

May 3, 2004

Larry Nelson
Colorado Division of Wildlife
317 West Prospect
Fort Collins, CO 80526

RE: Colorado prairie dog estimate, preliminary ground-truthing results

Dear Larry,

As you know, we've been in contact with Francie Pusateri and others during the last year over our concerns that there are procedural flaws in the results of the Colorado prairie dog survey technique reported in the draft paper "Area of black-tailed prairie dog colonies in eastern Colorado" authored by White, Dennis, and Pusateri. As we've discussed with Francie and others, we believed these flaws were likely to result in a significant overestimation bias in the results reported in that manuscript. To date, our findings based on ground surveys support those earlier concerns that the results reported in the submitted paper have such a bias.

In this letter, we report these preliminary results to the CDOW and others involved in this manuscript and offer some suggestions that we believe will help resolve them. We will continue to keep you informed of the results of additional surveys we make. We appreciate the cooperation we have received from CDOW in taking Sterling on a test flight last year and in providing a copy of the database last fall. We have, in turn, invited CDOW staff to participate with us in the ground truthing effort reported herein but this invitation was declined.

In this report the term "intercept" means the portion of the CDOW survey transect where an active prairie dog town was reported on the CDOW database. We plotted out the intercepts in 6 counties in SE Colorado on a map that included roads and ownership (federal or state) overlay layers. I have previously provided Francie with copies of these maps.

On these maps, we plotted the intercepts reported in the CDOW database to be $\geq 1,300$ feet because the draft paper submitted identified the statewide estimator as robust to errors in measurement of small colonies. Also, we concentrated our ground truthing on long intercepts because these cannot have quickly appeared elsewhere in areas off the CDOW transects. Errors in correct classification of large intercepts and their actual level of activity have immediate and significant implications on the accuracy of the statewide estimate reported in the submitted paper.

Our surveys have taken 2 forms. Both are constrained by access problems but are nevertheless instructive. In the first, we actually got on the reported intercept and surveyed as much of it as we could by walking along it or observing it from a road paralleling the intercept. Because of access problems, we were not always able to observe the whole length of the intercept. In the second, we went to points where reported intercepts crossed public rights-of-way and made observations from the right-of-way. We are now investigating options to do more extensive evaluations using aerial techniques less constrained by access issues.

On April 21-22, 2004 we examined all or accessible portions of 6 intercepts in Kiowa and Bent Counties including the 4 longest intercepts in Colorado reported by CDOW (Table 1).

We also conducted ground truthing on March 20, 2004 using binoculars to make observations of 5 intercepts in Crowley and Otero Counties from places where reported intercepts of prairie dog colonies intercepted rights-of-way (Table 2).

We believe these preliminary results support our previously-expressed concerns that the protocol followed by CDOW staff was flawed because it did not call for observers to make distinctions between inactive and active *portions* of intercepts they recorded. This source of error, as we suspected, appears quite evident in the long intercepts identified as being especially significant in the accuracy of the statewide estimate.

In some cases where prairie dog burrows were present but signs of prairie dog activity were not seen, it is possible that poisoning occurred during the time between the CDOW surveys and our work. If this is the entire explanation, however, a very alarming amount of poisoning must be occurring that should concern CDOW.

We are unable to offer any explanation for the intercepts where we found no current or historic evidence of prairie dogs.

In addition to the ground truthing results, we are also proceeding with indirect analyses that may reveal an overestimation bias in the estimate presented in your paper. One such indirect analysis involves comparing CDOW results for National Grasslands (where percent occupancy of prairie dogs is known from field surveys) with results from the CDOW surveys.

Within the Comanche NG (416,560 acres), 2.55% of CDOW transects were reported as intercepting prairie dog colonies (10,622 acres). Field surveys from 2002 for this area report 6,168 acres or 1.48% occupancy (J. Sidle, pers. commun. 4/29/04). The field surveys report only 58% of the occupancy estimate indicated by the CDOW surveys.

Within the Pawnee NG (207,265 acres), 1.38% of CDOW transects were reported as intercepting prairie dog colonies (2,664 acres). Field surveys from 2002 for the same area report 1,801 acres of prairie dogs or 0.87% occupancy (J. Sidle, pers. commun. 4/29/04). These field surveys report only 48% of the estimate reported by the CDOW surveys. We also hope to develop similar indirect comparisons for other areas with field data.

In Sterling's email to Gary White dated 4/6/04, Sterling asked for Gary's opinion on how we might proceed should our ground truthing develop evidence that the estimate reported in the submitted paper was a significant overestimate as we suspected it might be based upon our review of the protocol. Gary did not respond with an opinion. Therefore, we are proceeding on the basis that an appropriate response will be a "response manuscript" to the submitted paper should it be accepted by the *Wildlife Society Bulletin* or other journal following peer review. For this reason, I'll copy the WSB editor with this letter so that he is aware that a response to the

submitted paper is under consideration. We expect to complete our work by mid-summer and have a response by this fall.

Clearly, for all concerned, this course of action is best avoided if possible. Our interest is in avoiding publication of a significantly inflated estimate because this has clear management implications for prairie dog management in Colorado and elsewhere. We assume that this parallels CDOW's interest as CDOW bases the prairie dog part of its Conservation Plan for Grassland Species in Colorado on reliable estimates of prairie dog abundance. Gary's interest is, as always, in maintaining the high credibility he has established for the estimates with which he has been involved; we acknowledge that no scientist in the profession has a better reputation in such matters. However, the accuracy of Gary's results is dependent on the quality of the data provided to him. We make the following suggestions on a course of action that could resolve this issue in a professional manner.

- 1) CDOW conducts a resurvey this summer of at least 2-3 counties where prairie dogs were reported abundant during the original survey (we will jointly agree on these counties). This resurvey would use a protocol that calls for identifying and classifying portions of intercepts that are active and inactive. Both CDOW and the submitted paper identify this revised protocol as appropriate for future surveys. Conducting surveys on these counties this summer will be a valuable field test of the protocol prior to subsequent large-scale application. We believe it is important that a skeptical observer be involved in these resurveys to adequately resolve the controversy; one of us will be glad to participate as this observer. We agree that a response manuscript will not be necessary if the resurveys of these counties come out with a point estimate within the lower limit of the 90% CI of the former estimate for all counties resurveyed with the new protocol (or higher than the original point estimate) and the following suggestions are also implemented. We note that such resurvey results can profitably be added to the submitted paper if they support the paper's contention that this protocol issue is not a significant source of bias.
- 2) Develop a sampling protocol, perhaps similar to ours, to ground check portions of intercepts classified as "active" during the resurvey efforts to examine error in these classifications.
- 3) Conduct some replicated flights to document the hardware error in the GPS units used in the original surveys to correctly document the smaller intercepts (<200 meters in increments). Measuring this error will also strengthen the manuscript if it supports the model of this error that the authors proffered in the most recent draft of the paper.
- 4) On the resurveys of the counties, modify the protocol to avoid the hardware errors identified in #2, above. This probably requires separate recording of proximal and distal waypoints for intercepts <~200 m by recording these waypoints on different passes or using different GPS units.

We note that based on the information presented in this letter and the CDOW database, anyone can revisit the intercepts we've examined and verify the accuracy of the above observations.

We wish to be very clear that we do not believe that the problems identified above resulted from deliberate fabrication of data, from insufficiently skilled observers, or from a mathematically or conceptually flawed sampling scheme. Rather, we believe the apparent errors most likely

resulted from a flawed protocol developed for implementation by the observers, failure to conduct systematic ground surveys to check the accuracy of aerial classifications, failure to calibrate the GPS equipment in advance of conducting the surveys, and insufficient interaction between data collectors, data compilers, and data analyzers.

Thank you for consideration of these comments and suggestions. Please acknowledge receipt of this letter and let us know how CDOW wishes to proceed.

Best regards,



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cc: Warren Ballard (via email)
Francie Pusateri
Gary White

CDOW ID and County	“Original Seq.” ID	Length Rank	Reported intercept (feet)	Comments
B005E Bent	266	1	18,989	Saw only 4 PDs in middle of intercept, most holes elsewhere had cobwebs and weeds blocking entrances, old poison oats seen; almost no PD burrows N of intercept for entire length (Photo 1); currently this intercept is largely inactive.
B077E Bent	337	2	17,995	No evidence that a colony was ever here; the west half of the intercept (state land) was examined; east half was observed through binoculars from high point in middle of intercept (Photo 2) and from road on east end; good visibility across entire length, no sign of a prairie dog mound (in any direction).
B074E Bent	334	3	17,406	Viewed from road only. Active PDs to east for 200m; no PDs seen to west for 200m (large canal and converted land) but visibility blocked beyond this.
KC95E Kiowa	767	4	15,050	Eastern 3/4 of transect inactive with nonexistent middle section (Photos 3, 4, 5). Small area on west end of intercept had some evidence of recent digging activity but was poisoned within last 24 hours (Photo 6). No living prairie dogs seen/heard, 2 dead on surface in poisoned area.
B068E Bent	328	16	3,404	Viewed from road only. No sign or sound of PDs in either direction; vacant burrows filling in, blocked with weeds and cobwebs, old poison oats visible.
B026E Bent	286	39	7,701	Were just a few active PD holes on west end of intercept, but no PDs seen or heard; majority was inactive with burrows filling in, blocked with weeds and cobwebs, old poison oats visible throughout town. Very east end had a few acres of active town with PDs seen and heard.

Table 1. Prairie dog activity observed during April 21-22, 2004 on 6 intercepts reported as having active prairie dog colonies during surveys conducted during 2002 by the Colorado Division of Wildlife. Photos referenced are presented at the end of this document (intercept numbers in photos refer to the “original sequence ID” in this table).

CDOW ID and County	“Original. Seq.” ID	Length Rank	Reported intercept (feet)	Comments
CC37E Crowley	580	19	3,204	Inactive as far as we could see from road (which was easily over 0.5 mi)
O16E Otero	1023	21	3,128	Could not find a colony, nor sign of a colony ever being present over the portion we could see. Does not look like PD habitat (large slopes, garbage dump, etc.)
O24E Otero	1030	48	2,190	PD colony is inactive – small active area ~0.75 mi south of intercept.
CC36E Crowley	579	75	1,819	Active colony only on a small portion of intersect (<600 ft), and only to west of road (which almost divides the intersect in two).
CC40E Crowley	583	85	1,712	Active colony only on a small portion of the intersect (<400 ft). The rest was inactive or without sign of a colony ever being present.

Table 2. Prairie dog activity observed from roads during March 20, 2004 on 5 intercepts reported as having active prairie dog colonies during surveys conducted during 2002 by the Colorado Division of Wildlife.

Appendix

Photos referenced in Table 1. Intercept numbers refer to “original sequence” ID in Table 1.



Photo 1: View looking west from the middle of intercept 266; no burrows to the north of the intercept. (photo reference number 0562).



Photo 2: View looking east from middle of intercept 337; no burrows seen in any direction. (photo reference number 0583).



Photo 3: Typical collapsed burrow on the east end of intercept 767. (photo reference number 0542).



Photo 4: Middle of intercept 767; no evidence of prairie dog burrows. (photo reference number 0545).



Photo 5: Old collapsed burrow in the middle of intercept 767; similar old collapsed burrows were evident from here to near the west end of this intercept. (photo reference number 0546).



Photo 6: West end of intercept 767 (the only currently occupied portion of this intercept); fresh poison was evident here. (photo reference number 0547).