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Wildlands Network Interim Report for New Mexico Department of Game and Fish Share with Wildlife Program

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Project Title: Assessment of black-tailed prairie dog distribution and presence in New Mexico

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Project Objective

Our objectives continue to be to conduct range-wide estimates of black-tailed prairie dog colony occurrence throughout New Mexico using National Agricultural Imagery Product (NAIP) imagery and a deep learning and classification model, and then to validate those results on up to five hundred sites at prairie dog colonies. We will make direct comparisons between our surveys and previous surveys to estimate changes in the status of prairie dog colonies and identify patterns of change.

Progress Toward Objective

Initial Data Gathering

In year 1 of the project we gathered needed data, developed appropriate modeling approaches, and began field surveys to compare current prairie dog colony distributions to data from previous surveys and to validate our own modeling. We have gathered data on existing, or likely, prairie dog colonies across eastern New Mexico (NM) through direct observation, inspection of existing NAIP imagery to identify likely prairie dog colonies, and by reaffirming spatial signatures of known colonies (Figure 1). In early 2025, we contacted various private and public entities that had recently conducted prairie dog surveys. These various entities confirmed the presence of colonies and provided us colony perimeters and acreage. Throughout this process we worked with the Vermejo Ranch in northcentral New Mexico, the Kiowa National Grasslands in northeastern New Mexico, and the Las Cruces District of the Bureau of Land Management. Additionally, we used data collected from iNaturalist, OnX Hunt Maps, The National Science Foundation's catalogues (Vertnet.org), and through our own direct observation. Our initial data collection yielded 623 estimated perimeters of black-tailed prairie dog colonies across eastern NM and 629 points representing possible prairie dog colonies (perimeters and points often overlapped). We then estimated or obtained colony perimeters from additional locations: 123 locations in northwestern NM (roughly centered on Clayton, NM), 319 from south central NM (Tucumcari to Portales), 120 from southeastern NM (Portales south), 46 from northcentral NM (Cimarron to Maxwell), and 16 from southcentral NM (Otero Mesa).

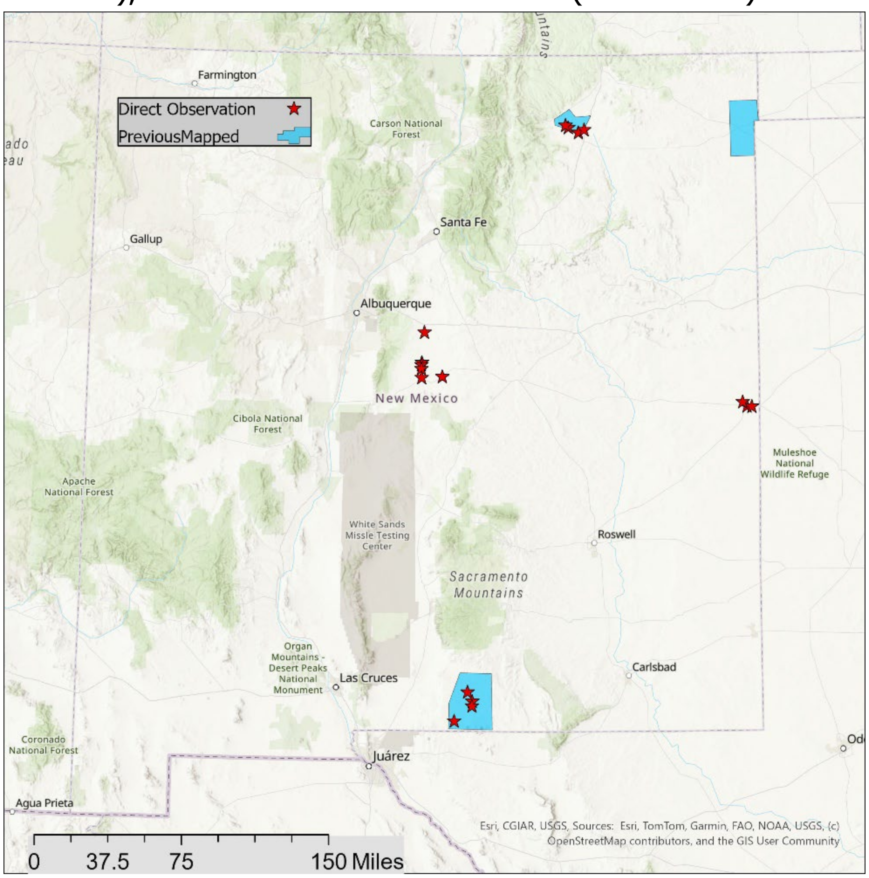

Figure 1. Location of areas in New Mexico (red stars) where we directly observed prairie dog colonies to confirm their presence, and areas (blue polygons) where we were provided information from previous mapping efforts. All data were used to help identify appropriate NAIP imagery and develop and test models.

Modeling

We used our collective information and resources, along with previous efforts on Gunnison's prairie dogs (Facka et al. 2023), to begin our formal modeling process. We selected three regions distributed across eastern NM to start. In each region, we used 60-centimeter resolution NAIP imagery from 2022 (the most recent available) to select over 20,000 visible prairie dog burrows by hand, informed by polygons of known active prairie dog colonies detected during previous field surveys or from information we gathered through online sources (Figure 2, A). The resulting burrow points served as test data for our models. To create the colony identification models, we started by classifying each NAIP image with the unsupervised Iso Cluster tool in ArcGIS Pro 3.3 (ESRI). This tool categorizes cells in the NAIP image into landcover based on their spectral signature similarity using a user-specified number of classes. To select the best model for each region, we compared Iso Cluster outputs using from 10 to 50 classes and tested them against our known burrow dataset for accuracy and specificity. After the NAIP was classified, we extracted the likely prairie dog landcover class, grouped contiguous cells into regions, and then converted those regions into centroid points, with each centroid representing one burrow (Figure 2, B). At this stage, we used spatial filters based on roads, lakes and streams, forests, steep landforms, cultivated crops, and slopes greater than 10% to remove centroids that were unlikely to be prairie dog burrows. To create colony polygons, we used the filtered burrow centroids to create a triangular irregular network (TIN; Kumler 1994), which is a surface created by lines connecting adjacent points to create triangular facets. Based on experience from other prairie dog researchers, we considered burrows greater than 250 feet (76 m) apart ot represent independent colonies. Consequently, we deleted TIN lines that connected individual burrows at greater than 250 feet to help create colony boundaries. Lines that were longer than 250 feet were deleted, indicating that burrows greater than that distance apart were functionally connected. Portions of the TINs were then dissolved and created a buffer around estimated colonies of 10 meters to account for edge effects (Figure 2, C and D).. From our estimated colony composite maps, we removed all individual colonies that were smaller than 1 hectare because we found keeping these in overestimated colony coverage and was likely to represent a few anomalous features on the landscape that were easily confused for prairie dog burrows. Thus far, we have evaluated or modeled more than 1,000 km^2 of potential prairie dog habitat.

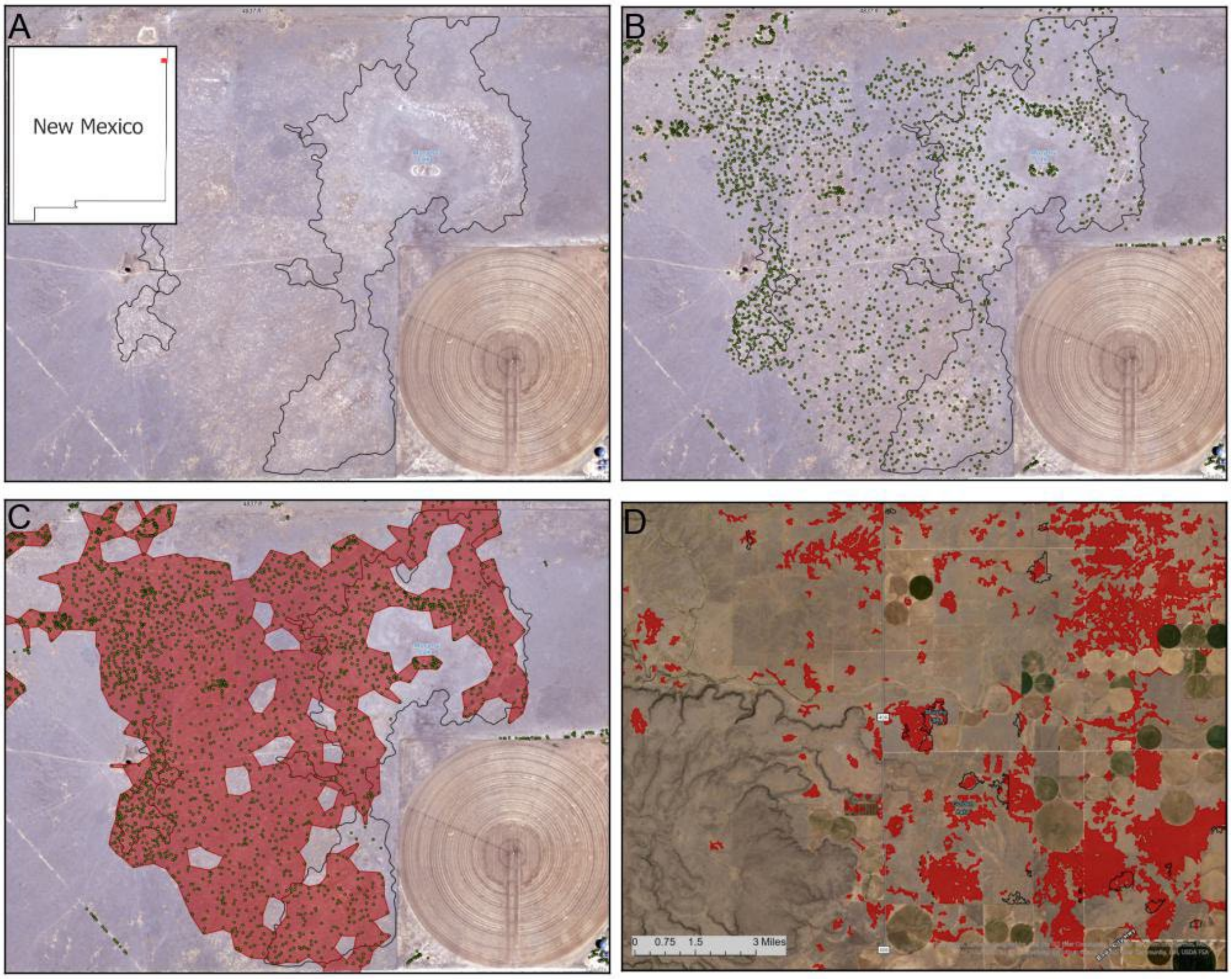

Figure 2. A) White dots on background of NAIP imagery show likely prairie dog burrows and the black lines show areas previously identified as a prairie dog colony through ground surveys; B) Locations of likely prairie dog burrows identified by a human for the purposes of training and testing models and green dots show point locations used for further testing and training; C) Likely prairie dog burrows (green dots) overlaid with initial model output (red shading) showing likely colony boundary as estimated by unsupervised spectral classification model and triangulated irregular network (TIN); D) Output of model across one portion of the northwestern corner of New Mexico showing possible prairie dog colonies (red dots). Inset map shows New Mexico with the small red square in upper right centered on panels A, B, and C and the square showing extent of panel D.

Field Validation

In June 2025, we began collecting field data on new sites identified as potential prairie dog colonies and on sites previously visited by Johnson et al. 2010. To date, we have visited 237 locations to confirm the presence of prairie dog burrows and colonies and to evaluate if prairie dogs exist on those colonies (Figure 3). Of the locations that we have visited, 72% (171) have old or currently active prairie dog burrows, 15% (36) showed no evidence of prairie dog burrows or colonies, and the status of 13% (30) could not be determined. Of the known locations with prairie dog burrows, 75% (128) have been classified as “active” (i.e., we have either seen, heard, or identified recent prairie dog activity at that colony). Of all locations that we have field validated, 54% (128) are currently extant colonies. In most instances, we identified active colonies by directly observing prairie dogs (Figure 4) using visual surveys or drones where permitted. We note that in at least 3 instances, the areas where we identified colonies from aerial imagery have been converted to agricultural fields and no longer contain evidence of prairie dogs. Conseuently, we are aware that the latest imagery may not completely align with current conditions on the ground.

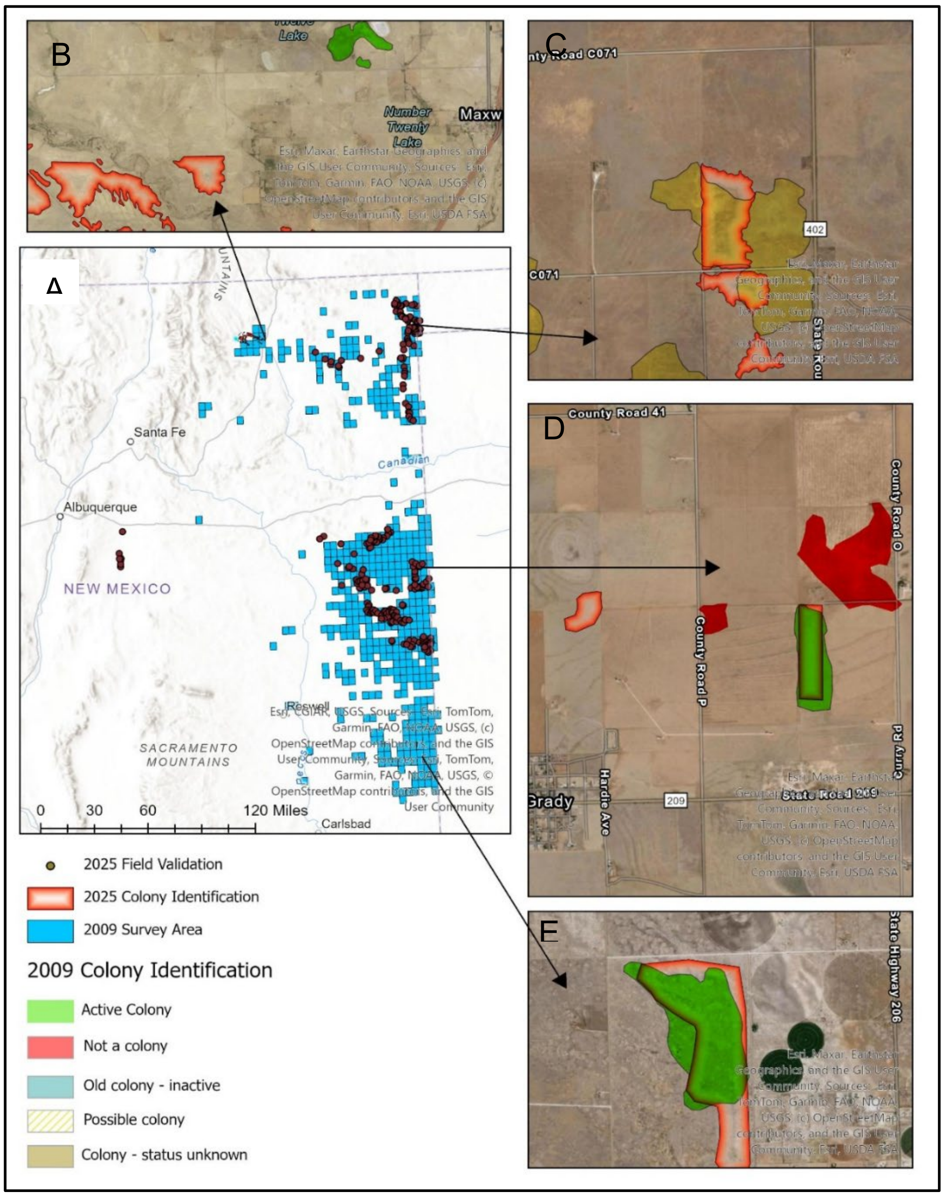

Figure 3. A) The statewide scope of the project showing survey areas (blue boxes) from 2009 and current field validation locations (red circles) from 2025; the locations just east of Albuquerque were used for training. B-E) Specific locations where we have identified prairie dog burrows and colonies; these locations have been used for training datasets, modeling, and field validation.

At 32 (14% of) sites, we have observed burrowing owls (*Athene cunicularia*) directly on colonies, on nearby fences or poles, or flying away from the colonies (Figure 4). We did not observe any other species that are listed as Species of Greatest Conservation Need in New Mexico, but will continue to look for these species during our surveys.

Figure 4. Clockwise from upper left: Burrowing owl on fence in Quay County; two prairie dogs standing near burrows in Chaves County; prairie dog in burrow entrance as seen from above in Curry County; prairie dog crouched on burrow in Curry County

Next Steps

To make a complete evaluation of active black-tailed prairie dog colonies in New Mexico, we must apply an appropriately-developed model for remaining regions across the prairie dogs' entire range in the state. We will complete this step over the remainder of 2025. Concurrent with the full-model rollout, we will continue to conduct field surveys at previously identified colony locations and at new locations that we identify using from models generated from NAIP imagery_. We will make refinements to our existing model outputs from field validation to create a final model output. From the model output and surveys, we will make final assessments of changes in areas occupied by prairie dogs. Where possible, we will make one-to-one comparisons at sites documented in 2009 and during our 2025 surveys to document changes in status and colony size over the intervening 16 years.

Acknowledgements

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