1). We would then use a stratified random procedure in conjunction with the SDM to generate a prospective set of representative 200 survey sites on public lands in northwestern California (Objective 2). We will collect a pilot season of drumming survey data collection using one senior field technician and two student assistants, monitoring at least 150 of the selected sites using Ruffed Grouse drumming surveys (Jones et al. 2005) and establishing drumming phenology throughout the region to economize future monitoring efforts (Objective 3). We would then use these data to evaluate site selection, sampling variance, and ultimately, provide a prospective design for a long-term trend analysis program for trend detection (i.e. determine the final sample and design needed to achieve a desired power for trend monitoring; Objective 4). Anticipated products thus include a species distribution model for Ruffed Grouse based on broad-scale plant community types, geographic, and climatic variables, one year of pilot data, and a prospective design for a cost-effective long-term monitoring program with known power.

Project description

The proposed project would generate a species distribution model (SDM), and conduct pilot field sampling and trend monitoring program design, covering the statewide distribution of Ruffed Grouse in California, in Del Norte, Humboldt, Mendocino, Siskiyou, Trinity, Tehama, and Shasta Counties. Proposed staffing requirements are Drs. Barton and Bean for development of the SDM, trend monitoring program design, and project management. One senior technician (or graduate student) will coordinate field data collection efforts and field data management and assist in report preparation, and two student technicians (either graduate students or advanced wildlife undergraduates) will assist in field data collection.

Barton and Bean will conduct initial data acquisition from available California sources for the SDM during summer and fall 2016. These data will include presence-only Ruffed Grouse data from the Breeding Bird Survey (at present, only 9 detections; Pardieck et al. 2015), spatially referenced western museum collections (at least 30 detections), and verified expert records from eBird (currently uncertain in number). These data, in combination with predictor variables extracted from available geographic and broad-scale plant community type, geographic (i.e. elevation, slope, and aspect), and climate layers, will be used to generate a species distribution model for Ruffed Grouse, predicting habitat suitability (Elith and Leathwick 2009) and completing Objective 1. Barton and Bean will then develop a stratification and randomization procedure in combination with access (i.e. available public ownership, road, and trail data) parameters to create an accessible and range-wide, yet randomized, sample of 200 prospective sites or ‘sample units’, completing Objective 2.

Working with the newly-hired senior technician or graduate student, we will then develop a field sampling schedule to establish a survey schedule during spring 2017, and then execute these surveys during mid-March to mid-May 2017, with assistance from two student technicians. We will use a modified version of the drumming survey protocols developed by Ammann and Ryel (1963), Jones et al. (2005), and Hansen et al. (2011) to, essentially, passively monitor for drumming male Ruffed Grouse at 150 or more roadside or trailside sample units (allowing for some sample units that may be inaccessible or unsuitable). The field sampling protocol will

consist of motorized or ambulatory travel along roads or trails to sub-sample units, at which technicians will conduct a passive 15-minute survey for ruffed grouse drumming during early morning activity hours, with 8 surveys composing each sample unit. Locations will be mapped and detection probability estimated using dual-observer and dual-visit approaches described by Jones et al. (2005) and Hansen et al. (2011) in combination with a simple removal model. We will also record detections of other upland game birds detected during surveys, particularly Mountain Quail (*Oreortyx pictus*) and Blue Grouse (*Dendragapus obscurus*), and provide these to the department. The senior technician will enter and manage field data sets, completing Objective 3. Finally, Barton and Bean will use these data to design a monitoring program within an occupancy model framework (MacKenzie and Royle 2005) and to evaluate site selection, sampling variance, and ultimately, provide a prospective design for a long-term trend analysis program for trend detection at a range of desired levels of power (answering the question of the sample size required in future monitoring to detect an annual trend in occupancy of any particular size with any particular power). These activities would complete Objective 4.

All proposed objectives will be met by the end of the 2016-17 Upland Game Bird Account grant cycle in summer 2017. All data, statistical procedures, and results will be provided to CDFW in the spirit of "open science" as part of a final report at the end of the grant period in 2017.

Funds are requested for the extensive travel that will be required for this project, which will be conducted in a rental vehicle and reimbursed use of personal vehicles (see budget for details of cost). Funding for a field laptop or tablet computer needed to assist in field data management and site selection contingencies is requested, as are funds for basic expendable field supplies (batteries, notebooks, flagging, etc.) Additional field sampling equipment (binoculars, GPS units) will be provided by the Barton lab at Humboldt State.

Expected benefits

The products from the proposed research include a species distribution model for Ruffed Grouse based on broad-scale plant community type, geography, and climate, one year of pilot data, and a prospective design for a cost-effective long-term monitoring program with known power. These pilot field data, in combination with the species distribution model, will also provide an opportunity to cross-validate species distribution modeling in harvested wildlife management with other techniques used for studying distributions (Royle et al. 2012). We believe the steps described are part of an innovative and likely effective, yet efficient, process for development of large-scale wildlife monitoring programs using real field data (Royle and Kery 2005). These data could also be used to cross-validate whether hunter returns do effectively index population size. We propose the information provided will be valuable for future effective decision making in management of Ruffed Grouse populations within California, which are currently of unknown status, trend, and habitat association. The data and results produced should assist in maximizing sustained hunter opportunities in the long-term, as well as potentially providing information valuable to conserving this valuable resource for non-consumptive and ecological value.

Literature Cited

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Project Budget

Ruffed Grouse Trend Monitoring Design and Implementation Budget	**Project Totals**
Personnel	
Daniel Barton – 120 hr at $41.67 / hr	$ 5,001
Tim Bean – 120 hr at $41.67 / hr	$ 5,000
Senior Technician – 1000 hr at $12.00 / hr	$ 12,000
Student Technicians (2) – 500 hr X 2 = 1000 hr at $11.00 / hr	$ 11,000
Fringe expenses for personnel – 15.02% for Bean, Barton, and Senior Technician and 7.37% for Student Technicians (for OASDI, Worker's Compensation, Unemployment Insurance, and Medicare contributions)	$ 4,115
Total Personnel Expenses	$ 37,116
Operating Expenses	
Rental SUV – 2 months	$ 2,000
Rental SUV fuel (enough for approx.. 5000 mi)	$ 1,200
Personal Vehicle Mileage (approx.. 2500 mi)	$ 1,500
Lodging for distant sampling trips (26 person-nights @ $50 / night)	$ 1,300
Expendable Field Supplies (batteries, field notebooks, etc.)	$ 500
Equipment: Field Laptop / Tablet Computer	$ 500
Total Operating Expenses	$ 7,000
Subtotal Personnel & Operating Expenses	$ 44,116
Grant Administration (negotiated rate between CDFW & HSU-SPF: 25% of modified total direct costs, which here exclude costs for equipment)	$ 10,904
Total Project Cost	$ 55,020