

<p>1 Anadarko, Searching for Cause-Pre-Coal Bed Natural Gas Greater SG Population Declines and State-Wide Lek Abandonment Rates</p>	<p>Evidence that oil and gas development is likely not the only potential cause of range-wide declines in Wyoming sage-grouse populations is suggested by two separate data sets. We propose the Wyoming Sage-Grouse Implementation Team ("SGIT") direct research efforts toward developing an understanding of the dynamics associated with lek abandonment, reviewing how temporal trends in lek attendance are influenced by landscape level perturbations be them natural (fire, drought) or anthropogenic (energy development, housing) in origin. Understanding how sage-grouse utilize the mosaic of habitats available in light of the working landscape will help understand trends in lek attendance, movement of birds between adjacent leks and habitats, and provide a clearer understanding of the influence of various variables on populations. Further, an analysis of PRB populations should be conducted to help isolate the root-cause for wholesale population declines occurring in the early 1990's prior to prolific CBNG development. Determination of the cause of these declines remains an unanswered question that should be addressed to help inform future management efforts.</p>	<p>No amount</p>
<p>2, WEST, WY GSG Population Abundance</p>	<p>The purpose of this study is to provide the Collaborative with an estimate of the GRSG population in Wyoming for use in evaluating the effectiveness of existing GRSG conservation efforts. This study will meet the time sensitive goals identified by the Collaborative while providing the necessary information to adequately assess existing conservation measures and the population status of GRSG in Wyoming and provide a baseline for future status reviews.</p> <p>OBJECTIVES</p> <p>The sample design and collection of one year of population abundance data will allow us to:</p> <ol style="list-style-type: none"> 1. Estimate state-wide GRSG population size; 2. Estimate GRSG population sizes in Core Areas; 3. Estimate the effectiveness of the Core Areas by comparing GRSG density and predicting winter concentration areas state-wide and within the Core Area. 4. Develop a simple state-wide survey methodology that will provide consistency over time and flexibility to detect on-going changes in habitat or distribution. 	<p>\$326,065.40</p>
<p>3, Ambrose, Review and synopsis of historical sound level measurements in WY relative to GSG and recommended protocol for future measurements</p>	<p>We propose to review all previous sound level studies conducted in Wyoming (and other western states as available) relative to greater sage-grouse. We will prepare a synopsis of historical sound level measurements, including location, equipment type, methods, duration, and results. Based on the most recent literature and best available science, we will prepare recommendations for equipment type and measurement protocols for future sound level studies relative to greater sage-grouse in Wyoming.</p> <p>This project will not attempt to determine sound levels at which greater sage-grouse</p>	<p>\$24,465.00</p>

	are negatively impacted by anthropogenic noise, but rather review all previous sound levels studies in Wyoming and provide a recommended state-wide protocol for all future acoustic studies relative to greater sage-grouse.	
4, Campbell CCD, Inventory Abandoned Leks	The method of study is to discern whether Greater Sage Grouse are returning to use leks abandoned due to industrial development by using wide angle remote photography to record any activity during the late February to mid-April timeframe in 2015. Data from the cameras will be downloaded on a planned weekly schedule. Downloaded data will be categorized by geographic location, occurrence, time of day, and habitat type. Ecological site information may be gathered as part of the research study. Variables may not be an issue as the main objective is to record whether “abandoned leks” are being re-populated. The research can be categorized as observational research. The “abandoned leks” chosen for sampling will be representative of the western half of Campbell County most affected by industrial development, and most affected by cessation of development.	\$7,986.60
5, Audubon, WY GSG Core Area Health Assessment	In this proposal we describe a process of assessing habitat conditions across various spatial scales and the response of sage-grouse populations to changes in those conditions. <i>Habitat metrics</i> are the habitat characteristics or attributes – both natural and man-made – that influence sage-grouse. We tailored the habitat metrics proposed in the <i>Sage-grouse Habitat Assessment Framework</i> (Stiver et al. 2006) to suit the specific conditions and needs in Wyoming. These habitat metrics are based on differing <i>orders of selection</i> , which represent 4 levels of spatial scale at which habitat metrics influence where sage-grouse reside and obtain resources necessary for survival and reproduction. The orders of selection move from broad or landscape-scale habitat requirements (1st order) to site-specific habitat requirements (4 th order): <input type="checkbox"/> 1st order of selection: Habitat attributes important for a population of sage-grouse. For this proposal, each core area in Wyoming is represented at the 1st order of selection. <input type="checkbox"/> 2nd order of selection: Habitat metrics associated with the existence and persistence of subpopulations (e.g., leks); for example the amount and configuration of sagebrush within an area delineated by a 4-mile radius. <input type="checkbox"/> 3rd order of selection: Habitat metrics important for a sage-grouse at the scale of a home range; for example seasonal habitat availability and configuration for an individual to meet its annual habitat requirements. <input type="checkbox"/> 4th order of selection: Site-specific habitat attributes which influence the probability that a sagegrouse will select a given location and the probability of success and/or survival; for example the cover and height of the herbaceous understory for nesting females.	\$674,094.40
6, WYGISC, Core Area	WyGISC proposes using existing digital aerial imagery to extract anthropogenic	\$102,000

	<p>features based on their spatial footprints. WyGISC will use two specific imagery products to delineate disturbance features. The first product is statewide color imagery flown in 2009 by the Farm Service Agency as part of the National Agriculture Imagery Program (NAIP). This 1-meter ground resolution imagery will serve as the baseline imagery for the project. The second product is also NAIP imagery, but was flown in 2012. The 2012 imagery will specifically be utilized to identify development that occurred between 2009 and 2012 and that have not previously identified through other means. Imagery-based feature identification will involve manually delineating features through on-screen head's up digitizing. In addition to feature geometry, a number of descriptive attributes will be linked to each feature, including disturbance type, area, parameter, date identified, date updated, and method of identification.</p>	
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<p>7, KLJ, Perform review of BMPs</p>	<p>1. Review Studies and Plans We will review any plans and studies completed in Wyoming and in other states that investigated and/or implemented sage grouse requirements and regulations.</p> <p>2. Communicate with State of Wyoming, Key Agencies and Individuals We will use these communications to better understand the short and long-term feasibility and impacts of the proposed regulation. The insight of local industry experts will help define socio-economic impacts as well as gauge public interest in the initiative. A sample of agencies include: <i>f</i> . Wyoming Game and Fish Department <i>f</i> . Wyoming Game and Fish Commission <i>f</i> . Wyoming Wildlife and Natural Resource Trust Account Board <i>f</i> . Representatives of Wyoming Legislature, primarily Travel Recreation and Wildlife Committee <i>f</i> . Conservation agencies such as The Nature Conservancy and Pheasants Forever <i>f</i> . Federal agencies: Natural Resource Conservation Service, United States Forest Service and Bureau of Land Management</p> <p>3. Consult with Businesses and Individuals The business community plays a vital role in economic development in the state. KLJ will determine their willingness to be an active participant in this initiative. We will contact individuals and organizations with vested interest in Wyoming and work with economic development groups to create a viable list of key businesses across the state and out-of-state businesses that will be important to engage during the project. A sample of businesses types include: <i>f</i> . Energy: Oil and Gas, Coal, Wind, Mining <i>f</i> . Agriculture Associations <i>f</i> . Recreation Outfitters <i>f</i> . Outdoor Enthusiasts</p> <p>4. Create a List of All Analysis and Data Gaps Based on the initial assessment and agency and stakeholder interviews, KLJ will collectively analyze the information gathered to determine need for additional analysis for the state to move forward with additional studies that may be beneficial. Each gap will be listed, prioritized and detailed with potential outcomes and benefits.</p> <p>5. Consolidate Results for Each Topic KLJ will develop its findings into a concise report that will outline the results of each analysis and provide recommendations on potential regulations, policies, practices or management. This format will be followed on each topic. They will be separated so that results can be easily determined for each area of interest.</p>	<p>\$450,000</p>
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<p>8, ERG, Analysis of the Energy Disturbance Thresholds Assoc. with GSG Lek Persistence</p>	<p>Using well data dating back to the early 1900s and GSG lek data since 1944, we will analyze how energy development has, or has not, affected GSG populations and lek persistence. Wells drilled per five-year period, as well as a running total of wells, will be analyzed per township (or section) and will be related to lek activity.</p> <ul style="list-style-type: none"> • Track density of active drill rigs and the density of the running total well heads through time. • Calculate densities at a variety of radii based upon varying literature's documented disturbance distances. • Evaluate the GSG lek status and inventory data through time by disturbance densities. • Attempt to incorporate a variety of other variables affecting lek persistence (e.g. climatic, vegetative, grazing, natural disturbance, invasive vegetation, etc.). 	<p>\$58,712</p>
<p>9, Beck, Gregory, Analysis of the Energy Disturbance Thresholds Assoc. with GSG Lek Persistence</p>	<p>Question (1) <i>Conduct analyses related to landscape and environmental features that may impact lek attendance.</i></p> <p>Question (2) <i>Identify configurations of oil and gas disturbance around leks that lead to lek abandonment and reduced lek counts.</i>-Using the 52 leks identified in Gregory and Beck (2014) where sage-grouse populations were observed to increase despite having the same Gregory and Beck 2014 Wyoming Sage-Grouse Question (3)</p> <p>Question (3) <i>Evaluate the degree to which particular extraction methods (e.g. directional or horizontal drilling) impacts lek attendance.</i>-</p>	<p>\$47,860</p>

<p>10, Conover, Impact of predator removal on GSG populations</p>	<p>We will write a review paper and meta-analysis of predator control efforts on sage-grouse demographic rates to address the effectiveness of avian and mammal removal programs on sage-grouse populations. We will use published papers and unpublished reports and data sets to conduct a meta-analysis of the impact of avian and mammal predator control efforts on nest success and hen survival through time and space.</p> <p>We will also collaborate with another researcher at Utah State University, Dr. Julie Young, who has conducted research on a coyote removal program's impact on sage-grouse. That project has been completed though the results are still forthcoming in the peer-reviewed literature. In addition, there is data that has not been analyzed that may provide greater insight into mammal removal's impact on sage-grouse.</p> <p><i>Research on the impact of raven removal on sage-grouse</i>—We have been conducting an ongoing project monitoring the impact of raven removal on sage-grouse in southwestern Wyoming that has been collecting data pre- and post-removal efforts since 2007. Some of the preliminary data has been published though much of the data collection and analysis are ongoing. This project is being completed on a large scale (Uinta, Lincoln, Sweetwater, and Carbon counties) in designated core habitat area for sage-grouse in Wyoming. We seek funding to expand this research during the next year to include more detailed tracking of raven populations in sage-grouse habitats. We want to use satellite telemetry to get an understanding of movements of ravens across the landscape. We seek funding to purchase some satellite radio-collars.</p>	<p>\$125,817</p>
<p>11, Beck et al Evaluation of the Effectiveness of Existing Greater Sage-Grouse Conservation Measures in Wyoming</p>	<ol style="list-style-type: none"> 1. Core Area Metrics for Sage-grouse Conservation - \$37,274 2. Trends in Sage-Grouse and Sagebrush Obligate Passerines – \$31,474 3. Microhabitat Quality in Wyoming Sage-grouse Core Areas - \$38,815 4. Winter Concentration Areas for Migratory and Non-migratory Sage-grouse – \$28,400 5. Identifying Winter Concentration Areas for Sage-Grouse in South-Central and North-Central Wyoming – \$29,183 6. Identifying Risky Habitats and Corvid Use of Sage-Grouse Breeding Habitat - \$21,382 	<p>\$186, 528</p>

12, WGFD Histrionics	They Wyoming Game and Fish Department (WGFD) would work with the University of Wyoming faculty and students to complete this project. The University has an extensive research database and works with this database on a regular basis. The WGFD would work with Department of Ecosystem Science and Management and would also approach the UW Law School for help in identifying the critical elements that will be needed in any success legal action regarding ESA actions. Using UW resources would help expand access to necessary resources and may decrease time and costs.	\$50,000
13, WGFD Multi-state metrics	They Wyoming Game and Fish Department (WGFD) will work with the states to develop a data entry system that outlines the work being done to address the threats.	\$27,000
14, Ramey Pilot Project To Use Emerging Technology For Sage Grouse Censusing	We are proposing a pilot project that will test a new, emerging technology that could benefit sage grouse research and management. This technology is non-invasive and would potentially allow us to fill an information gap of vital importance to sage grouse conservation: locate new leks in previously inaccessible areas, locate nests non-invasively (that would ultimately allow for monitoring nest predation and nest success), and gather data on habitat use and census data using a statistically-robust (i.e. random) sampling design. We propose to use GPS-programmable, low-flying multi-rotor copters (small, portable UAVs) with geo-referenced video data from high-resolution FLIR thermal video cameras to identify and map the presence of sage grouse. These data will then be compared to lek counts, in terms of cost, accuracy, and area surveyed.	\$193,361
15, Taylor, Examination of Annual Population Dynamics of GSG in the Bighorn Basin, WY	Additional analyses of our existing 4-year dataset will allow us to assess fitness of marked GSG in the BHB including seasonal and annual survival, nest survival, and chick survival. Levels of predator control by study area will be used as covariates in analyses. We will estimate nesting season and over-winter survival of marked birds using Program MARK (White and Burnham 1999). Nest survival will be estimated using the nest model in Program MARK (Dinsmore et al. 2002). Chick survival will be estimated using the young survival from marked adults model in Program MARK (Lukacs 2004). These fitness metrics will be used to generate a population viability analysis (Dinsmore and Johnson 2005) including elasticity analysis (Clark et al. 2008) to determine which life stage is limiting the GSG populations in BHB and help inform future management decisions. Furthermore, we will provide an assessment of the risk of extinction given the conditions observed in the field. These combined analyses will provide assessment the health of the GSG population in the BHB and assist in informing and focusing management activities.	\$70,635

<p>17, Taylor, Quantifying Winter Use Patterns of Greater Sage-Grouse in the Bighorn Basin, Wyoming</p>	<p>Aerial surveys are currently conducted by a licensed pilot of the USDA, Wildlife Services program in Wyoming. The plane is fitted with radio telemetry equipment which is owned by the program, thus no equipment costs are needed. The pilot flies over study sites during winter months at low elevation with a scanning radio receiver tuned to each marked hens' radio frequency. When a signal is detected, the pilot obtains a precise location and enters a waypoint in the onboard global positioning system. Locations are added to a geographic information system and are used for survival, movement, and home range analyses.</p>	<p>\$17,535</p>
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