Agency Response to University of Wyoming COOP Unit coordinated third party review of monitoring protocol for pronghorn in the PAPO development area

I. Change in Pronghorn Numbers - Surveys

Reviewer Assessment:

a.) Aerial count method is not adequately specified.
b.) The ground count method is not adequately specified.

Reviewer Recommendations:

1.) The RFQ should specify the type of aerial survey (e.g., distance sampling) to be used, and do some power calculations to determine the likelihood of detecting population change of 15% with the proposed sampling.
2.) Describe how contractor will assess detectability (sighting distance or sighting angle or if they are assuming a total count on the area.
3.) Provide discussion of basic sampling principles with respect to transect placement and estimate precision
4.) Describe how data will be analyzed
5.) Describe how abundance will be summarized
6.) Calculate the variance associated with surveys to adequately assess whether treatment areas have changed relative to reference areas.
7.) Accuracy and precision of line transect estimates are directly related to the number of observations. Burnham et al. (1980) recommended a minimum of 40 observations.

BLM and WGFD Biologist Response to Recommendations #1, 2 and 3: The Reviewers provided reference to several publications describing line transect survey methods however these were primarily methods applied during spring/summer surveys when groups are smaller and widely scattered. These methods (such as distance sampling) were not designed to survey large groups of animals that are typically seen in winter. We are conducting aerial surveys using line transects ½ mile apart in an attempt to locate every group of pronghorn, and then using high-definition video to record images of the groups for analysis. The aerial survey is based on a 'complete count' technique (Seber 1982). Current application of the complete count technique involves flying a dense sample of line transects (spaced ½ mile apart), attempting to locate every group of pronghorn in the study area(s), and using high-definition video images to collect as accurate of counts as possible.

Contractor will use the Brownian bridge movement model (BBMM; Horne et al.2007) to estimate migration routes.

BLM and WGFD Biologist Response to Recommendations #4 & #5:

- Contractor will submit summary reports from aerial line transect surveys and ground counts (including maps and raw data) within 1 month of each survey.
- Contractor will also submit an Annual report that includes: 1) description, RSF analysis, maps of pronghorn habitat use, group sizes and locations in the treatment and reference areas, 2) abundance estimates for treatment and reference area, and 3) clear discussion on how RSF and abundance results relate to matrix criteria.
- All GPS locations and relevant data will be delivered to the PAPO in accordance with specifications (format and accuracy) defined in the RFQ and future conversations with the PAPO.

BLM and WGFD Biologist Response to Recommendation #6: Our methods are to count (census) all the animals in both treatment and reference areas. A systematic sample of east-west transects spanning each study area was drawn. The transects were spaced approximately 1/2 mile apart, and observers attempted to identify all groups of pronghorn within the reference and treatment areas. High-definition video imaging is used to count groups with > 20 individuals, and multiple evaluations of each video image are used to estimate precision. For example, the video of each pronghorn group is viewed multiple times, and the variance across independent counts is used to estimate the overall precision for the abundance estimate for each survey. This method does assume that all groups are detected, and no groups are double counted. A power analysis can be performed using the estimated levels of precision for the 2009-2010 surveys. This analysis will be interpreted assuming all groups are detected, or at least that detection rates are consistent over time, and no groups are counted more than once. This can be achieved by snow tracking pronghorn group movements to determine locations pre-detection if double counting is suspected.

BLM and WGFD Biologist Response to Recommendation #7: This question is only valid if we were trying to sample a portion of the antelope in the reference and treatment areas. As stated above, the monitoring protocol is designed to count all pronghorn in both the entire reference area and treatment area. An adequate sample size is not applicable with this protocol.

Budget: no change

II. Change in Pronghorn Numbers - Individual Survivorship

Reviewer Assessment:

a.) Sample sizes for estimating individual survival rates are too low.

b.) Survival rates of individual males should be included in the study.

Reviewer Recommendations:

1.) Reviewers recommend increasing the sample size to a minimum of 25 animals per area.
2.) Reviewers recommend including time of death.
3.) Reviewers recommend estimating age of individuals to be radio collared.
4.) Reviewers conclude that survival estimates are inappropriate because they exclude males. The Reviewers recommend including males in the radio collared sample set.
5.) Better survival estimates could be obtained by deploying a greater number of VHF radio collars on both male and female pronghorn.
6.) Conduct repeated counts in October.
7.) Monitoring methods described in the RFQ over estimate or underestimate true survival rates and do not measure male survival rates.

BLM and WGFD Biologist Response to Recommendations #1, #4, #5, and #7: Agency Biologists agree that additional collared animals would be needed to provide a rigorous survival estimate; however, survival is not a Matrix component. The GPS collared pronghorn are intended for habitat selection monitoring only. Including males in our sample would be useful if our intention was to provide a more fine scale measure for survivorship. We are concerned that hunter harvest would affect our sample if we included males. A survival analysis would provide additional insight into population changes. However, relatively small changes in survival (<10%) can determine whether a population is increasing or decreasing, and detecting such small changes is extremely difficult and costly. Since the primary matrix objective is to measure a 15% change in population, it has been decided to place pronghorn monitoring resources into detecting a 15% change in populations and not estimate survival rates.

BLM and WGFD Biologist Response to Recommendation #2: The GPS units do not collect time of death, but time of death will be estimated from the GPS collar after it is recovered.

BLM and WGFD Biologist Response to Recommendation #3: The contractor captures only aged 2+ does in both the treatment and reference areas.

BLM and WGFD Biologist Response to Recommendation #6: Ground counts were not conducted in October because hunting seasons are still in place and pronghorn have not completed migration to winter ranges. In the most recent Wildlife Conservation Society (WCS) report (Beckmann et al. 2009) no significant changes in fawn ratios between December and March were documented. In addition, the WCS research has not shown significant differences between treatment and control areas. Furthermore, ground count data can vary annually due to animals vacating the area independent of gas development

activity (i.e., extreme winter conditions). We recommend the Contractor discontinue monthly ground counts, collecting sex/age classification information during January through March since this data is not needed for the Matrix criteria.

Budget: TBD

III. Avoidance Distances - Habitat Use

Reviewer Assessment:

a.) The Matrix criteria to trigger mitigation are not clearly defined and are inconsistently defined. Unambiguous and independent criteria are needed.

b.) Fixed rates of the GPS collars are too low, and the method by which GPS data would be used to describe migration paths was not specified.

c.) There is no plan to describe summer ranges of pronghorn that winter within the PAPA. This is a deficiency, especially if some pronghorn summer within the PAPA, or if travel to some summer ranges may be impeded by development.

Reviewer Recommendations

1.) State how changes in the Resource Selection Function equate to changes in habitat availability. What constitutes a 10% decline in habitat availability for one year?

2.) GPS collar recording of only 3 fixes per day are insufficient to detect migration routes.

3.) Use a greater number of VHF collars to describe summer ranges of the PAPA winter range for pronghorn.

4.) Quantitative methods are inappropriate to detect changes in habitat availability.

BLM and WGFD Biologist Response to Recommendations #1 and 4: Agency Biologists agree with reviewer's recommendation that monitoring size of habitat fragment use be modified to incorporate changes in probability of use described by Sawyer et al. (2006). Habitat use is being analyzed using Resource selection and will follow Sawyer et al. (2006, 2007, 2009*a*, 2009*b*), where the animal is treated as the experimental unit and probability of use is estimated as a function of habitat variables (e.g., slope, elevation), including distance to well pad. We are not, and there never was the intention to measure habitat availability. The RSF model is designed to show change in use and distribution. Following recent consultation with West Inc., Agency Biologists recommend modifying the Matrix criteria "Size of habitat fragment used by dropping the threshold criteria "10% decline in habitat availability for one year "due to the issues outlined by the reviewers and the fact that changes in habitat availability do not trigger any mitigation action by itself. Only changes in population documented to have exceeded 15% triggers additional mitigation. We support continuing habitat use data collection and analysis as it is useful for monitoring distribution and use overtime and for assessing mitigation success. Pronghorn distribution across the PAPA

would continue to be monitored from a sample of GPS collared adult females (n=30) and modeled annually using Resource Selection Function (RSF) analyses. This analysis would be consistent with current monitoring efforts. In addition to modeling the geographic area described in Sawyer et al. (2009), fine scale analysis would monitor pronghorn distribution in Development Areas annually to assess pronghorn response to ongoing mitigation efforts, reclamation, concentrated gas development, etc. This approach would still provide Agency Biologists detailed data on annual pronghorn distribution in relation to PAPA development activities without using arbitrary avoidance criteria.

BLM and WGFD Biologist Response to Recommendation #2: The GPS collars are collecting fixed locations every 3.5 hours.

BLM and WGFD Biologist Response to Recommendation #3: While VHF collars could provide us with survival data and describe how pronghorn use summer range these are not objectives of the Matrix and not needed to determine changes in number of pronghorn using the treatment area vs. the reference area.

Budget: no change

Literature Cited

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Burnham, K.P., D.R. Anderson, and J. L. Laake. 1980. Estimation of density from line transect sampling of biological populations. *Wildlife Monographs* No. 72.

Horne, J.S., E.O. Garton, S.M. Krone, and J.S. Lewis. 2007. Analyzing animal movements using Brownian Bridges. Ecology 88:2354–2363.

Sawyer, H., R.M. Nielson, F. Lindzey, and L.L. McDonald. 2006. Winter habitat selection of mule deer before and during development of a natural gas field. Journal of Wildlife Management 70:396-403.

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Seber, G.A.F. 1982. The Estimation of Animal Abundance and Related Parameters. Second edition. Blackburn Press, Caldwell, New Jersey, United States.