Preliminary Report: Mapping Black-tailed Prairie Dog (*Cynomys ludovicianus*) Colonies Across Montana Using the 2005 National Agriculture Imagery Program (NAIP) Imagery

Prepared for:

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and

Montana Department of Fish, Wildlife, and Parks
Nongame Program

Prepared by:

Bryce A. Maxell, Scott Blum, and Karen Walker

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EXECUTIVE SUMMARY

Numerous animal and plant species are dependent on, or closely associated with, the burrowing and foraging activities of Black-tailed Prairie Dogs (*Cynomys ludovicianus*). In Montana, these species include the federally endangered Black-footed Ferret (*Mustela nigripes*) and numerous state Species of Concern such as the Ferruginous Hawk (*Buteo regalis*), Mountain Plover (*Charadrius montanus*), and Burrowing Owl (*Athene cunicularia*) (MPDWG 2002, MTNHP and MFWP 2010). To manage and protect Black-tailed Prairie Dogs and associated species, the Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana calls for statewide prairie dog abundance and distribution standards, including complexes defined by a 7km distance to nearest neighbor rule that are greater than 5,000 acres (Category 1), between 1,000 and 5,000 acres (Category 2), and less than 1,000 acres (Category 3) (MPDWG 2002). The conservation plan also calls for inventorying and monitoring prairie dog distribution and status and identifying isolated colonies in need of special consideration for conservation or possible use in restoration of colonies depopulated by plague. Achievement of these and other goals of the conservation plan has been hindered by inaccuracies in the most recent statewide polygonal GIS coverage for prairie dog colonies and incomplete mapping of prairie dog colonies across their range in Montana due to the associated logistical difficulties and costs of acquiring and maintaining this information.

In hopes of addressing these deficiencies and fulfilling the goals of the Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana, we completed a statewide pilot mapping of Black-tailed Prairie Dog colonies using natural color and color infrared images from the National Agriculture Imagery Program's (NAIP) 2005 imagery (USDA FSA 2010). We did this by coding a gridded network of one hectare (ha) cells as to whether they showed any evidence of vegetation or soil disturbance associated with the presence of recent prairie dog activity. We then buffered the resulting potential colony polygons to identify 1.5, 3.0, and 7.0 km complexes and summarized colony and complex numbers and acres by ownership (federal, state, tribal, private) and administrative unit (FWP region, BLM Field Office, Tribal Reservation, USFS District, and county).

We generally felt that the 2005 NAIP imagery worked well for identifying areas with evidence of recent activity for Black-tailed Prairie Dogs. Alterations to vegetation and mounds associated with their burrows seemed to stand out well against the background vegetation and soils in many areas at map scales of between 1:5,000 and 1:30,000; scales around 1:10,000 often seemed to work best. However, White-tailed Prairie Dog (*Cynomys leucurus)* colonies were not easily detected on the 2005 NAIP imagery, potentially as a result of extirpation of colonies and lower densities and less obvious burrow structures relative to Black-tailed Prairie Dogs. In addition, badland areas were problematic to review in general because the barren soils in these regions are similar in appearance to areas where prairie dogs have removed vegetation and created spoil piles from burrow diggings; areas in southern Phillips County were particularly problematic to review on this front. The area between Terry and Melstone was also a problematic area to review because, while there were apparent burrow entrances, the typical vegetation alterations associated with prairie dog activity were not always evident.

Areas with previous evidence for Black-tailed Prairie Dog activity were usually independently identified as having evidence for recent prairie dog activity on the 2005 NAIP imagery. Furthermore, it seems promising that potential colonies identified under this effort have size class and spatial distribution patterns that are similar to previously gathered information for Montana. However, it is important to note that estimates of acreage for areas with recent evidence of prairie dog activity are biased high by an unknown magnitude because other ground features, such as ant mounds and Richardson's Ground Squirrel (*Spermophilus richardsonii*) burrows, have likely been misinterpreted as evidence of recent prairie dog activity. Similarly, only a portion of each individual grid cell had to show evidence of recent prairie dog activity to be coded as such. Ground truthing is needed to correct for these biases.

Our digitization effort identified 8,852 potential prairie dog colonies on the 2005 NAIP imagery that range in size from 2.5 acres to 2,945 acres; 2,598 (29%) of these had previous confirmation of prairie dog activity in the immediate area. Potential colonies were identified in 8 counties that do not have previously confirmed observations of prairie dogs. For complexes defined by the 1.5 km distance rule, our effort identified 2,474 complexes that contain 2.5 to 38,766 acres of potential colonies. Ten of these complexes contain greater than 5,000 acres of potential prairie dog colonies, 73 complexes contain between 1,000 and 5,000 acres, and 2,391 complexes contain less than 1,000 acres. For complexes defined by the 3.0 km distance rule, our effort identified 1,032 complexes that contain 2.5 to 109,883 acres of potential colonies. Sixteen of these complexes contain greater than 5,000 acres of potential prairie dog colonies, 42 complexes contain between 1,000 and 5,000 acres, and 974 complexes contain less than 1,000 acres. For complexes defined by the 7.0 km distance rule, our effort identified 289 complexes that contain 2.5 to 397,086 acres of potential colonies. Six of these complexes contain greater than 5,000 acres of potential prairie dog colonies, 16 complexes contain between 1,000 and 5,000 acres, and 267 complexes contain less than 1,000 acres.

The colony boundaries defined by this mapping effort have not been verified with a ground truthing effort. Therefore, we suggest the following uses and limitations to this information:

(1) The 2,598 colonies identified on the 2005 NAIP imagery that are corroborated with other evidence of recent prairie dog activity in the statewide Point Observation Database should be immediately used in environmental reviews and other colonies should be added to this coverage as they are verified.
(2) Given the time delay involved, exact boundaries of colonies mapped from the 2005 NAIP imagery should be evaluated in the field for environmental reviews and other purposes for which an exact colony boundary is needed.
(3) Whether they have been corroborated with other evidence of recent activity or not, all potential colonies mapped in this effort should be used in conjunction with predicted distribution models to examine conservation priorities. However, finalization of conservation priorities in statewide or regional management plans should not proceed without evaluation with ground truthing.
(4) We strongly caution that acreage estimates resulting from this mapping effort should not be used in conservation plans or for other purposes until magnitudes of biases are identified with ground truthing and the appropriate corrections can be determined. We currently know that these estimates are likely to be biased high because other ground features such as ant mounds and Richardson's Ground Squirrel burrows have likely been misinterpreted as evidence of recent prairie dog activity and because many of the one ha grid cells were not fully occupied with evidence of recent prairie dog activity. On the other hand, we also have reason to believe that the estimates are biased low because many colonies smaller than an acre in size were likely missed by this mapping effort.

Finally, we strongly encourage ground truthing and would suggest the following approach:

(1) Ground truth potential colonies for evidence of recent prairie dog activity, current occupancy, and the presence of other species associated with praire dog colonies whenever possible in the course of other fieldwork. A coverage of colonies and one ha grid cells loaded onto GPS units or PDAs can greatly assist with this.
(2) Systematically ground truth all potential colonies identified outside of the current documented range of Black-tailed Prairie Dogs in order to expand knowledge of their known distribution, document isolated colonies, and identify ground features that are being misinterpreted as prairie dog burrows on the NAIP imagery.
(3) Ground truth a spatially balanced sample of all identified potential colonies and evaluate them for evidence of recent prairie dog activity, current occupancy, and the presence of other species associated with praire dog colonies.
(4) Intensively examine a spatially balanced sample of those colonies that are ground truthed by evaluating evidence of recent prairie dog activity and occupancy in each of the individual 1 ha grid cells that compose the potential colony as identified on the 2005 NAIP imagery.

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INTRODUCTION

Prior to widespread European settlement, Black-tailed Prairie Dogs (*Cynomys ludovicianus*) were widely distributed across the Great Plains of the United States with an overall estimated population of more than 5 billion animals (Hoogland 1996). In Montana, the species was abundant and widely distributed throughout grassland and shrub/grassland habitats east of the Continental Divide during the 1800s, but declined in abundance during the 20th century as a result of conversion of native rangelands to agricultural production, poisoning campaigns, sylvatic plague, urbanization, and recreational shooting (MPDWG 2002). The burrowing and foraging activities of this species have structured plant and animal communities across the Great Plains for the past 3 million years and numerous animal species are dependent on, or closely associated with, their colonies (Hoogland 1996, Roelle et al. 2006). In Montana, these species include the federally endangered Black-footed Ferret (*Mustela nigripes*) and numerous state Species of Concern such as the Ferruginous Hawk (*Buteo regalis*), Mountain Plover (*Charadrius montanus*), and Burrowing Owl (*Athene cunicularia*) (MPDWG 2002, MTNHP and MFWP 2010).

To manage and protect Black-tailed Prairie Dogs and species associated with prairie dog colonies, the Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana (MPDWG 2002) calls for statewide prairie dog abundance and distribution standards that:

> *achieve a mix of prairie dog colonies and complexes (groups of colonies) capable of accommodating Black-footed Ferret recovery, supporting viable, well-distributed populations of other wildlife species associated with prairie dogs, and capable of sustaining a viable population of black-tailed prairie dogs distributed over 90% of the historic range of the species*
> (page 15)

The conservation plan has specific goals for conservation of prairie dogs and associated species according to three categories of prairie dog colony size using a 7 km rule for distance to nearest neighbor as follows.

> *Category 1: A minimum of two black-tailed prairie dog complexes sufficient to maintain viable populations of black-footed ferrets. These should be at least 100 km apart, with each encompassing at least 5,000 acres of prairie dogs*
>
> *Category 2: A total of 36,000 acres occupied by black-tailed prairie dogs, composed of at least 20 complexes of at least 1,000 acres*
>
> *Category 3: Complexes less than 1,000 acres in size…plus scattered isolated colonies of any acreage*
> (pages 15-16)

The conservation plan also calls for inventorying and monitoring prairie dog distribution and status and identifying isolated colonies in need of special consideration for conservation or possible use in restoration of colonies depopulated by plague (MPDWG 2002). Achievement of these and other goals of the conservation plan has been hindered by incomplete mapping of prairie dog colonies across their range in Montana due to the associated logistical difficulties and costs of acquiring and maintaining this information. The most recent statewide polygonal GIS coverage for prairie dog colonies has a large number of inaccuracies in colony locations and boundaries and lacks mapping for large numbers of colonies on private lands.

Mapping prairie dog colonies using National Agriculture Imagery Program (NAIP) imagery from the U.S. Department of Agriculture's Farm Service Agency may be a cost effective means of acquiring and maintaining a statewide polygonal coverage that can be used to meet the goals of Montana's Conservation Plan for Black-tailed and White-tailed Prairie Dogs (MPDWG 2002). NAIP imagery is high resolution digital ortho photography gathered on a 3 to 5 year cycle during the growing season and is freely

available to government agencies and the general public within a year of its acquisition. NAIP imagery contains four bands of information (red, green, blue, and near infrared) to yield both natural color and color infrared images, is acquired at a one-meter ground sample distance (i.e., one-meter per pixel), and has a horizontal accuracy of six meters (USDA FSA 2010). Four-band NAIP imagery was acquired statewide with one-meter resolution for the first time in 2005 and was made available in the spring of 2006. Statewide four-band imagery was acquired again in 2009 and this was made available in early March of 2010. Cursory reviews of 2005 NAIP imagery in 2006 and 2007 showed promise for identification of prairie dog colonies and the Montana Department of Fish, Wildlife, and Parks (FWP), subsequently funded a pilot project to investigate its systematic use for this purpose (Maxell 2009a). After successful completion of the pilot project, the Miles City Field Office of the Bureau of Land Management (BLM) then funded this effort to systematically map prairie dog colonies across the remainder of the state.

PROJECT GOALS

The goals of this effort were to: (1) map areas with evidence of recent prairie dog activity on the 2005 NAIP imagery across the possible range of Black-tailed Prairie Dogs in Montana; (2) examine the use of NAIP imagery in detection of recent evidence of activity of White-tailed Prairie Dogs (*Cynomys leucurus*); (3) identify complexes of colonies using the 7 km rule in the Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana (MPDWG 2002), a 1.5 km rule proposed for use in complexes for recovery of Black-footed Ferrets (Biggins et al. 2006), and an intermediate 3 km rule that may be useful in identifying linkage areas between complexes; (4) identify acres and the size class distribution of colonies in each complex relative to the Category 1 (>5,000 acres), Category 2 (1,000-5,000 acres), and Category 3 (<1,000 acres) criteria in the conservation plan (MPDWG 2002); (5) summarize numbers and acres of colonies and complexes by ownership (federal, state, tribal, private) and administrative unit (FWP region, BLM Field Office, Tribal Reservation, USFS District, and county); (6) begin to evaluate this mapping effort by identifying the number of polygons mapped with previous evidence of prairie dog activity from ground or flight surveys; and (7) develop a draft plan for ground truthing and managing the polygons that have been mapped.

METHODS

Digitization of Prairie Dog Colonies

We used ArcMap 9.3 © ESRI software and file geodatabase for digitization and subsequent GIS and tabular analyses. In order to provide for faster processing times and more manageable datasets during the digitization effort, all areas east of the Continental Divide were broken up into 717 tiles each covering an area of 400 square kilometers (20 km on a side) using the Marine Geospatial Ecology Fishnet Tool. We then classified tiles as high density, low density, or no documented presence of prairie dog colonies based on the density of prairie dog colonies recorded in the statewide Point Observation Database (POD) and predicted distribution models created by the Montana Natural Heritage Program using the methodology outlined in Maxell; tiles that were heavily forested mountainous areas were excluded (2009b) (Figures 1 and 2).

Within each of the 20 km x 20 km tiles, we documented areas with recent evidence of prairie dog activity using a network of 40,000 one ha grid cells (100 meters on each side) rather than trying to digitize colony boundaries in order to enhance repeatability of classifications across different colonies and observers. We chose this grid cell size because it allowed patterns associated with mounds and burrow entrances to be detected on the NAIP imagery within individual grid cells so that they could be coded somewhat independently of one another. Similarly, we felt this grid cell size would be an appropriate scale for on-

the-ground evaluations of grid cells. However, this approach does bias acreage estimates high because only a portion of each individual grid cell had to show evidence of recent prairie dog activity to be coded as such. Each grid cell was examined for evidence of recent prairie dog activity on high resolution true color and color infrared 2005 NAIP imagery at scales varying between 1:3,000 and 1:30,000 on a 19 inch computer screen. Smaller map scales were more useful in detecting vegetation contrasts resulting from prairie dog activity and larger map scales were more useful in detecting mounds associated with burrow entrances; scanning tiles at a scale of 1:10,000 often seemed to work best. At the beginning of our efforts we discussed coding of grid cells in detail as a group, but only one of us (SAB) coded all of the grid cells for purposes of consistency. Models identifying slopes less than 10 percent, digital topographic maps, black and white digital ortho quadrangle maps, and predicted distribution models of prairie dogs were also used at these scales to assist the digitizing process by locating flat areas and areas with vegetation contrasts indicative of recent evidence of prairie dog activity. However, 1 ha grid cells were only classified as having evidence of recent prairie dog activity if they contained evidence of mounds at the mouths of prairie dog burrows somewhere within the grid cell on the 2005 NAIP imagery (Figure 3).

All initial examination and coding of grid cells as having "evidence for recent activity = 1" or having "no evidence for recent activity = 0" were made blind to any documentation of the known locations of prairie dog towns. However, after all grid cells on each 20 km x 20 km tile were initially coded, a second pass was made through each tile using prairie dog town locations documented in the statewide observation database and flight intercepts from FWP's 2008 aerial surveys (Figures 4 and 5). Any additional colonies with obvious mounds at the mouths of burrows detected on the 2005 NAIP imagery on this second pass were then coded as "assisted evidence for recent activity = 2". After the second pass through each 20 km x 20 km tile the following statistics were recorded: (1) total number of colonies digitized; (2) total number of unique colonies mapped in statewide point observation database; (3) total number of flight intercepts of colonies during FWP's 2008 aerial surveys; (4) total number of colonies initially missed, but found with the assistance of observations in the statewide point observation database; (5) total number of colonies initially missed, but found with the assistance of FWP's 2008 aerial surveys; (6) total number of previously undocumented colonies prior to this effort; (7) total number of observations in the statewide point observation database with no colony evident on the 2005 NAIP imagery; and (8) total number of flight intercepts during FWP's 2008 aerial surveys with no colony evident on the 2005 NAIP imagery (Appendix A).

Analyses of Colonies and Complexes

After completing the digitizing effort, we merged grid cells in all 717 of the 20 km x 20 km tiles into a single vector coverage and dissolved adjacent individual grid cells into colonies for additional analyses; grid cells that only touched another grid cell on a corner were assigned a separate colony identification number. Colonies were buffered by 750, 1,500, and 3,500 meters using the Analysis/Proximity/Buffer tool to create the 1.5, 3.0, and 7.0 km complex boundaries. For each complex distance rule, the "Dissolve Type = All" option was used to dissolve overlapping buffers and create a single multipart polygon. We then exploded this multipart polygon into separate polygons with unique identification numbers for each complex using the Data Management/Features/Multipart to Singlepart tool. We used spatial joins to identify colonies with previous corroborating evidence of prairie dog activity and to assign colonies to the complexes they fell within under each of the 1.5, 3.0, and 7.0 km complex rules. We assigned colonies and complexes to various administrative boundaries (BLM Field Offices, FWP Regions, Tribal Reservations, U.S. Forest Service Districts, Counties) and land ownership classes (federal, state, tribal, and private) using the Analysis/Overlay/Identity tool. Finally, we summarized acres for each complex under the three complex rules for various administrative boundaries and land ownership types using group by queries in a file geodatabase. Figures and charts were created in ArcMap 9.3 © ESRI software and Microsoft Excel.

RESULTS

Summaries of Potential Colonies and Complexes

It is important to note that the following estimates of acreage for areas with recent evidence of prairie dog activity are biased high by an unknown magnitude because other ground features, such as ant mounds and Richardson's Ground Squirrel (*Spermophilus richardsonii*) burrows, have likely been misinterpreted as evidence of recent prairie dog activity and because only a portion of each individual grid cell had to show evidence of recent prairie dog activity to be coded as such. Ground truthing is needed to correct for this bias. In the mean time, we will refer to these as potential colonies and complexes. It is also important to note that White-tailed Prairie Dog colonies were not easily detected on the 2005 NAIP imagery, potentially as a result of extirpation of colonies and lower densities and less obvious burrow structures relative to Black-tailed Prairie Dogs (Appendix A, MPDWG 2002). Thus, the following results and discussion pertain almost solely to Black-tailed Prairie Dogs.

Our digitization effort identified 8,852 potential prairie dog colonies on the 2005 NAIP imagery that range in size from 2.5 acres to 2,945 acres (Table 1). The potential colonies are spatially distributed in a pattern that closely agrees with previous confirmed evidence of prairie dog activity and 2,598 (29%) of them had previous confirmation of prairie dog activity in the immediate area (Figure 6). However, large numbers of potential colonies were newly identified on individual 20 km x 20 km map tiles (Appendix A). Twenty-two of these potential colonies are between 1,000 and 5,000 acres in size and 8,830 are less than 1,000 acres in size with most of these being less than 500 acres. The modal size class for colonies is 11-50 acres (Figure 7a), similar to that reported in the 2002 Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana (MPDWG 2002). The modal size class for total acreage of potential prairie dog towns in the complexes defined by the 1.5, 3.0, and 7.0 km distance rule is 101 to 500 acres (Figures 7b-d). Private land ownership is the dominant ownership for 6,214 potential colonies (70.2%) totaling 427,197 acres (Figure 8). This is followed by federal (dominant for 1,227 potential colonies (14%) totaling 94,465 acres), tribal (dominant for 739 potential colonies (8.3%) totaling 65,283 acres), and state (dominant for 665 potential colonies (7.5%) totaling 58,588 acres).

Summaries of the numbers and acres of potential prairie dog colonies by various administrative units closely matches patterns presented in the 2002 Conservation Plan for Black-tailed and White-tailed Prairie Dogs in Montana, but numbers of potential colonies and total acres are much higher with this effort (Tables 2-6, Appendix A, MPDWG 2002). Montana Fish, Wildlife, and Parks Region 7 is the dominant FWP Region for numbers of potential colonies (5,184 – 58.6%) and total acres (337,979 – 52.3%), but Regions 5 and 6 also have large numbers and total acres (Table 2). The Miles City Field Office of the BLM is the dominant BLM Field Office for numbers of potential colonies (5,268 – 59.5%) and total acres (342,471 – 53%), but the Malta and Billings Field Offices also have large numbers of potential colonies and total acres (Table 3). Six tribal reservations have some evidence of recent prairie dog activity within their administrative boundaries; Crow (450 potential colonies and 30,431 acres), Fort Belknap (273 potential colonies and 34,729 acres), Northern Cheyenne (166 potential colonies and 9,987 acres), Fort Peck (17 potential colonies and 1,194 acres), Blackfeet (4 potential colonies and 192 acres), and Rocky Boys (1 potential colony and 59 acres) (Table 4). Three U.S. Forest Service Districts have some evidence of recent prairie dog activity; Ashland Ranger District of the Custer Forest (98 potential colonies and 3,406 acres), Beartooth Ranger District of the Custer Forest (5 potential colonies and 188 acres), and the Helena Ranger District of the Helena Forest (1 potential colony and 77 acres) (Table 5). Forty-four counties have some evidence of recent prairie dog activity, including 8 that do not have previously confirmed observations of prairie dogs; Daniels, Gallatin, Glacier, Madison, Meagher, Roosevelt, Sheridan, and Wibaux Counties (Table 6). The top six counties by numbers of potential colonies and total acres are Rosebud (1,833 potential colonies and 136,363 acres), Custer (1,709 potential colonies and 89,201 acres), Phillips (749 potential colonies and 74,193 acres), Powder River (621

potential colonies and 38,636 acres), Blaine (319 potential colonies and 35,503 acres), and Big Horn (569 potential colonies and 35,291 acres).

For complexes defined by the 1.5 km distance rule, our effort identified 2,474 complexes that contain 2.5 to 38,766 acres of potential colonies. Ten of these complexes contain greater than 5,000 acres of potential prairie dog colonies, 73 complexes contain between 1,000 and 5,000 acres, and 2,391 complexes contain less than 1,000 acres (Table 1, Figure 9a). Private land ownership is the dominant land ownership for six of the ten 1.5 km complexes containing greater than 5,000 acres of potential prairie dog colonies (average of 85% private; range 80-90%), with tribal ownership dominant for three (average of 74% tribal; range 68-78%) and federal ownership dominant for one (82% federal) (Figure 9b).

For complexes defined by the 3.0 km distance rule, our effort identified 1,032 complexes that contain 2.5 to 109,883 acres of potential colonies. Sixteen of these complexes contain greater than 5,000 acres of potential prairie dog colonies, 42 complexes contain between 1,000 and 5,000 acres, and 974 complexes contain less than 1,000 acres (Table 1, Figure 10a). Private land ownership is the dominant land ownership for fourteen of the sixteen 3.0 km complexes containing greater than 5,000 acres of potential prairie dog colonies (average of 79% private; range 55-90%), with tribal ownership dominant for one (52% tribal) and federal ownership dominant for one (41% federal) (Figure 10b).

For complexes defined by the 7.0 km distance rule, our effort identified 289 complexes that contain 2.5 to 397,086 acres of potential colonies. Six of these complexes contain greater than 5,000 acres of potential prairie dog colonies, 16 complexes contain between 1,000 and 5,000 acres, and 267 complexes contain less than 1,000 acres (Table 1, Figure 11a). Private land ownership is the dominant land ownership for four of the six 7.0 km complexes containing greater than 5,000 acres of potential prairie dog colonies (average of 75% private; range 59-98%), with tribal ownership dominant for one (65% tribal) and federal ownership dominant for one (39% federal) (Figure 11b).

DISCUSSION / RECOMMENDATIONS

Strengths and Weaknesses of Digitization from NAIP Imagery

This mapping approach needs to be fully evaluated with systematic ground truthing to determine the level of accuracy for evidence of recent prairie dog activity and spatial coverage of individual colonies. In the mean time, it should be noted that the current mapping is biased high by an unknown magnitude because other ground features such as ant mounds and Richardson's Ground Squirrel (*Spermophilus richardsonii*) burrows have likely been misinterpreted as evidence of recent prairie dog activity.

Despite the fact that we do not know the true magnitude of these complications, we generally felt that the 2005 NAIP imagery worked well for identifying areas with evidence of recent prairie dog activity. Alterations to vegetation and mounds associated with burrows seemed to stand out well against the background vegetation and soils in many areas at map scales of between 1:5,000 and 1:30,000; scales around 1:10,000 often seemed to work best. However, badland areas were problematic to review in general because the barren soils in these regions are similar in appearance to areas where prairie dogs have removed vegetation and created spoil piles from burrow diggings; areas in southern Phillips County were particularly problematic to review on this front. The area between Terry and Melstone was also a problematic area to review because, while there were apparent burrow entrances, the typical vegetation alterations associated with prairie dog activity were not always evident.

It seems promising that potential colonies identified under this effort have size class and spatial distribution patterns that are similar to previous information for Montana (Tables 2-6, Figures 6 and 7a-d, MPDWG 2002). Areas with previous evidence for prairie dog activity in the statewide Point Observation Database or the 2008 aerial surveys conducted by FWP were usually independently identified as having evidence for recent prairie dog activity on the 2005 NAIP imagery and 2,598 of them had previous confirmation of prairie dog activity in the immediate area (Appendix A). On average, across all 3 density strata, there were 0.51 towns per 20 km x 20 km tile mapped in the statewide Point Observation Database that were missed during the initial review with this effort. Similarly, on average across all three density strata, there were 0.13 towns per 20 km x 20 km tile with flight intercepts from the 2008 aerial surveys that were initially missed with this effort. The majority of the towns missed on the initial review were less than 4 ha in size so these smaller towns appear to be the largest source of detection failure. On average, across all 3 density strata, there were 0.65 towns per 20 km x 20 km tile that were mapped in the statewide Point Observation Database, but had no evidence for prairie dog burrows on the 2005 NAIP imagery. This is probably partially due to mapping errors in the current statewide database and partially due to towns that have been extirpated long enough that burrow entrances are no longer evident on the 2005 NAIP imagery. POD records may date back 200 years, so this scenario is very possible. The recent FWP 2008 flight surveys had a much lower discrepancy with our mapping effort. On average, across all 3 density strata, only 0.06 colonies per 20 km x 20 km tile that had been designated as intersecting prairie dog towns with the 2008 FWP aerial surveys had no evidence for prairie dog burrows on the 2005 NAIP imagery. This is most likely due to colonization of new towns after the 2005 NAIP imagery was collected. The most significant differences between this and previous mapping efforts is that more potential colonies were identified with this effort and a small number of these were in areas without previous evidence of prairie dog activity (Figure 6, Appendix A). On average across all three density strata, there were 7.3 newly identified potential colonies per 20 km x 20 km tile.

From a mechanical perspective, it worked well to use 20 km x 20 km tiles of one ha grid cells because the tiles allowed for faster processing times and areas that could be assessed in a reasonable amount of time in order to prevent digitizer burn out. Scoring 1 ha grid cells for evidence of recent prairie dog activity greatly assisted with consistency and repeatability of delineating prairie dog activity over heads-up digitizing of polygon boundaries in the GIS. It is important to note that this is another source of error that will systematically bias estimates of total acres of recent prairie dog activity high because not all portions

of all grid cells have evidence of recent activity. However, the consistency and repeatability afforded by this scoring approach probably outweighs problems created by this bias. It is possible that this bias could be systematically corrected through efforts such as reducing the resulting colony polygons by a 100-meter buffer distance to essentially remove all of the outer grid cells, but this would only be necessary for some applications of this information.

Suggested Uses and Limitations of NAIP Mapped Colonies and Complexes

The colony boundaries defined by this mapping effort have not been verified with a ground truthing effort. Therefore, we suggest the following uses and limitations to this information:

(1) The 2,598 colonies identified on the 2005 NAIP imagery that are corroborated with other evidence of recent prairie dog activity in the statewide Point Observation Database should be immediately used in environmental reviews and other colonies should be added to this coverage as they are verified.

(2) Given the time delay involved, exact boundaries of colonies mapped from the 2005 NAIP imagery should be evaluated in the field for environmental reviews and other purposes for which an exact colony boundary is needed.

(3) Whether they have been corroborated with other evidence of recent activity or not, all potential colonies mapped in this effort should be used in conjunction with predicted distribution models to begin to examine regional or statewide conservation priorities. However, finalization of conservation priorities in statewide or regional management plans should not proceed without evaluation with ground truthing.

(4) We strongly caution that acreage estimates resulting from this mapping effort should not be used in conservation plans or for other purposes until magnitudes of biases are identified with ground truthing and the appropriate corrections can be determined. We currently know that these estimates are likely to be biased high because other ground features such as ant mounds and Richardson's Ground Squirrel burrows have likely been misinterpreted as evidence of recent prairie dog activity and because many of the one ha grid cells were not fully occupied with evidence of recent prairie dog activity. On the other hand, we also have reason to believe that the estimates are biased low because many colonies smaller than an acre in size were likely missed by this mapping effort.

Suggestions for Ground Truthing

A ground truthing effort to evaluate this mapping endeavor is problematic because the imagery dates to 2005 and substantial changes in prairie dog activity may have occurred during the intervening years (e.g., sylvatic plague has impacted a large number of colonies across the state in recent years). Ground truthing the 2009 NAIP imagery or other future versions of the NAIP imagery are likely to continue to be problematic because NAIP imagery is not generally made available until the spring following the year imagery was captured and it takes several months to evaluate the 1 ha grid cell network for evidence of recent prairie dog activity. Thus, there is always likely to be a 1 to 2 year interval between collection of the imagery and ground truthing. Therefore, we believe that any ground truthed evaluation of mapping from NAIP imagery will have to focus on whether an area shows signs of recent evidence of prairie dog activity rather than just whether or not a colony is currently active. With this in mind, we suggest that the potential colonies identified from the 2005 NAIP imagery be used to plan a ground truthing effort of both the 2005 and 2009 NAIP imagery and that the 2009 NAIP imagery should be systematically evaluated for evidence of recent prairie dog activity in a manner consistent with the effort described in this report.

We would suggest the following approach to ground truthing:

(1) Ground truth potential colonies for evidence of recent prairie dog activity, current occupancy, and the presence of other species associated with praire dog colonies whenever possible in the course of other fieldwork. A coverage of colonies and one ha grid cells loaded onto GPS units or PDAs can greatly assist with this.

(2) Systematically ground truth all potential colonies identified outside of the current documented range of Black-tailed Prairie Dogs in order to expand knowledge of their known distribution, document

isolated colonies, and identify ground features that are being misinterpreted as prairie dog burrows on the NAIP imagery.

(3) Ground truth a spatially balanced sample of all identified potential colonies and evaluate them for evidence of recent prairie dog activity, current occupancy, and the presence of other species associated with praire dog colonies.

(4) Intensively examine a spatially balanced sample of those colonies that are ground truthed by evaluating evidence of recent prairie dog activity and occupancy in each of the individual 1 ha grid cells that compose the potential colony as identified on the 2005 NAIP imagery.

Suggestions for Future Digitizing and Management of a Statewide Database of Colony Boundaries

We suggest that future digitizing of potential prairie dog colonies be performed both blindly across the known range of Black-tailed Prairie Dogs and with intensive focus on previously detected colonies in order to evaluate potential changes in colony boundaries over time. We also suggest that all point, flight intercept, previous polygon boundaries, and 1 ha grid cell evaluations of 2005, 2009, and future NAIP imagery be managed in a single central file geodatabase. The central feature class in this geodatabase would be a master layer of one ha grid cells that would contain the following attribute fields at a minimum:

(1) Colony ID
(2) Evidence of recent prairie dog activity for each NAIP year (one field for each NAIP year).
(3) Confirmation of activity at any point in time (Y/N)
(4) Most recent date of confirmed activity (date field)
(5) History of confirmed activity (text field summarizing visits to colony)
(6) Maximum extent acres
(7) Complex ID (one field for each different distance rule desired)

This would allow a maximum extent polygon to be tracked over time and used in environmental reviews while the extent of a colony at any one time could be tracked via 1 ha grid cells on a particular NAIP year or polygons recorded on the ground with a GPS unit which would be managed in separate feature classes. Confirmation of activity through ground based point observations or points or flight intercepts gathered during aerial surveys would also be managed as separate point or line feature classes in the geodatabase and would be used to update the attributes of the central maximum extent feature class.

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FIGURES

Figure 1. Point observations and 20 km x 20 km tiles coded as high density (red), low density (green), and no previously documented prairie dog activity (blue). Heavily forested mountainous areas were excluded from review.

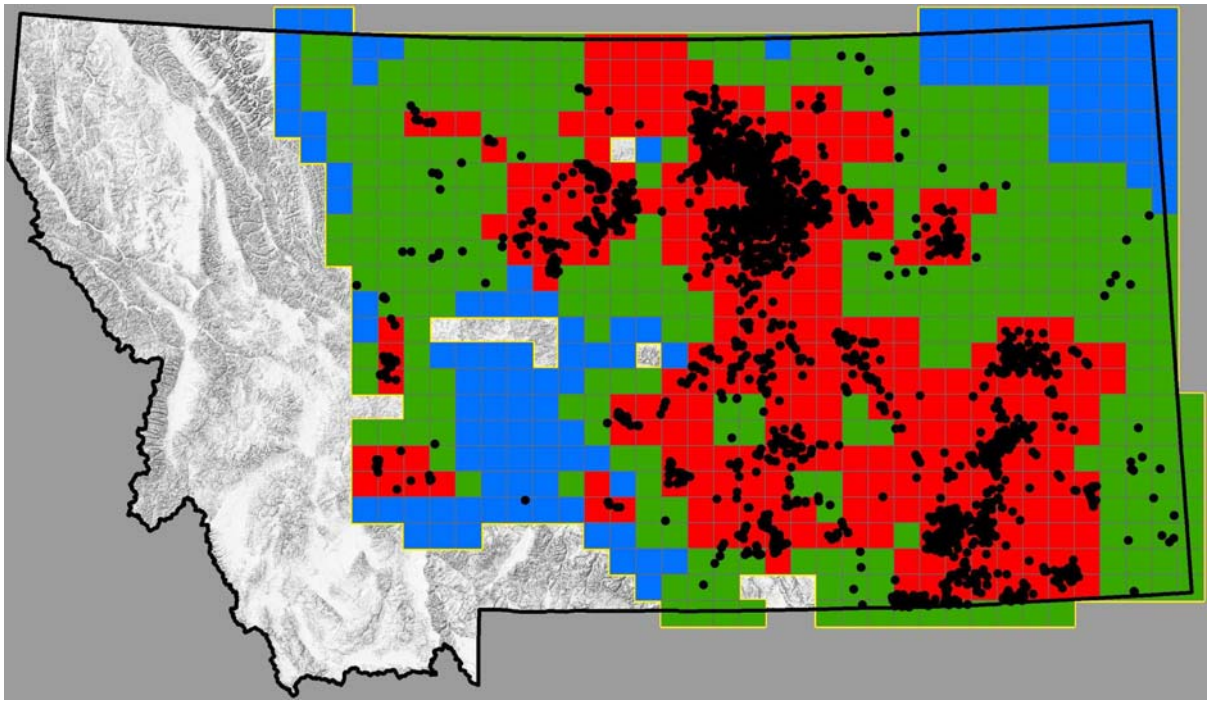


Figure 2. Predicted distribution model (blue is predicted low habitat suitability and red is predicted high habitat suitability) overlaid by 20 km x 20 km tiles coded as high density (red), low density (green), and no previously documented prairie dog activity (blue).

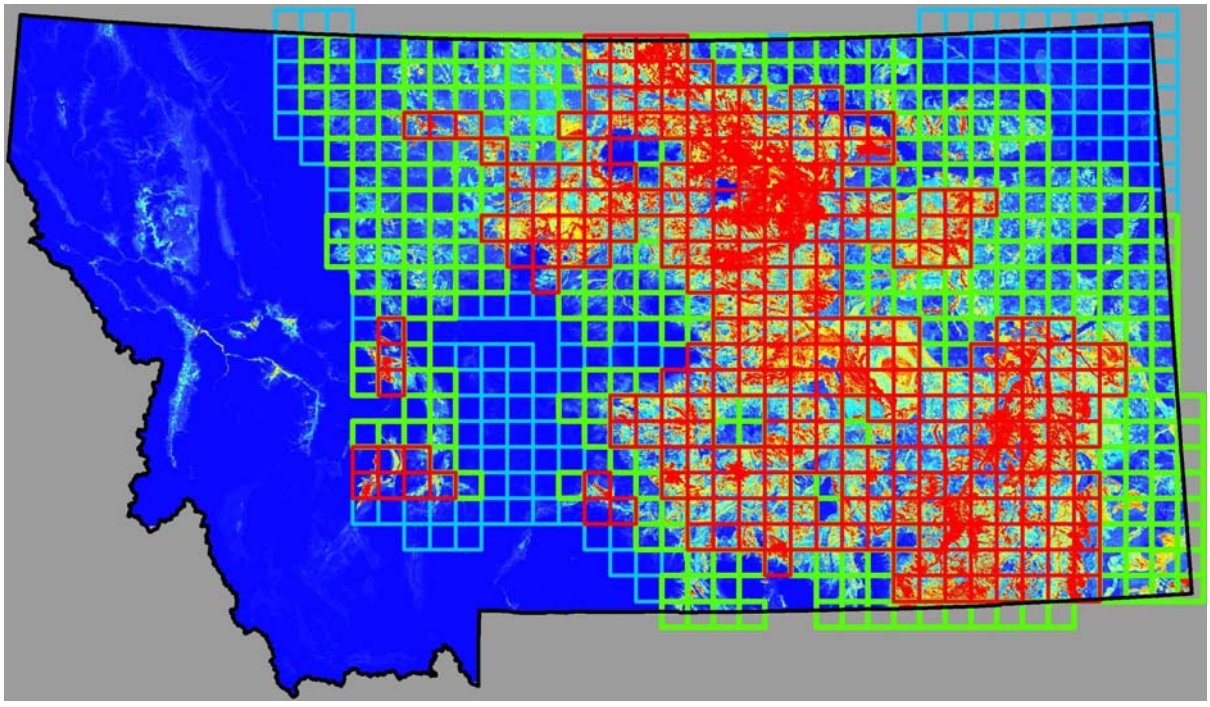


Figure 3. Example of one hectare grid cell network overlying the 2005 NAIP imagery with areas coded for evidence of recent prairie dog activity (orange cells). Grid cells had to have evidence of mounds at the mouths of prairie dog burrows somewhere within the grid cell to be coded as having evidence of recent prairie dog activity.

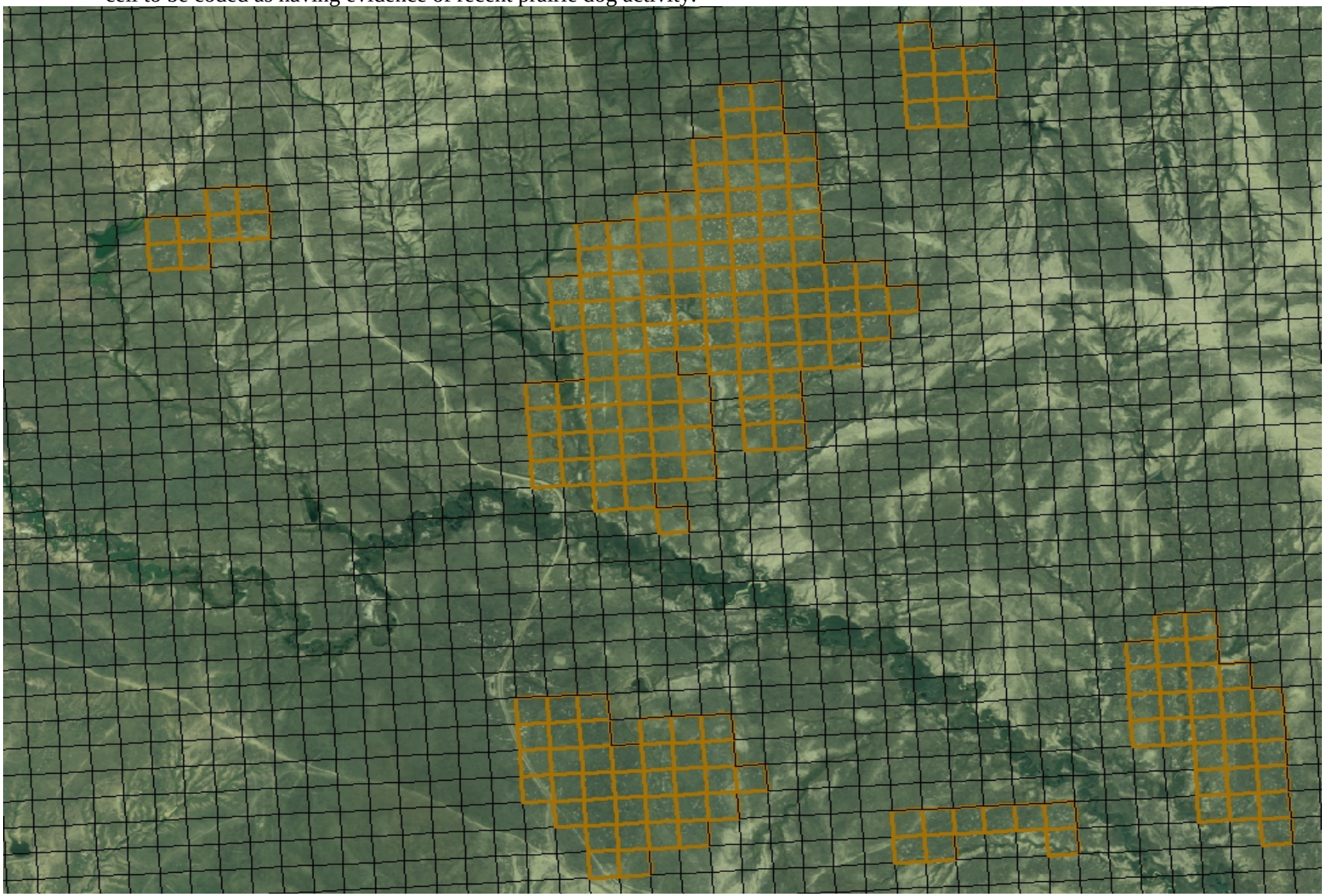


Figure 4. Example of one hectare grid cells coded as having evidence of recent prairie dog activity (cells with darker shading) and aerial flight intercept lines from 2008 FWP aerial surveys (red lines). Although the 2005 NAIP image did not have evidence of prairie dog burrows on one of the 2008 FWP flight intercepts on the right side of this image, these discrepancies were rare and are probably mostly indicative of town expansion or contraction between 2005 and 2008.

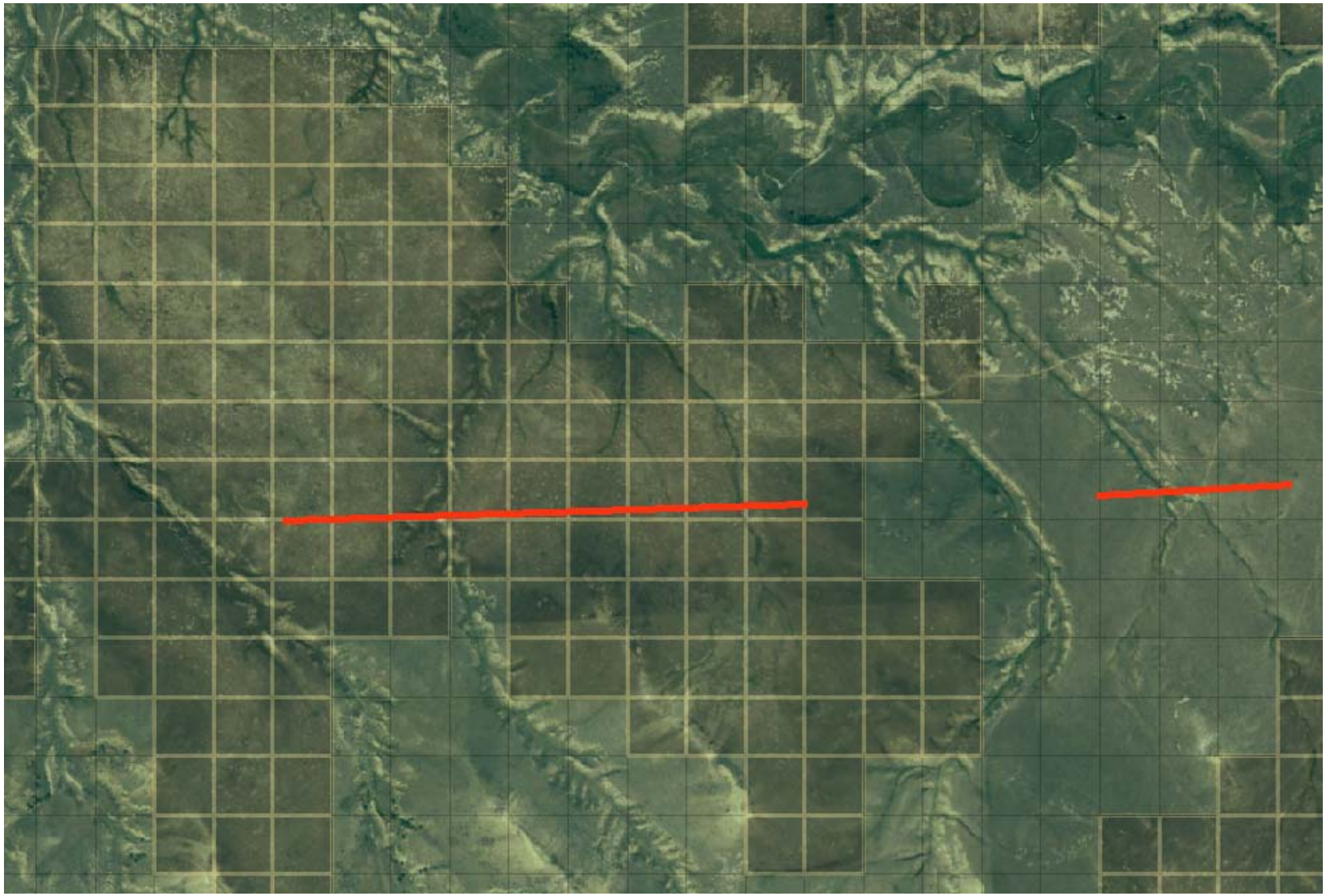


Figure 5. Example of 20 km x 20 km tiles (yellow lines) with one hectare grid cells coded for evidence of recent prairie dog activity (lighter small grid cells), previous observations of Black-tailed Prairie Dogs in the statewide Point Observation Database (yellow points) and flight intercepts of Black-tailed Prairie Dog colonies recorded during FWP's 2008 aerial surveys (red lines). Grid cells were initially evaluated for evidence of recent activity blind to other data, but a second pass was made through each tile for comparison (Appendix A).

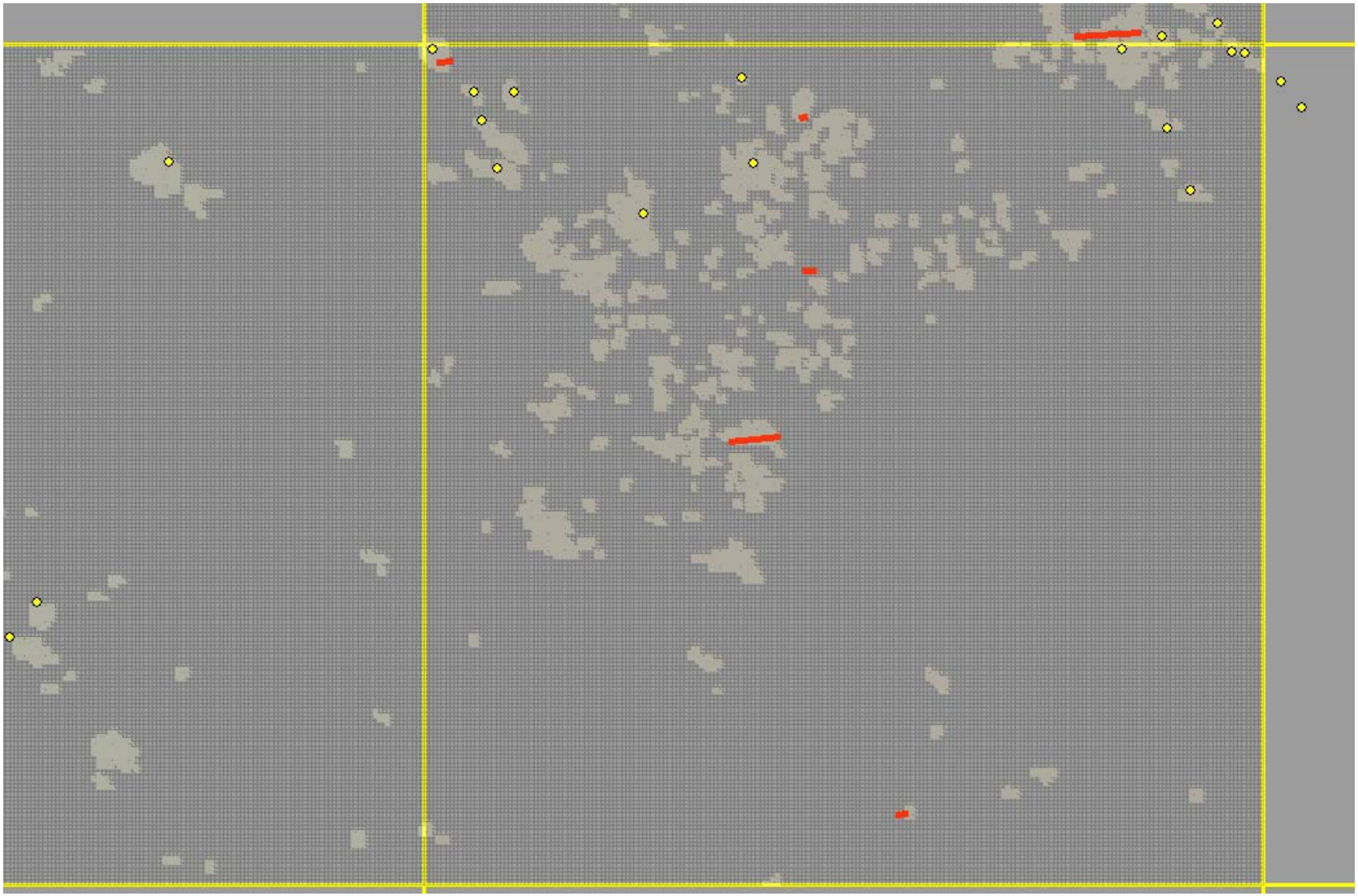


Figure 6. Potential prairie dog colonies digitized from the 2005 NAIP imagery (black) along with previously confirmed areas with Black-tailed Prairie Dog activity in the statewide point observation database (purple) and flight intercepts of Black-tailed Prairie Dog colonies recorded during FWP's 2008 aerial surveys (red).

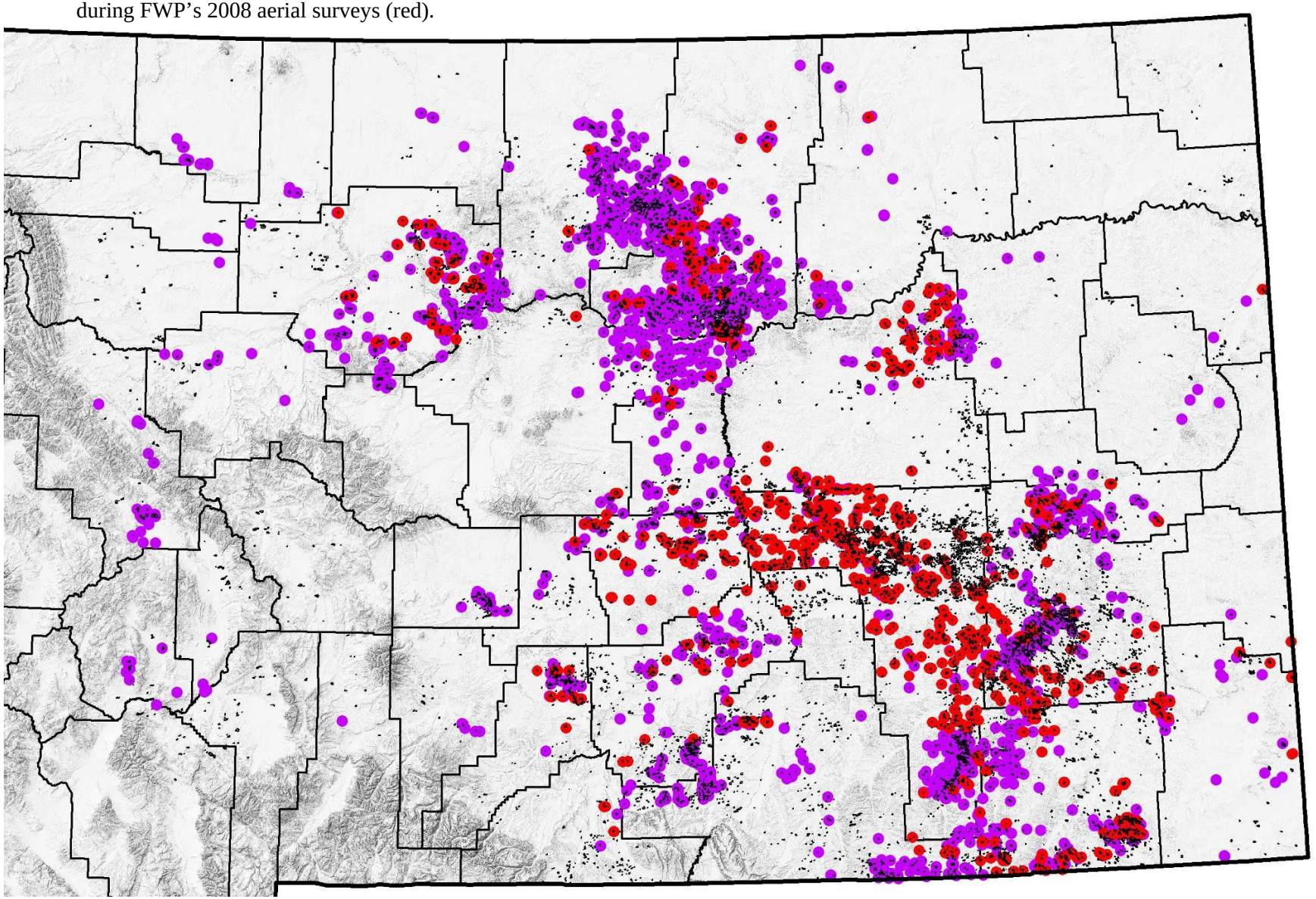
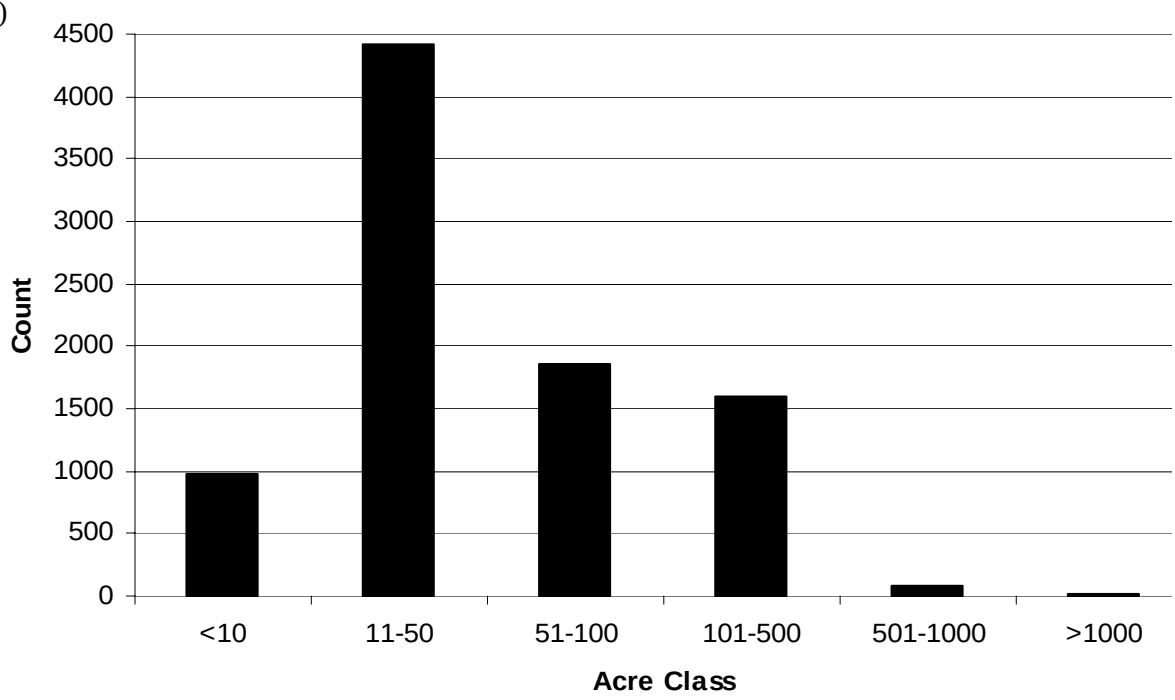


Figure 7. Size class distribution of potential prairie dog colonies digitized from the 2005 NAIP imagery (black) (A), and total acres of potential prairie dog colonies within complexes defined by the 1.5 km (B), 3.0 km (C), and 7.0 km (D) distance rules.

(A)



(B)

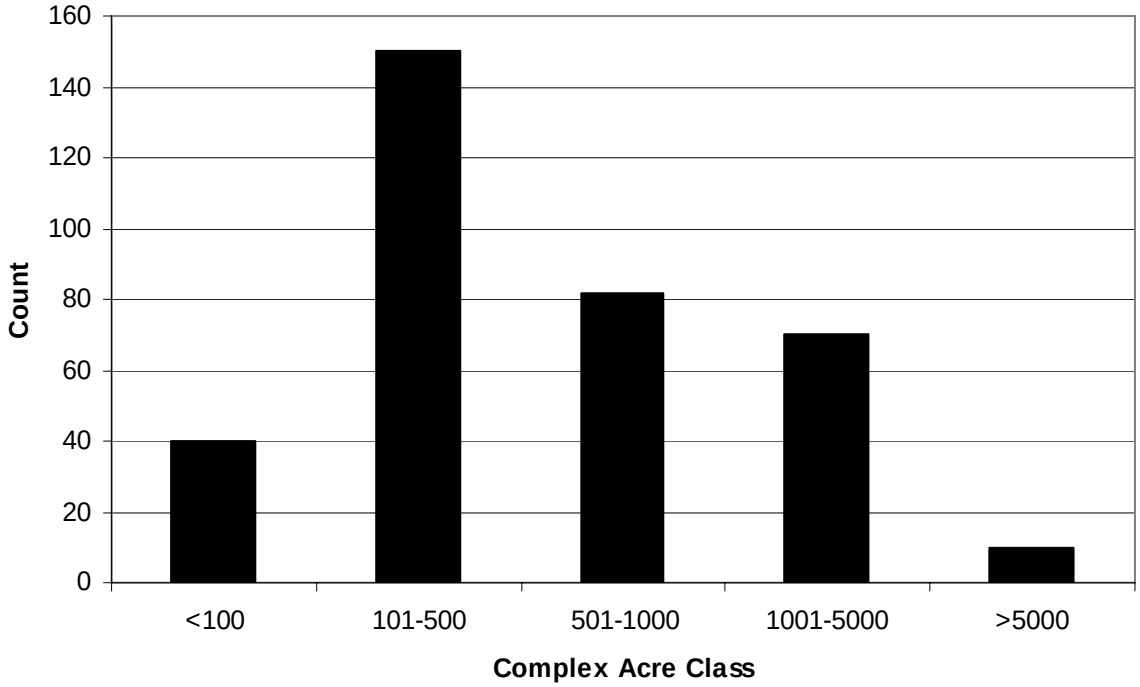
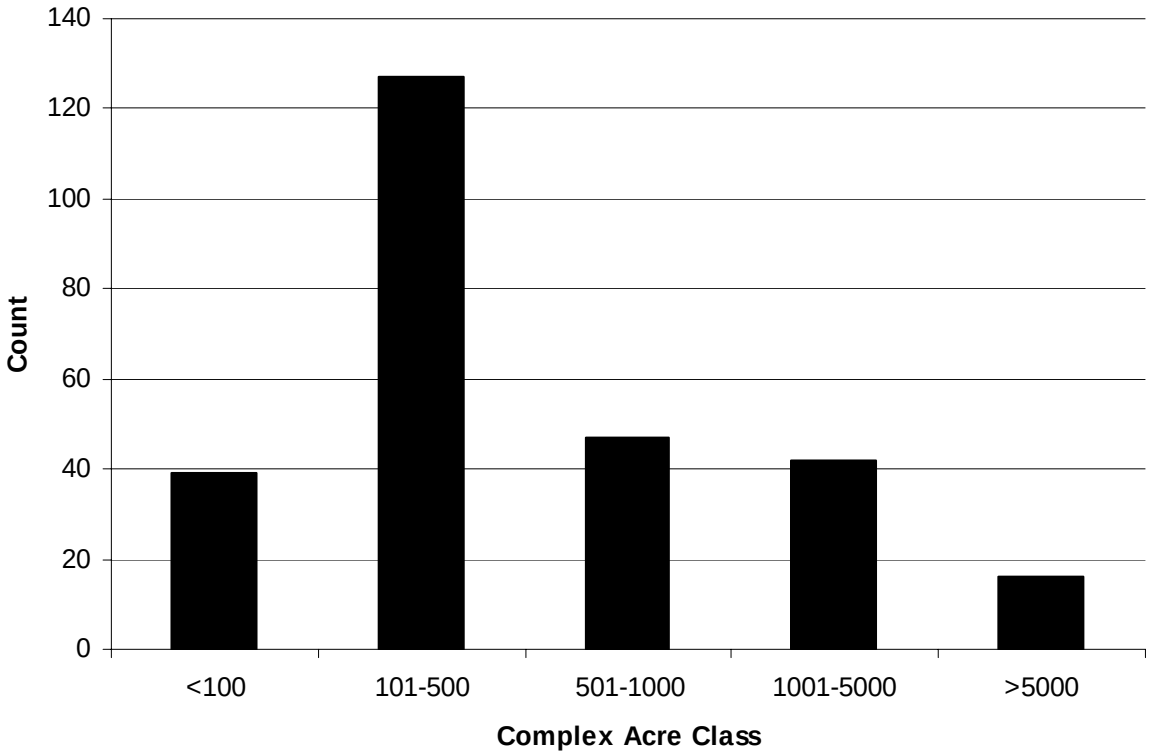


Figure 7 continued.

(C)



(D)

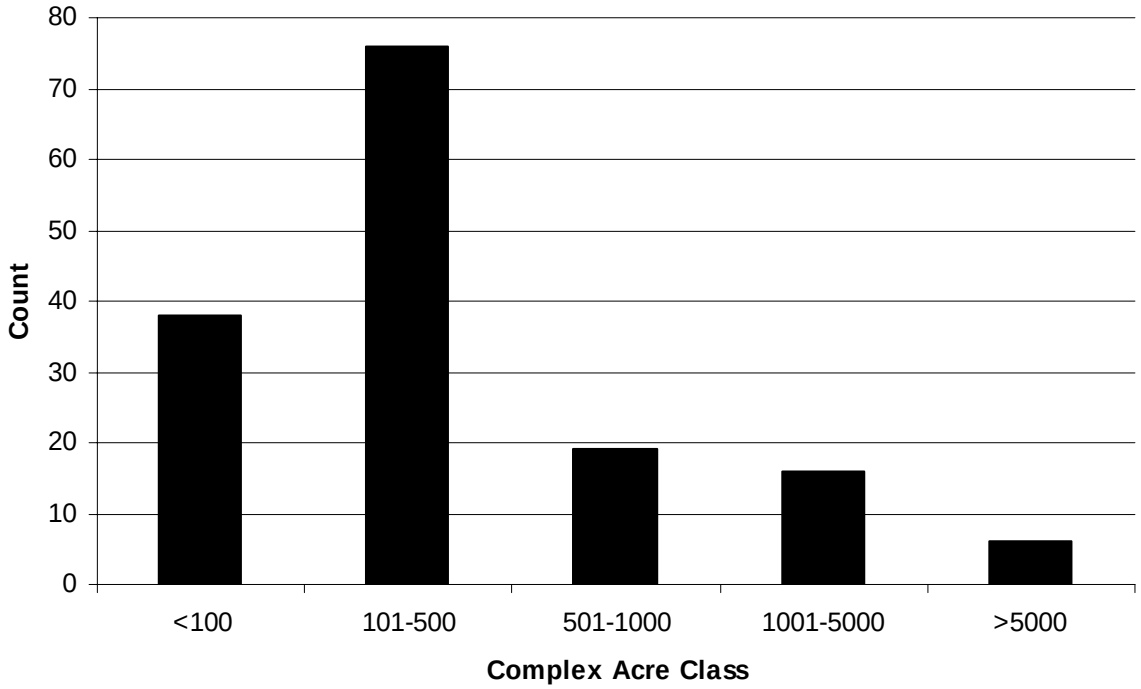


Figure 8. Dominant ownership of colonies; private (gray), federal (yellow), tribal (brown), state (blue).

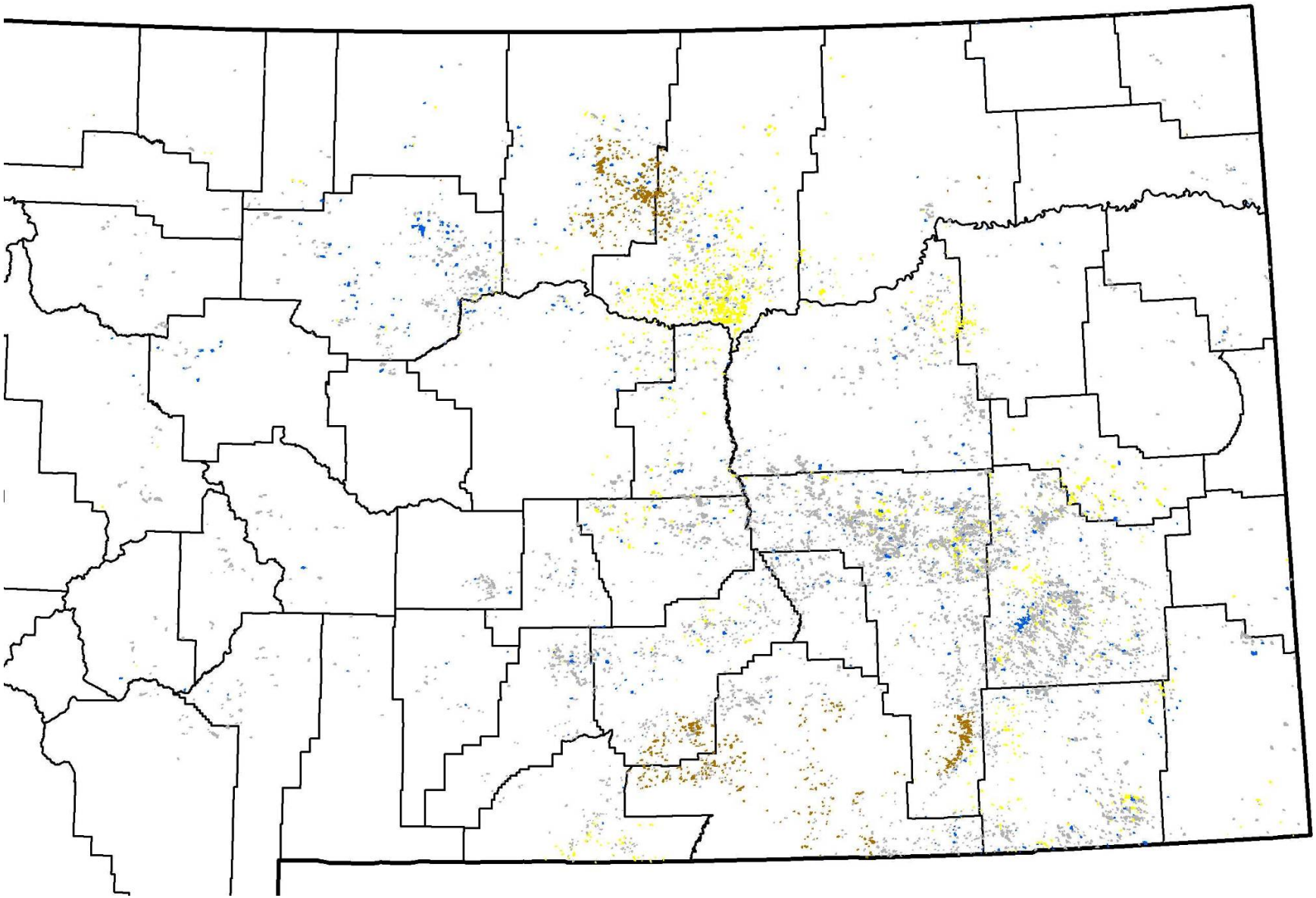
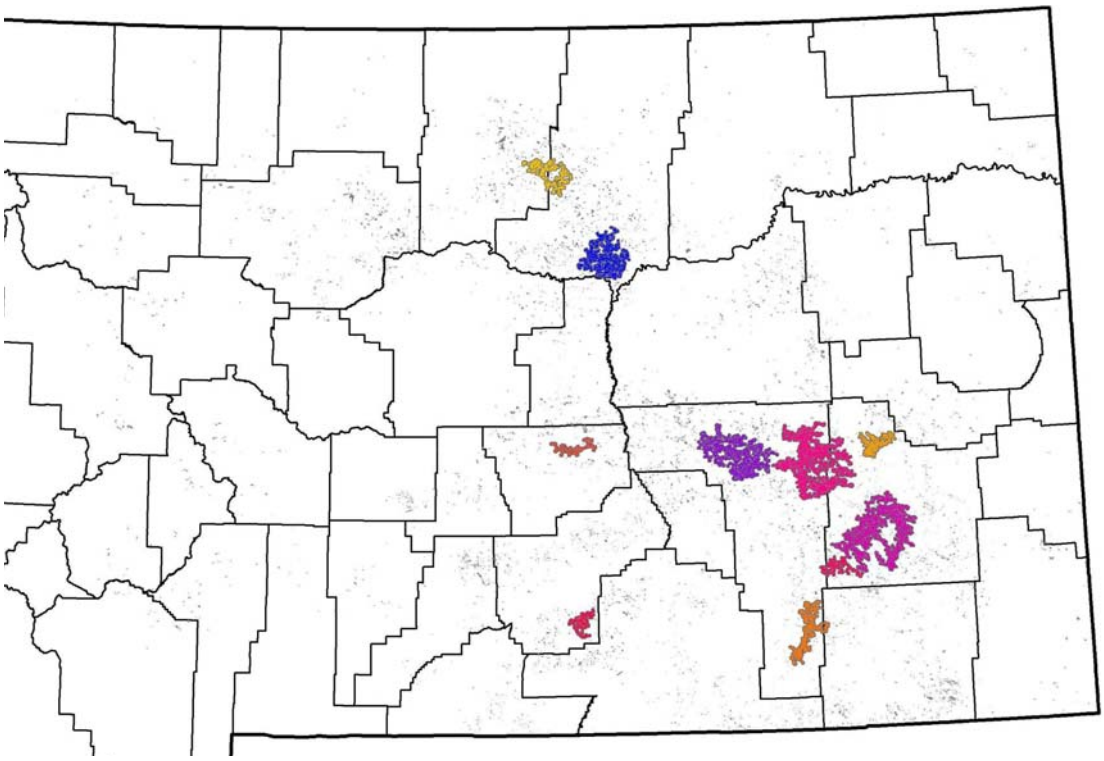


Figure 9. Ten complexes containing greater than 5,000 acres of potential prairie dog colonies as defined by the 1.5 km distance rule (A). Most of these are dominated by private land ownership (gray), but three are dominated by tribal ownership (brown), one is dominated by federal ownership (yellow), and state ownership (blue) is a component of most (B).

(A)



(B)

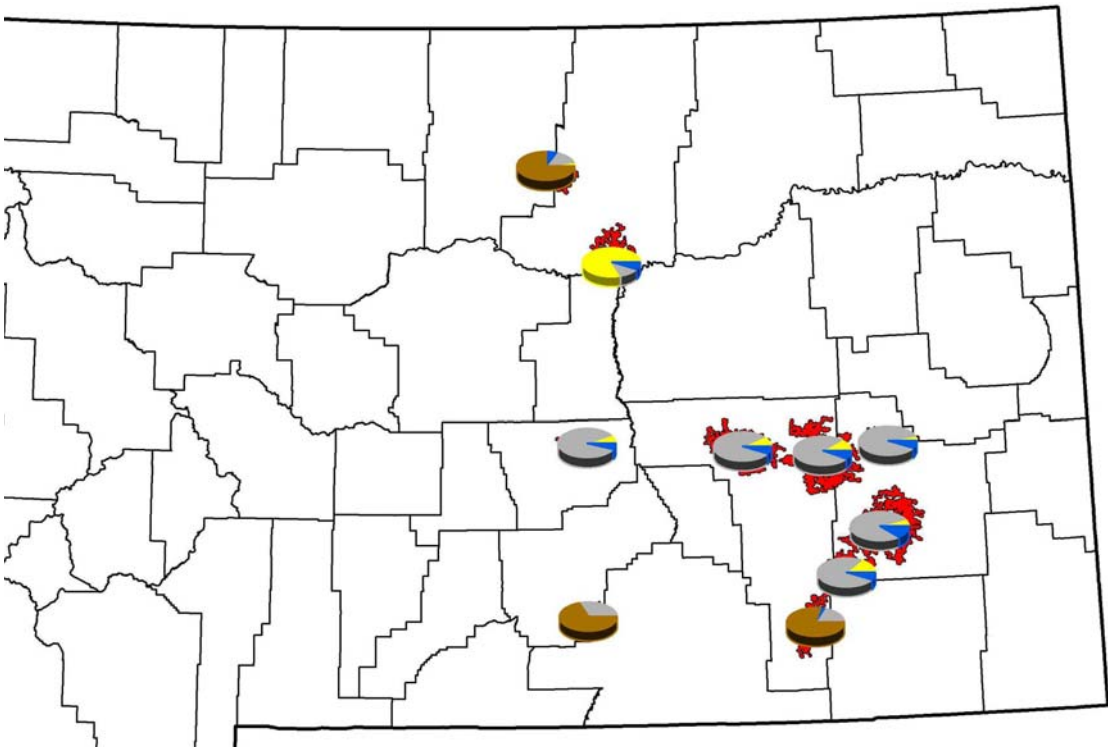
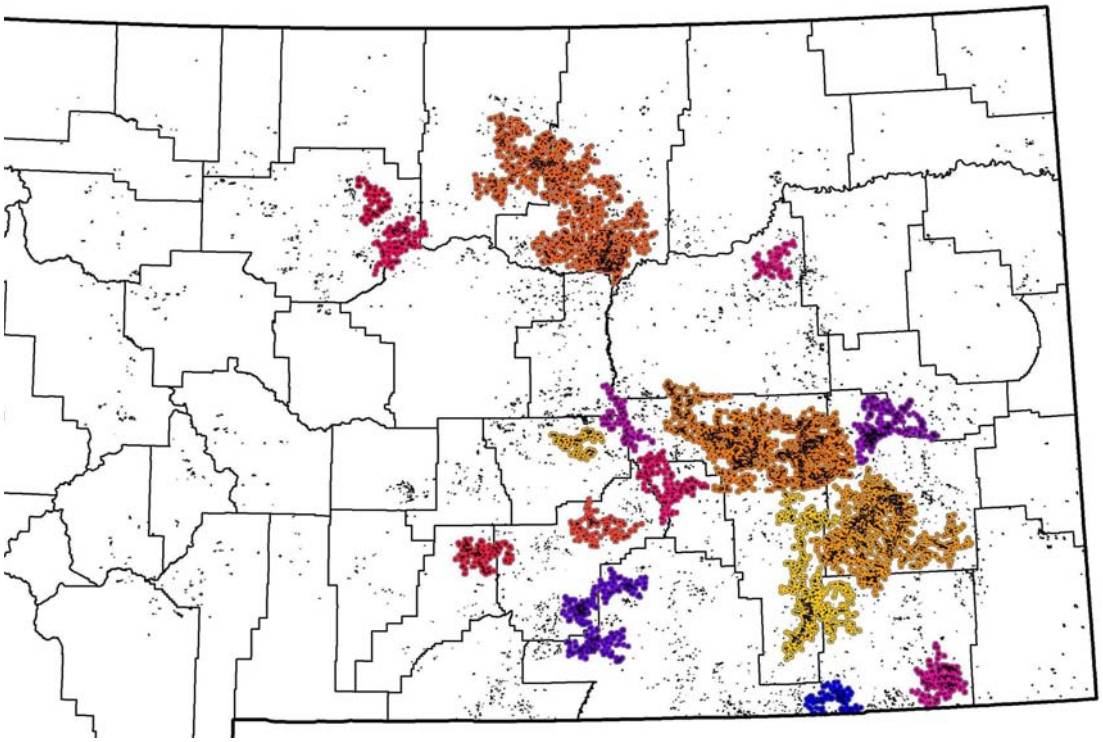


Figure 10. Sixteen complexes containing greater than 5,000 acres of potential prairie dog colonies as defined by the 3.0 km distance rule (A). Most of these are dominated by private land ownership (gray), but one is dominated by tribal ownership (brown), one is dominated by federal ownership (yellow), and state ownership (blue) is a component of most (B).

(A)



(B)

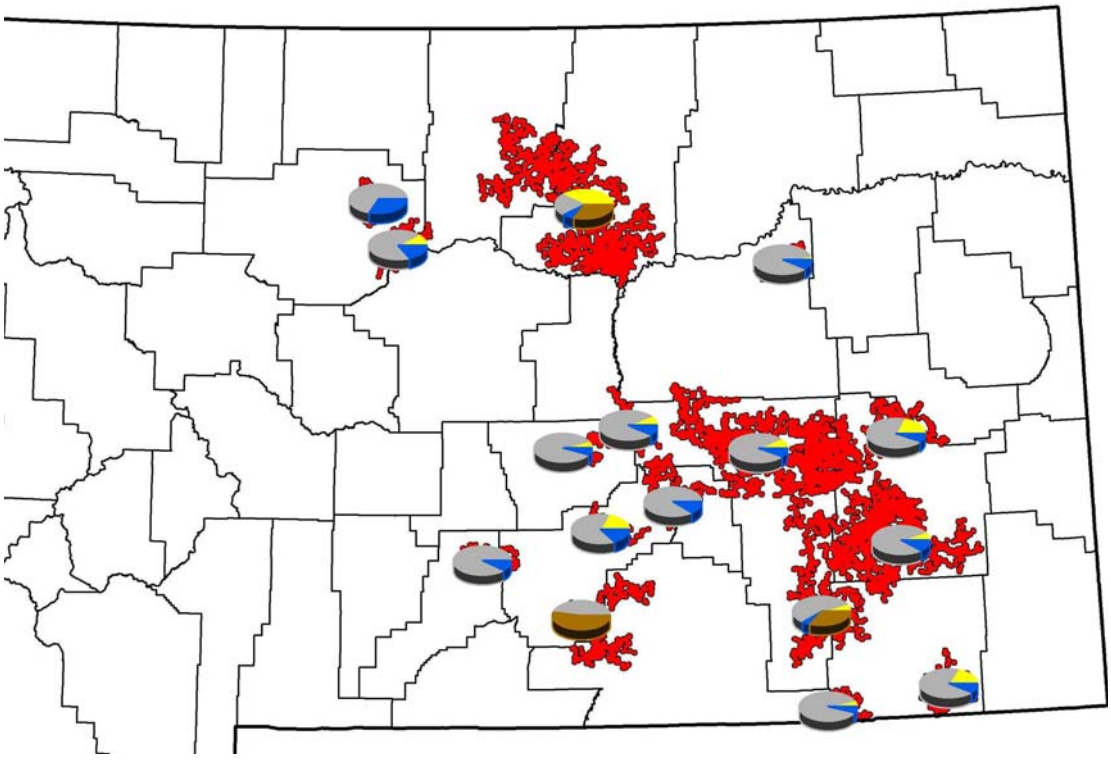
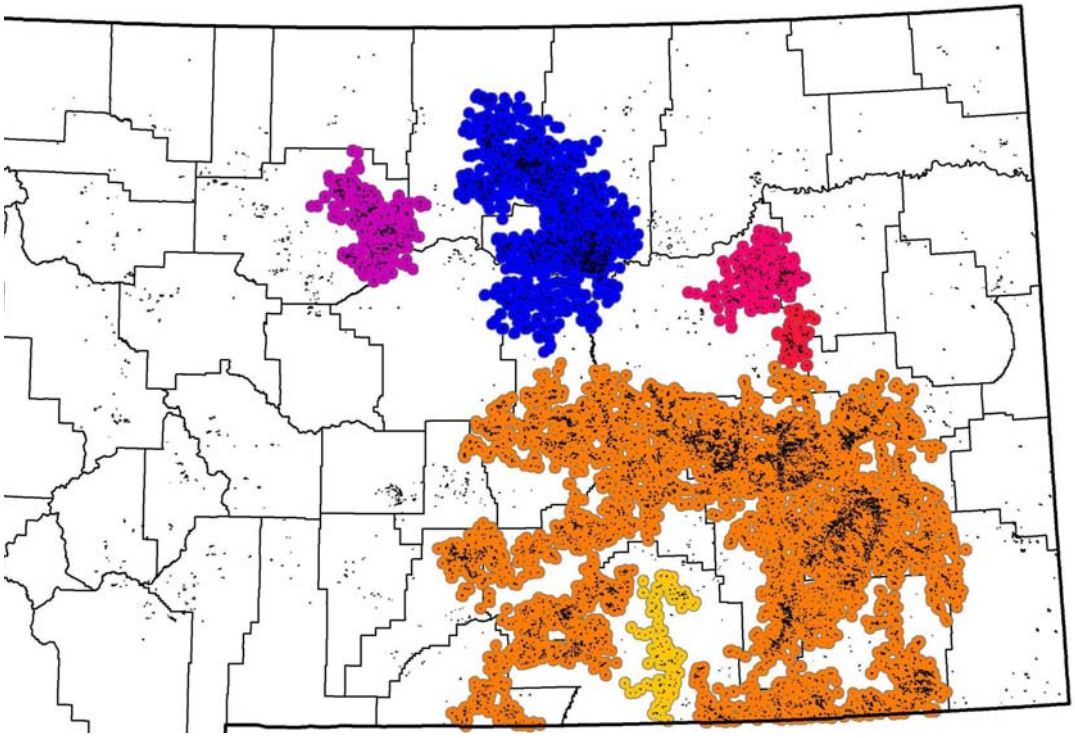
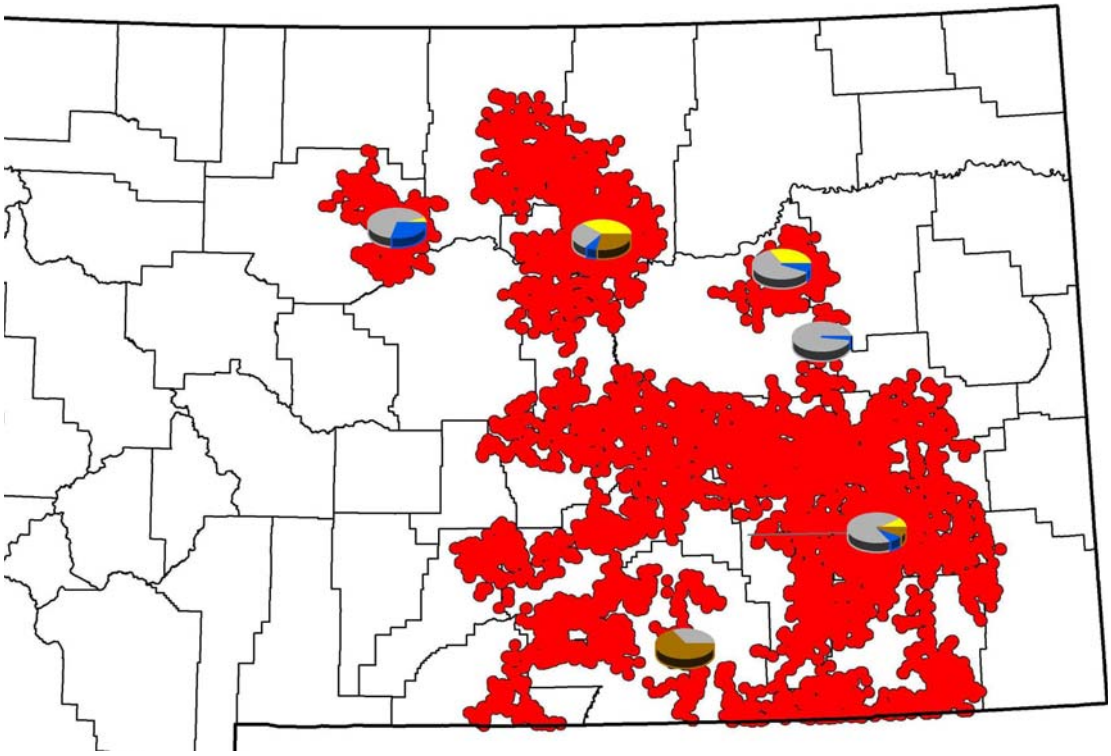


Figure 11. Six complexes containing greater than 5,000 acres of potential prairie dog colonies as defined by the 7.0 km distance rule (A). Most of these are dominated by private land ownership (gray), but one is dominated by tribal ownership (brown), one is dominated by federal ownership (yellow), and state ownership (blue) is a component of most (B).

(A)



(B)



TABLES

Table 1. Numbers of potential colonies and complexes in various acreage classes digitized from the 2005 NAIP imagery.

	Smallest acres	Largest acres	<1,000 acres	1,000-5,000 acres	>5,000 acres
Individual Colonies	2.5	2,945	8,830	22	0
1.5 km Complex	2.5	38,766	2,391	73	10
3.0 km Complex	2.5	109,883	974	42	16
7.0 km Complex	2.5	397,086	267	16	6

Table 2. Numbers of potential colonies and total acres by FWP Region.

FWP Region	Number of Potential Colonies	Total Acres
2	1	77
3	143	12,414
4	525	41,953
5	1,581	110,208
6	1,459	143,458
7	5,184	337,979

Table 3. Numbers of potential colonies and total acres by BLM Field Office.

BLM Field Office	Number of Potential Colonies	Total Acres
Billings	1,558	104,801
Butte	109	10,186
Dillon	31	2,164
Lewistown	544	43,933
Malta	1,364	142,534
Miles City	5,268	342,471

Table 4. Numbers of potential colonies and total acres by Tribal Reservation.

Tribal Reservation	Number of Potential Colonies	Total Acres
Blackfeet	4	193
Crow	450	30,431
Fort Belknap	273	34,729
Fort Peck	17	1,194
N. Cheyenne	166	9,987
Rocky Boys	1	59

Table 5. Numbers of potential colonies and total acres by U.S. Forest Service District.

Forest / District	Number of Potential Colonies	Total Acres
Custer / Ashland	98	3,406
Custer / Beartooth	5	188
Helena / Helena	1	77

Table 6. Numbers of potential colonies and total acres by County.

County	Number of Potential Colonies	Total Acres
Big Horn	569	35,291
Blaine	319	35,503
Broadwater	24	2,076
Carbon	167	5,695
Carter	83	8,613
Cascade	29	2,493
Chouteau	317	31,794
Custer	1,709	89,201
Daniels	9	210
Dawson	36	1,217
Fallon	19	1,152
Fergus	135	10,794
Gallatin	39	3,030
Garfield	409	30,948
Glacier	2	47
Golden Valley	59	4,197
Hill	11	907
Jefferson	15	1,502
Judith Basin	10	1,589
Lewis and Clark	33	4,028
Liberty	18	1,399
Madison	31	2,165
McCone	110	5,113
Meagher	23	2,558
Musselshell	228	22,565
Park	14	633
Petroleum	175	14,056
Phillips	749	74,193
Pondera	11	719
Powder River	621	38,636
Prairie	141	8,959
Richland	32	2,178
Roosevelt	25	1,275
Rosebud	1833	136,363
Sheridan	20	921
Stillwater	144	10,300
Sweet Grass	21	1,515
Teton	29	2,970
Toole	8	709
Treasure	141	10,949
Valley	81	6,369
Wheatland	66	4,223
Wibaux	3	99
Yellowstone	450	26,936

APPENDIX A
Summary of Mapping of Potential Prairie Dog Colonies for each 20 km x 20 km Map Tile

20 km x 20 km Tile ID	BLM Field Office	Known Prairie Dog Density	Region of Tile	Total Colonies Mapped	No. POD[1] Points	No. Flight Intercepts[2]	No. Towns Missed with POD[1] Points	No. Towns Missed with Flight Intercepts[2]	No. Previously Unmapped Towns	No. POD[1] Points with No Towns on NAIP	No. Flight Intercepts[2] with No Towns Evident on NAIP
197	Billings	High	Acton	11	13	0	4	0	7	9	0
161	Billings	High	Airpark Oscars (Billings)	14	2	1	0	0	13	2	0
199	Billings	High	Anita	8	3	0	1	0	6	0	0
162	Billings	High	Badbaby Coulee	28	4	0	1	0	25	1	0
266	Billings	High	Barber	8	6	0	1	0	2	1	0
128	Billings	High	Bentonite Flats	20	0	0	0	0	20	0	0
192	Billings	High	Big Timber	4	3	0	3	0	1	0	0
342	Billings	High	Big Wall	32	31	10	5	1	10	2	0
232	Billings	High	Broadview	34	41	0	11	0	12	13	0
339	Billings	High	Cameron Creek	4	8	1	0	0	0	1	0
126	Billings	High	Chilkoot Coulee	36	11	0	2	0	26	0	0
160	Billings	High	Clappers Flat	3	0	0	0	0	3	0	0
307	Billings	High	Cory Flat	9	3	0	0	0	7	1	0
234	Billings	High	Deer Point	33	35	3	3	0	16	14	0
196	Billings	High	Devils Hole	37	33	2	9	0	16	18	0
166	Billings	High	Eagle Butte	25	0	0	0	0	25	0	0
91	Billings	High	Grapevine Dome	28	4	0	0	0	24	0	0
195	Billings	High	Halfbreed Lake NWR	40	46	5	8	1	17	10	0
267	Billings	High	Haystack Butte	7	5	0	1	0	4	1	0
231	Billings	High	Hoagland Reservoir	34	46	3	8	0	12	14	0
233	Billings	High	Hoskin Basin Cemetery	19	31	0	6	0	3	12	0
198	Billings	High	Huntley (Billings Heights)	8	4	0	0	0	6	0	0
124	Billings	High	Joliet	3	0	0	0	0	3	0	0
163	Billings	High	Jr Scott Number 18 Reservoir	60	10	1	0	0	50	0	0
341	Billings	High	Lake Mason	18	24	6	5	0	5	5	1
343	Billings	High	Melstone Oil Field	33	26	8	4	0	9	4	0
272	Billings	High	Mud Butte	28	25	0	12	0	8	6	0
304	Billings	High	Naderman Buttes	4	4	1	1	0	1	0	1
303	Billings	High	Ninemile Spring	26	24	0	5	0	13	3	0

268	Billings	High	Painted Robe Creek	4	12	0	2	0	2	10	0
156	Billings	High	Piano Hill	6	3	0	0	0	5	0	0
235	Billings	High	Pompeys Pillar	33	52	3	9	0	7	10	0
265	Billings	High	Potato Creek	30	25	0	4	0	12	9	0
236	Billings	High	Randalls Island	23	49	4	11	1	2	11	0
131	Billings	High	Rednose Reservoir	0	0	0	0	0	0	0	0
130	Billings	High	Reno Ford	8	3	0	2	0	6	1	0
167	Billings	High	Sarpy Creek	5	0	0	0	0	5	0	0
129	Billings	High	Shoulder Blade Camp	6	6	0	0	0	3	3	0
271	Billings	High	Steamboat Butte	27	28	2	7	1	5	14	1
125	Billings	High	Stratford Hill	29	8	2	2	0	8	3	0
340	Billings	High	Sulfur Springs	17	22	3	3	2	7	6	0
164	Billings	High	Toluca	40	11	6	1	1	28	1	0
202	Billings	High	Tullock Creek	15	0	0	0	0	14	0	0
302	Billings	High	Wallum	4	7	0	2	0	0	1	0
127	Billings	High	Wild Horse Ridge	56	38	0	11	0	26	3	0
301	Billings	High	Winnecook	18	36	0	3	0	2	3	0
122	Billings	Low	Absarokee	1	0	0	0	0	1	0	0
264	Billings	Low	Baxter Strip	1	2	0	0	0	0	0	0
17*	Billings	Low	Bear Canyon	13	17	0	5	0	7	0	0
51*	Billings	Low	Bearcreek	8	26	0	2	0	8	*	0
338	Billings	Low	Bercail	1	0	0	0	0	1	0	0
89	Billings	Low	Bird Spring	22	4	0	2	0	19	0	0
200	Billings	Low	Blue Spring	19	5	0	1	0	16	1	0
16*	Billings	Low	Bobcat Pass	5	0	0	0	0	5	0	0
157	Billings	Low	Bratten FAS	3	2	0	0	0	0	0	0
88	Billings	Low	Bridger	13	11	2	1	0	4	6	0
18*	Billings	Low	Burnt Timber Canyon	3	5	0	0	0	3	5	0
229	Billings	Low	Cayuse Hills	0	0	0	0	0	0	0	0
201	Billings	Low	Chapman Coulee	8	1	0	0	0	7	0	0
191	Billings	Low	Cort Creek	5	3	0	0	0	2	0	0
299	Billings	Low	Daisy Dean Creek	0	0	0	0	0	0	0	0
270	Billings	Low	Dunn Mountain	0	7	0	0	0	0	7	0
93	Billings	Low	Eychaner Coulee	2	0	0	0	0	2	0	0
306	Billings	Low	Gage	3	2	0	0	0	3	2	0
269	Billings	Low	Goulding Creek	1	5	0	0	0	1	6	0
165	Billings	Low	Hardin	8	4	2	0	0	6	0	1
300	Billings	Low	Harlowton	2	0	0	0	0	2	0	0

52*	Billings	Low	Hatcher Pass	45	9	1	1	0	42	2	0
194	Billings	Low	Hugh Henry Hill	1	0	0	0	0	1	0	0
53*	Billings	Low	Ingram Spring	23	4	0	0	0	19	0	0
94	Billings	Low	Lodge Grass	25	2	0	0	0	23	0	0
21	Billings	Low	Lotties Draw	1	0	0	0	0	1	0	0
336	Billings	Low	Oka	0	0	0	0	0	0	0	0
337	Billings	Low	Oxford	0	0	0	0	0	0	0	0
305	Billings	Low	Roundup	6	6	2	0	2	1	3	0
123	Billings	Low	Shane Ridge	7	0	0	0	0	7	0	0
90	Billings	Low	Shively Creek	20	10	0	2	0	10	0	0
158	Billings	Low	Springtime	0	0	0	0	0	0	0	0
57	Billings	Low	Stevie Creek	7	0	0	0	0	7	0	0
15*	Billings	Low	Three Corner Spring	13	15	0	1	0	12	1	0
159	Billings	Low	Toms Creek	12	1	1	1	0	10	0	0
22	Billings	Low	Twin Creek	4	1	0	0	0	3	1	0
230	Billings	Low	Van Winkle Creek	2	2	1	0	0	1	2	0
92	Billings	Low	War Man Creek	7	0	0	0	0	7	0	0
58	Billings	Low	Wyola	26	1	0	1	0	25	0	0
227	Billings	No	Battleship Butte	0	0	0	0	0	0	0	0
86	Billings	No	Castagne	6	0	0	0	0	6	0	0
155	Billings	No	Chicken Creek	0	0	0	0	0	0	0	0
85	Billings	No	Crater Lake	9	0	0	0	0	9	0	0
335	Billings	No	Elephant Rock	0	0	0	0	0	0	0	0
121	Billings	No	Fladberg Bench	0	0	0	0	0	0	0	0
228	Billings	No	Franklin Hills	1	0	0	0	0	1	0	0
120	Billings	No	Hicks Mountain	0	0	0	0	0	0	0	0
372	Billings	No	Oka Butte	0	0	0	0	0	0	0	0
263	Billings	No	Porcupine Butte	0	0	0	0	0	0	0	0
50*	Billings	No	Red Lodge Mountain Ski Area	0	1	0	0	0	0	1	0
87	Billings	No	Roberts	1	1	0	0	0	0	0	0
193	Billings	No	Wullum Gulch	0	0	0	0	0	0	0	0
377	Billings/Lewistown	High	Pike Creek Hills	15	13	1	2	0	7	2	0
95	Billings/Miles City	Low	Kirby	15	0	0	0	0	15	0	0
183	Dillon	High	Cedric	1	0	0	0	0	1	0	0
221	Dillon	High	Cooney Park	2	0	0	0	0	2	0	0
220	Dillon	High	Dunn Canyon	3	4	0	0	0	0	0	0
328	Dillon	High	Helena	1	7	0	0	0	0	6	0
184	Dillon	High	Lewis and Clark Caverns	16	2	0	0	0	16	2	0

185	Dillon	High	Milligan Canyon	1	1	0	0	0	1	1	0
364	Dillon	High	North Helena Valley	8	17	0	0	0	1	1	0
400	Dillon	High	Oxbow Bend	4	3	0	0	0	2	0	0
219	Dillon	High	Ratio Mountain	3	3	0	0	0	0	0	0
186	Dillon	High	Three Forks	8	2	0	0	0	8	2	0
147	Dillon	Low	Bumby Gulch	0	0	0	0	0	0	0	0
294	Dillon	Low	Canyon Ferry Reservoir	16	0	0	0	0	16	0	0
222	Dillon	Low	Clarkston	3	0	0	0	0	3	0	0
330	Dillon	Low	Diamond City	2	0	0	0	0	2	0	0
187	Dillon	Low	Edilou	3	0	0	0	0	3	0	0
255	Dillon	Low	Galena Park	0	0	0	0	0	0	0	0
293	Dillon	Low	Kelley Spring	0	0	0	0	0	0	0	0
327	Dillon	Low	MacDonald Pass	0	0	0	0	0	0	0	0
363	Dillon	Low	Marysville	4	0	0	0	0	4	0	0
329	Dillon	Low	Spokane Hills	0	0	0	0	0	0	0	0
256	Dillon	Low	Tacoma Gulch	3	0	0	0	0	3	0	0
257	Dillon	Low	White Rock Spring	0	0	0	0	0	0	0	0
365	Dillon	Low	York	0	0	0	0	0	0	0	0
258	Dillon	Low	Yorks Islands	1	1	0	0	0	1	1	0
366	Dillon	No	Avalanche Butte	0	0	0	0	0	0	0	0
369	Dillon	No	Barnaboo Creek	0	0	0	0	0	0	0	0
334	Dillon	No	Baxter Gulch	0	0	0	0	0	0	0	0
224	Dillon	No	Bearskull Creek	1	0	0	0	0	1	0	0
152	Dillon	No	Beasley Creek	0	0	0	0	0	0	0	0
367	Dillon	No	Berkins Butte	2	0	0	0	0	2	0	0
226	Dillon	No	Campfire Lake	2	0	0	0	0	2	0	0
190	Dillon	No	Choke-to-Death Butte	2	0	0	0	0	2	0	0
151	Dillon	No	Cowan	0	0	0	0	0	0	0	0
259	Dillon	No	Daniels Cow Camp	0	0	0	0	0	0	0	0
113	Dillon	No	Ennis Lake	1	0	0	0	0	1	0	0
114	Dillon	No	Finnegan Ridge	1	0	0	0	0	1	0	0
189	Dillon	No	Gobbler Knob	2	0	0	0	0	2	0	0
298	Dillon	No	Groveland	0	0	0	0	0	0	0	0
153	Dillon	No	Livingston	0	1	0	0	0	0	1	0
150	Dillon	No	Madison Plateau	15	0	0	0	0	15	0	0
223	Dillon	No	Maudlow	8	0	0	0	0	8	0	0
154	Dillon	No	Mission	1	0	0	0	0	1	0	0
399	Dillon	No	Mitchell Mountain	0	0	0	0	0	0	0	0

368	Dillon	No	Moose Pass	0	0	0	0	0	0	0	0
295	Dillon	No	Mount Edith	1	0	0	0	0	1	0	0
115	Dillon	No	Noon Mark	1	0	0	0	0	1	0	0
149	Dillon	No	Norwegian Creek	7	0	0	0	0	7	0	0
297	Dillon	No	P K Spring	1	0	0	0	0	1	0	0
332	Dillon	No	Park Hills	2	0	0	0	0	2	0	0
148	Dillon	No	Pony	0	0	0	0	0	0	0	0
188	Dillon	No	Ross Pass	1	0	0	0	0	1	0	0
260	Dillon	No	Sixteen	1	0	0	0	0	1	0	0
262	Dillon	No	Virginia Peak	0	0	0	0	0	0	0	0
296	Dillon	No	Wertz Reservoir	3	0	0	0	0	3	0	0
225	Dillon	No	Wilsall	1	0	0	0	0	1	0	0
484	Lewistown	High	Bohemian Corners	5	3	0	1	0	4	2	0
549	Lewistown	High	Bramlette Reservoir	15	11	0	0	0	5	0	0
451	Lewistown	High	Cat Creek (town)	4	1	0	0	0	3	0	0
523	Lewistown	High	Chain Buttes (CMR)	16	38	0	10	0	0	13	0
551	Lewistown	High	Dammel Reservoir	8	7	0	1	0	3	0	0
376	Lewistown	High	Durfee Gap	23	19	5	2	1	11	0	0
378	Lewistown	High	Flatwillow	25	26	2	4	1	11	2	0
478	Lewistown	High	Geyser	8	7	0	0	0	1	0	0
520	Lewistown	High	Griffee Ridge	5	1	0	0	0	4	0	0
485	Lewistown	High	Haystack Butte	16	3	0	0	0	15	1	0
522	Lewistown	High	Horse Camp Trail	27	34	0	4	0	3	0	0
521	Lewistown	High	Jakes Reservoir	20	18	1	3	0	9	1	0
514	Lewistown	High	Jensen Spring	23	16	1	0	0	8	0	0
415	Lewistown	High	Jitney	5	12	0	1	0	0	6	0
379	Lewistown	High	Kelley	47	25	2	2	1	40	2	0
550	Lewistown	High	Montague	4	2	0	0	0	3	0	0
519	Lewistown	High	Peck Hills	2	0	0	0	0	2	0	0
513	Lewistown	High	Pirate Lake	1	3	0	0	0	0	2	0
587	Lewistown	High	Sexton Coal Mines	7	1	0	0	0	6	0	0
450	Lewistown	High	Shale Coulee	11	5	0	2	0	5	0	0
516	Lewistown	High	Soda Spring	7	4	1	0	0	2	0	0
515	Lewistown	High	Square Butte	6	3	1	0	1	3	0	0
555	Lewistown	High	Sullivan Ridge	15	0	1	0	1	15	0	0
413	Lewistown	High	Tennessee Flat	4	2	0	0	0	3	0	0
486	Lewistown	High	Torger Reservoir	18	19	3	1	1	6	3	0
449	Lewistown	High	War Horse NWR	1	0	0	0	0	1	0	0

414	Lewistown	High	Winnett	23	16	0	5	0	19	5	0
408	Lewistown	Low	Ackley Lake	0	0	0	0	0	0	0	0
506	Lewistown	Low	Anderson Lake	0	0	0	0	0	0	0	0
651	Lewistown	Low	Armstrong Ranch	0	0	0	0	0	0	0	0
479	Lewistown	Low	Arrow Creek	3	1	0	0	0	2	0	0
617	Lewistown	Low	Brady	0	0	0	0	0	0	0	0
472	Lewistown	Low	Bullwhacker Springs	3	0	0	0	0	3	0	0
615	Lewistown	Low	Bynum Resevoir	7	0	0	0	0	7	0	0
615	Lewistown	Low	Bynum Resevoir	7	0	0	0	0	7	0	0
473	Lewistown	Low	Cascade Butte	4	0	0	0	0	4	0	0
474	Lewistown	Low	Castner Falls	0	0	0	0	0	0	0	0
436	Lewistown	Low	Craig	5	3	0	0	0	4	2	0
517	Lewistown	Low	Cral Coulee	4	0	0	0	0	4	0	0
437	Lewistown	Low	DeLacey Point	0	0	0	0	0	0	0	0
448	Lewistown	Low	Dengel Cemetery	0	0	0	0	0	0	0	0
480	Lewistown	Low	Denton	2	0	0	0	0	2	0	0
582	Lewistown	Low	Diamond Valley	0	0	0	0	0	0	0	0
581	Lewistown	Low	Dutton	1	0	0	0	0	1	0	0
581	Lewistown	Low	Dutton	1	0	0	0	0	1	0	0
618	Lewistown	Low	East Community	1	0	0	0	0	0	0	0
483	Lewistown	Low	Fergus	0	0	0	0	0	0	0	0
512	Lewistown	Low	Fife	3	2	0	2	0	1	0	0
411	Lewistown	Low	Forestgrove	0	0	0	0	0	0	0	0
447	Lewistown	Low	Fort Maginnis	0	0	0	0	0	0	0	0
509	Lewistown	Low	Fort Shaw	12	1	0	0	0	11	0	0
654	Lewistown	Low	Fowler Reservoir	2	0	0	0	0	2	0	0
544	Lewistown	Low	Freezeout Lake	6	0	0	0	0	6	0	0
580	Lewistown	Low	Gamble Coulee	3	0	0	0	0	3	0	0
475	Lewistown	Low	Giffen	0	0	0	0	0	0	0	0
471	Lewistown	Low	Gobblers Knob	0	1	0	0	0	0	1	0
687	Lewistown	Low	Goolin Ranch	0	0	0	0	0	0	0	0
507	Lewistown	Low	Gouchnour Ranch	6	0	0	0	0	0	6	0
412	Lewistown	Low	Grass Range	1	0	0	0	0	1	0	0
511	Lewistown	Low	Great Falls	0	1	0	0	0	0	1	0
650	Lewistown	Low	Hagers Coulee	0	0	0	0	0	0	0	0
445	Lewistown	Low	Hanover	0	0	0	0	0	0	0	0
543	Lewistown	Low	Hodgskiss Ranch	1	0	0	0	0	0	1	0
444	Lewistown	Low	Indian Buttes	0	0	0	0	0	0	0	0

579	Lewistown	Low	Klingensmith Coulee	1	0	0	0	0	0	1	0
546	Lewistown	Low	Lake Creek Flat	0	0	0	0	0	0	0	0
653	Lewistown	Low	Letz Lake	0	0	0	0	0	0	0	0
446	Lewistown	Low	Lewistown	0	0	0	0	0	0	0	0
652	Lewistown	Low	Manson	3	0	0	0	0	3	0	0
481	Lewistown	Low	Marshall Flat	1	0	0	0	0	1	0	0
438	Lewistown	Low	Mullery Creek	0	0	0	0	0	0	0	0
616	Lewistown	Low	Noble Spring	2	0	0	0	0	2	0	0
482	Lewistown	Low	North Moccasin Mountains	0	0	0	0	0	0	0	0
545	Lewistown	Low	Second Bench	0	0	0	0	0	0	0	0
508	Lewistown	Low	Simms	7	1	0	1	0	1	0	0
443	Lewistown	Low	Stanford	0	0	0	0	0	0	0	0
518	Lewistown	Low	Suffolk	0	0	0	0	0	0	0	0
554	Lewistown	Low	Sugarloaf Rock	1	0	0	0	0	1	0	0
476	Lewistown	Low	Swede Bench	0	0	0	0	0	0	0	0
401	Lewistown	Low	Tender Gulch	0	0	0	0	0	0	0	0
542	Lewistown	Low	Tunnel Lake	0	0	0	0	0	0	0	0
510	Lewistown	Low	Ulm Pishkun State Park	3	3	0	0	0	0	0	0
371	Lewistown	No	Antelope Gorge	0	0	0	0	0	0	0	0
375	Lewistown	No	Ashbridge Spring	0	0	0	0	0	0	0	0
409	Lewistown	No	Beacon Star Antique Airport	0	0	0	0	0	0	0	0
614	Lewistown	No	Blackleaf	0	0	0	0	0	0	0	0
439	Lewistown	No	Calvert	0	0	0	0	0	0	0	0
331	Lewistown	No	Camas Ridge	6	0	0	0	0	6	0	0
407	Lewistown	No	Courtneys Creek	0	0	0	0	0	0	0	0
440	Lewistown	No	Dicks Gulch	0	0	0	0	0	0	0	0
373	Lewistown	No	Garneill	0	0	0	0	0	0	0	0
410	Lewistown	No	Heath	0	0	0	0	0	0	0	0
261	Lewistown	No	Higgins Reservoir	3	0	0	0	0	3	0	0
441	Lewistown	No	Kibby	0	0	0	0	0	0	0	0
333	Lewistown	No	Lake Sutherlin	2	0	0	0	0	2	0	0
372	Lewistown	No	Oka Butte	0	0	0	0	0	0	0	0
477	Lewistown	No	Raynesford	0	0	0	0	0	0	0	0
435	Lewistown	No	Routt Creek	2	0	0	0	0	2	0	0
578	Lewistown	No	Saypo	0	0	0	0	0	0	0	0
649	Lewistown	No	Swift Reservoir	0	0	0	0	0	0	0	0
442	Lewistown	No	Wolf Butte	0	0	0	0	0	0	0	0
686	Lewistown/Malta	Low	Four Horns Lake	1	0	0	0	0	1	0	0

554	Lewistown/Malta	Low	Sugarloaf Rock	1	0	0	0	0	1	0	0
684	Lewistown/Malta	No	Dog Gun Lake	0	0	0	0	0	0	0	0
556	Malta	High	Barnes Ridge	4	5	0	0	0	1	0	0
706	Malta	High	Beaverton	0	0	0	0	0	0	0	0
807	Malta	High	Bennett Coulee	0	0	0	0	0	0	0	0
668	Malta	High	Bennett Lake	2	2	0	1	0	2	1	0
666	Malta	High	Big Flat	52	55	0	2	0	10	3	0
701	Malta	High	Bigby Lake	24	15	0	2	0	6	1	0
667	Malta	High	Black Coulee	23	22	2	2	0	4	4	0
665	Malta	High	BlackButte	65	56	0	3	0	25	11	0
736	Malta	High	Borders Coulee	15	30	0	1	0	6	4	0
704	Malta	High	Bowdoin NWR	3	0	0	0	0	3	0	0
699	Malta	High	Chief Joseph Battleground	4	0	0	0	0	4	0	0
598	Malta	High	Chittick Spring	13	20	1	4	0	5	0	0
623	Malta	High	Coal Banks Landing	23	7	3	0	0	17	0	0
627	Malta	High	Coal Mine Coulee	15	1	1	0	0	13	0	0
594	Malta	High	Coburn Butte	35	36	3	5	2	2	1	0
633	Malta	High	Content	1	0	0	0	0	1	0	0
559	Malta	High	Cruikshank Flat	110ish	63	8	2	0	50ish	0	
690	Malta	High	Devon	1	2	0	0	0	0	0	0
702	Malta	High	Dodson	21	14	3	1	0	5	1	0
740	Malta	High	Fanny Hill	2	2	1	0	0	0	0	0
695	Malta	High	Faulkners Coulee	4	0	0	0	0	4	0	0
585	Malta	High	Fort Benton	11	6	2	0	0	9	0	0
732	Malta	High	Fresno Reservoir	1	3	0	0	0	0	0	0
741	Malta	High	Glascock Spring	6	5	1	1	0	1	0	0
621	Malta	High	Goose Bill Coulee	8	0	0	0	0	8	0	0
733	Malta	High	Havre	0	0	0	0	0	0	0	0
804	Malta	High	Havre Air Force Station	0	0	0	0	0	0	0	0
588	Malta	High	Haystack Butte	28	10	8	2	0	18	0	0
697	Malta	High	Hobbs Ravine	2	0	0	0	0	2	0	0
737	Malta	High	Hungover Reservoir	8	15	0	1	0	7	1	0
548	Malta	High	Huntley Coulee	0	0	0	0	0	0	0	0
700	Malta	High	Indian Bathtub	37	35	1	1	0	14	1	0
805	Malta	High	Kahn Coulee	0	0	0	0	0	0	0	0
691	Malta	High	Kolstad Coulee	0	0	0	0	0	0	0	0
769	Malta	High	Lake Thibadeau NWR	0	0	0	0	0	0	0	0
696	Malta	High	Laredo	0	0	0	0	0	0	0	0

591	Malta	High	Lion Coulee	1	2	0	0	0	0	0	0
629	Malta	High	Lodge Pole	24	30	0	4	0	6	5	0
734	Malta	High	Lohman	2	0	0	0	0	2	0	0
586	Malta	High	Loma	4	1	0	0	0	3	0	0
590	Malta	High	Lone Tree Bench	7	3	0	0	0	4	0	0
590	Malta	High	Lone Tree Bench	7	3	0	0	0	4	0	0
738	Malta	High	Matulka Reservoir	0	0	0	0	0	0	0	0
632	Malta	High	Mitchell Corner	16	11	1	1	0	5	0	0
656	Malta	High	Moffat Bridge	8	5	0	0	0	6	2	0
689	Malta	High	Naismith	3	6	0	1	0	1	0	0
558	Malta	High	Nichols Coulee Camp	62	56	0	6	0	18	4	0
771	Malta	High	Over The Hill Reservoir	0	0	0	0	0	0	0	0
630	Malta	High	Parrot Flat	65	43	8	5	0	20	3	0
670	Malta	High	Pippin Reservoir	0	0	0	0	0	0	0	0
589	Malta	High	PW Flats	31	48	4	2	0	10	0	0
768	Malta	High	Red Rock Coulee	2	0	0	0	0	2	0	0
553	Malta	High	Reed Hill	34	29	0	0	0	20	0	0
660	Malta	High	Rocky Boy Mine	5	0	0	0	0	5	0	0
664	Malta	High	Saint Johns Coulee	30	22	0	3	0	13	3	0
592	Malta	High	Saskatchewan Butte	5	5	1	0	0	1	1	0
595	Malta	High	Scott Coulee	66	49	11	8	1	20	4	0
631	Malta	High	Seymour Resevoir	40	39	5	5	1	11	1	0
599	Malta	High	Shufeldt Ridge	4	1	0	0	0	4	0	0
557	Malta	High	Siparyann Ridge	37	53	3	3	0	10	7	0
772	Malta	High	Snider Spring	0	0	0	0	0	0	0	0
669	Malta	High	Snowbank Coulee	4	2	0	0	0	2	0	0
628	Malta	High	Spirit Woman Butte	42	44	0	7	0	22	19	0
624	Malta	High	Studhorse Butte	33	43	3	3	0	5	2	0
624	Malta	High	Studhorse Butte	33	43	3	3	0	5	2	0
596	Malta	High	Sun Prairie	68	40	2	2	0	30	3	0
770	Malta	High	Super Lynx Reservoir	0	0	0	0	0	0	0	0
597	Malta	High	The Chimneys	24	8	0	1	0	15	0	0
593	Malta	High	The Plunge	8	8	0	4	0	1	1	0
705	Malta	High	Thomas Coulee	2	0	0	0	0	2	0	0
625	Malta	High	Tiger Butte	9	5	2	0	0	6	1	0
625	Malta	High	Tiger Butte	9	5	2	0	0	6	1	0
698	Malta	High	Tiger Ridge	3	2	0	0	0	2	0	0
552	Malta	High	Tom Dale Coulee	43	31	4	1	0	17	0	0

622	Malta	High	Tye Reservoir	2	1	0	0	0	1	0	0
707	Malta	High	Vandalia	3	2	0	0	0	2	0	0
703	Malta	High	Wagner	4	1	1	0	0	3	0	0
671	Malta	High	Wagontop Reservoir	0	0	0	0	0	0	0	0
806	Malta	High	Woodpile Coulee	0	0	0	0	0	0	0	0
735	Malta	High	Zurich	1	0	0	0	0	1	0	0
758	Malta	Low	Antelope Butte	0	0	0	0	0	0	0	0
779	Malta	Low	Antelope Pass	1	4	0	0	0	0	0	0
636	Malta	Low	Archambeault	0	0	0	0	0	0	0	0
767	Malta	Low	Archie Coulee	0	0	0	0	0	0	0	0
635	Malta	Low	Arrambide Coulee	0	0	0	0	0	0	0	0
728	Malta	Low	Badger Coulee	0	0	0	0	0	0	0	0
814	Malta	Low	Baulk Reservoir	1	3	0	0	0	0	0	0
659	Malta	Low	Big Sandy	1	0	1	0	0	0	0	0
694	Malta	Low	Black Coulee Hall	0	0	0	0	0	0	0	0
672	Malta	Low	Brazil Creek	0	0	0	0	0	0	0	0
584	Malta	Low	Bucks Bridgs	3	0	0	0	0	3	0	0
688	Malta	Low	Bullhead Valley	0	0	0	0	0	0	0	0
742	Malta	Low	Burnt Shed Coulee	1	0	0	0	0	1	0	0
810	Malta	Low	Caldwell	0	0	0	0	0	0	0	0
727	Malta	Low	Childers Reservoir	0	0	0	0	0	0	0	0
634	Malta	Low	Clover Reservoir	1	0	0	0	0	1	0	0
723	Malta	Low	Cut Bank	0	0	0	0	0	0	0	0
657	Malta	Low	Dead Indian Coulee	4	1	2	0	0	3	0	0
726	Malta	Low	Devon Gas Field	0	0	0	0	0	0	0	0
776	Malta	Low	Dibble Spring	0	0	0	0	0	0	0	0
693	Malta	Low	Dobie Ridge	2	0	0	0	0	2	0	0
620	Malta	Low	Dugout Coulee	7	0	0	0	0	7	0	0
620	Malta	Low	Dugout Coulee	7	0	0	0	0	7	0	0
724	Malta	Low	Ethridge	0	0	0	0	0	0	0	0
692	Malta	Low	Fey Coulee	0	0	0	0	0	0	0	0
547	Malta	Low	Flick Lake	0	0	0	0	0	0	0	0
777	Malta	Low	Forks	1	0	0	0	0	1	0	0
802	Malta	Low	Goldstone	0	0	0	0	0	0	0	0
813	Malta	Low	Grag Reservoir	0	0	1	0	0	0	0	1
765	Malta	Low	Gritty Milk Reservoir	0	0	0	0	0	0	0	0
739	Malta	Low	Hat Flat	1	0	0	0	0	1	0	0
760	Malta	Low	Healy Coulee	0	0	0	0	0	0	0	0

730	Malta	Low	Hingham	0	0	0	0	0	0	0	0
729	Malta	Low	Joplin	0	0	0	0	0	0	0	0
658	Malta	Low	Kenilworth Cemetery	1	0	0	0	0	1	0	0
793	Malta	Low	Kennedy Coulee	0	0	0	0	0	0	0	0
762	Malta	Low	Kippen	1	0	0	0	0	1	0	0
721	Malta	Low	Kittson Coulee	0	0	0	0	0	0	0	0
655	Malta	Low	Knockin Knees Reservior	3	0	0	0	0	3	0	0
801	Malta	Low	Laird Lake	0	0	0	0	0	0	0	0
775	Malta	Low	Lambing Coulee	0	0	0	0	0	0	0	0
743	Malta	Low	Landre Hills	1	4	1	0	0	0	1	0
794	Malta	Low	Landslide Butte	0	0	0	0	0	0	0	0
583	Malta	Low	Leeper's Flat	3	0	0	0	0	3	0	0
815	Malta	Low	McEachern Creek	0	0	0	0	0	0	0	0
764	Malta	Low	Meissner Reservoir	0	0	0	0	0	0	0	0
766	Malta	Low	Miranda Coulee	0	0	0	0	0	0	0	0
722	Malta	Low	Mission Lake	3	0	0	0	0	3	0	0
809	Malta	Low	Mosquito Springs	0	0	0	0	0	0	0	0
763	Malta	Low	Oh Henrys Place Reservoir	1	0	0	0	0	1	0	0
761	Malta	Low	Oilmont	0	0	0	0	0	0	0	0
780	Malta	Low	Pikes Peak	0	0	0	0	0	0	0	0
798	Malta	Low	Pratt Canyon	0	0	0	0	0	0	0	0
800	Malta	Low	Sage Creek Colony	0	0	0	0	0	0	0	0
626	Malta	Low	Sawtooth Mountain	8	0	0	0	0	8	0	0
808	Malta	Low	Senechal Spring	0	0	0	0	0	0	0	0
757	Malta	Low	Sharp Lake	0	0	0	0	0	0	0	0
725	Malta	Low	Shelby	1	3	0	0	0	0	2	0
803	Malta	Low	Simpson	0	0	0	0	0	0	0	0
816	Malta	Low	Slaughter Coulee	0	0	0	0	0	0	0	0
778	Malta	Low	Three Chimney Coulee	0	0	0	0	0	0	0	0
663	Malta	Low	Thunder Butte	4	0	0	0	0	4	0	0
812	Malta	Low	Tondra Reservoir	0	0	0	0	0	0	0	0
774	Malta	Low	Turner	0	0	0	0	0	0	0	0
619	Malta	Low	West Knee	4	0	0	0	0	4	0	0
619	Malta	Low	West Knee	4	0	0	0	0	4	0	0
799	Malta	Low	Whitlash	0	0	0	0	0	0	0	0
797	Malta	Low	Willshaw Flats	0	0	0	0	0	0	0	0
773	Malta	Low	Wing	0	0	0	0	0	0	0	0
708	Malta	Low	Wire Grass Coulee	0	0	0	0	0	0	0	0

731	Malta	Low	Xenia	1	5	0	0	0	0	0	0
781	Malta	No	Baylor	0	0	0	0	0	0	0	0
662	Malta	No	Bear Paw Mountains	0	0	0	0	0	0	0	0
829	Malta	No	Bushnell Hill/Canada	0	0	0	0	0	0	0	0
811	Malta	No	Chapman	0	0	0	0	0	0	0	0
830	Malta	No	Del Bonita	0	0	0	0	0	0	0	0
720	Malta	No	Durham	0	0	0	0	0	0	0	0
759	Malta	No	Headlight Coulee	0	0	0	0	0	0	0	0
685	Malta	No	Heart Butte	0	0	0	0	0	0	0	0
858	Malta	No	Little Beaver Creek	2	0	0	0	0	2	0	0
795	Malta	No	Lukins Lake	0	0	0	0	0	0	0	0
796	Malta	No	Mars Coulee	0	0	0	0	0	0	0	0
817	Malta	No	Opheim	1	0	0	0	0	1	0	0
853	Malta	No	Ophiem Port of Entry	1	0	0	0	0	1	0	0
857	Malta	No	Outlet Marsh WPA	0	0	0	0	0	0	0	0
828	Malta	No	Saint Mary River/Canada	0	0	0	0	0	0	0	0
792	Malta	No	Squaw Flat	0	0	0	0	0	0	0	0
756	Malta	No	Wetzel	0	0	0	0	0	0	0	0
562	Malta/Miles City	High	Faranuf	12	13	1	2	0	5	5	0
563	Malta/Miles City	High	Hell Creek SP	1	2	0	0	0	0	0	0
561	Malta/Miles City	High	Iron Stake Ridge (UL Bend)	6	9	0	3	0	0	2	0
560	Malta/Miles City	High	Matovich Ranch (CMR)	65	40	2	5	0	39	3	0
637	Malta/Miles City	Low	Fort Peck	14	1	0	0	0	14	0	0
818	Malta/Miles City	No	Richland	0	0	0	0	0	0	0	0
383	Miles City	High	Acorn Flats	17	3	8	0	3	9	0	0
237	Miles City	High	Andresen Coulee	15	3	0	0	0	13	1	0
316	Miles City	High	Angelwing Butte	58	9	1	0	0	52	0	0
170	Miles City	High	Ashland	100	66	7	0	1	51	2	1
354	Miles City	High	Bacon School	22	8	0	0	0	15	1	0
61	Miles City	High	Bad Land Gulch	21	5	2	1	1	17	1	0
169	Miles City	High	Badger Peak	19	13	4	1	0	9	2	0
203	Miles City	High	Bar Coulee	7	1	0	0	0	6	0	0
65	Miles City	High	Bay Horse	35	10	7	0	0	19	0	0
488	Miles City	High	Benzien	3	1	0	0	0	3	1	0
66	Miles City	High	Biddle	60	22	14	0	0	50	0	2
347	Miles City	High	Big Porcupine Creek	108	6	22	1	4	85	2	0
530	Miles City	High	Bigney Coulee	42	25	0	3	0	20	5	0
97	Miles City	High	Birney	24	4	0	1	0	19	0	0

389	Miles City	High	Blatchford	39	57	3	2	0	4	3	0
419	Miles City	High	Blazier Butte	3	3	3	3	3	0	0	0
239	Miles City	High	Bob	8	0	0	0	0	6	0	0
64	Miles City	High	Bootjack Draw	25	29	3	1	0	13	0	0
103	Miles City	High	Boyes	9	2	0	0	0	7	0	0
138	Miles City	High	Broadus	3	0	3	0	0	0	0	0
312	Miles City	High	Castle Butte	~70	1	8	0	1	~60	0	0
204	Miles City	High	Castle Rock	6	1	0	0	0	5	0	0
529	Miles City	High	Christmas Coulee	34	12	8	0	2	25	0	2
136	Miles City	High	Chuffey Spring	4	1	0	0	0	3	0	0
387	Miles City	High	Clevenger Spring	34	1	0	0	0	33	0	0
205	Miles City	High	Colstrip	16	0	2	0	0	14	0	0
601	Miles City	High	Cut Coulee	11	4	4	0	1	5	0	0
318	Miles City	High	Dead Cow Reservoir	20	3	0	0	0	18	0	0
565	Miles City	High	Dirty Wash Reservoir	51	5	7	1	1	42	1	2
392	Miles City	High	Dorothy Draw	0	0	0	0	0	0	0	0
319	Miles City	High	Dragseth	3	0	0	0	0	3	0	0
172	Miles City	High	Elk Ridge	21	5	5	1	1	14	0	0
133	Miles City	High	Elliot Spring	34	36	1	1	0	7	4	0
418	Miles City	High	Emma Butte	16	11	4	0	0	6	0	0
280	Miles City	High	Etna	150	65	6	0	0	~70	0	0
102	Miles City	High	Fighting Butte	46	32	7	1	0	20	3	1
273	Miles City	High	Fivemile Hill	30	4	2	2	0	25	2	0
348	Miles City	High	Flat Bottom Coulee	~90	0	12	0	3	~80	0	0
390	Miles City	High	Flat Top Butte	19	5	0	0	0	15	0	0
276	Miles City	High	Forsyth	9	2	3	0	2	4	1	0
99	Miles City	High	Fort Howes	15	7	1	0	0	11	1	0
243	Miles City	High	Garland	100+	55	8	1	0	50+	1	0
242	Miles City	High	Gobbler Knob	46	3	13	0	2	31	1	2
174	Miles City	High	Hawkey Creek	2	0	0	0	0	2	0	0
207	Miles City	High	Hayes Point	63	7	10	0	0	52	0	0
525	Miles City	High	Hazny (Hazney)	0	0	0	0	0	0	0	0
350	Miles City	High	Hobo Coulee	100+	0	4	0	0	100+	0	0
100	Miles City	High	Hodsdon Flats	4	0	0	0	0	4	0	0
238	Miles City	High	Hollister Coulee	1	0	0	0	0	1	0	0
175	Miles City	High	Honeycomb Hills	19	4	1	0	0	17	1	0
313	Miles City	High	Ice Cream Butte	60	1	18	0	2	40	0	2
388	Miles City	High	Ingersol Butte	58	56	9	3	0	19	2	0

346	Miles City	High	Ingomar	48	7	15	0	4	33	0	2
356	Miles City	High	Ismay	19	0	0	0	0	19	0	0
352	Miles City	High	Kinsey Bridge	125	13	5	0	0	110	0	0
244	Miles City	High	Kirkpatrick Hill	100	13	6	0	0	~90	0	0
246	Miles City	High	L and L Reservoir	65	0	2	0	0	63	0	0
308	Miles City	High	Lemonade Springs	23	10	3	2	0	14	3	1
139	Miles City	High	Lightning Butte	2	0	0	0	0	2	0	0
281	Miles City	High	Loaf of Bread Butte	80	6	2	0	0	75	0	0
489	Miles City	High	Lodgepole Creek	3	0	0	0	0	3	0	0
168	Miles City	High	Lynch Spring	0	0	0	0	0	0	0	0
171	Miles City	High	Maxwell Spring	46	23	1	7	0	29	1	0
135	Miles City	High	McBride Spring	27	37	0	3	0	15	8	0
425	Miles City	High	McClure Butte	6	3	0	0	0	4	0	0
420	Miles City	High	McGraw Butte	2	0	1	0	0	1	0	0
417	Miles City	High	McWilliams Coulee	18	13	4	0	0	13	0	0
487	Miles City	High	Mecaha	13	7	1	0	0	7	0	0
344	Miles City	High	Melstone	39	10	9	2	2	24	1	0
391	Miles City	High	Mildred	8	5	1	0	0	3	0	0
240	Miles City	High	Moon	12	3	6	0	2	8	0	2
279	Miles City	High	Moon Creek	55	9	8	0	0	45	1	1
416	Miles City	High	Mosby	23	2	1	1	0	20	0	0
173	Miles City	High	North Star Mine	20	0	0	0	0	20	0	0
315	Miles City	High	Paragon	77	3	2	0	0	74	0	0
137	Miles City	High	Peerless Mine	30	0	1	0	0	29	0	0
528	Miles City	High	Piney Buttes	20	1	11	0	3	9	1	0
98	Miles City	High	Poker Jim Butte	8	11	1	2	1	4	3	0
603	Miles City	High	Prairie Elk	1	0	0	0	0	1	0	0
62	Miles City	High	Quietus	45	19	5	2	0	28	2	0
380	Miles City	High	Rattlesnake Buttes	39	16	10	4	2	25	0	2
210	Miles City	High	Rattlesnake Hill	21	2	2	0	2	18	0	0
67	Miles City	High	Ridge	19	3	4	0	0	15	0	0
277	Miles City	High	Rosebud	28	0	9	0	2	19	0	0
309	Miles City	High	Ruskosky Ridge	52	0	4	0	2	50	0	0
245	Miles City	High	Saddle Horse Butte	95	2	3	0	0	90	0	0
314	Miles City	High	Sand Buttes	100+	0	11	0	1	100+	0	0
453	Miles City	High	Sand Springs	3	0	1	0	0	2	0	0
134	Miles City	High	Schaudel Reservoir	91	79	6	5	0	28	4	0
241	Miles City	High	Shearing Pen Coulee	13	2	6	0	1	6	1	0

426	Miles City	High	Sheepshead Bluffs	4	0	1	0	0	3	0	0
353	Miles City	High	Shirley	29	8	0	2	0	22	0	0
355	Miles City	High	Shoemaker	6	0	0	0	0	6	0	0
382	Miles City	High	Short Creek	56	17	18	0	4	36	0	4
424	Miles City	High	Sig Spring	4	4	0	0	0	1	1	0
602	Miles City	High	Snuff Gap	3	1	0	1	0	2	0	0
211	Miles City	High	Soldiers Mount	30	12	6	0	0	19	1	1
384	Miles City	High	Stellar Lake	36	0	14	0	4	27	0	1
381	Miles City	High	Studhorse Coulee	29	0	9	0	2	20	0	5
345	Miles City	High	Sumatra	27	0	13	0	3	19	0	2
317	Miles City	High	Sunshine Camp	21	0	0	0	0	21	0	0
278	Miles City	High	Sweeney Creek	32	0	14	0	1	18	0	0
96	Miles City	High	Taintor Desert	11	0	0	0	0	11	0	0
283	Miles City	High	Tepee Butte	10	0	1	0	0	9	0	0
101	Miles City	High	Terrett Butte	18	4	0	0	0	16	1	0
282	Miles City	High	Tiger Tim Creek	50	2	1	0	0	48	0	0
60	Miles City	High	Tongue River Reservoir	13	11	1	2	0	7	0	1
206	Miles City	High	Trembling Butte	43	2	9	0	2	35	0	2
524	Miles City	High	Tripp Divide	18	13	1	2	0	8	2	0
311	Miles City	High	Vananda	32	4	6	0	1	21	0	0
351	Miles City	High	Venn Ranch	83	3	0	0	0	80	0	0
208	Miles City	High	Volberg	70	3	6	0	1	~60	0	0
452	Miles City	High	Wagga Coulee	0	0	0	0	0	0	0	0
63	Miles City	High	Wallop Butte	45	12	8	2	0	29	4	0
349	Miles City	High	Wild Horse Pass	70	0	4	0	0	67	0	1
566	Miles City	High	Wild Horse Pass	29	20	1	3	1	13	0	0
209	Miles City	High	Witcher Reservoir	34	1	5	0	1	32	0	2
106	Miles City	Low	Albion	4	0	0	0	0	4	0	0
247	Miles City	Low	Alkali Creek	26	0	1	0	0	25	0	0
536	Miles City	Low	Allard Ranch	3	0	0	0	0	3	0	0
70	Miles City	Low	Alzada	4	0	0	0	0	4	0	0
644	Miles City	Low	Andes	0	0	0	0	0	0	0	0
386	Miles City	Low	Angela	~75	0	0	0	0	~75	0	0
214	Miles City	Low	Arpan Spring	0	0	0	0	0	0	0	0
25	Miles City	Low	Badger Hills	8	6	0	2	0	3	0	0
322	Miles City	Low	Baker	3	0	0	0	0	3	0	0
287	Miles City	Low	Big Gumbo Creek/ND Border	0	0	0	0	0	0	0	0
527	Miles City	Low	Biscuit Butte	8	2	2	0	1	6	1	0

27	Miles City	Low	Black Eagle Butte	15	0	4	0	0	11	0	0
746	Miles City	Low	Blinky Springs	0	0	0	0	0	0	0	0
535	Miles City	Low	Bloomfield	5	0	0	0	0	5	0	0
502	Miles City	Low	Blue Mountain	1	0	0	0	0	1	0	0
176	Miles City	Low	Blue Mud Hills	1	0	0	0	0	1	0	0
749	Miles City	Low	Bredette	0	0	0	0	0	0	0	0
609	Miles City	Low	Brorson	0	0	0	0	0	0	0	0
526	Miles City	Low	Brusett	1	0	0	0	0	1	0	0
323	Miles City	Low	Buffalo Creek/Dakota Border	1	0	0	0	0	1	0	0
564	Miles City	Low	Buffalo Hill	15	1	5	0	0	10	0	1
744	Miles City	Low	Buggy Reservoir	0	0	0	0	0	0	0	0
143	Miles City	Low	Burnt Bend (Little MO River)	1	0	0	0	0	1	0	0
642	Miles City	Low	Candee Pond	0	0	0	0	0	0	0	0
179	Miles City	Low	Capitol Rock	0	0	1	0	0	0	0	1
607	Miles City	Low	Carda Coulee	0	0	0	0	0	0	0	0
394	Miles City	Low	Carlyle	0	0	0	0	0	0	0	0
459	Miles City	Low	Chalk Butte	5	0	0	0	0	5	0	0
677	Miles City	Low	Chelsea	0	0	0	0	0	0	0	0
177	Miles City	Low	Chito Creek	0	0	0	0	0	0	0	0
532	Miles City	Low	Circle	0	0	0	0	0	0	0	0
501	Miles City	Low	Cluster Buttes	0	0	0	0	0	0	0	0
423	Miles City	Low	Combs Ranch	4	0	0	0	0	4	0	0
458	Miles City	Low	Crow Rock Creek	30	0	0	0	0	30	0	0
499	Miles City	Low	D Bar Coulee	0	0	0	0	0	0	0	0
105	Miles City	Low	Dead Horse Point	1	0	0	0	0	1	0	0
24	Miles City	Low	Decker	20	17	0	0	0	3	0	0
275	Miles City	Low	Deveny Coulee	13	0	3	0	0	10	0	1
461	Miles City	Low	Diamond G Butte	1	0	0	0	0	1	0	0
429	Miles City	Low	Douthit School	0	0	0	0	0	0	0	0
59	Miles City	Low	Eagle Nest Peak	24	1	0	0	0	23	0	0
454	Miles City	Low	Edwards	0	0	0	0	0	0	0	0
534	Miles City	Low	Egeness School (historical)	0	0	0	0	0	0	0	0
643	Miles City	Low	Elmdale	0	0	0	0	0	0	0	0
709	Miles City	Low	Enright Coulee	0	0	0	0	0	0	0	0
673	Miles City	Low	Espeil Coulee	10	0	0	0	0	10	0	0
455	Miles City	Low	Fig Mountain	1	0	0	0	0	1	0	0
249	Miles City	Low	Flasted Draw	15	4	1	0	0	14	3	0
250	Miles City	Low	Flasted Hill	6	1	1	0	0	5	1	0

574	Miles City	Low	Folkoord Reservoir	0	0	0	0	0	0	0	0
638	Miles City	Low	Frazier	1	0	0	0	0	1	0	0
422	Miles City	Low	Frozen Dog Coulee	28	0	0	0	0	28	0	0
310	Miles City	Low	Froze-to-death Creek	35	0	0	0	0	35	0	0
30	Miles City	Low	Fuller Gulch/Wyoming Border	1	0	0	0	0	1	0	0
605	Miles City	Low	Gady Coulee	1	0	0	0	0	1	0	0
573	Miles City	Low	Gartside Reservoir	4	0	0	0	0	4	0	0
178	Miles City	Low	Gergen Spring	1	2	0	0	0	0	1	0
358	Miles City	Low	Grassy Butte	0	0	0	0	0	0	0	0
104	Miles City	Low	Greasy Hill	0	0	0	0	0	0	0	0
71	Miles City	Low	Grumpy Reservoir	2	0	0	0	0	2	0	0
568	Miles City	Low	Hamblin	0	0	0	0	0	0	0	0
26	Miles City	Low	Hampton Butte	16	5	0	1	0	11	1	0
132	Miles City	Low	Hardrobe Water Gap	1	0	0	0	1	0	0	0
674	Miles City	Low	Hauck Coulee	6	0	0	0	0	6	0	0
747	Miles City	Low	Haugens Hill	1	0	0	0	0	1	0	0
212	Miles City	Low	Hehn Draw	0	0	0	0	0	0	0	0
421	Miles City	Low	Hillside	12	0	0	0	0	12	0	0
465	Miles City	Low	Hodges	0	0	0	0	0	0	0	0
462	Miles City	Low	Hogmire Reservoir	0	0	0	0	0	0	0	0
274	Miles City	Low	Hysham	13	0	0	0	0	13	0	0
713	Miles City	Low	J B Airport	0	0	0	0	0	0	0	0
710	Miles City	Low	Jack Norris Coulee	0	0	0	0	0	0	0	0
430	Miles City	Low	Jackrabbit Butte	0	0	0	0	0	0	0	0
491	Miles City	Low	Jordan	11	1	0	0	0	11	0	0
571	Miles City	Low	Klempel Cemetery	3	0	0	0	0	3	0	0
215	Miles City	Low	Kool-Aid Reservoir	1	0	0	0	0	1	0	0
748	Miles City	Low	Krause Coulee	1	0	0	0	0	1	0	0
68	Miles City	Low	Lanning Ranch	2	0	0	0	0	2	0	0
538	Miles City	Low	Lindberg Hill	0	0	0	0	0	0	0	0
498	Miles City	Low	Lindsay	0	0	0	0	0	0	0	0
606	Miles City	Low	Lisk Creek	5	0	0	0	0	5	0	0
23	Miles City	Low	Little Youngs Creek	7	1	0	0	0	6	0	0
142	Miles City	Low	Lone Tree Creek	1	3	0	0	0	1	3	0
711	Miles City	Low	Lustre	0	0	0	0	0	0	0	0
464	Miles City	Low	Makoshika State Park	0	0	0	0	0	0	0	0
427	Miles City	Low	Marsh	3	0	0	0	0	3	0	0
572	Miles City	Low	McCone Heights	1	0	0	0	0	1	0	0

357	Miles City	Low	Monarch Oil Field	1	0	0	0	0	1	0	0
497	Miles City	Low	Mount Antelope	1	0	0	0	0	1	0	0
141	Miles City	Low	Muskrat Creek	0	1	0	0	0	0	1	0
641	Miles City	Low	Nickwall	0	0	0	0	0	0	0	0
284	Miles City	Low	O'Fallon Creek	8	0	0	0	0	8	0	0
460	Miles City	Low	Olanda (townsite)	0	0	0	0	0	0	0	0
639	Miles City	Low	Oswego	1	1	0	0	0	0	0	0
493	Miles City	Low	Peden Coulee	10	1	1	0	1	8	0	0
463	Miles City	Low	Pleasant View	1	0	0	0	0	1	0	0
457	Miles City	Low	Pluhar	4	0	0	0	0	4	0	0
428	Miles City	Low	Prairie Goat Reservoir	0	0	0	0	0	0	0	0
640	Miles City	Low	Preacher Coulee	2	1	0	0	0	1	0	0
570	Miles City	Low	Richey	3	0	0	0	0	3	0	0
393	Miles City	Low	Rocking Chair Butte	0	0	0	0	0	0	0	0
492	Miles City	Low	Russian Coulee	6	1	0	0	0	5	0	0
537	Miles City	Low	Savage	13	0	0	0	0	13	0	0
248	Miles City	Low	Schmidt Reservoir	3	0	0	0	0	3	0	0
320	Miles City	Low	Scroggin Creek	0	0	0	0	0	0	0	0
456	Miles City	Low	Seventynine Spring	1	0	0	0	0	1	0	0
600	Miles City	Low	Sixth Ridge (CMR)	0	0	0	0	0	0	0	0
107	Miles City	Low	Sneezie Reservoir	0	0	0	0	0	0	0	0
251	Miles City	Low	Snider Hill	1	0	1	0	0	0	0	0
745	Miles City	Low	Snow Coulee	0	0	0	0	0	0	0	0
321	Miles City	Low	South Sandstone Reservoir	0	0	0	0	0	0	0	0
28	Miles City	Low	Spear Hills	6	3	3	0	1	3	0	0
285	Miles City	Low	Sportsman Pond	3	1	0	0	0	2	0	0
490	Miles City	Low	Steve Forks	4	0	0	0	0	2	0	0
500	Miles City	Low	Stipek	1	2	0	0	0	1	0	0
496	Miles City	Low	Stony Butte (townsite)	1	0	0	0	0	1	0	0
213	Miles City	Low	Sugarbowl Spring	0	0	0	0	0	0	0	0
385	Miles City	Low	Sweetser Spring	43	0	0	0	0	43	0	0
569	Miles City	Low	Switzer Reservoir	1	0	0	0	0	1	0	0
29	Miles City	Low	Three Bar Creek/WY Border	5	0	0	0	0	5	0	0
608	Miles City	Low	Three Buttes	2	0	0	0	0	2	0	0
675	Miles City	Low	Three Buttes	0	0	0	0	0	0	0	0
604	Miles City	Low	Tueten Reservoir	3	0	0	0	0	3	0	0
604	Miles City	Low	Tueten Reservoir	3	0	0	0	0	3	0	0
494	Miles City	Low	Twin Buttes	28	0	0	0	0	28	0	0

712	Miles City	Low	Volt	1	0	0	0	0	1	0	0
531	Miles City	Low	Waller Dam	1	1	0	0	0	0	0	0
495	Miles City	Low	Watkins	8	0	0	0	0	8	0	0
286	Miles City	Low	Webster	4	0	0	0	0	4	0	0
567	Miles City	Low	Weldon	0	0	0	0	0	0	0	0
140	Miles City	Low	Whitetail Detention Reservoir	0	0	0	0	0	0	0	0
466	Miles City	Low	Wibaux	0	0	0	0	0	0	0	0
676	Miles City	Low	Wolf Point	1	0	0	0	0	1	0	0
533	Miles City	Low	Woodworth Hill	0	0	0	0	0	0	0	0
69	Miles City	Low	Zimmerman Draw	3	2	0	1	0	2	0	0
788	Miles City	No	Antelope	1	0	0	0	0	1	0	0
681	Miles City	No	Bainville	5	0	0	0	0	5	0	0
718	Miles City	No	Band Aid Reservoir	0	0	0	0	0	0	0	0
679	Miles City	No	Calais	0	0	0	0	0	0	0	0
750	Miles City	No	Chris Hill	0	0	0	0	0	0	0	0
717	Miles City	No	Clay Butte	9	0	0	0	0	9	0	0
854	Miles City	No	Coal Creek/Canada Border	3	0	0	0	0	3	0	0
680	Miles City	No	Culbertson	2	0	0	0	0	2	0	0
789	Miles City	No	Dagmar	0	0	0	0	0	0	0	0
785	Miles City	No	Danelson Reservoir	0	0	0	0	0	0	0	0
754	Miles City	No	Dead Horse Spring	0	0	0	0	0	0	0	0
610	Miles City	No	Diamond Willow FAS	6	0	1	0	0	5	0	0
824	Miles City	No	Dooley	0	0	0	0	0	0	0	0
646	Miles City	No	Fairview	0	0	0	0	0	0	0	0
784	Miles City	No	Fairview Cemetery	0	0	0	0	0	0	0	0
751	Miles City	No	Flagstaff Hill	2	0	0	0	0	2	0	0
820	Miles City	No	Four Buttes	1	0	0	0	0	1	0	0
716	Miles City	No	Froid	1	0	0	0	0	1	0	0
714	Miles City	No	Geddart Lake	0	0	0	0	0	0	0	0
855	Miles City	No	Goose Creek/Canada Border	0	0	0	0	0	0	0	0
753	Miles City	No	Katy Lake	0	0	0	0	0	0	0	0
787	Miles City	No	Kisler Butte	2	0	0	0	0	2	0	0
856	Miles City	No	Lost Child Creek/Canada Border	0	0	0	0	0	0	0	0
715	Miles City	No	Manning Lake	0	0	0	0	0	0	0	0
752	Miles City	No	Medicine Lake	3	0	0	0	0	3	0	0
862	Miles City	No	NE Montana corner	0	0	0	0	0	0	0	0
823	Miles City	No	Outlook	3	0	0	0	0	3	0	0
821	Miles City	No	Paradis Pond	0	0	0	0	0	0	0	0

783	Miles City	No	Peerless	0	0	0	0	0	0	0	0
822	Miles City	No	Redstone	0	0	0	0	0	0	0	0
645	Miles City	No	Sioux Pass	0	0	0	0	0	0	0	0
819	Miles City	No	Slaughter Hill	0	0	0	0	0	0	0	0
682	Miles City	No	Snowden	0	0	0	0	0	0	0	0
859	Miles City	No	Snuggins School	1	0	0	0	0	1	0	0
678	Miles City	No	Sprole	0	0	0	0	0	0	0	0
825	Miles City	No	Tadpole Lake	2	0	0	0	0	2	0	0
860	Miles City	No	Wankel Cemetery	0	0	0	0	0	0	0	0
826	Miles City	No	Westby	0	0	0	0	0	0	0	0
782	Miles City	No	White Highland Hills	1	0	0	0	0	1	0	0
861	Miles City	No	Widgeon Slough	1	0	0	0	0	1	0	0
790	Miles City	No	Wilson School	0	0	0	0	0	0	0	0
786	Miles City	No	Wolf Creek Hall	0	0	0	0	0	0	0	0
Averages				10.88	4.71	0.93	0.51	0.12	7.27	0.65	0.06

[1] POD = Statewide Point Observation Database housed at the Montana Natural Heritage Program.

[2] Flight intercepts refer to the Montana Department of Fish, Wildlife, and Parks 2008 aerial survey flights.

* 20 km x 20 km map tiles where a number of previously mapped White-tailed Prairie Dog Colonies were not detected on the 2005 NAIP imagery. White-tailed Prairie Dog colonies were not easily detected on the 2005 NAIP imagery, potentially as a result of extirpation of colonies and lower densities and less obvious burrow structures relative to Black-tailed Prairie Dogs.