Agency Response to University of Wyoming Cooperative Fish and Wildlife Research Unit coordinated third party review of monitoring protocol for White-tailed prairie dog populations in the Pinedale Anticline Project Area (PAPA)

I. Treatment and Reference and Areas

Reviewer Recommendations:

1.) Determine whether the area for development to which inferences are to be made is Core Area with Development Areas (CADA) or PAPA. Identify appropriate reference areas.

2.) We suggest reference areas to the west (as already denoted), possibly to the south, and to the east of CADA or PAPA.

Bureau of Land Management (BLM) and Wyoming Game and Fish (WGFD) Biologist Response to Recommendation:

No changes are needed since the treatment area is already being monitored and an adequate reference area is in place.

The treatment area includes all areas within the PAPA analysis boundary for energy development. This area includes the Core development areas under development and areas with potential for development.

The three reference areas planned for this study are separated by rivers which potentially limit the spread of plague and span the length of the study area in a north-south direction. Areas to the south are being monitored by Jonah operator's contractor per the Jonah wildlife plan and using the same BLM protocols. The PAPO could evaluate other adjacent habitat for suitability however expanding beyond the current reference area will not improve the current sample design and reliability of analysis sufficiently to justify the added cost.

Budget: No changes

II. Grid Sampling

Reviewer Recommendations:

1.) Overlay CADA or PAPA with a grid of rectilinear sampling units. A size of 400×400 m or 500×500 m seems appropriate. Number the grid cells and then randomly select the sample that will be monitored.

BLM and WGFD Biologist Response to Recommendation: We have modified our 2010 monitoring to include a grid of plots (500 m x 500 m) that will comprise the sampling frame within PAPA and each reference area. From this grid, a sample of plots will be selected with

a generalized random tessellation stratified (GRTS) sample using the R package 'spsurvey' (Kincaid and Olsen 2009).

Budget: No changes

III. Stratified Sample

Reviewer Recommendations:

1.) Decide whether the plots should be placed in a small number of strata (e.g. open and intermediate density sagebrush vs. dense sagebrush) that might help predict occupancy rates.

2.) Decide whether environmental covariates, such as temperature and Julian date, will be used to help predict detection probabilities.

BLM and WGFD Biologist Response to Recommendation: We appreciate this recommendation. Sample of plots will be selected with a generalized random tessellation stratified (GRTS) sample using the R package 'spsurvey' (Kincaid and Olsen 2009). The GRTS sample allows for a spatially representative sample across the study area.

We will include temperature and Julian date in our analysis.

Budget: No changes

IV. Change in Occupancy

Reviewer Recommendations:

1.) Determine the change in occupancy that is to be detected, and then use statistical power analyses to determine the appropriate number of plots to sample.

BLM and WGFD Biologist Response to Recommendation: The change in occupancy to be detected as defined in the Matrix is an average of 15% decline over 3 consecutive years. The population numbers for 3 consecutive years will be averaged to find the percent decline. In order to determine the appropriate number of sample plots to survey to detect this change in occupancy, a power analysis will be conducted using the data collected in the 2010 survey year. The GRTS sample allows for a spatially representative sample across the study area which is maintained as more points are added to the sampling effort. The mean and variance estimates for the occupancy rate and active burrow density will be used to determine sample sizes required to ensure adequate power to detect trends in the two parameters of interest (occupancy rate and active burrow density).

Budget: No changes

V. Survey Protocol

Reviewer Recommendations:

1.) Have 2 different technicians independently visit the 4 corners of each plot on different days, but within the same week. This will allow weather to serve as a covariate in the model, but ensure population closure); use 10× binoculars at each corner to count the number of prairie dogs observed. The repeated observations will establish detection rates and correct for false negatives (prairie dogs present, but undetected in one survey).

BLM and WGFD Biologist Response to Recommendation: Each sample plot will be visited by two different qualified surveyors, with surveys separated by 3-5 days. Surveyors should not know if prairie dogs have previously been documented at the plot. During each visit to a sample plot, the surveyor will walk to each of the four corners of the sample plot to document the presence or absence of white-tailed prairie dogs (Andelt et al 2009). The surveyor shall remain at each corner and search for prairie dogs for 5 minutes prior to proceeding to the next corner. Surveyors will record the total number of prairie dog groups observed from each corner. In addition, surveyors should document if prairie dogs were observed within the plot while walking from corner to corner. It is not necessary to count the number of groups observed while walking from corner to corner. The time spent from the beginning of the perimeter walk to the end should be recorded. Temperature and precipitation will be documented during both visits, with measurements recorded at the first corner visited at each plot.

Budget/Quality: No changes

VI. Use Program Mark

Reviewer Recommendations:

a) Use Program MARK (White 2008, Andelt et al 2009) to calculate detection rates, occupancy rates, and change in occupancy among years.

BLM and WGFD biologists recommend the following: We will be using Program MARK to calculate detection rates, occupancy rates, and change in occupancy among years.

Budget: additional $10,000 to current budget

VII. Additional Protocols

Reviewer Recommendations:

1.) Additional protocols or additional details on protocol for monitoring occupancy rates of white-tailed prairie dogs see MacKenzie et al (2002, 2003, and 2006) and Andelt et al (2009).

BLM and WGFD Biologist Response to Recommendation: Our 2010 monitoring protocols will include additional protocol information from MacKenzie et al (2002, 2003, 2006) and Andelt et al (2009) as described above for item #5 - Survey Protocol. Occupancy rates and associated variance will be calculated for each study area using methods of MacKenzie et al (2006).

Budget: No changes

VII. **Estimate of Absolute Abundance**

Reviewer Recommendations:

1.) If estimates of absolute abundance are desired, then after conducting the visual observations ("a" through "f" above), use mark-recapture (for example, see Robinette et al 1995) and program Mark (White 2008) or mark-resight and program NOREMARK (White 1996, Magle et al 2007) to focus estimates of number of prairie dogs on plots where prairie dogs were observed during the above estimates of occupancy rates. However, some additional estimates of abundance also should be conducted on plots where prairie dogs were not observed. We recognize that estimating actual numbers of prairie dogs will be very time and labor intensive.

BLM and WGFD Biologist Response to Recommendation: Each plot for which presence was recorded during the occupancy survey will be revisited to conduct a survey of burrows. We will be using Biggins et al (1992) to determine active burrows. We agree estimating actual numbers of prairie dogs will be very time and labor intensive and have elected to measure presence/absence as outlined in the Matrix.

Budget: No changes

VII. **Mark – recapture or Mark resight vs Biggins**

Reviewer Recommendations:

1.) We recognize that estimating number of prairie dogs via mark-recapture or mark-resight will be much more defensible than using a surrogate, such as number of active burrows, for abundance of white-tailed prairie dogs. However, consider the approach of Biggins et al (1993) for a surrogate for point estimates of absolute abundance of prairie dogs.

BLM and WGFD Biologist Response to Recommendation: We will continue to use the density of burrows to estimate population density following the guidance in Biggins et al (1992) as recommended by the reviewers. Each plot for which presence recorded during the occupancy survey will be revisited to conduct a survey of burrows. Eight strip transects spaced 60 m apart and oriented in a north-south direction will be surveyed in each of the occupied sample plots. Strip transects will be 3 meters wide and extend the length of the sample plot (500 meters). Burrows will be counted if they are greater than 7 centimeters in

diameter and deep enough that the end cannot be seen. Burrows will be identified as active or inactive, with active burrows defined by the presence of fresh scat within 0.5 meters of the burrow entrance. Burrows on the edge of transects will be counted if more than half of the burrow entrance is located within the transect (Biggins et al 1993). Active burrows outside of the strip transects will not be recorded. Observations of prairie dogs will also be recorded.

Budget: No changes

References

Andelt, W. F., G. C. White, P. M. Schnurr, and K. W. Navo. 2009. Occupancy of random plots by white-tailed and Gunnison's prairie dogs. Journal of Wildlife Management 73:35-44.

Biggins, D. E., B. J. Miller, L. R. Hanebury, B. Oakleaf, A. H. Farmer, R. Crete, and A. Dood. 1993. A technique for evaluating black-footed ferret habitat. Pages 73-88 in J. L. Oldemeyer, D. E. Biggins, B. J. Miller, and R. Crete, editors. Proceedings of the symposium on the management of prairie dog complexes for the reintroduction of the black-footed ferret. Biological Report 13. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 96 pp.

Breidt, F.J. and W.A. Fuller. 1999. Design of supplemented panel surveys with application to the natural resources inventory. Journal of Agricultural, Biological, and Environmental Statistics 4(4): 331-345.

Fuller, W.A. 1999. Environmental surveys over time. Journal of Agricultural, Biological, and Environmental Statistics 4(4): 391-403.

Kincaid, T., and T. Olsen 2009. Package 'spsurvey' Users Guide. http://cran.r-project.org/web/packages/spsurvey/spsurvey.pdf.