BATS OF SOUTHERN WYOMING: DISTRIBUTION & MIGRATION

YEAR 2 REPORT
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Table of Contents

Contents

EXECUTIVE SUMMARY iii

INTRODUCTION 1

Study Objectives 3

METHODS 3

Field Surveys 3

Mist Net Surveys 3

Acoustic Surveys 4

Habitat Associations of Bat Species 5

Distribution and Migration Models 5

Model Validation Analyses 5

Summer Distribution Models 5

Migration Stopover Habitat Models 7

Bat Exposure to Wind Energy Development 7

Summer Distribution and Migration Stopover Habitat Model Validation 8

RESULTS 8

Mist Net and Acoustic Surveys 8

Mist Net Surveys 8

Acoustic Surveys 8

Habitat Analyses 9

Summer Distribution, Migration Stop-over Habitat and Exposure Models 9

Validation of Summer Distribution and Migration Stop-over Habitat Models 9

DISCUSSION 9

ACKNOWLEDGEMENTS 12

LITERATURE CITED 13

TABLES 15

Table 1. Habitat types of mist net survey sites 15

Table 2. Habitat types of acoustic survey sites. 15

Table 3. Number occurrences documented during 2012 surveys and the efficiency of detection by survey method. 15

Table 4. Bat species detected during 2012 surveys in southern Wyoming, their relative abundance and seasonal residency. 16

Table 5. Number of bats captured during 2012 mist net surveys broken out by sex and age. 17

Table 6. Chi-square analysis of habitat preferences in relation to all sites sampled. 18

Table 7. Spearman Rank Correlation values between the likelihood of occurs for summer distribution models and the actual prevalence of validation occurrences for nine species. Higher correlations indicate better model performance. 19

Table 8. Spearman Rank Correlation values for fall stop-over habitat models for two species. Higher correlations indicate better model performance. 19

Table 9. Scoring system used to evaluate the quality of occurrence records based on spatial precision (A), age of record (B), and taxonomic certainty of identification (C). 20

FIGURES 21

APPENDDICES 23

Appendix 1: Summer Distribution Models 23

Appendix 2: Fall Migration Stopover Models 36

Appendix 3: Exposure to Wind Development Model 41

Appendix 4: 2012 Mist Net Captures 43

Appendix 5: 2012 Acoustic Monitoring Data 57

Appendix 6: Key to Wyoming Bats 74

Appendix 7: Anabat Classification Key to Wyoming Bats 81

Appendix 8: Data Sheets 87

EXECUTIVE SUMMARY

Distributions and habitat associations of bats in Wyoming are poorly understood. Wind energy development is an existing and growing aspect of Wyoming's energy economy and land use. These activities also represent a threat to resident and migratory bat species. As part of the second year of a multi-year research project, we conducted bat surveys throughout southern Wyoming to better understand species composition, distribution, habitat associations, and migration in south central Wyoming. Evidence from previous studies suggests that placement of wind turbines in relation to bat habitat and movement corridors may limit negative impacts to bat populations. The primary goal of this project is to better understand distribution and migration of bats in relation to potential wind energy development facilities. In turn, land managers can then make better informed management decisions when evaluating potential impacts to local bat populations and migrating bats when citing wind energy development. Specific objectives for this multi-year project included:

1. Inventory bats occurring in and near areas with potential for establishment of wind-energy facilities. (Primary Objective)
2. Validate and improve distribution maps of bat species in southern Wyoming. (Primary Objective)
3. Identify potential zones of conflict between wind-energy facilities and areas of bat use. (Primary Objective)
4. Identify areas that are likely to be of particularly high importance for bats, such as those proximate to maternity colonies or with high species diversity. (Secondary Objective)
5. Document evidence of White-nose Syndrome (WNS) in Wyoming. (Secondary Objective)

In 2012, we conducted 87 mist net surveys and 176 acoustic surveys. Surveys at mist net sites resulted in 233 occurrences from captures and acoustic detections representing 12 species. Acoustic surveys resulted in 314 bat occurrences representing 13 species. Overall, sex ratios were nearly equal with 187 females and 190 males captured. However, sex ratios of some species were heavily skewed and females in reproductive condition were observed at some sites. Additionally, we captured juvenile individuals of eight species. These factors taken together suggest that some areas we sampled may be important maternity areas for these species. Examination of membranes of both wings and the uropatagium did not reveal any evidence of White- nose Syndrome.

Bat surveys also extended the known range of several bat species. Specifically, Western Long-eared Myotis, Pallid Bat, and Townsend's Big-eared Bat were documented in southern portions of the Red Desert into the foothills of the Sierra Madre Range. This constitutes an eastern extension of the known range of these species. We documented reproductive and juvenile Yuma Myotis along the Little Snake River near Baggs, WY, confirming presence and reproduction of the species in this portion of Wyoming.

We field validated summer distribution and migratory stopover habitat models created by Griscom et al. (2012). Validation of summer distribution models indicates varied performance, with models for some species predicating presence very well. Most importantly, most models performed very well in areas predicting high probability of presences for each species. This suggests that these models have management value by highlighting areas important for several bat species. We obtained limited occurrences of migratory bats during the migration season, limiting our ability to assess migratory stopover habitat models.

We refined these models using validation results and additional occurrence data collected in 2012 and expanded our area of inference to include a larger area of southern Wyoming that will be sampled in 2013. We were able to create summer distribution maps for 11 species. These models predict that important habitat features for many species include river and stream corridors and foothills across the study area. Additionally, the southern portion of the Red Desert is an important area for many bat species. We extrapolated migration stopover habitat models to encompass the area of Wyoming that will be sampled in 2013. A model of bat exposure to potential wind energy development and existing wind energy development proposals also indicate that these areas are likely to overlap. Areas of particular management interest include White Mountain north of Rock Springs, WY and the foothills of the Sierra Madre Range south of Rawlins, WY. These areas have been proposed for wind energy development but also correspond with areas predicted to be used by migrating bats.

There are some caveats inherent to the models presented in this report, and caution should be used in their interpretation. First, when applying these models in a planning context, they should be used as conceptual tools rather than for fine-scale planning and decision-making. These models predict general areas of habitat use, but limitations in input layers, predictive layers, and differences in map scales lead to errors that make interpretation at scales less than 2km inaccurate. Please see the Discussion Section for a more detailed explanation.

White-nose Syndrome (WNS) is a disease that has caused significant declines in bat populations in eastern North America. The disease has spread great distances since first observed in 2006 and may eventually affect the entire content, including Wyoming. Our work also serves to provide a baseline for bat health as well as monitor for signs of WNS in Wyoming. Bats captured in 2012 displayed no signs of WNS.

Other products presented in this report include detailed information and maps of each species detected, raw occurrence and capture data, species keys, and blank datasheets. This report represents the second year of an ongoing study. Survey efforts in 2013 will follow similar methods focusing on stratified sampling for validation of distribution and migration models and documenting occurrences during the fall migration season. Additionally, the study area will include portions of the Green River Basin in southwestern Wyoming. This information will be used to further improve the habitat, distribution and migration models presented herein, with specific attention to modeling migration flight paths through the study area.

INTRODUCTION

Bats are an important component of ecosystems worldwide. They are integral pollinators and seed-dispersers for many plant species. Bats also consume large quantities of insects, many of which cause significant agricultural losses and threaten human health (Kunz and Parsons 2009). It is estimated that in North America alone, bats prevent $3.7 billion in damage to agricultural resources each year (Boyles et al. 2011). Unfortunately, many bat species have undergone large population declines and are faced with increasing risks of extinction. For example, of the 47 bat species known to occur in the United States, six are currently listed as "Endangered" under the Endangered Species Act (ESA) and at least three others are under active petitions for ESA protections (Harvey et al. 2011, United States Fish and Wildlife Service 2011). Observed population declines across the globe have many causes including habitat loss and alteration, disease, and renewable energy development.

Wind energy is a rapidly expanding form of energy production. As with other forms of renewable energy, generating electricity in this fashion is attractive primarily because it does not produce carbon emissions that contribute to climate change. However, increased wind energy development has been cited as a current and growing threat to bat populations worldwide. Bat fatalities at wind facilities were first observed in the early 1990s. Since this time, research has indicated bat deaths at most wind farms with high fatality rates at some wind facilities (Arnett et al. 2008).

Increasingly, wind resources have been sought out in Wyoming. As of 2012, 1,410 Megawatts of electricity could be generated from existing infrastructure. Existing proposals would allow for approximately five times this production (5,742 MW) (American Wind Energy Association 2012). Furthermore, as of 2012, wind projects in Wyoming covered 116,300 acres while proposed wind projects would occupy an estimated additional 510,505 acres (Jakle 2012). Within Wyoming, the south-central portion of the state has particularly good wind-energy potential and several large wind energy facilities currently exist and more are slated for development in the near future.

Observations of bat mortalities at wind energy sites have led to increased funding for research to identify mitigation measures that reduce the impacts of wind energy to bats. One promising line of research indicates that minor modifications to turbine operations, such as shutting down rotors on low wind speed nights during bat migration may reduce the number of bats killed at wind energy facilities (Arnett et al. 2008). An alternative line of research has focused on the location of wind turbines in relation to bat habitat. Although results vary across studies, some have shown that fatalities can be reduced by placing turbines in locations where fewer bats are likely to come into contact with them in the first place (Baerwald and Barclay 2009). This is the focus of our research. Our aim is to better understand bat distribution and migration in southern Wyoming. This will allow us to model these aspects of bat ecology in relation to areas with high wind energy potential. These tools will be available to managers and planners seeking ways to mitigate the impact of wind energy on bats. Eventually, we would like to provide these data for all of Wyoming.

Planning future wind energy development based on the premise that specific locations may result in reduced mortalities requires an extensive knowledge of local bat distributions. Unfortunately, little is known about bat distribution and habitat use in southern Wyoming. This can largely be attributed to a lack of systematic survey effort. Additionally, it was thought that the basins of Wyoming support few species and low densities of bats. Recent distribution maps produced by the Wyoming Natural Diversity Database (WYNDD) have provided a much-needed tool for bat management (Keinath et al. 2010). These tools also highlight the paucity of bat occurrences available for generating these maps and the resulting uncertainty associated with them. In light of increasing wind energy development in the region, this gap in our understanding of where bats occur and how they use the landscape has become particularly problematic, especially for land managers, including the Bureau of Land Management (BLM), the principle manager of public land in southern Wyoming.

Bats display varied life history traits. Evidence suggests that specific life history traits make certain bat species more vulnerable to wind energy development. Generally, migratory species make up a large proportion of bat fatalities at wind facilities across the United States (Arnett et al. 2008). However, resident bat species are affected as well (Jain et al. 2011). In addition to direct effects (i.e. mortality), there are also indirect effects associated with wind turbines. Specifically, wind energy development has the potential to fragment habitats, limiting the ability of bats to move across the landscape. These indirect effects are poorly understood at this time. Because direct and indirect effects likely impact both resident and migrant bat species, we modeled the distribution of resident bats during the summer season and have tested models of stopover habitat of migratory bats created by Griscom et al. (2012).

Predictive modeling of species distributions has become a common and important tool for biologists and land managers (Phillips et al. 2006, Elith et al. 2011). Species distribution models are created by evaluating the relationships between species occurrences and remotely sensed environmental and spatial characteristics of the occurrence locations (Elith et al. 2011). MaxEnt (Phillips et al. 2006) is a commonly used program for modeling species distributions and is well suited for modeling distributions of bats because most common bat survey techniques generally produce presence-only occurrence data.

Another emerging issue for bats in North American is White-nose Syndrome (WNS). The disease is caused by the fungal pathogen *Geomyces destructans* and affects hibernating bats (Lorch et al. 2011). The disease was first noted in New York in 2006. Since that time, an estimated 5.7 million bats have died from WNS (Bat Conservation International 2013). In affected areas, mortality rates of up to 100% have been documented (Frick et al. 2010). The disease continues to spread across the eastern and southeastern US and has been detected as far west as Oklahoma. To date, no western bat species have been affected. It is assumed that the WNS will eventually occur across North America but it is unknown if the disease will affect bats in warmer or drier climates that occur in the western United States to the degree it has in eastern North America. Our work also serves to provide a baseline for bat health as well as monitor for signs of WNS in Wyoming. Early detection of the disease may help to reduce the scale of effects and transmission in the state (Abel and Grenier 2011).

In order to provide land managers a better understanding of bat distributions and habitat associations in southern Wyoming, we conducted an extensive inventory of bats and their habitats during the summer of 2012. We were able to build upon work initiated in 2011 by continuing bat surveys in areas of management interest and in areas with limited bat occurrence data. These data also allowed us to validate distribution and migration models, and refine models to aid in land management decisions regarding bats in southern Wyoming.

Study Objectives

Funding for this project was provided by the Wyoming Office of the BLM. All reports, maps, and data will be freely available to the public. This work will provide information allowing the BLM to fulfill multiple-use mandates on lands it manages as well provide data aiding in land management and resource development decisions the agency is responsible for. This report details the results of the second year of a multi-year research effort. Objectives of this multi-year research effort are:

1) **Conduct an inventory of bat species and their habitats across southern Wyoming.**
2) **Test habitat based species distribution and migratory stopover models produced in 2011.**
3) **Refine species distribution and migratory stopover models produced in 2011 using model validation statistics and bat occurrence data collected in 2012.**

METHODS

Field Surveys

Our study area (and modeling area) in 2012 encompassed a large portion of southern Wyoming and corresponded roughly with the administrative boundaries of the Rawlins Field Office of the BLM (Figure 1). Because this area encompassed approximately 48,000 km^2, we focused survey effort first on areas of management interest identified by the BLM, and secondly on areas with few or no occurrence data. Areas of interest highlighted by the BLM included portions of the Shirley Basin (1), the Sage Creek and Muddy Creek watersheds south of Rawlins (2), The Little Snake River and Atlantic Rim in the vicinity of Baggs (3) (Figure 1). Portions of the study area that lacked occurrence data included the Sweetwater River in the vicinity of Sweetwater Junction (4) and large areas of the Red Dessert (5) (Figure 1). We focused on lower elevation basin and foothills sites for two reasons. First, these areas are typically managed by the BLM and second, higher elevation forested sites within the study area were surveyed by the Wyoming Game and Fish Department in 2011 (Completion Report) .

We trained and deployed two crews of two people from June 12 to September 28, 2012. Crews conducted two types of surveys: active mist-netting and passive acoustic monitoring. Capturing live bats with mist nets allowed us to verify species presence, inspect individuals for disease, assess physical condition, and collect demographic information. Passive surveys allowed us to efficiently collect species presence information from multiple sites each night.

Mist Net Surveys

Potential mist net sites were identified using aerial imagery from the 2009 National Agriculture Imagery Program (NAIP). Potential sites included small reservoirs, natural ponds, streams, rivers, and springs that could be identified from NAIP imagery. While in the field, surveyors evaluated potential sites and conducted a mist net survey at appropriate sites.

At suitable mist net sites, combinations of 6, 9, 12, and 18 m mist nets[1] were suspended over water between aluminum poles in single-high arrangements to catch bats while feeding or drinking. Mist nets were opened at civil sunset unless nontarget taxa (e.g. birds) were active at the site. In this case, nets were opened as soon as bird activity ceased. Nets were checked for captures at least every 15 minutes and

[1] Avinet bat-specific mist nets, 38mm mesh, black polyester, Dryden, NY, www.Avinet.com

captures were removed from nets immediately to minimize injury, drowning, strangulation, or stress associated with being in the net. Experienced and well trained surveyors removed bats from nets with great care to protect wing bones and patagia. If large numbers of bats were captured, nets were closed to ensure that all captures were removed from nets, processed and released within 30 minutes of capture. Nets were not set in high winds or temperatures below 40ºF to minimize bat stress and injury. If these conditions occurred during a survey, the survey was discontinued. Once removed from the net captures were placed in a cloth bag for transport and processing to minimize stress. Captured bats were measured (forearm length, ear length), weighed, sexed, aged, identified to species, photographed, and released on site.

Additionally, the membranes of both wings and the uropatagium of each captured bat were inspected following the methods presented by Reichard and Kunz (2009). After each survey, we decontaminated all survey equipment and supplies following the National White-Nose Syndrome Decontamination Protocol Version 06.25.2012 (2012). We also followed all guidelines laid out in the Wyoming White-Nose Strategic Plan (Abel and Grenier 2011).

At each mist net survey site, acoustic monitoring equipment was also deployed to detect any additional bat species present but not captured in nets. Acoustic monitoring equipment at mist net sites included an Anabat II detector connected to an Anabat Storage ZCAIM[2] and an Echo Meter 3[3] detector. Anabat recordings were analyzed in Analook W[4] viewing software while Echo Meter 3 recordings were analyzed using SonoBat 3 Wyoming Species Package[5] (details in Acoustic Surveys section below).

Acoustic Surveys

Acoustic surveys were conducted using Wildlife Acoustics Song Meter SM2BAT and SM2BAT+[6] full-spectrum recording equipment. Units were programed to begin recording one half hour before civil sunset and to stop recording one half hour after civil sunrise. On each recorder, one SMX-US[7] ultrasonic microphone was attached to a 3 m cable and placed between 1 m and 2 m above the ground. All calls were analyzed using the Sonobatch automated call analysis algorithm in the SonoBat 3 Wyoming Species Package. We used an acceptable call quality threshold of 0.70 and a discriminate probability threshold of 0.80.

Acoustic surveys were designed to explicitly test summer distribution models and fall stop-over habitat migration models developed by Griscom et al. (2012). To test the summer distribution models, sites were selected in a stratified random fashion in a Geographic Information System using the predicted species richness map produced by Griscom et al. (2012). Within each 10-digit Hydrologic Unit (HUC) in the study area, 5 sites that were within a raster cell with a predicted species richness value of 0, 1-3, 4-6, 7-8, and 9 were randomly placed (total of 25 random sites per HUC). In the field, surveyors placed one detector at the randomly selected point and one detector an easily accessible location at least 1 km away at a location with a different predicted species richness level for one night. This procedure was repeated

[2] Anabat SD1 Bat Detector and Anabat Storage ZCAIM, Columbia, MO, www.titley-scientific.com
[3] Echo Meter 3 Active ultrasonic monitoring unit, Concord, MA, www.wildlifeacoustics.com
[4] Analook W viewing software for Anabat files, www.users.lmi.net/corben/Beta (Corbin 2011)
[5] SonoBat 3, Wyoming species package, Arcata, CA, www.sonobat.com (Szewczak 2011)
[6] Song Meter SM2Bat+ ultrasonic monitoring unit, Concord, MA, www.wildlifeacoustics.com
[7] SMX-US ultrasonic microphone, Concord, MA, www.wildlifeacoustics.com

each night so that each species richness category had been sampled an approximately even number of times within each HUC and throughout the field season. To test the fall stop-over habitat models, a buffer with a 2.5 mile radius was placed around each location where a summer distribution acoustic survey had been conducted. Within this buffer, four points were randomly placed at least 1 km apart in raster cells that had a predicted probability of migratory species presence of 0, 0.01-0.25, 0.26-0.50 or 0.50-1. A detector was placed at each of these four points for one night. We chose this clustered sampling strategy in an attempt to account for spatial, temporal, and habitat effects.

Habitat Associations of Bat Species

Chi-square analysis is an appropriate tool for handling categorical data such as habitat type and was used to evaluate possible habitat relationships from 2012 field surveys. This analysis was intended to look for positive or negative relationships between species and habitat types. The test was conducted by comparing the prevalence of a habitat type at all sites sampled to the prevalence of that type where the target species was found. All habitat types were compared for all species. The Chi-square value for each comparison was used to determine if there was a positive or negative relationship between the species and the habitat type at the 95% confidence level.

Distribution and Migration Models

Model Validation Analyses

We tested predictions made by the summer distribution and migratory stopover habitat models. Summer and migration seasons were not defined explicitly by Griscom et al. (2012). To better reflect temporal differences in distribution and habitat use, we have limited data included in the validation analyses of summer distribution to occurrences documented between June 1 and August 31 for non-migratory species and between June 1 and August 15 for migratory species (Hoary Bat and Silver-haired Bat). We were limited by small sample size for some species and only present validation statistics for species with 30 or more occurrence locations. For validation analyses of the migration models, occurrences documented between August 15 and September 30 were included. We used the “Boyce Index” (Boyce et al. 2002, Hirzel et al. 2006), which produces a Spearman Rank Correlation between binned model scores and the number of species observations falling within each bin, for both the species distribution models and the fall migration models.

Summer Distribution Models

We used Maxent, a commonly applied algorithm for predicting species distributions (Phillips et al. 2006), to model the spatial distribution of 13 bat species detected in 2011 and 2012 during the summer season. Maxent can generate useful models with relatively limited training data (Hernandez et al. 2006) and does not require absence data for model building, making it well suited for our data. Multiple iterations of modeling via Maxent were used to arrive at a set of final models for all species. Final summer models for each species were combined to generate a single map representing predicted bat richness in summer across the study area.

Summer Input Data

Occurrence (i.e., species presence) data used for model building came primarily from surveys conducted in 2011 and 2012 in the study area. Secondarily, occurrence data from existing datasets within WYNDD’s database were used. Any existing occurrences that were outside the study area, or were old (pre-1980), or imprecise (>1km), were removed from the analysis.

Additionally, opportunistically-collected observation data often exhibit strong spatial biases that reflect sampling effort or intensity, rather than habitat preferences by the species (Jimenez-Valverde and Lobo 2006, Johnson and Gillingham 2008). Thus, we followed methods described by Keinath et al. (2010) to subsample occurrence data to reduce spatial biases in the data.

Occurrence data were first attributed with a Point Quality Index (PQI), based on the mapping precision, age, and certainty of taxonomic identification for each point (Table 9). Then, any points for a given species within 1600 m of a higher quality (i.e., higher PQI) point for the species were eliminated. This reduces spatial biases in occurrence data at a fine scale. Points selected using this routine comprised the final model training dataset as shown in the last column of Table 6. Ten-thousand randomly placed “background” points were then generated to compare to this training dataset.

Summer Predictor Data Layers

Predictor data layers used to generate summer season models were resampled to match the extent of the 2013 study area from datasets created by previous researchers (Keinath et al. 2010). These predictors spanned basic categories of environmental variation, and included representations of climate, topography, hydrology, soil and substrate, land cover and landscape metrics, as well as variables intended to identify unique habitat features important to bats (e.g., caves, cliffs, and rock outcrops). Occurrence training data and background points were attributed with each of the potential predictors.

Summer Model Building and Selection

We constructed initial models of 13 species in Maxent using 79 predictor layers from Keinath et al. (2010), using 10-fold cross-validation. Cross-validation was used to reduce the possibility of overfitting models to noise in the training data, by ensuring that variables included in the final models were those that were most important in predicting occurrence across each of the 10-folds of training data (Baumann 2003). Selected variables from Keinath et al. (2010) were excluded from these initial runs, as they were not deemed to be biologically meaningful for bats, and may have produced misleading results. For example, the “Distance to Roads” variable likely would have shown an inverse relationship with bat distribution because many of the bat occurrence data were collected from or near roads for ease of sampling. Once the cross-validation models were run, variables that explained none of the variation were excluded from the final models. Although Maxent is relatively robust to over-fitting, even with large numbers of predictors and relatively small numbers of samples (Phillips and Dudík 2008), we removed predictor variables that were not biologically relevant or were correlated to other predictor layers to further reduce the possibility of overfitting.

In general, summer distribution models described in this report used fewer predictor layers than those generated by Griscom et al. (2012) . When selecting predictors, we selected a small set of biologically relevant predictors that remained in the model after the initial run. During this process, we also sought to remove correlated predictors. For example, if the initial model included a variable that related species presence to permanent and flowing water within a 300 m window and a variable to only permanent water within 300 m, the variable containing less information was excluded from the final model. Through this process, we sought to include only the minimum number of predictor layers to adequately model the species distribution to avoid over-fitting models. Models with ten or fewer training data points (California

Myotis and Eastern Red Bat) were not used in subsequent model overlays because we had low confidence in their accuracy.

Logistic output rasters were generated from the final models constructed for each of the remaining 11 species. Though not strictly interpretable as logistic probability, these rasters provide an indication of relative habitat suitability for all the cells in a study area (Phillips et al. 2006). Binary versions (predicted absent/predicted present) were then created for each species by applying a threshold (specifically, the “Minimum Training Presence” threshold identified by Maxent) to each logistic raster.

A predicted index of summer bat species richness map was generated by combining the above binary versions of each species’ model. This was done by first performing a simple additive overlay, and then standardizing the resulting raster so that it ranged from 0 to 1. We standardized model output so that it could be overlaid with the subsequent models described below. In this final summer richness model, a value of 0 indicates that none of the target species were predicted present, and 1 indicates that all of the 9 target species were predicted present.

Migration Stopover Habitat Models

We did not construct new migration stopover habitat models for this report. Rather, modeling efforts focused on extrapolating the models generated by Griscom et al. (2012) to the expanded study area that will be sampled during the summer of 2013. It is important to note that migration stopover habitat models are deductive. Also, these models predict habitat that may be used for foraging, roosting, and feeding by migrating bats. We plan to generate new models of migration stopover habitat once sufficient sampling has occurred over the entire project area.

Bat Exposure to Wind Energy Development

We combined the two maps representing an index of species richness based on migration stopover models (N = 3 species) and summer distribution models (N= 11 species) by taking their mean value (i.e., summing the layers and dividing by two). This resulted in a raster representing combined bat habitat importance for both summer and migration seasons. This layer was then combined with a layer representing projected wind energy development (Copeland et al. in prep.; see below), using a multiplicative overlay, and the resulting layer was linearly rescaled so as to range from 0 (lowest predicted exposure) to 1 (highest predicted exposure). An exposure value of 1 would indicate that an area of high predicted bat richness for summer and migration seasons overlapped with an area with a high level of suitability for wind energy development.

The potential for wind energy development (Copeland et al. In Press) was mapped through a two-step process that used a predictive model to represent wind resource potential, followed by adjustments reflecting short-term development indicators and legal or operational constraints. Operational wind turbine locations were used as a response variable in a maximum entropy model with average wind resource potential at 50-m height, percent slope, and topographic position as predictor variables. Areas with model values below the logistic threshold of 0.314 (maximum training sensitivity plus specificity) were eliminated and the remaining values were rescaled to range from 0 (very low potential for wind farms) to 1 (very high potential for wind farms). The rescaled values were adjusted based on density of existing meteorological towers (met towers indicated increased likelihood of development), distance to proposed high-capacity electrical transmission lines (areas with access to existing lines have increased likelihood of development), proposed wind farm boundaries (areas in planned farms have increased likelihood of development), and current land tenure (private lands have fewer stipulations and have increased likelihood of development). Further adjustments were made for legally protected lands (less likely development), airport runway air space (no development allowed within 1524 meters), urban areas (no development allowed), mountainous areas above 2743 meters in elevation (less likelihood of development), and lakes (no development).

Summer Distribution and Migration Stopover Habitat Model Validation

We tested predictions made by the summer distribution and migratory stopover habitat models generated by data collected in 2011 by Griscom et al. (2012), using occurrence data collected in 2012. Model predictions were tested using a Spearman Rank Correlation to evaluate the relationship between the frequency of observations of a species within model quantiles and the proportion of the study area within each quantile for both the species distribution models and the fall migration stopover habitat models. To better reflect temporal differences in distribution and habitat use, we limited data included used to validate the summer distribution models to occurrences between June 1 and August 31 for non-migratory species and between June 1 and August 15 for migratory species (Eastern Red Bat, Hoary Bat, Silver-haired Bat). For validation analyses of the migratory stopover habitat models, we used occurrences documented between August 15 and September 30. For summer distribution models, we do not present validation results for species with fewer than 30 occurrences within the study area. For the migration stopover habitat models, we present results for Silver-haired Bat and Hoary Bat (26 and 15 occurrences respectively).

RESULTS

Mist Net and Acoustic Surveys

Mist Net Surveys

In 2012, we conducted 87 nights of mist netting. We captured 381 bats representing 12 species (Tables 4 and 5). The most commonly captured species was the Western Long-eared Myotis, comprising 42.5% of all captures. The second most commonly captured species as the Little Brown Myotis, making up 20.5% of all captures. Overall, sex ratios were nearly equal, although those of Big Brown Bat, Hoary Bat, Pallid Bat, and Western Small-footed Myotis were highly skewed (Table 5). Many more males than female of Big Brown Bat, and Hoary Bat were captured, while captures of Pallid Bat and Western Small-footed Myotis were skewed toward females (Table 5). We captured juvenile individuals of eight species (Table 5), with the no juveniles being captured before July 2, 2013. Examination of membranes of both wings and the uropatagium did not reveal any evidence of WNS. In addition to captures, a total of 87 nights of acoustic data were collected at mist net sites (Table 3). This accounted for a total of 224 bat occurrences. Of these, 116 occurrences (80 from Anabat recordings and 36 from EM3recordings) would not have been detected via mist net captures alone.

Acoustic Surveys

A total of 176 acoustic surveys were conducted in 2012. From these, 314 species occurrences representing 13 species were documented (Tables 3 and 4). The most frequently detected species was the Western Small-footed Myotis, followed by the Little Brown Myotis (Table 4). Only one species, California Myotis, was documented from acoustic recordings alone.

Habitat Analyses

Chi-square analyses of species presence relative to habitat types revealed significant results for five species: Pallid Bat, Townsend's Big-eared Bat, Eastern Red Bat, Fringed Myotis, and Yuma Myotis (Table 6). While tests for other species were not statistically significant, weak positive or negative relationships between species presence and single habitat types were observed (Table 6). Specifically, Little Brown Myotis, Long-legged Myotis, and Silver-haired Bat were negatively associated with shrub steppe habitats. Big Brown Bat was detected less frequently than expected within grasslands and conifer forests. Hoary Bat was observed more frequently than expected at sites with open water or wetlands. Long-legged Myotis was observed more frequently than expected at grassland sites (Table 6).

Summer Distribution, Migration Stop-over Habitat and Exposure Models

We were able to model summer distribution for 11 species detected in 2012, adding Townsend's Big-eared Bat and Eastern Red Bat in addition to the 9 species previously modeled by Griscom et al. (2012). We were able to model predicted distributions for more species because of additional data collected during 2012 surveys. Between 3 and 7 predictor variables were used create each species' summer distribution model. There was considerable overlap in predictor variables included in summer distribution models among species. Similarly, there was considerable overlap in predicted species distribution among species. Summer distribution, migration stopover habitat models, and exposure to wind energy development models are displayed in Appendices 1, 2, and 3 respectively. Figure 12 in Appendix 1 displays the combined species richness model for 11 species during the summer season.

Validation of Summer Distribution and Migration Stop-over Habitat Models

We had sufficient observations to validate summer distribution models for eight species and the model predicting species richness (Table 7). Summer distribution models for Little Brown Myotis, Long-legged Myotis, Western Small-footed Myotis, and species richness had statistically significant relationships between predicted and observed species presence. Marginally significant relationships were seen in the models for Pallid Bat and Silver-haired Bat. Models for Big Brown Bat, Hoary Bat, and Western Long-eared Myotis were not well correlated with observed presence, suggesting poor model specification.

We had relatively few observations of migratory bats during the migration season. We observed a significant relationship between predicted and observed species presence for Silver-haired Bat. Hoary Bat presence was not well correlated with predicted presence (Table 8).

DISCUSSION

Mist net surveys in 2012 were quite successful, accounting for approximately 42% of occurrences. As opposed to many bat surveys conducted in the region and in Wyoming that have shown Little Brown Myotis to be the most frequently observed species (Griscom and Keinath 2011, Griscom et al. 2012), our most frequently captured species was the Long-eared Myotis. This was in part due to high numbers of captures of Long-eared Myotis at two sites (61 and 19 captures). Additionally, much of our survey effort took place in relatively dry habitats where Little Brown Myotis may occur and lower densities. This unexpected result and relatively high number of captures of other bat species associated with dry shurbland habitats (e.g. Western Small-footed Myotis and Pallid Bat among others) highlights the importance of continued species inventories in areas and habitats that have received little survey effort.

Another interesting and important finding from mist net surveys was the presence of reproductively active females and juvenile individuals (Table 5), indicating that we sampled in areas where offspring are raised. While pregnant and while raising offspring, female bats select very specific roosting habitats (Adams 2003, Harvey et al. 2011) and females of many bat species congregate in maternity colonies that represent a very important component of the local bat community (Adams 2003). Furthermore, bats have extraordinarily low fecundity, with most species raising only one pup per year (Harvey et al. 2011). In the context of wind energy development, it is important to identify areas where female bats raise young. A logical next step would be to identify the specific locations of maternity roosts that are being used in these areas. Findings of note in 2012 included a lactating female Townsend’s Big-eared Bat (suggesting a nearby and yet-to-be discovered cave or mine maternity colony) and lactating female and juvenile Yuma Myotis (expanding their known Wyoming breeding range well beyond what was previously thought).

Acoustic surveys continue to be a very efficient survey method, accounting for 58% of occurrences in 2012. We observed a lower number of detections per night than Griscom et al. (2012). This is likely because they frequently placed acoustic recorders in areas that were predicted to have high bat activity (e.g. riparian corridors) while we placed acoustic recorders in stratified random manner in order to validate previous distribution models, which necessarily included areas with low likelihoods of being used by bats. This also helped us to gain a better understanding of habitats that bats may be using away from features that typically concentrate bat activity, such as water sources. Interestingly, even detectors placed several kilometers from water sources and riparian areas recorded some bat activity, suggesting that bats utilize portions of the landscape that are not typically associated with supporting bats. While acoustic surveys are effective at answering some questions, acoustic monitoring in conjunction with mist net surveys continues to provide the best picture of species occurrence, local demographics, and allowing us to monitor disease status of bats in hand.

Habitat analyses species presence relative to habitat types revealed significant results for five species. While some of these results line up with our expectations (e.g. prevalence of Silver-haired Bat near forest-dominated areas), many positive or negative relationships did not line up with known habitat affinities of these species. For example, Long-legged Myotis is typically associated with forested habitats, but our results indicate it was observed in grassland habitats more than expected. It should be noted that results for species with few captures (e.g. Eastern Red Bat, Townsend’s Big-eared Bat, Yuma Myotis) or occurring in habitat types that were not prevalent in our study area (e.g. grasslands) may lead to erroneous conclusions and should be viewed with caution. On the other hand, the unexpected results for species with sufficient sample size point out our lack of understanding of habitat associations of bats in our study area.

Observed distribution of bat species roughly correspond with our current understanding of species distributions in the state (Clark and Stromberg 1987, Adams 2003, Keinath et al. 2010). However, our efforts extended the known range of several species in Wyoming. For example, Pallid Bat and Western Long-eared Myotis were observed throughout the southern Red Desert into the western foothills of the Sierra Madre Range, extending the range of these species to the east by approximately 50 and 100 kilometers respectively. Townsend’s Big-eared Bat was also found approximately 125 kilometers further east than previously known in portions of the Red Desert than previously documented. While Yuma Myotis was thought to occur in extreme south central Wyoming in the vicinity of Baggs, WY, we were able to confirm species presence with mist net captures and acoustic recordings. While these species have not been previously documented in these areas, these observations are likely a result of few if any surveys being conducted in these areas, not as a result of range expansions.

In general, our summer distribution models are fairly similar to those created by Griscom et al. (2012). Models generally predict that areas near water, especially river and large stream corridors, and foothills areas surrounding major mountain ranges are likely to support many species. The largest changes in predicted distribution occurred in upland areas of the Red Desert and Great Divide Basin in south central Wyoming, where previous models suggested an apparent lack of suitable habitat for any bat species. Our updated models suggest that these areas may support several bat species, particularly Long-eared Myotis and Pallid Bat. These changes in predicted distribution from earlier models are likely because the Red Desert and Great Divide basin were previously undersampled, highlighting the importance of spatially balanced sampling.

Migration stopover habitat models were extrapolated further west to include portions of the Green River Basin that will be sampled in 2013. Areas predicted to be used by the three migratory bat species in Wyoming include foothills of the major mountain ranges and riparian corridors. The model evaluating the exposure of bats to wind energy development indicates similar patterns. Areas of particular management interest include White Mountain north of Rock Springs, WY and the foothills of the Sierra Madre Range south of Rawlins, WY. These areas have been proposed for wind energy development but also correspond with areas predicted to be used by migrating bats.

Results from our model validation indicate that summer distribution models varied in quality between species. For example, the predictions of summer distribution for Little Brown Myotis lined up very well with our observations of the species presence in the field while the opposite was true for Big Brown Bat. In general, species models that were generated using a large number of occurrence points performed better than models generated from few points. Specifically, models created from more than 30 points validated well and are probably reliable indicators of potential habitat, while models generated from fewer points should be viewed with caution. This highlights the need to obtain more occurrences for bat species with few occurrence locations.

We had relatively few observations of migratory bats during the migration season. Because of this, validation results of migration stop-over habitat models should be viewed with caution. Evidence suggests temporal variation in migration is dictated by factors such as weather events, prey abundance and other factors. Additionally, these factors may result in discrete movement events where relatively large numbers of bats move through an area in a short period of time (Arnett et al. 2008). This may be one potential explanation for the low number of detections of migratory bat species during migration. We hope to obtain additional occurrence locations in 2013 which will allow for more robust model evaluation.

These validation statistics also indicate that most models are under-predicting actual distribution, which means that most model errors were errors of omission (suitable habitat predicted as unsuitable) rather than commission (unsuitable habitat predicted as suitable). Moreover, models accurately predicted use by bats in areas of high probability, but were increasingly unreliable in areas of low probability. As a result, bats were frequently encountered when conducting surveys in areas with low (or zero) predicted probability of occurrence. From a management standpoint, this suggests that areas where our models show a high probability of species occurrence are quite likely to be occupied by that species. Wind farms constructed in the higher probability areas of our models are thus likely to encounter bats; though this does not necessarily suggest that increased moralities will occur in those areas.

There are some caveats inherent to the models presented in this report, and caution should be used in their interpretation. First, when applying these models in a planning context, they should be used as conceptual tools rather than for fine-scale planning and decision-making. These models predict general areas of habitat use, but limitations in observation data, environmental predictor layers, predictive layers, and differences in map scales lead to errors that make interpretation at scales less than 2km inaccurate. Second, a relatively small number of bat occurrences were used to create summer distribution maps of several species. Generally-speaking, the reliability of a model declines as the number of occurrences upon which it was based declines. While we took efforts to implement random sampling, it is likely that oversampling in mesic areas has skewed the results to favor water features and probably does not represent the full spectrum of bat habitat use on the landscape. This has likely contributed to the under-prediction issue discussed above. Third, bats are opportunistic and move easily between roosting and foraging sites. Although our maps may predict where bats spend most of their time, they do not account for movement between areas of heavy use. For example, although ridge tops are generally not predicted to be important habitat features for bats in our models, bats undoubtedly fly over ridge tops in order to access roosting and foraging habitat and may even forage above ridge tops when insect swarms are present (McCracken et al. 2008, Rydell et al. 2010). Further investigation and movement modeling may provide insight to such areas that are used for travel between suitable foraging and stopover sites. Forth, the lack of predicted species richness in some portions of the study area (for example the Great Divide Basin north of Interstate 80) could be an artifact of minimal sampling in those regions rather than a true reflection of available bat habitat. Future surveys will focus on sampling within these areas. As a result of two seasons of surveys and modeling, we now have a clearer picture of which species inhabit the area and what habitats are most important to conserve. Collectively, perennial water sources, especially near rock formations and in foothill regions, appear to be important as well as forested areas for migrating bats. Survey efforts will continue in 2013 and we plan to survey a similar number of sites in a variety of habitats in both the summer and fall migration seasons. This information will be used to improve the habitat, distribution and migration models presented here.

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TABLES

Table 1. Habitat types of mist net survey sites.

Habitat Type	Percent of sampled sites where type was present
Shrubland / Shrub steppe	60.9
Grassland	19.5
Wetland / Open water	73.6
Rock outcrop	8.0
Cliff	8.0
Cave	2.3
Conifer forest	6.9
Deciduous forest	4.6
Riparian shrub	16.1
Badlands	2.3
Disturbed	3.4

Table 2. Habitat types of acoustic survey sites.

Habitat type	Percent of sampled sites where type was present
Shrubland / Shrub steppe	75.6
Grassland	19.2
Wetland / Open water	22.6
Rock outcrop	10.1
Cliff	6.4
Cave	0.7
Conifer forest	13.9
Deciduous forest	3.4
Foothills Shrub	0.7
Riparian shrub	7.89
Badlands	1.1
Disturbed	2.3

Table 3. Number occurrences documented during 2012 surveys and the efficiency of detection by survey method.

Survey method	Species occurrences*	Nights surveyed	Efficiency+
Mist net	117	87	1.34
Anabat	170	62	2.74
EM3	54	25	2.16
Songmeter	314	176	1.78

*An occurrence is the detection of a species at a site (regardless of the number of captures or recordings)
+Efficiency is the average number of species occurrences per survey night.

Table 4. Bat species detected during 2012 surveys in southern Wyoming, their relative abundance and seasonal residency.

Common name	Scientific name	Relative abundance	Mist net occurrences*	Acoustic occurrences*	Season of residency
Big Brown Bat	*Eptesicus fuscus*	Less common	11	32	Year round
California Myotis	*Myotis califonicus*	Very uncommon	0	3	Year round
Fringed Myotis	*Myotis thysanodes*	Uncommon	3	9	Year round
Hoary Bat	*Lasiurus cinereus*	Common	9	50	Spring, summer, fall
Little Brown Myotis	*Myotis lucifugus*	Common	19	97	Year round
Western Long-eared Myotis	*Myotis evotis*	Common	22	84	Year round
Long-legged Myotis	*Myotis volans*	Common	9	23	Year round
Pallid Bat	*Antrozous pallidus*	Less common	7	31	Year round
Eastern Red Bat	*Lasiurus borealis*	Uncommon	1	3	Spring, summer, fall
Silver-haired Bat	*Lasionycteris noctivagans*	Less common	7	57	Spring, summer, fall
Townsend's Big-eared Bat	*Corynorhinus townsendii*	Uncommon	3	14	Year round
Western Small-footed Myotis	*Myotis ciliolabrum*	Common	20	123	Year round
Yuma Myotis	*Myotis yumanensis*	Very uncommon	6	13	Year round

*An occurrence is the detection of a species at a site, regardless of the number of captures or recordings.

Table 5. Number of bats captured during 2012 mist net surveys broken out by sex and age.

Common name	Males (repro[1])	Females (repro[2])	Adults	Juveniles
Big Brown Bat	14 (2)	1 (0)	16	1
Fringed Myotis	1 (0)	1 (2)	4	0
Hoary Bat	6 (0)	2 (0)	7	1
Little Brown Myotis	35 (2)	25 (16)	64	7
Western Long-eared Myotis	81 (0)	71 (10)	141	21
Long-legged Myotis	15 (0)	4 (7)	21	5
Pallid Bat	3 (0)	7 (4)	8	6
Eastern Red Bat	2 (0)	0 (0)	2	0
Silver-haired Bat	5 (1)	1 (1)	8	0
Townsend's Big-eared Bat	0 (2)	1 (1)	4	0
Western Small-footed Myotis	15 (0)	15 (13)	40	3
Yuma Myotis	6 (0)	2 (3)	10	1

[1]Number of males with descended testis.

[2]Number of females pregnant, lactating, or post-lactating.

Table 6. Chi-square analysis of habitat preferences in relation to all sites sampled.

Species	**Shrub steppe**	**Grass-land**	**Wetland/ Open water**	**Rock outcrop**	**Cliff/ Canyon**	**Cave**	**Conifer Forest**	**Deciduous Forest**	**Foot-hills**	**Riparian Shrub**	**Bad-lands**	**Disturbed**
Big Brown Bat		-					-					
Fringed Myotis**	-		+				-					
Hoary Bat			+									
Little Brown Myotis	-											
Western Long-eared Myotis												
Long-legged Myotis	-	+										
Pallid Bat*	-										+	
Eastern Red Bat**			++									
Silver-haired Bat	-											
Townsend's Big-eared Bat**	--	-	-				+		++		+	
Western Small-footed Myotis												
Yuma Myotis**	+		+				-					

*Significant at $p < 0.05$; ** Significant at $p < 0.001$

Table 7. Spearman Rank Correlation values between the likelihood of occurs for summer distribution models and the actual prevalence of validation occurrences for nine species. Higher correlations indicate better model performance.

Species	Spearman Rank Correlation	p-value
Big Brown Bat	0.370	0.147
Hoary Bat	0.297	0.202
Little Brown Myotis*	0.976	<0.001
Western Long-eared Myotis	0.418	0.115
Long-legged Myotis*	0.952	<0.001
Pallid Bat	0.643	0.060
Silver-haired Bat	0.503	0.069
Western Small-footed Myotis*	0.939	<0.001
Species Richness*	0.198	0.008

*Significant at $p < 0.05$

Table 8. Spearman Rank Correlation values for fall stop-over habitat models for two species. Higher correlations indicate better model performance.

Species	Spearman Rank Correlation	p-value
Hoary Bat	0.286	0.246
Silver-haired Bat*	0.750	0.026

*Significant at $p < 0.05$

Table 9. Scoring system used to evaluate the quality of occurrence records based on spatial precision (A), age of record (B), and taxonomic certainty of identification (C).

A. Spatial Precision of Occurrence Record

Score	***Definition***	***Example***
4	Location uncertainty ≤ 30 meters	Location via GPS
3	Location uncertainty > 30 meters and ≤ 100 m	Location via 7.5' quad map
2	Location uncertainty > 100 meters and ≤ 300 ms	Location via 100k quad map
1	Location uncertainty > 300 meters and ≤ 600 m	Location via large-scale map or detailed written directions
0	Location uncertainty > 600 meters and < ~3,000 m	Location via landscape description (e.g., 5 miles south of Laramie Peak)
U	Record is unusable; uncertainty > ~3,000 m	Museum specimen located by reference to a county

B. Age of Occurrence Record

Score	***Calendar Year of Observation***	***Definition***
4	≥ 2000	Observation made within roughly 10 years of model creation
3	1990 - 1999	Observation made within roughly 20 years of model creation
2	1980 - 1989	Observation made within roughly 30 years of model creation
1	1960 - 1979	Observation made within roughly 50 years of model creation
0	≤ 1959	Observation made within roughly 100 years of model creation
U	Historic	Record is unusable, because the record is over 100 years old, the species is known to be extirpated from the area in question, or the habitat has changed drastically since its collection.

C. Taxonomic Certainty of Occurrence Record

Score	***Category***	***Definition***
4	Confirmed Identification (TAX_CERT = Y)	Adequate supporting information exists within the occurrence record to consider it a valid observation of the species in question
2	Questionable Identification (TAX_CERT = ?)	Supporting information within the occurrence record is insufficient to *confirm* correct identification of the species (e.g., no supporting documentation or observer credentials), but neither is there any reason to assume that the record is in error
U	Misidentification	Record is unusable. Information in the occurrence record suggests it is misidentified

FIGURES

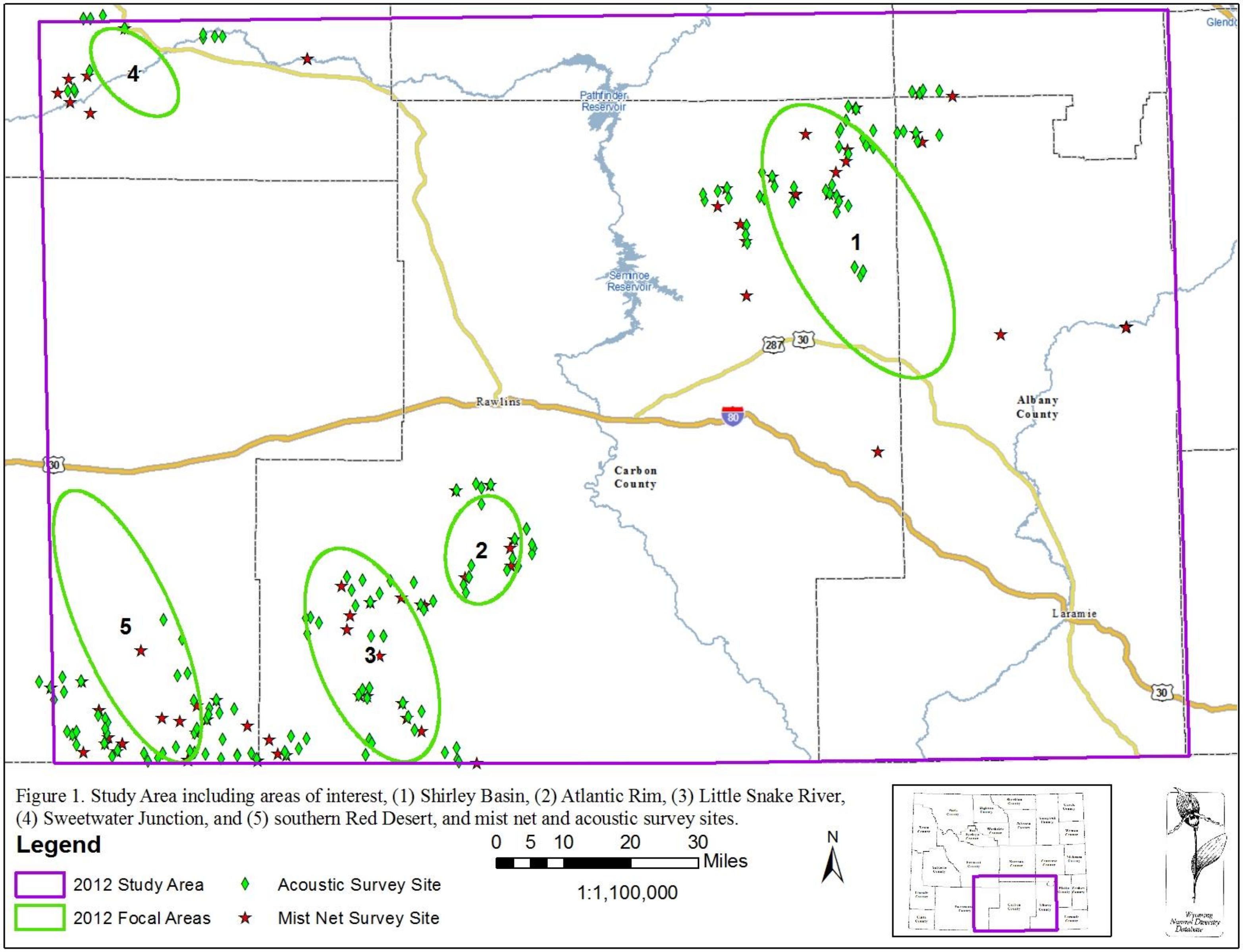


Figure 1. Study Area including areas of interest, (1) Shirley Basin, (2) Atlantic Rim, (3) Little Snake River, (4) Sweetwater Junction, and (5) southern Red Desert, and mist net and acoustic survey sites.

APPENDDICES

Appendix 1: Summer Distribution Models

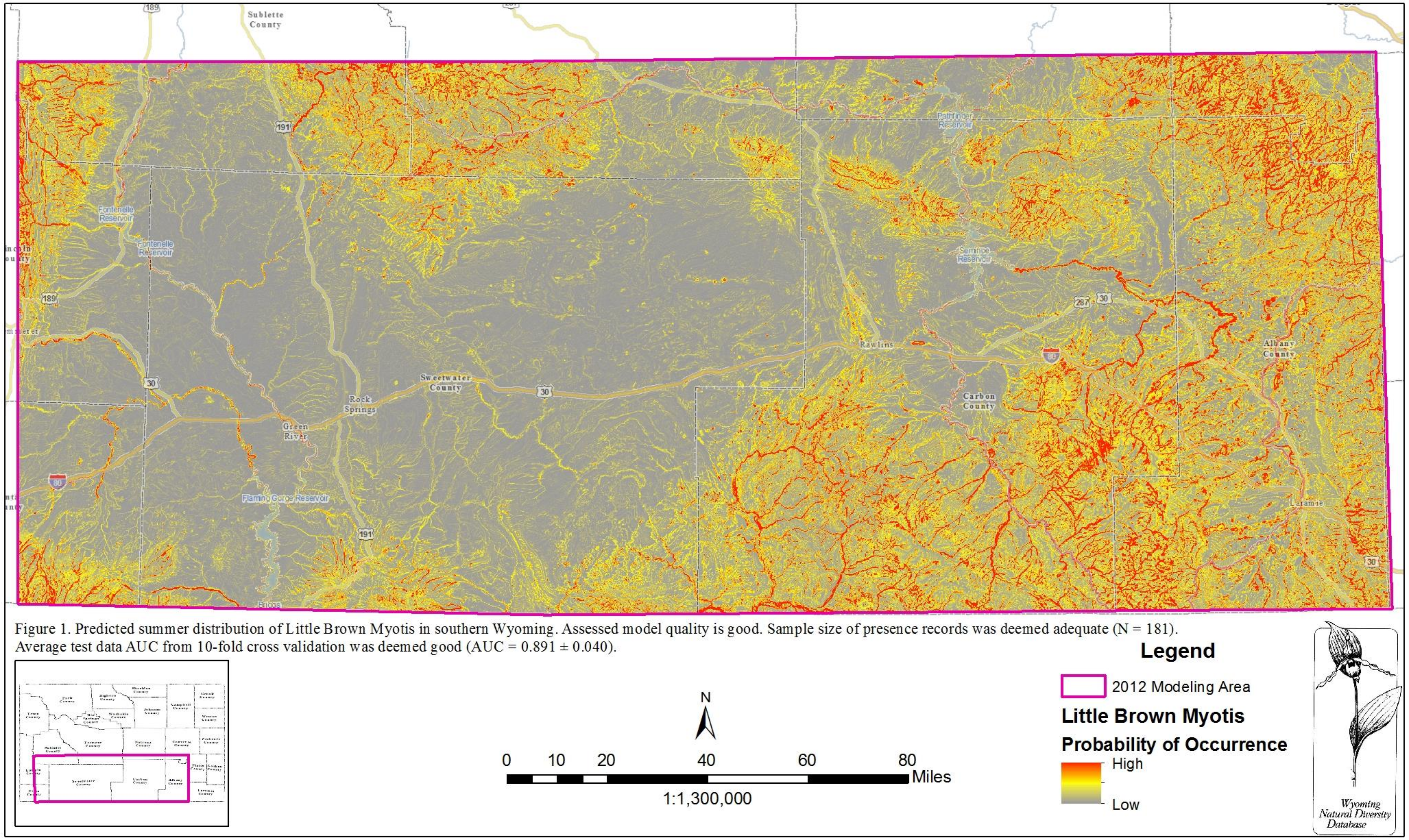


Figure 1. Predicted summer distribution of Little Brown Myotis in southern Wyoming. Assessed model quality is good. Sample size of presence records was deemed adequate (N = 181). Average test data AUC from 10-fold cross validation was deemed good (AUC = 0.891 ± 0.040).

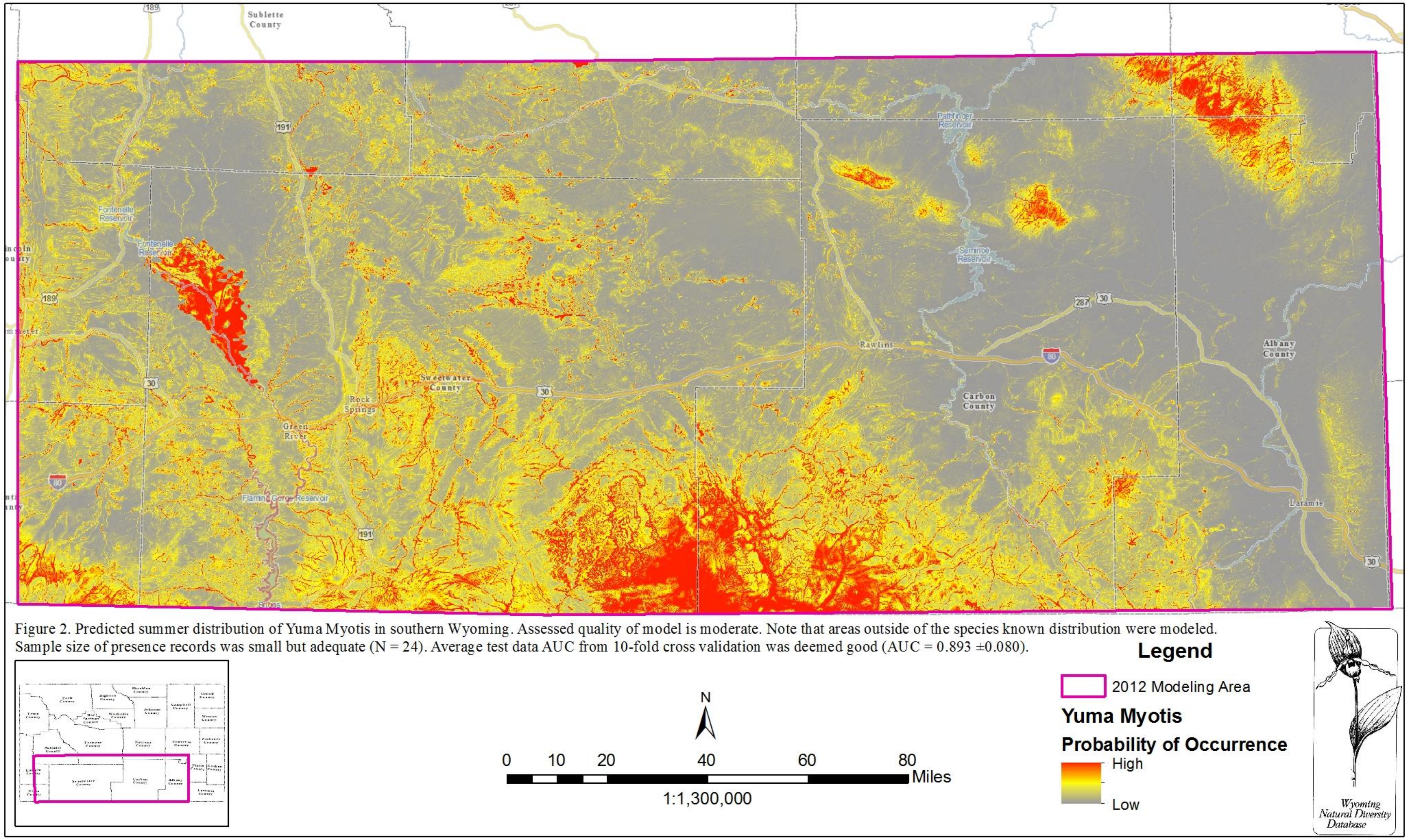


Figure 2. Predicted summer distribution of Yuma Myotis in southern Wyoming. Assessed quality of model is moderate. Note that areas outside of the species known distribution were modeled. Sample size of presence records was small but adequate (N = 24). Average test data AUC from 10-fold cross validation was deemed good (AUC = 0.893 ±0.080).

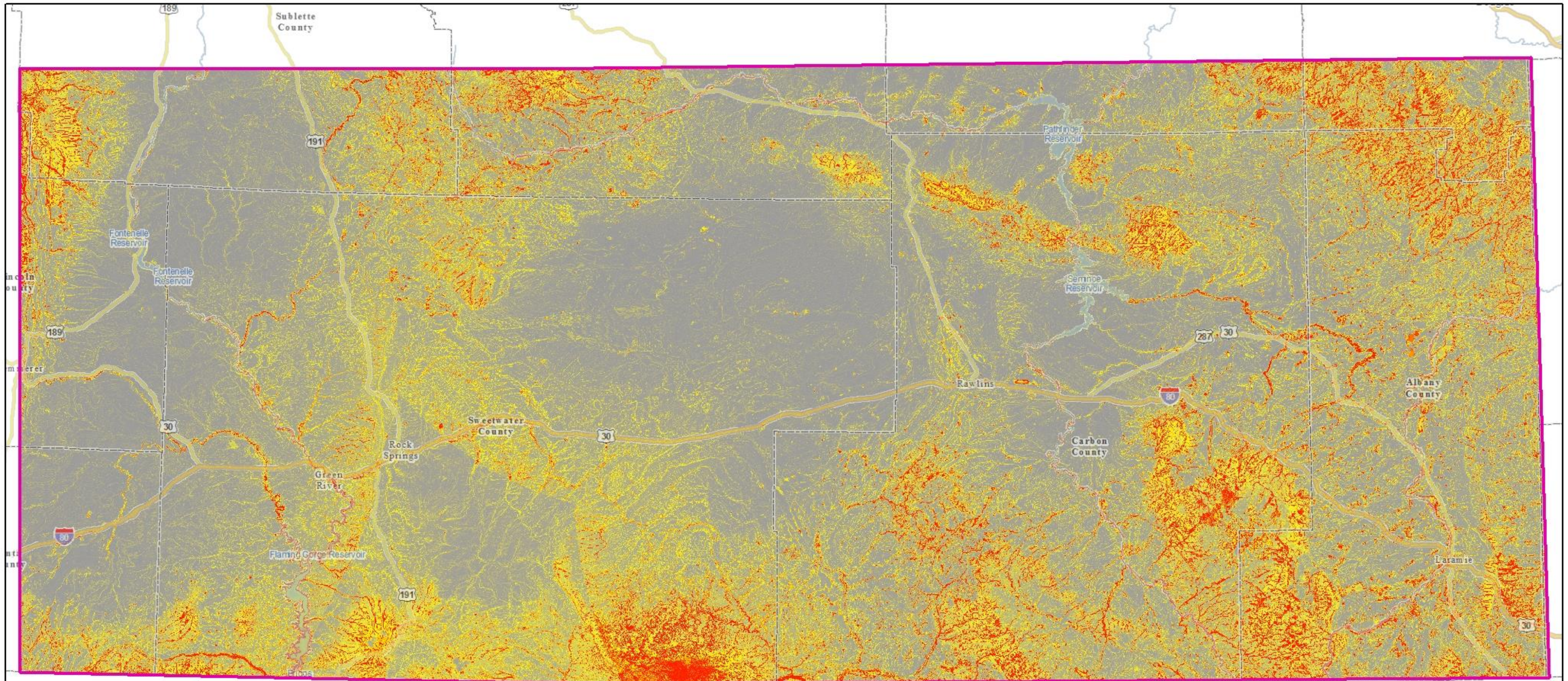
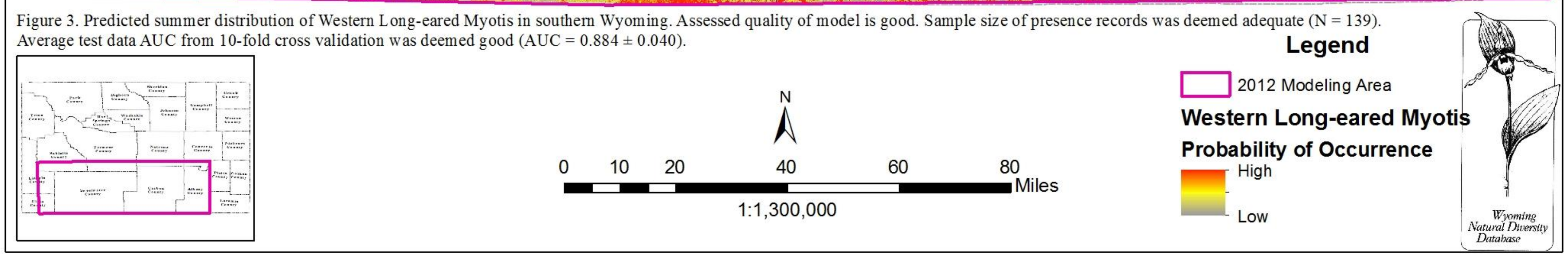


Figure 3. Predicted summer distribution of Western Long-eared Myotis in southern Wyoming. Assessed quality of model is good. Sample size of presence records was deemed adequate (N = 139). Average test data AUC from 10-fold cross validation was deemed good (AUC = 0.884 ± 0.040).



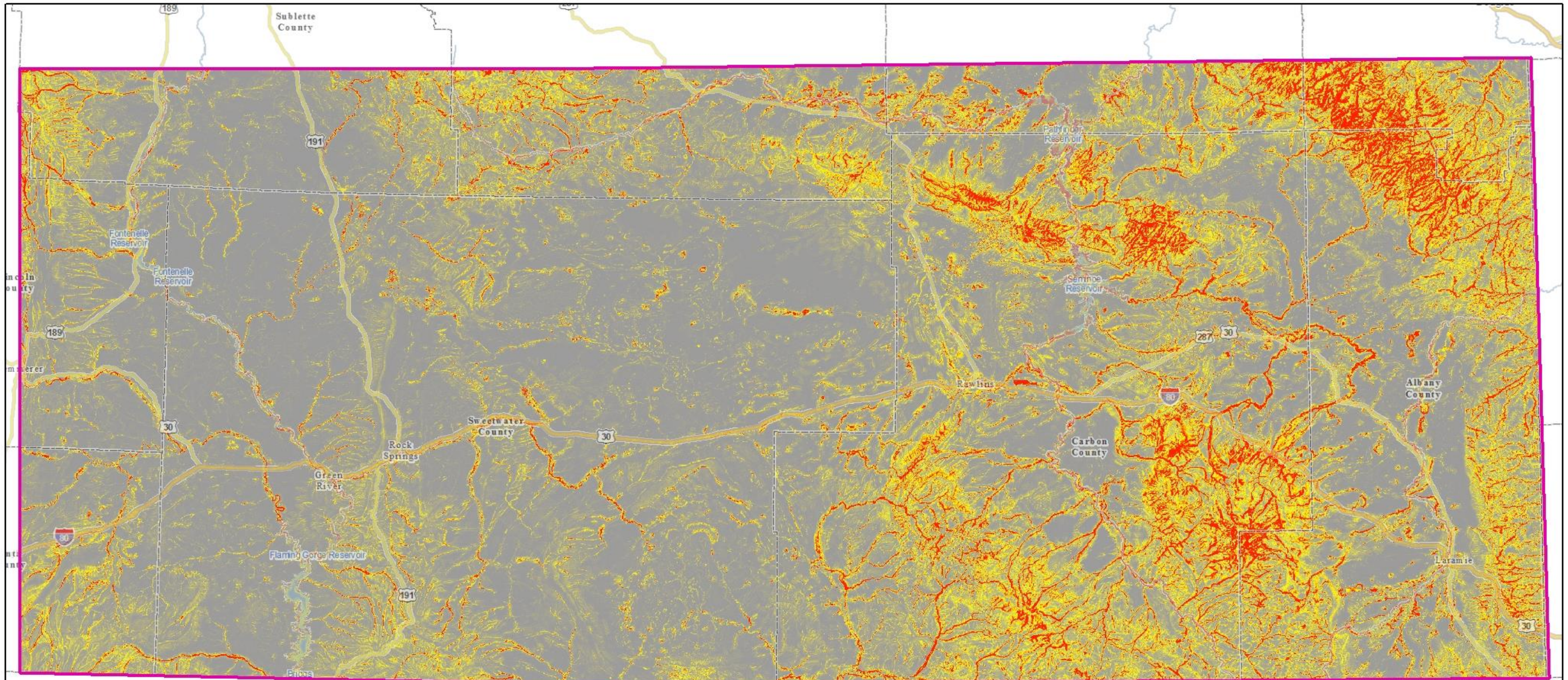
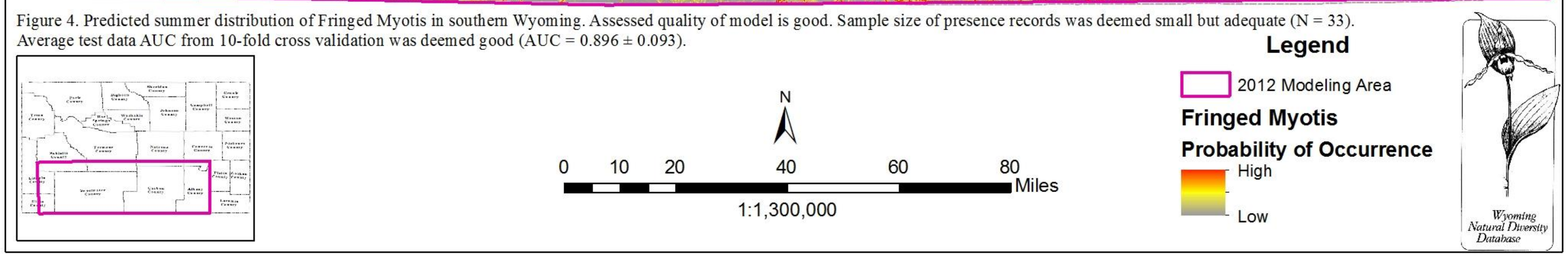


Figure 4. Predicted summer distribution of Fringed Myotis in southern Wyoming. Assessed quality of model is good. Sample size of presence records was deemed small but adequate (N = 33). Average test data AUC from 10-fold cross validation was deemed good (AUC = 0.896 ± 0.093).



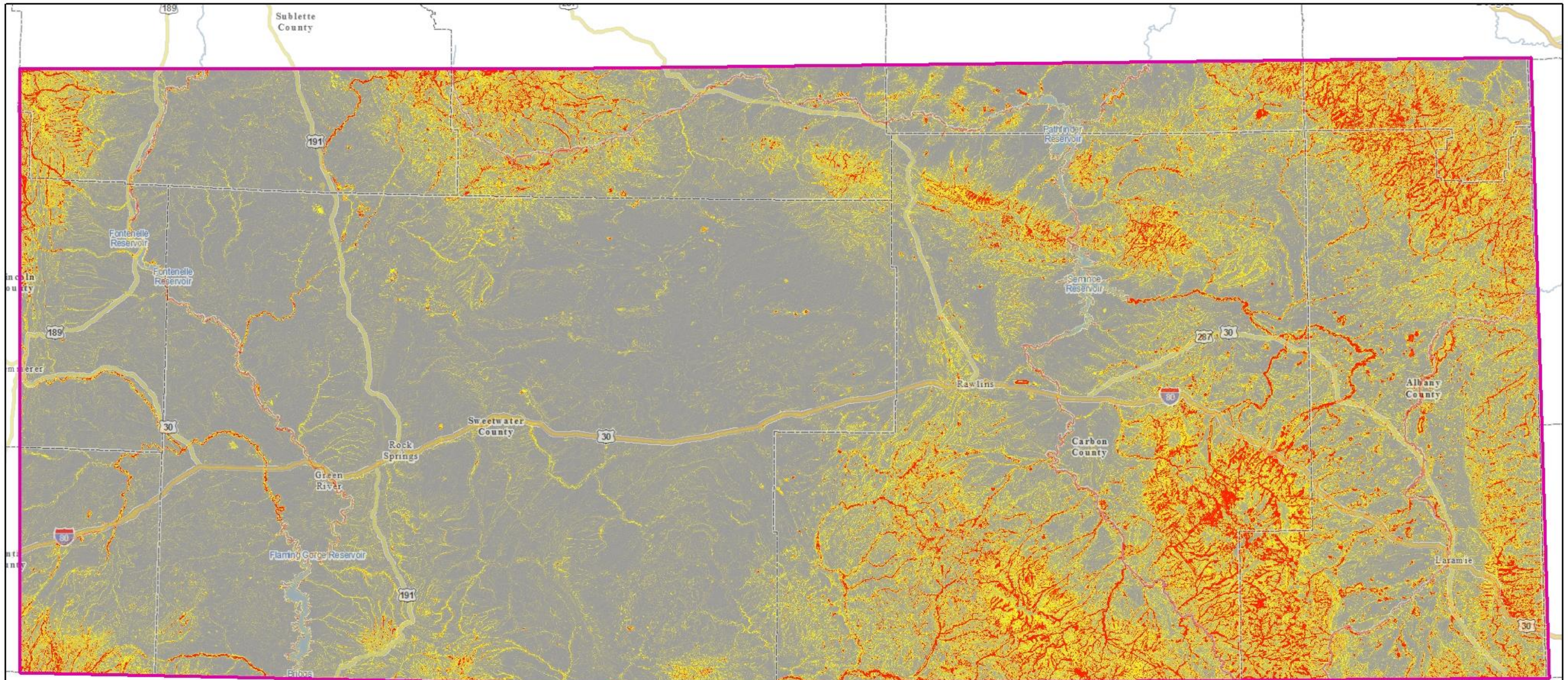
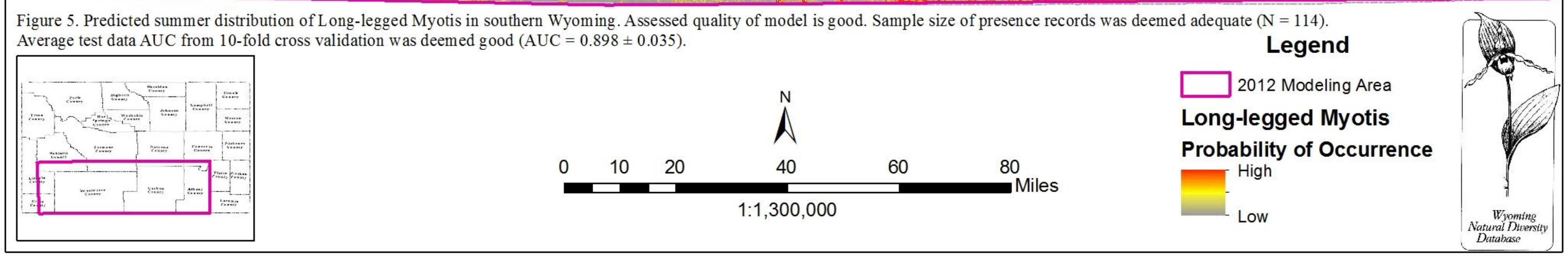


Figure 5. Predicted summer distribution of Long-legged Myotis in southern Wyoming. Assessed quality of model is good. Sample size of presence records was deemed adequate (N = 114). Average test data AUC from 10-fold cross validation was deemed good (AUC = 0.898 ± 0.035).



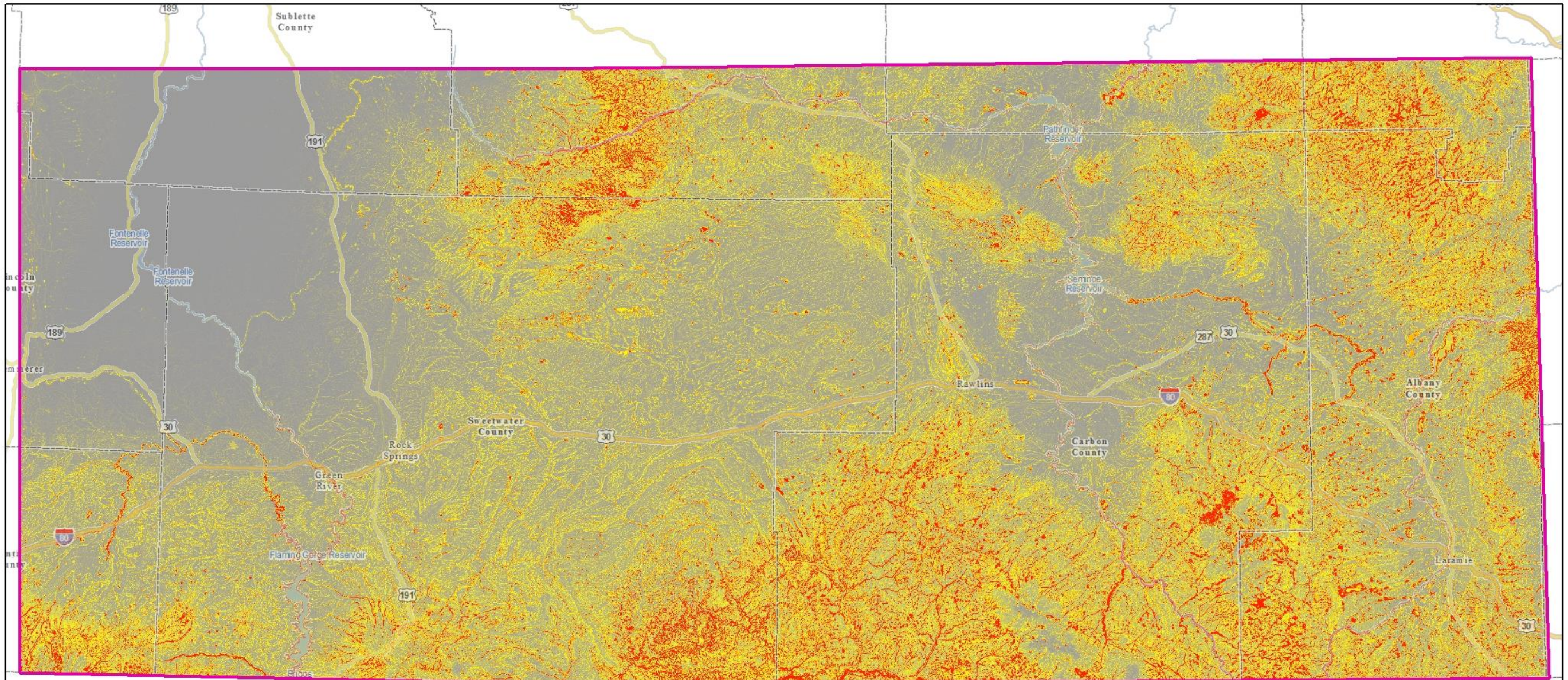
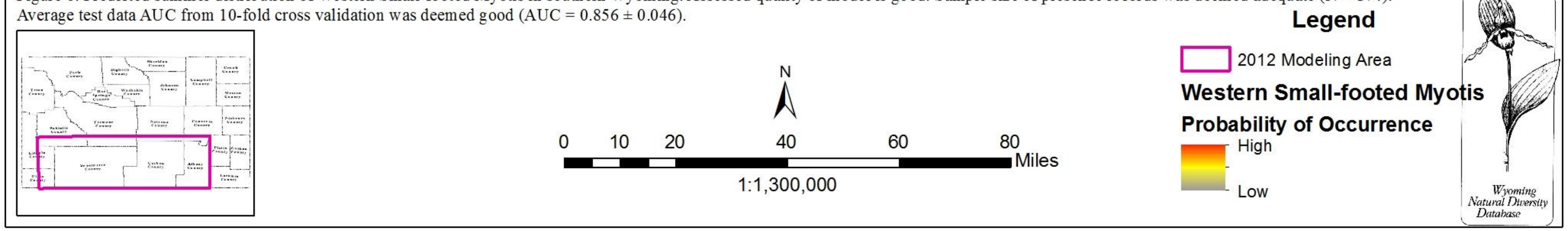


Figure 6. Predicted summer distribution of Western Small-footed Myotis in southern Wyoming. Assessed quality of model is good. Sample size of presence records was deemed adequate (N = 174). Average test data AUC from 10-fold cross validation was deemed good (AUC = 0.856 ± 0.046).



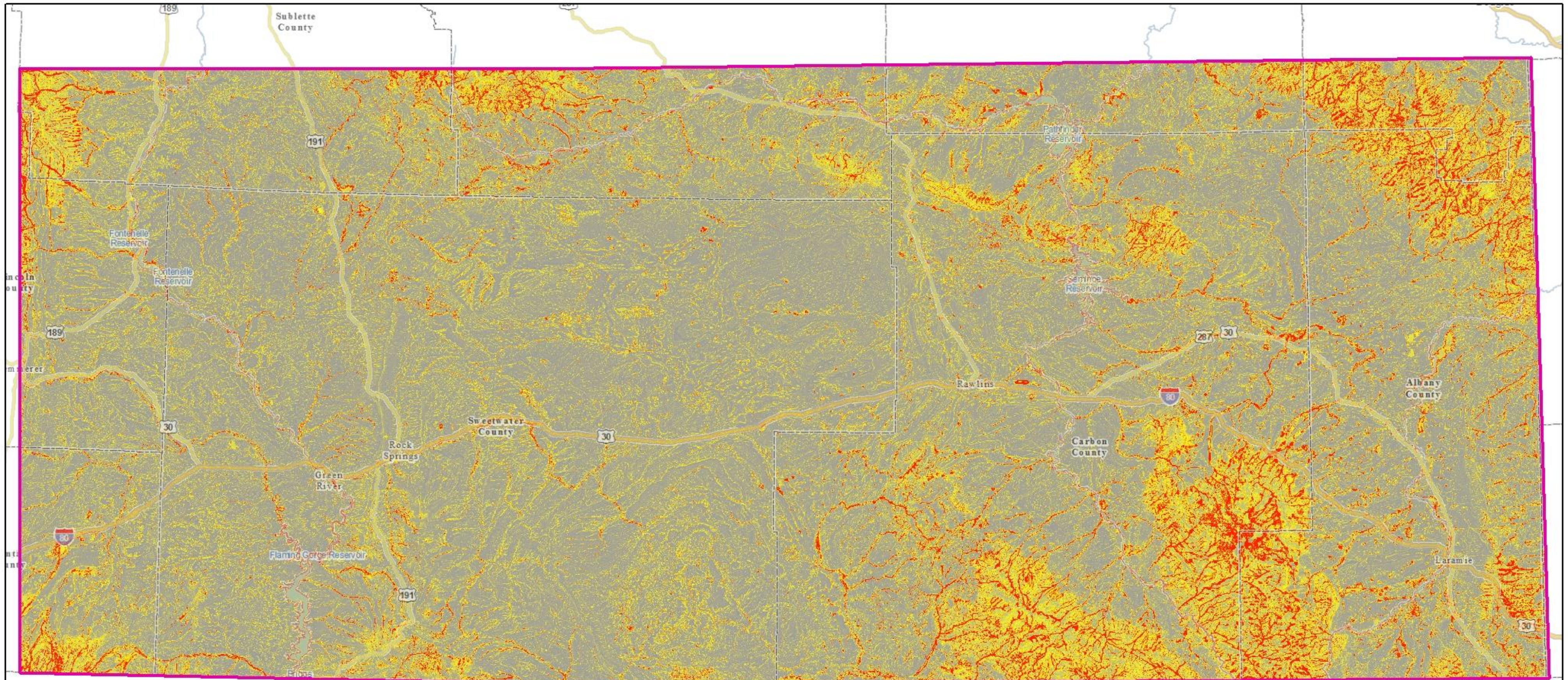
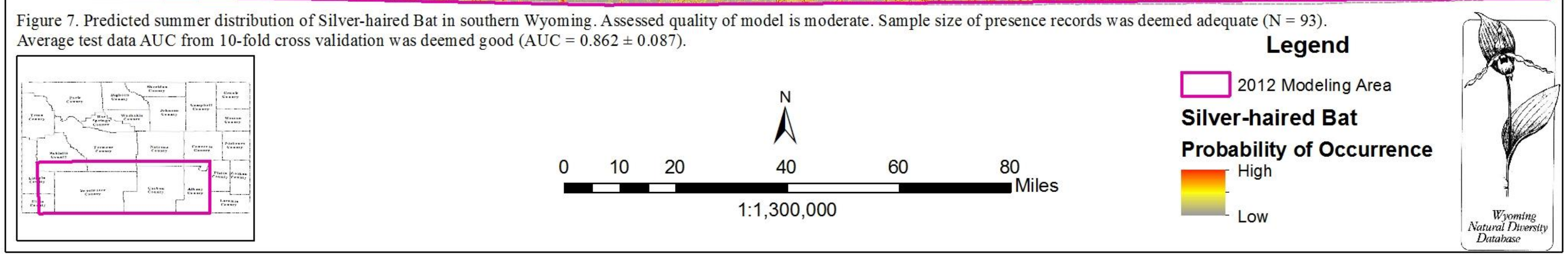


Figure 7. Predicted summer distribution of Silver-haired Bat in southern Wyoming. Assessed quality of model is moderate. Sample size of presence records was deemed adequate (N = 93). Average test data AUC from 10-fold cross validation was deemed good (AUC = 0.862 ± 0.087).



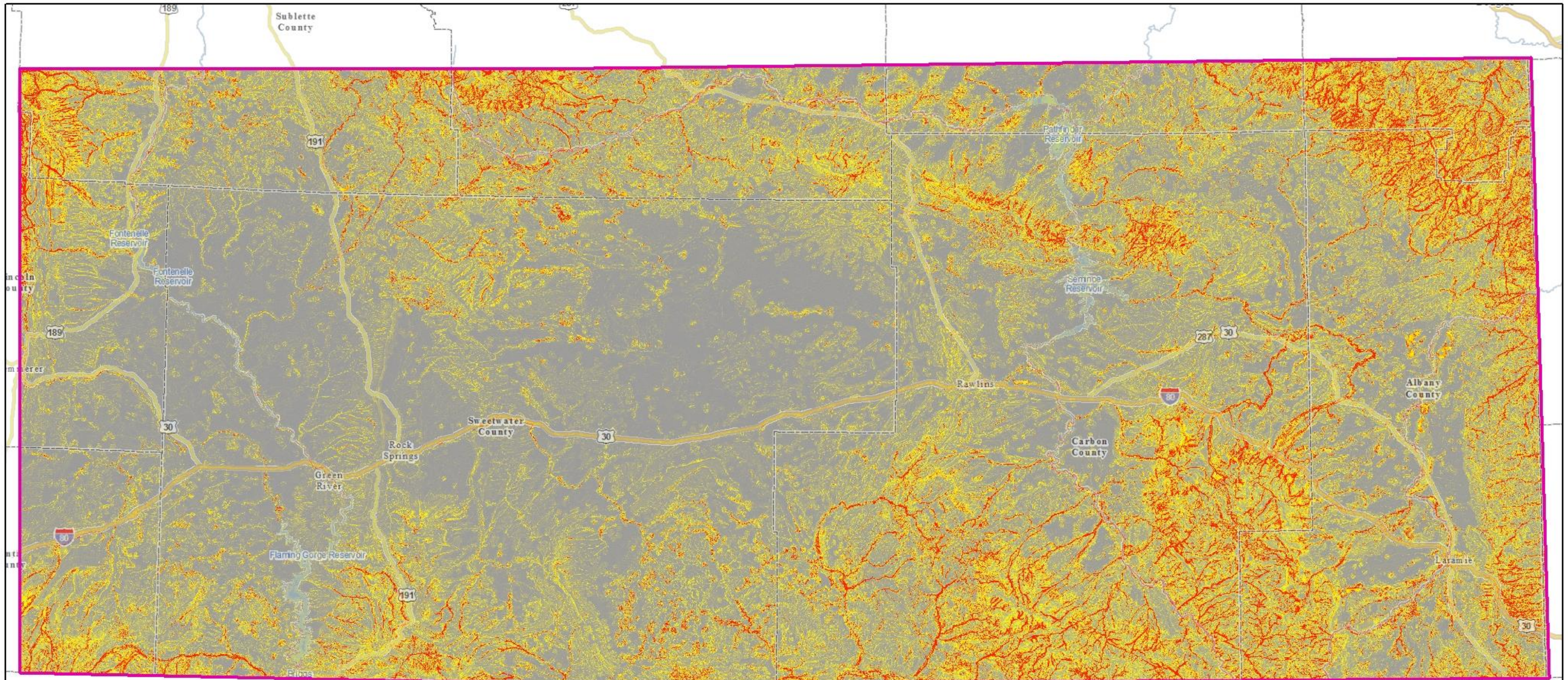
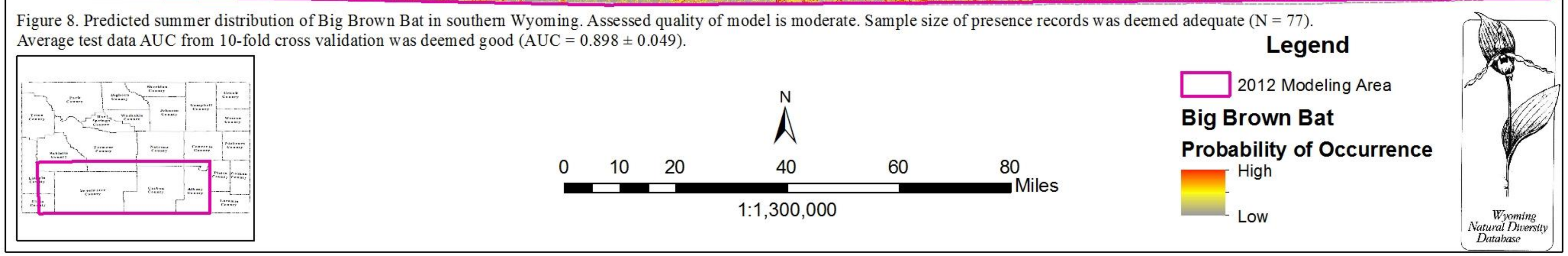


Figure 8. Predicted summer distribution of Big Brown Bat in southern Wyoming. Assessed quality of model is moderate. Sample size of presence records was deemed adequate (N = 77). Average test data AUC from 10-fold cross validation was deemed good (AUC = 0.898 ± 0.049).



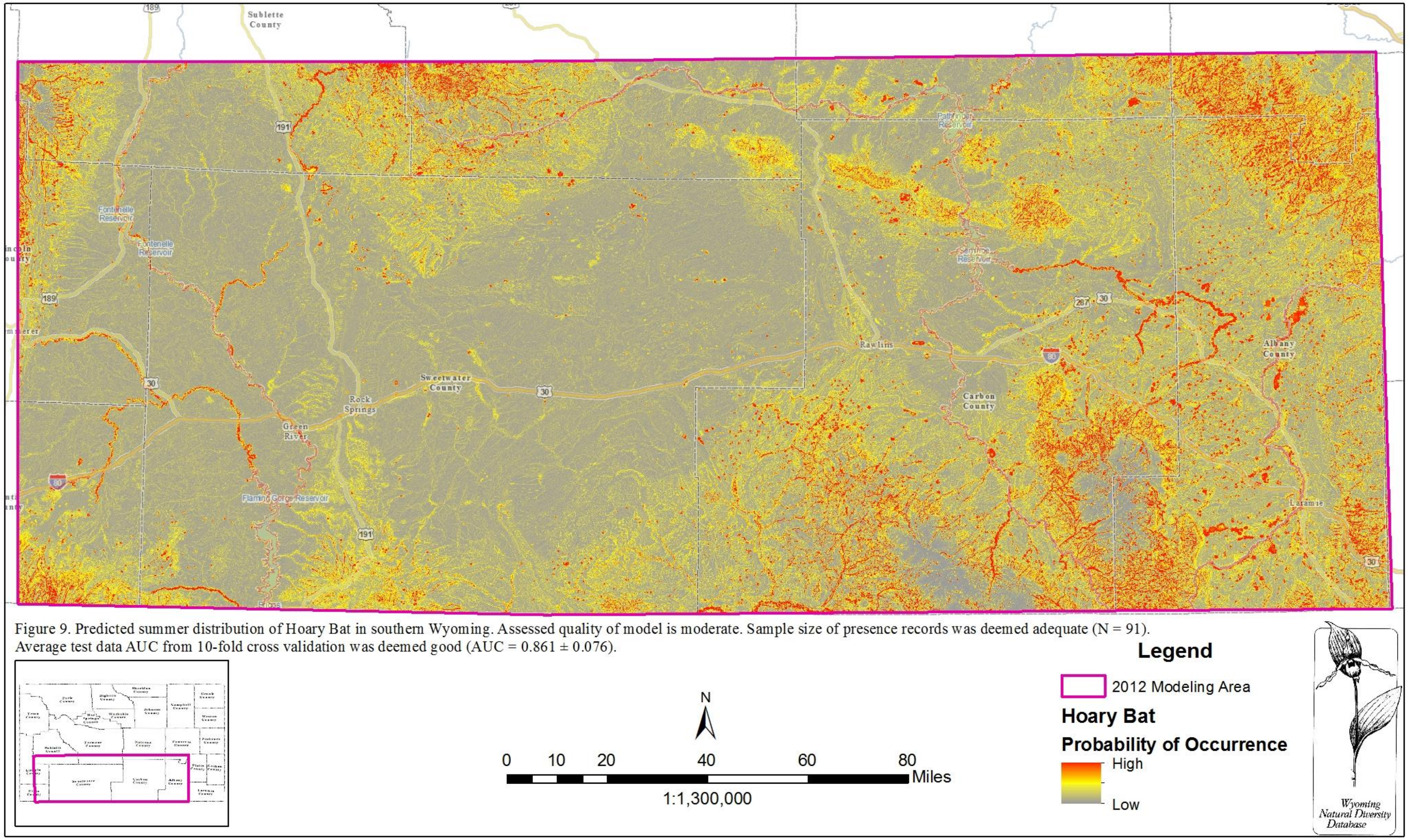


Figure 9. Predicted summer distribution of Hoary Bat in southern Wyoming. Assessed quality of model is moderate. Sample size of presence records was deemed adequate (N = 91). Average test data AUC from 10-fold cross validation was deemed good (AUC = 0.861 ± 0.076).

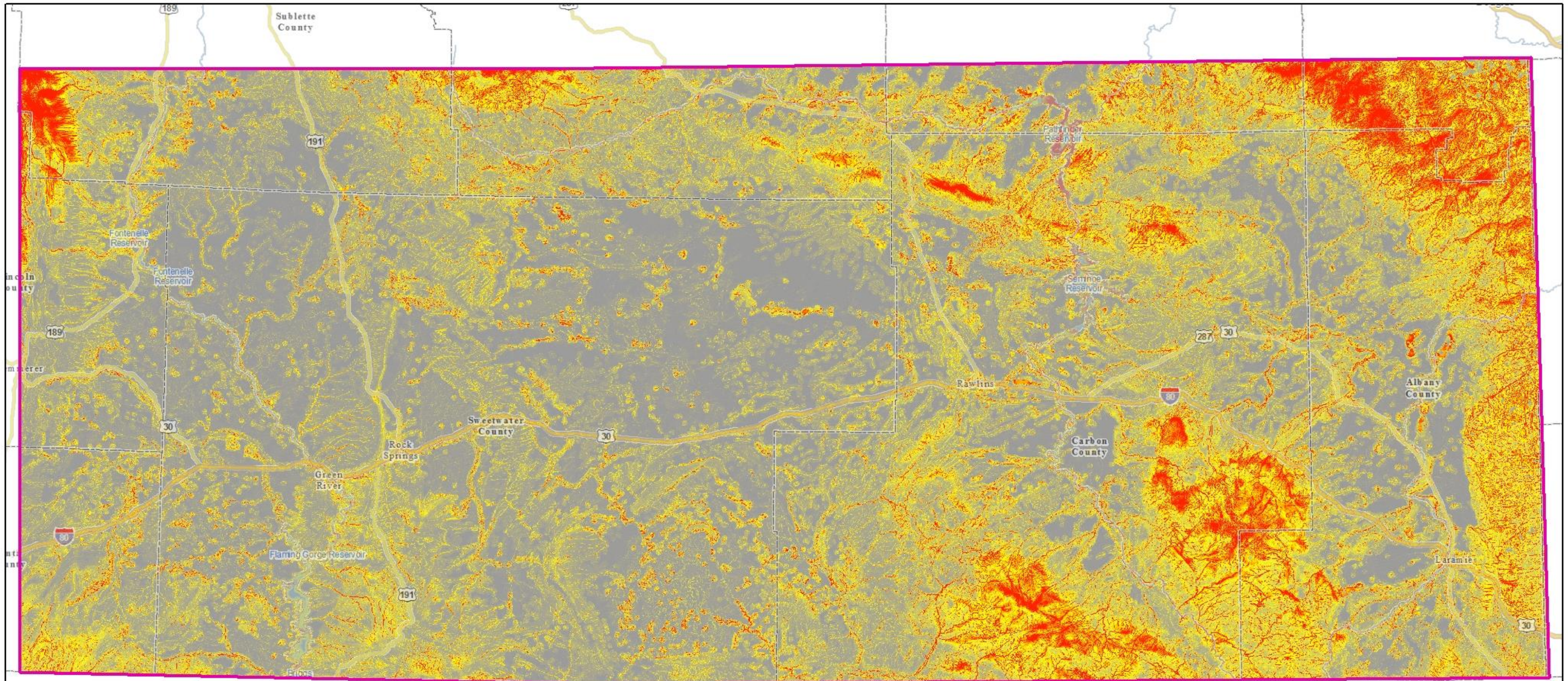
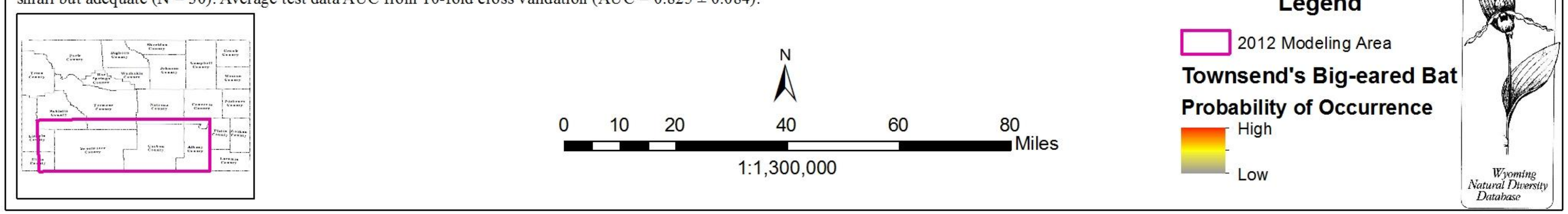


Figure 10. Predicted summer distribution of Townsend's Big-eared Bat in southern Wyoming. Assessed quality of model is poor. Sample size of presence records was deemed small but adequate (N = 30). Average test data AUC from 10-fold cross validation (AUC = 0.825 ± 0.084).



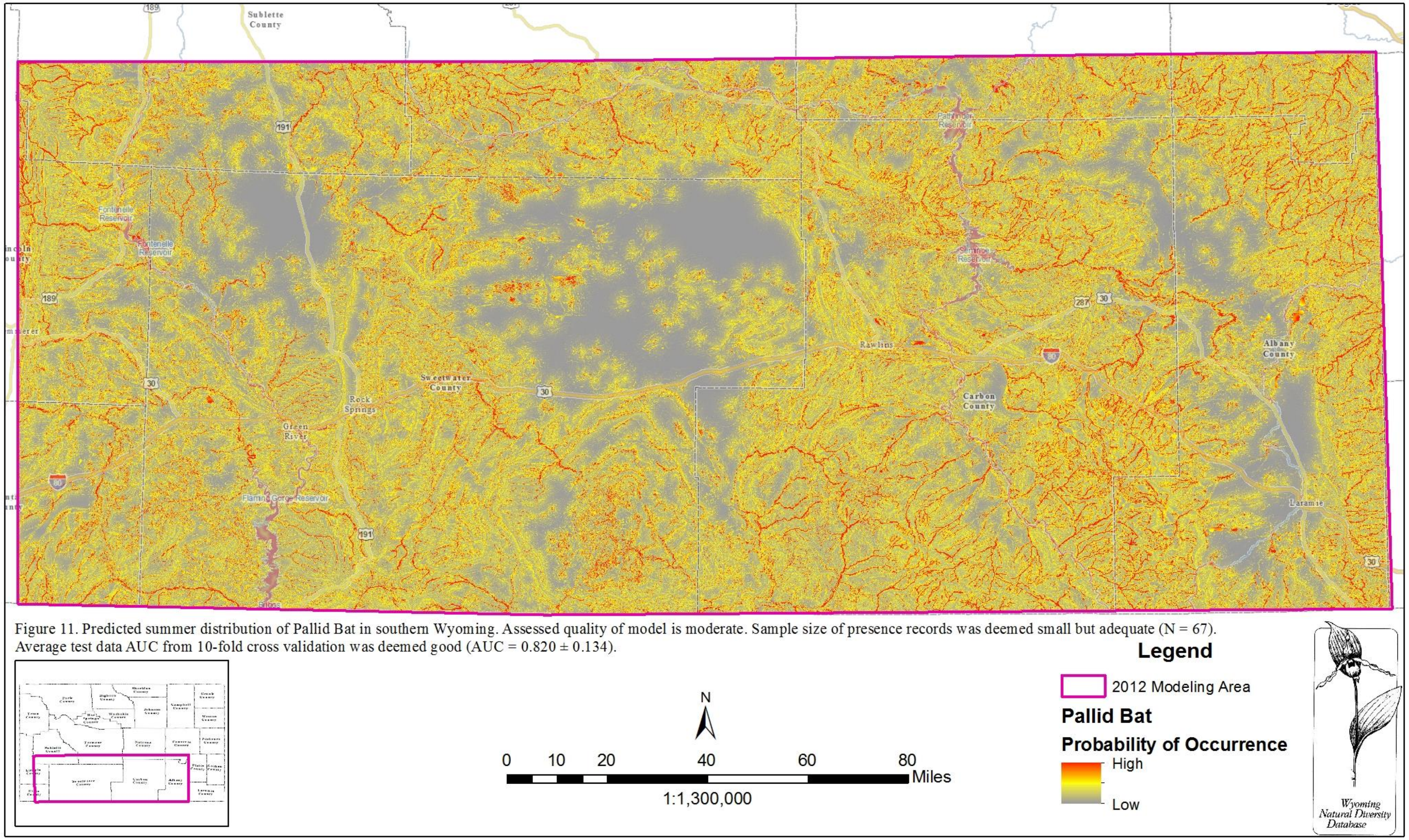


Figure 11. Predicted summer distribution of Pallid Bat in southern Wyoming. Assessed quality of model is moderate. Sample size of presence records was deemed small but adequate (N = 67). Average test data AUC from 10-fold cross validation was deemed good (AUC = 0.820 ± 0.134).

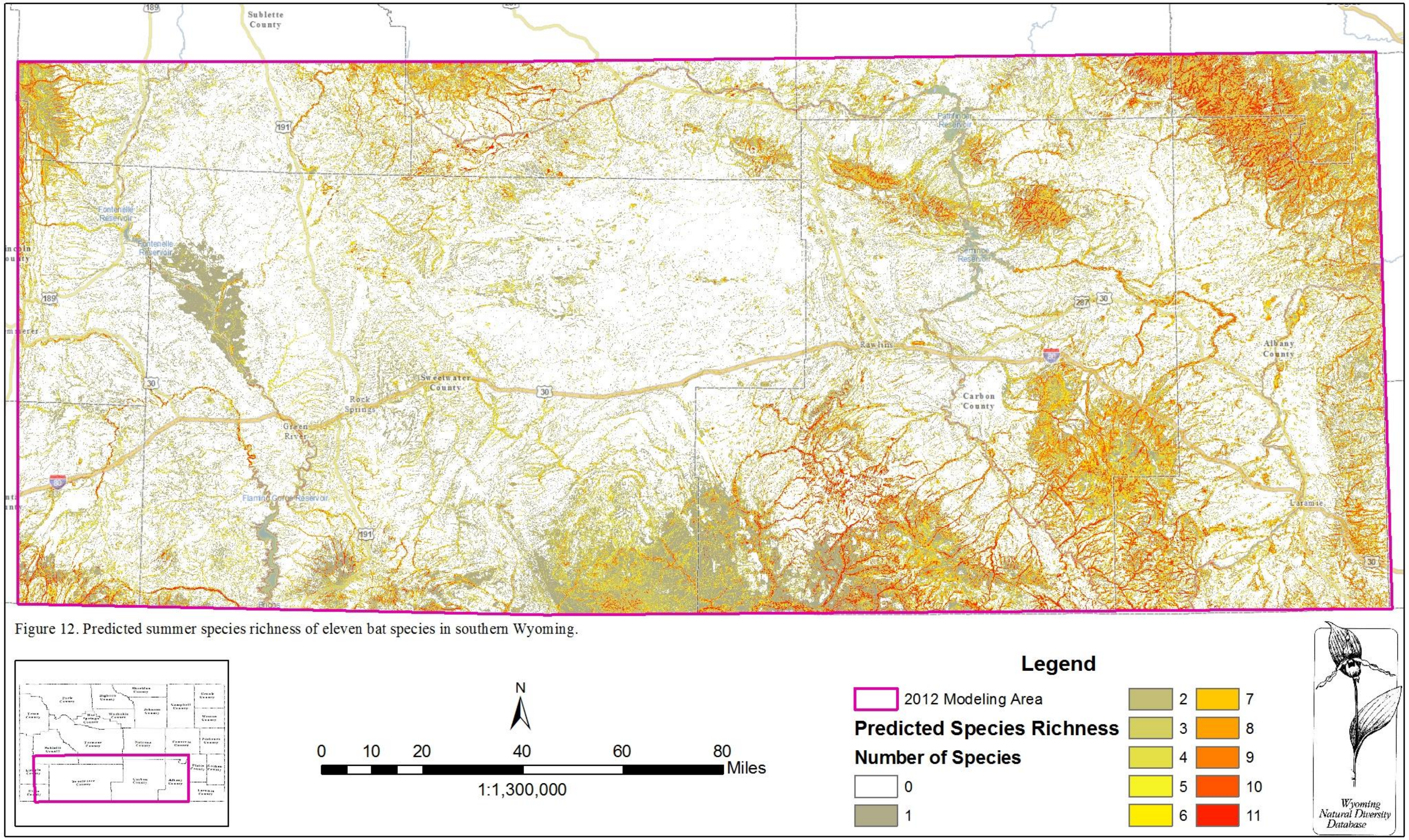


Figure 12. Predicted summer species richness of eleven bat species in southern Wyoming.

Appendix 2: Fall Migration Stopover Models

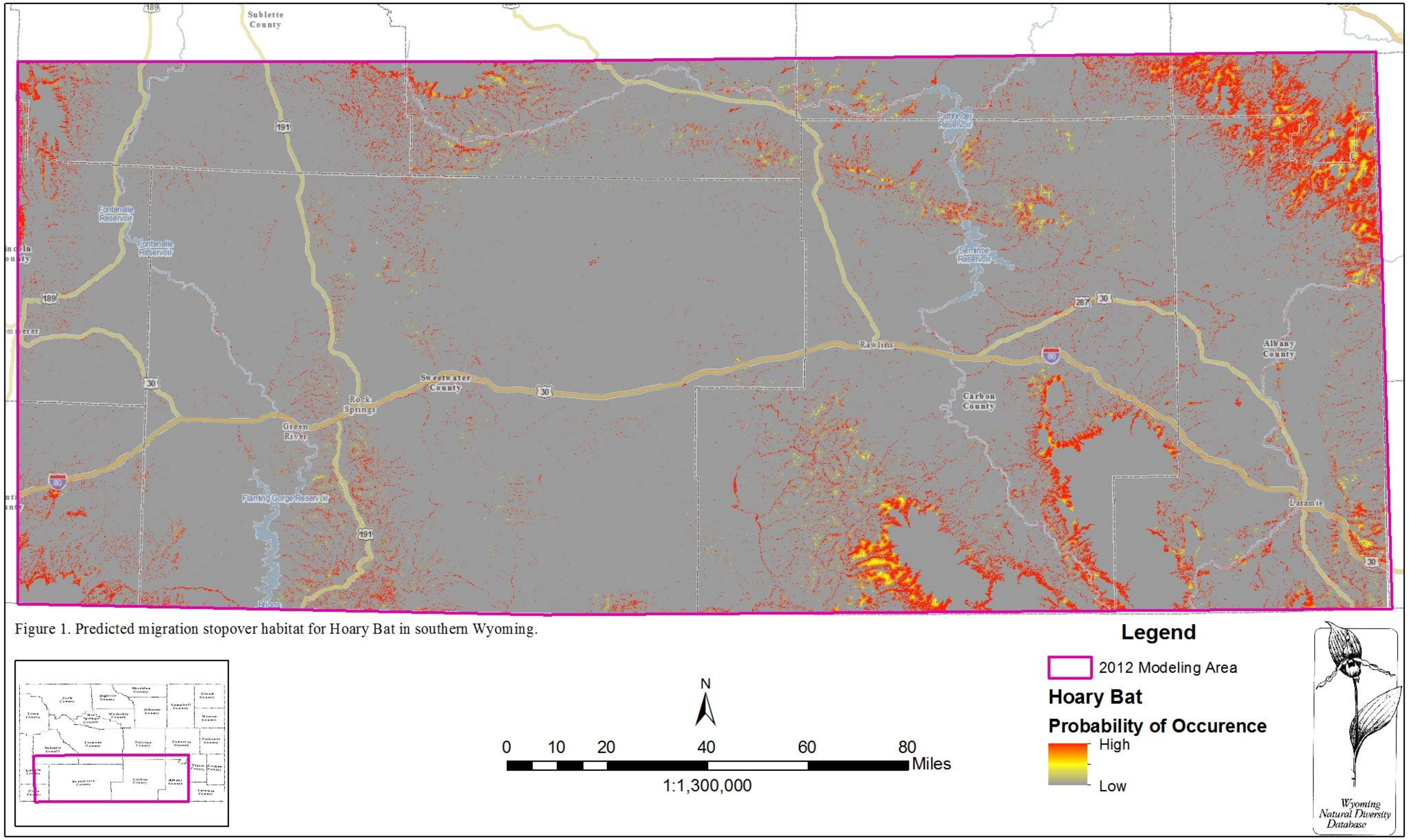


Figure 1. Predicted migration stopover habitat for Hoary Bat in southern Wyoming.

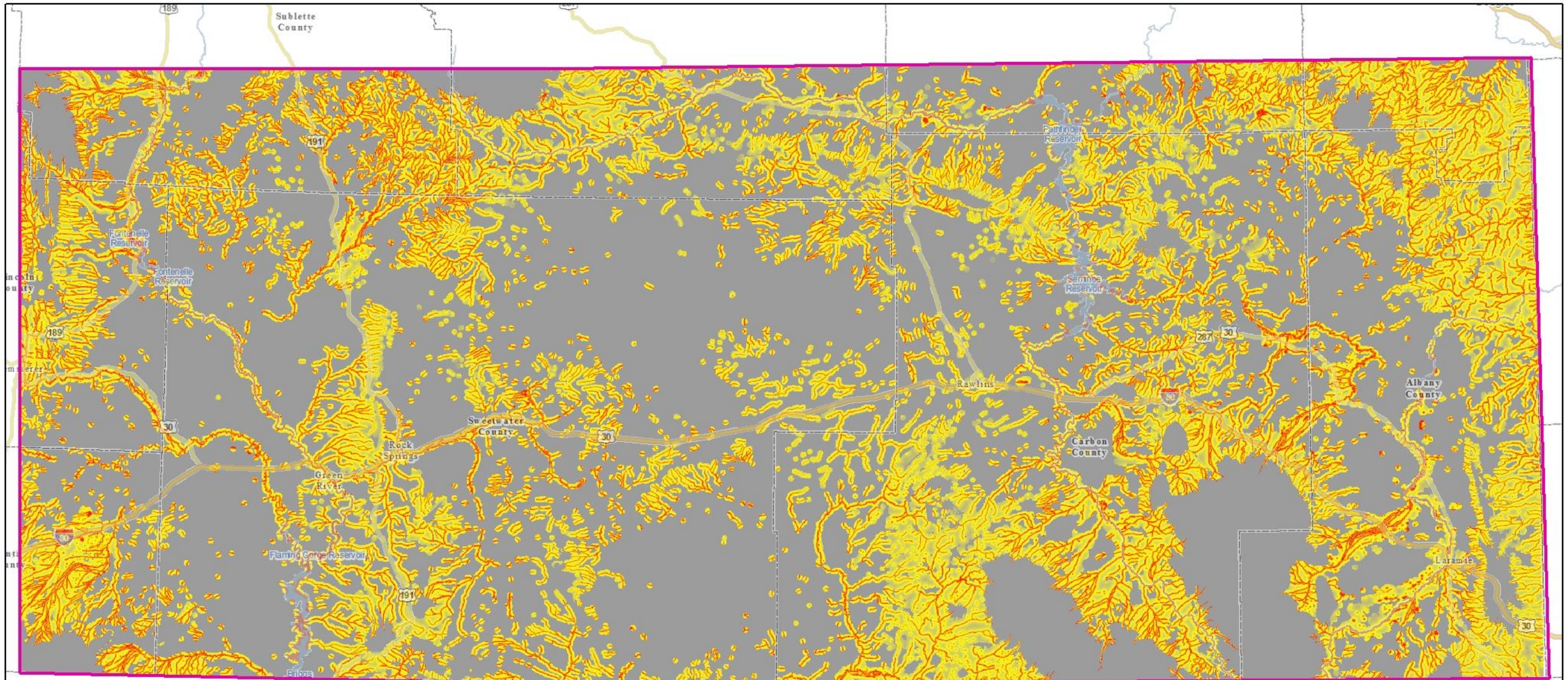
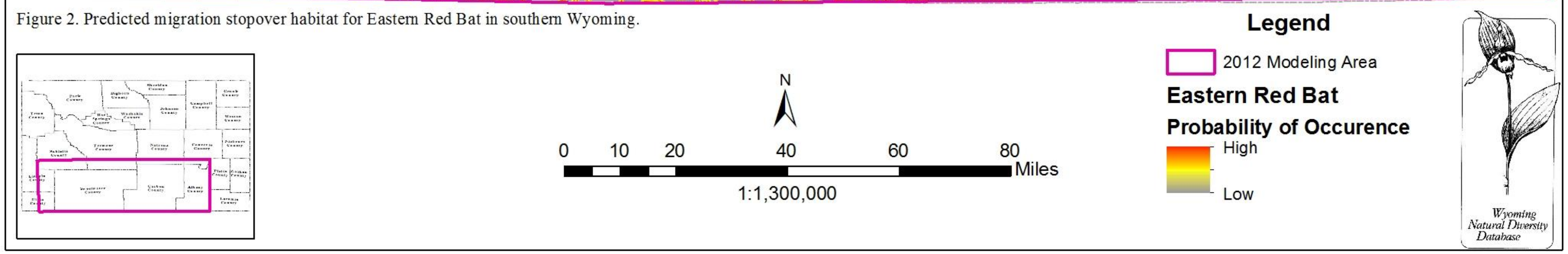


Figure 2. Predicted migration stopover habitat for Eastern Red Bat in southern Wyoming.



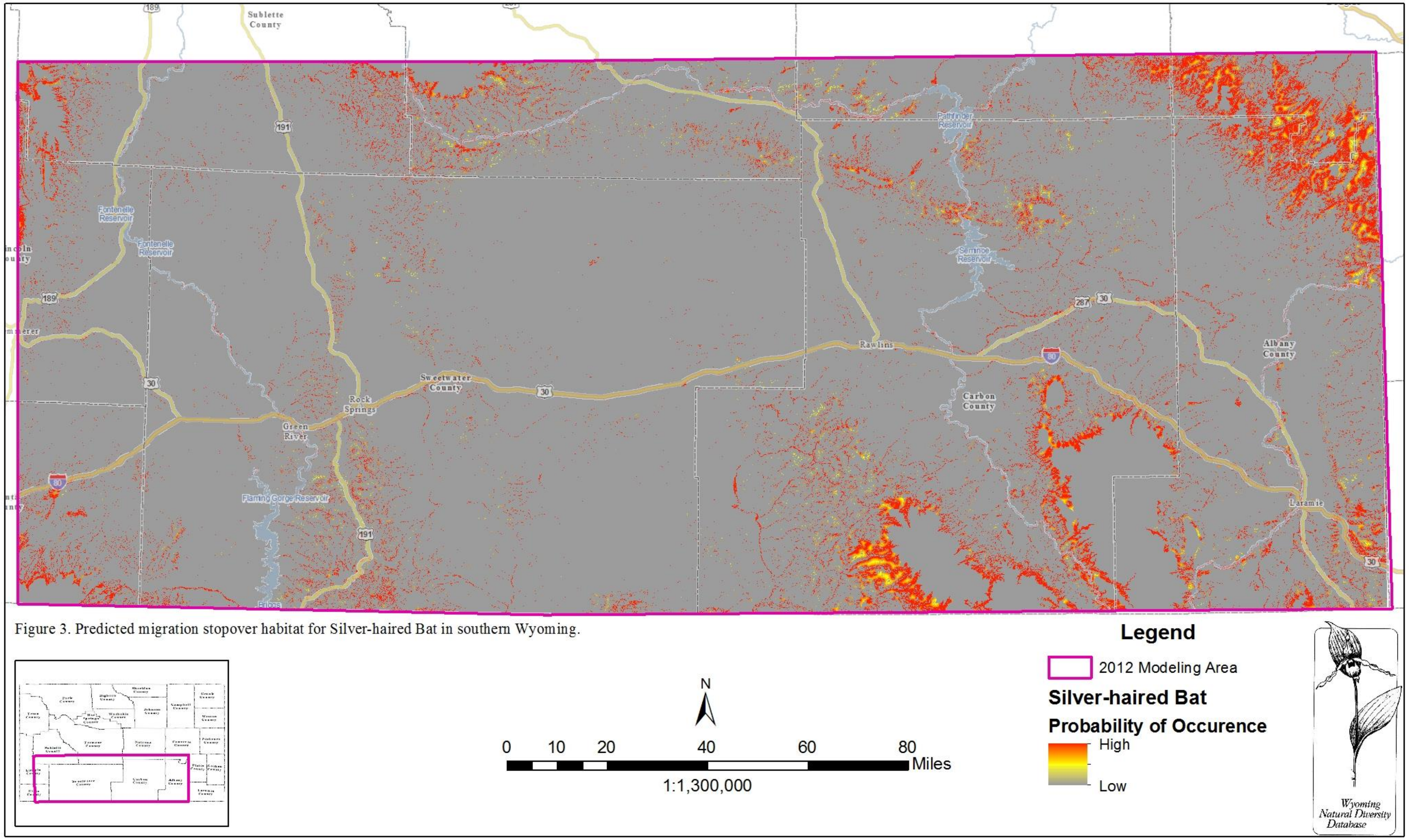


Figure 3. Predicted migration stopover habitat for Silver-haired Bat in southern Wyoming.

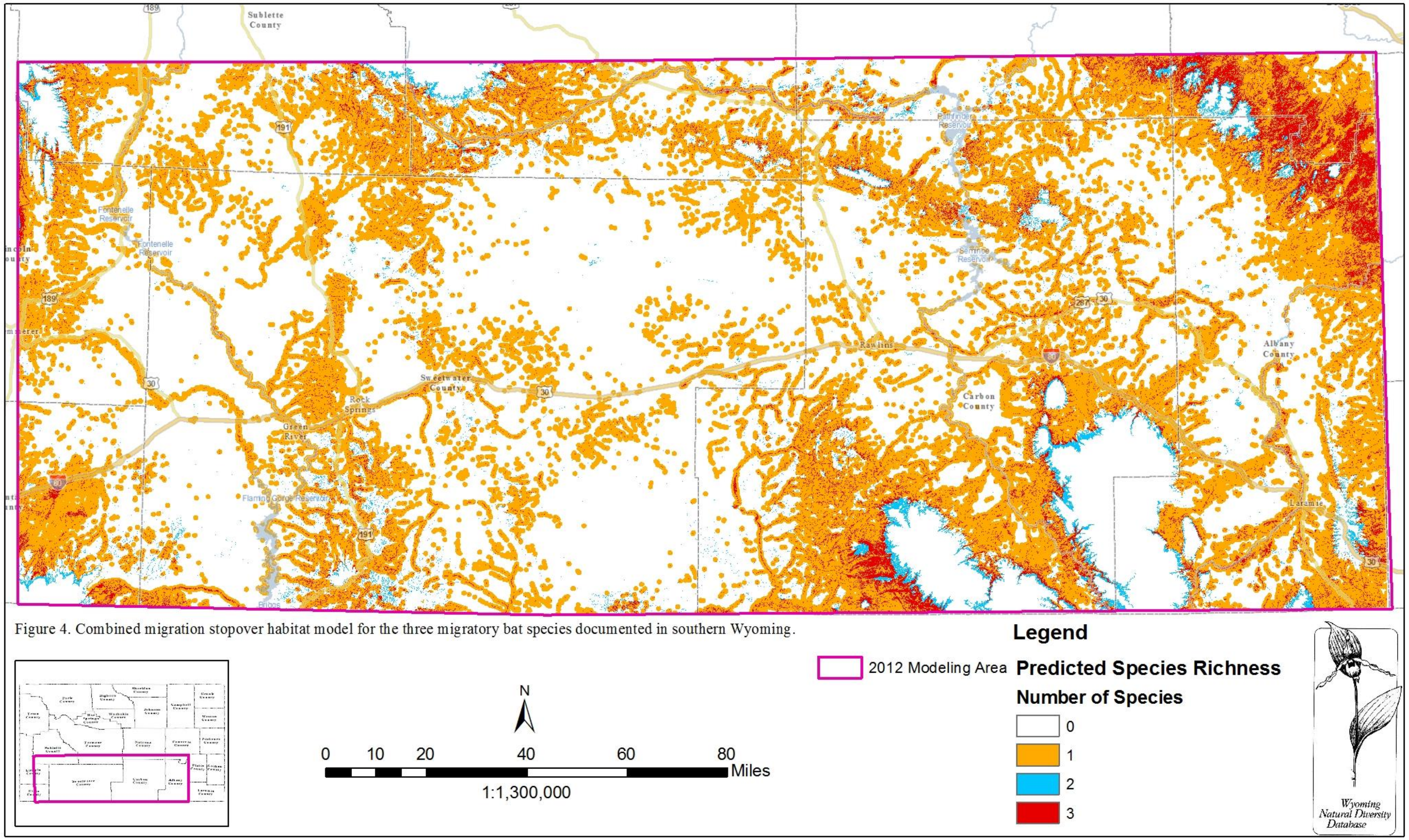


Figure 4. Combined migration stopover habitat model for the three migratory bat species documented in southern Wyoming.

Appendix 3: Exposure to Wind Development Model

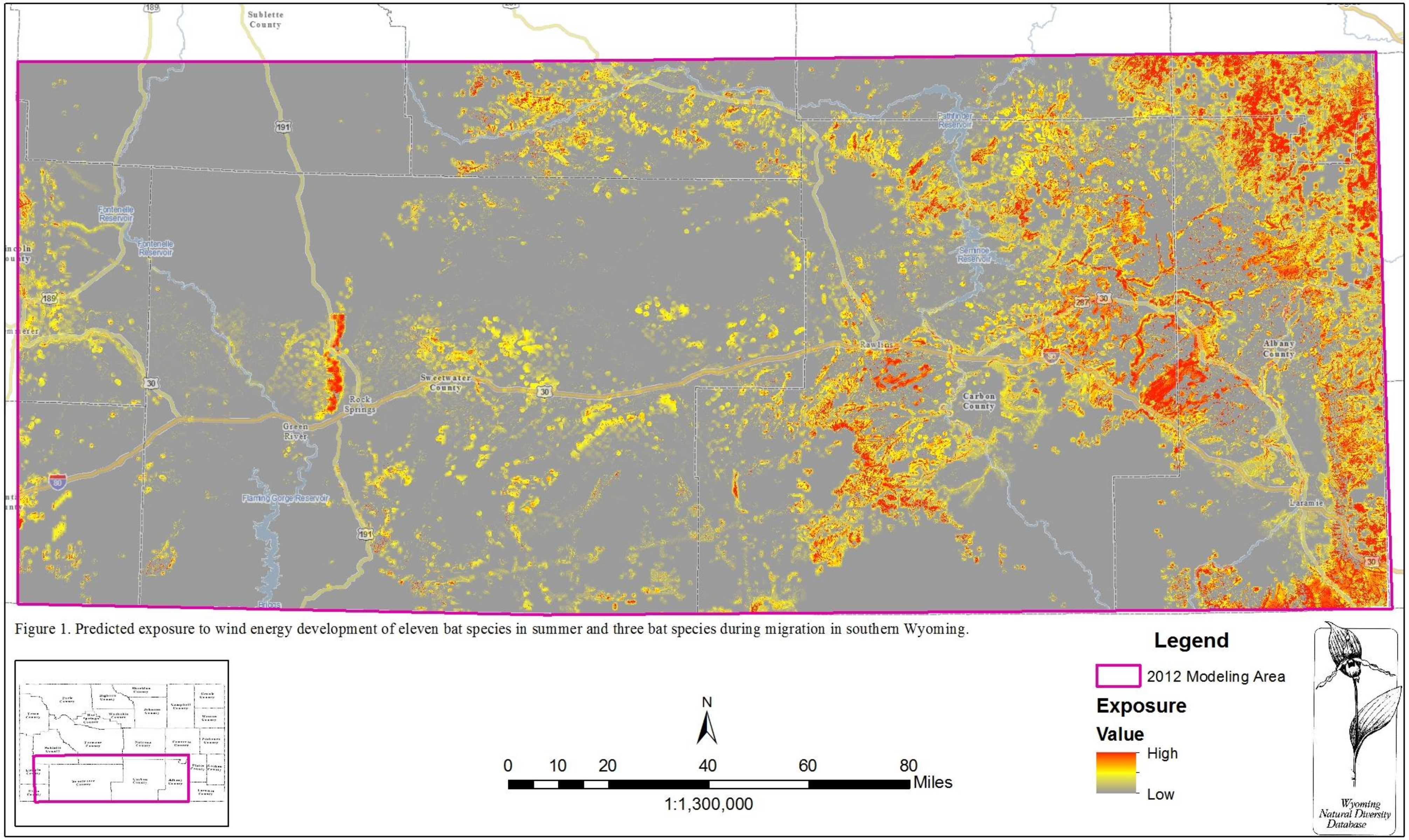


Figure 1. Predicted exposure to wind energy development of eleven bat species in summer and three bat species during migration in southern Wyoming.

Appendix 4: 2012 Mist Net Captures

Location	Zone	Easting	Northing	Date	Species	TOC	Sex	Age	Repro	FA (mm)	E (mm)	Wt(g)	Keel (y/n)	WDI
HWY 287	12	719886	4718646	6/12/2012	LANO	0:03	F	A	P	40.1	14.4	10.5	N	0P
Sweetwater River	12	722770	4708084	6/13/2012	MYLU	22:21	F	A	N	37.5	12.4	8	N	0
Sweetwater River	12	722770	4708084	6/13/2012	MYLU	23:42	F	A	N	37.6	15.1	8	N	0P
Sweetwater River	12	722770	4708084	6/13/2012	MYLU	0:20	F	A	N	40.7	14.1	8	N	0P
Sweetwater River	13	271150	4712009	6/14/2012	MYLU	21:32	F	A	N	38.2	12.1	9	N	0P
Sweetwater River	13	271150	4712009	6/14/2012	MYLU	21:51	F	A	N	39.5	14.4	8	N	0
Sweetwater River	13	271150	4712009	6/14/2012	MYLU	21:50	F	A	P	38.6	13.5	8	N	0
Sweetwater River	13	271150	4712009	6/14/2012	MYLU	23:08	F	A	P	40.7	12.8	7	N	0
Sweetwater River	13	271150	4712009	6/14/2012	MYLU	23:52	F	A	P	37.3	11.1	9	N	0
Sweetwater River	13	271150	4712009	6/14/2012	MYLU	0:20	F	A	P	38.1	13	8	N	0P
Sweetwater River	13	271150	4712009	6/14/2012	MYLU	0:20	M	A	N	38.1	13	7.5	N	0
Sweetwater River	13	271150	4712009	6/14/2012	MYLU	0:50	F	A	P	38.3	11.6	8	N	0P
Sweetwater River	13	271150	4712009	6/14/2012	MYLU	0:50	F	A	P	35	12.7	10	N	0
Sagecamp	12	711523	4706841	6/15/2012	EPFU	22:40	M	A	N	46.7	12.6	46	Y	1P
N. Little Med. Bow Rvr	13	417649	4699242	6/20/2012	MYEV	0:45	F	A	NA	42	20.7	28.5	N	0P
HWY 487	13	389992	4690318	6/26/2012	LACI	0:27	UNK	UNK	UNK					
HWY 487	13	397428	4674936	6/26/2012	LACI	22:00	M	A	N	54.6	15.5	19.5	Y	0
HWY 487	13	397428	4674936	6/26/2012	LACI	23:30	M	A	N	52.6	14	20	Y	0
Shirley Basin Res.	13	387232	4675995	6/27/2012	MYLU	21:39	F	A	L	39.2	14	8.5	N	0
Shirley Basin Res.	13	387232	4675995	6/27/2012	MYLU	22:45	F	A	P	38.2	13	10	N	0
Shirley Basin Res.	13	387232	4675995	6/27/2012	MYLU	22:45	F	A	P	38.1	11	9.5	N	0
Shirley Basin Res.	13	387232	4675995	6/27/2012	MYEV	23:30	F	A	P	39.4	18	10	N	0P
Shirley Basin Res.	13	387232	4675995	6/27/2012	MYLU	23:35	F	A	P	37	12	10	N	0
Shirley Basin Res.	13	387232	4675995	6/27/2012	MYLU	0:45	F	A	P	38.5	12	9.5	N	0
Shirley Basin Res.	13	387232	4675995	6/27/2012	MYEV	1:10	M	A	N	35.4	18	7	N	0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	MYLU	21:30	M							0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	MYLU	21:30	M							0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	MYLU	21:30	M							0

Location	Zone	Easting	Northing	Date	Species	TOC	Sex	Age	Repro	FA (mm)	E (mm)	Wt(g)	Keel (y/n)	WDI
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	EPFU	21:30	M							0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	MYLU	21:30	M							0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	MYLU	21:30	M							0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	LANO	21:45	M							0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	LANO	21:45	M							0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	MYEV	21:30	M	A	N	39.5	19	7	Y	0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	LANO	21:30	M	A	D					0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	MYEV	21:50	M							0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	MYEV	22:15	M							0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	MYVO	22:15	F	A	P	39.5	11	12	Y	0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	MYLU	22:26	M	A	N	38	12	6	N	0P
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	MYEV	22:35	M	A	N	40.5	20	7.5	Y	0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	MYEV	22:46	M	A	N	37.7	18.5	6	Y	0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	MYEV	23:00	F	A	N	40.5	20	7	Y	0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	EPFU	23:37	M	A	N	44.8	14	12	Y	0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	MYEV	23:45	M	A	N	37.5	20		Y	0
Shirley Mtn Loop Rd	13	373821	4669153	6/30/2012	MYEV	0:02	M	A	N	38.1	19	6.5	Y	0P
Shirley Mtn Loop	13	373821	4669153	6/30/2012	MYVO	0:57	F	A	P	38.9	10	9.5	Y	0
	12	742318	4543883	7/10/2012	MYCI	0:35	F	A	N	35.7	12.8	5	Y	0

Location	Zone	Easting	Northing	Date	Species	TOC	Sex	Age	Repro	FA (mm)	E (mm)	Wt(g)	Keel (y/n)	WDI
CO RD 501	13	293817	4549775	7/10/2012	LACI	22:00	M	A	N	53	14	26	Y	0P
CO RD 501	13	293817	4549775	7/10/2012	MYVO	22:30	F	A	N	53	14	10	Y	0
CO RD 501	13	293817	4549775	7/10/2012	MYEV	0:00	M	A	N	35.4	19	6	N	0
CO RD 501	13	293817	4549775	7/10/2012	MYLU	0:20	F	A	N	38.5	11	7.5	N	0
CO RD 501	13	293817	4549775	7/10/2012	MYLU	0:23	F	A	P	39.5	12	10	N	0
CO RD 501	13	293817	4549775	7/10/2012	MYLU	0:25	F	A	N	36.7	13	9	N	0
CO RD 501	13	293817	4549775	7/10/2012	LACI	0:45	M	A	N	41.4	14	25.5	Y	0
CO RD 501	13	293817	4549775	7/10/2012	MYLU	0:45	F	A	N	38.3	12	7	N	0
CO RD 501	13	293817	4549775	7/10/2012	MYLU	1:15	M	A	N	38	13	8	N	0
CO RD 501	13	293817	4549775	7/10/2012	MYLU	1:30	F	A	P	40	12	10.5	N	0
	12	742318	4543883	7/10/2012	MYCI	21:32	M	A	N	32.8	15	5	Y	0
	12	742318	4543883	7/10/2012	EPFU	22:35	M	A	D	46.1	12.9	16.5	Y	0
	12	742318	4543883	7/10/2012	MYCI	23:40	M	A	N	32.6	10.4	4.5	Y	0
McPheron Springs	13	252229	4552258	7/11/2012	MYCI	21:17	F	A	N	35.8	10	4.5	Y	0
McPheron Springs	13	252229	4552258	7/11/2012	MYCI	21:45	F	A	N	35.7	14	4.5	Y	0
McPheron Springs	13	252229	4552258	7/11/2012	MYCI	21:40	F	A	N	34.5	12.4	5	Y	0
McPheron Springs	13	252229	4552258	7/11/2012	MYCI	22:00	M	A	N	33	12.7	5	Y	0
McPheron Springs	13	252229	4552258	7/11/2012	MYCI	22:00	F	A	P				Y	0
McPheron Springs	13	252229	4552258	7/11/2012	MYCI	22:00	F	A	P	32.8	12.6	6	Y	0
McPheron Springs	13	252229	4552258	7/11/2012	EPFU	22:30	M	A	N	49.1	14.4	16.5	Y	0
McPheron Springs	13	252229	4552258	7/11/2012	EPFU	23:00	M	A	N	49.9	13.5	15.5	Y	0
McPheron Springs	13	252229	4552258	7/11/2012	MYYU	23:00	M	A	N	36.4	12	6.5	N	0
McPheron Springs	13	252229	4552258	7/11/2012	MYYU	0:35	F	A	N	37.7	13.1	7	N	0
McPheron Springs	13	252229	4552258	7/11/2012	MYYU	0:35	M	A	N	37.8	11.5	7	N	0
McPheron Springs	13	252229	4552258	7/11/2012	EPFU	1:30	M	A	D	46		15.5	Y	0
McPheron Springs	13	252229	4552258	7/11/2012	ANPA	1:30	F	A	PL	57.7	28.1	24.5		0
Little Snake River	13	259374	4545496	7/12/2012	MYLU	22:00	F	A	N	38.1	10	8	N	0
Little Snake River	13	259374	4545496	7/12/2012	MYYU	22:00	F	A	P	37.3	13	9	N	0

Location	Zone	Easting	Northing	Date	Species	TOC	Sex	Age	Repro	FA (mm)	E (mm)	Wt(g)	Keel (y/n)	WDI
Little Snake River	13	259374	4545496	7/12/2012	MYLU	22:45	F	A	N	38	12	9.5	N	0
Little Snake River	13	259374	4545496	7/12/2012	MYYU	22:45	F	A	P	37.3	13	7	N	0
Little Snake River	13	259374	4545496	7/12/2012	MYCI	23:15	F	A	L	34	12	6	Y	0
Little Snake River	13	259374	4545496	7/12/2012	MYYU	23:00	M	A	N	35.5	12	7	N	0
Little Snake River	13	259374	4545496	7/12/2012	MYCI	0:15	F	A	L	32.3	12	26	Y	0
Little Snake River	13	254423	4543966	7/13/2012	MYYU	21:43	F	A	N	37.3	12.9		N	0
Little Snake River	13	254423	4543966	7/13/2012	MYCI	23:30	F	A	N	35.8	12.7	5	Y	0
Little Snake River	13	254423	4543966	7/13/2012	MYYU	23:30	M	A	N	36.3	12.85	7		0
Little Snake River	13	254423	4543966	7/13/2012	MYCI	0:50	M	A	N	32.9	12.9		Y	0
Little Snake River	13	254423	4543966	7/13/2012	MYYU	0:55	F	A	L	37.6	13.3		N	0
Cotton Creek	13	290388	4553112	7/13/2012	EPFU	22:00	M	A	N	45.2	14	12	Y	0
Cotton Creek	13	290388	4553112	7/13/2012	MYCI	0:30	F	A	N	32.5	12.5	4.5	Y	0
Co. Rd. 7	12	644782	4650706	7/14/2012	MYLU	22:06	M	A	N	37.8	13	7	N	0
Co. Rd. 7	12	644782	4650706	7/14/2012	MYLU	22:27	M	A	N	39.1	14	9	N	0
CO Rd. 17	12	645445	4650206	7/16/2012	MYCI	0:45	F	A	N	33.5	12	5.5	Y	0
Co. Rd. 17	12	645445	4650206	7/16/2012	MYEV	21:48	M	A	N	40.1	21	5.5	N	0
Co. Rd. 17	12	645445	4650206	7/16/2012	MYLU	21:48	M	A	N	40	12	8	N	0
Co. Rd. 17	12	645445	4650206	7/16/2012	MYEV	22:32	F	A	L					0
Co. Rd. 17	12	645445	4650206	7/16/2012	MYCI	22:32	F	A	L	32.6	12.8			0
Co. Rd. 17	12	645445	4650206	7/16/2012	MYCI	23:06	F	A	N	33.9	12.9	5.5	Y	0
Co. Rd. 17	12	645445	4650206	7/16/2012	LACI	23:26	M	A	N	51.5	14.5	25	Y	0P
E. of Dad	12	275665	4585127	7/24/2012	MYCI	21:15	F	A	L	33.5	12.5	5.5	Y	0
E. of Dad	12	275665	4585127	7/24/2012	MYCI	21:50	F	A	P	34.5	13	6.5	Y	0
Sage Creek	13	317303	4595177	7/25/2012	MYLU	21:45	M	A	N			7	N	0P
HWY 401	13	316415	4588898	7/26/2012	MYEV	22:00	M	A	N	40.5	20.4	5.5	N	0
HWY 401	13	316415	4588898	7/26/2012	LABO	22:15	M	A	N	54.9	17.5		Y	0
HWY 401	13	316415	4588898	7/26/2012	MYEV	22:03	M	A	N				N	0
HWY 401	13	316415	4588898	7/26/2012	LABO	0:45	M	A	N	55.8	16		Y	0
JO Ranch	13	282530	4581178	7/26/2012	MYEV	21:20	F	A	L	38.9	20	6	N	0
JO Ranch	13	282530	4581178	7/26/2012	MYEV	21:20	F	A	L			6.5	N	0
JO Ranch	13	282530	4581178	7/26/2012	MYEV	21:48	F	A	L	38.2	19	6	N	0
JO Ranch	13	282530	4581178	7/26/2012	MYEV	22:00	F	A	N	38.2	19	6.5	N	0

Location	Zone	Easting	Northing	Date	Species	TOC	Sex	Age	Repro	FA (mm)	E (mm)	Wt(g)	Keel (y/n)	WDI
JO Ranch	13	282530	4581178	7/26/2012	MYLU	22:21	M	A	N	36.3	12	7.5	N	0
JO Ranch	13	282530	4581178	7/26/2012	MYVO	22:21	F	A	L	39.7	12	8	Y	0P
JO Ranch	13	282530	4581178	7/26/2012	MYEV	22:25	M	A	N	38.4	20	7	N	0P
JO Ranch	13	282530	4581178	7/26/2012	MYLU	22:30	F	A	L			9	N	0
JO Ranch	13	282530	4581178	7/26/2012	MYCI	22:45	F	A	L	34.6	12	5	Y	0
JO Ranch	13	282530	4581178	7/26/2012	MYLU	22:50	M	A	D	36.2	13	7	N	0P
JO Ranch	13	282530	4581178	7/26/2012	MYEV	23:22	F	A	L	38.5	18	7	N	0P
JO Ranch	13	282530	4581178	7/26/2012	MYEV	0:06	F	A	L	40	18	7	N	0
JO Ranch	13	282530	4581178	7/26/2012	MYVO	0:15	M	A	N	40	12.5	7	Y	0
JO Ranch	13	282530	4581178	7/26/2012	MYLU	0:15	F	A	N	38.1	14	7	N	0P
JO Ranch	13	282530	4581178	7/26/2012	MYCI	0:36	F	A	L	32	12	6	Y	0
JO Ranch	13	282530	4581178	7/26/2012	MYLU	0:59	M	A	N	36.6	11	7	N	0
HWY 503	13	305407	4586439	7/28/2012	MYEV	21:14	M	A	N	39	22.6	7	N	0
HWY 503	13	305407	4586439	7/28/2012	MYEV	21:33	M	A	N	39.5	20.4	6.5	N	0
HWY 503	13	305407	4586439	7/28/2012	LACI	0:57	M	A	N	40.9	12.9	45.5	N	0
CR 608	13	279222	4558740	7/29/2012	MYCI	21:44	F	A	L	35.5	12.5	6	y	0
CR 608	13	279222	4558740	7/29/2012	MYEV	21:53	F	A	N	37.8	20.5	7	N	0
CR 608	13	279222	4558740	7/29/2012	MYVO	22:11	F	A	L			7.5	Y	0
CR 608	13	279222	4558740	7/29/2012	MYVO	22:15	F	A	L				Y	0
CR 608	13	279222	4558740	7/29/2012	MYEV	22:30	F	A	N	39.4	18	6	N	0
CR 608	13	279222	4558740	7/29/2012	MYLU	22:30	M	A	N	38.9	12	8	N	0
CR 608	13	279222	4558740	7/29/2012	MYEV	22:30	F	J	N	38.5	20	5.5	Y	0
CR 608	13	279222	4558740	7/29/2012	MYEV	22:43	M	J	N	38.4	18	6	N	0
CR 608	13	279222	4558740	7/29/2012	MYEV	22:43	F	A	L	37.9	18	7.5	Y	0
CR 608	13	279222	4558740	7/29/2012	MYEV	23:11	F	A	N	39.4	17	7.5	N	0P
CR 608	13	279222	4558740	7/29/2012	MYVO	23:50	M	A	N	39.2	11	8.5	Y	0
CR 608	13	279222	4558740	7/29/2012	MYVO	0:08	F	A	L			7.5	Y	0P
Bridger Pass Road	13	303789	4607358	7/29/2012	MYLU	0:30	M	A	N	38.2			N	0

Location	Zone	Easting	Northing	Date	Species	TOC	Sex	Age	Repro	FA (mm)	E (mm)	Wt(g)	Keel (y/n)	WDI
HWY 608	13	279222	4558740	7/29/2012	MYVO	21:00	F	A	1	38.6	12	6.5	Y	0
HWY 608	13	279222	4558740	7/29/2012	MYCI	21:00	F	J	N	32.9	11	2.5	Y	0
HWY 608	13	279222	4558740	7/29/2012	MYEV	21:12	M	A	N	38.6	19.5	7	N	0
HWY 608	13	279222	4558740	7/29/2012	MYEV	21:33	F	A	L	39	18.5	7.5	Y	0
HWY 608	13	279222	4558740	7/29/2012	MYEV	21:38	F	A	N	40.1	20	4	N	0
CR 608	13	276792	4574695	7/30/2012	MYCI	21:13	F	A	N	34.8	12.5	5	y	0
CR 608	13	276792	4574695	7/30/2012	MYCI	21:13	F	A	L	32.4	13	4.5	Y	0P
CR 608	13	276792	4574695	7/30/2012	MYVO	21:25	F	A	N	40.3	13	7	Y	0P
CR 608	13	276792	4574695	7/30/2012	MYCI	21:46	F	A	N	31	12	4.5	Y	0P
CR 608	13	276792	4574695	7/30/2012	MYCI	23:00	F	A	N	33	12	5	Y	0
CR 608	13	276792	4574695	7/30/2012	MYCI	23:40	F	A	L				Y	0
CR 608	13	276792	4574695	7/30/2012	MYVO	23:40	F	A	N	38.9	23	7	Y	0
Medicine Bow River	13	374707	4651955	7/31/2012	MYLU	21:10	F	A	N	37.2	13	9	N	0
Medicine Bow River	13	374707	4651955	7/31/2012	MYLU	21:15	M	A	N	37.4	12.5	8	N	0
Medicine Bow River	13	374707	4651955	7/31/2012	MYLU	23:58	M	A	N			8	N	0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	21:05	M	J	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	21:05	F	A	L					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	21:10	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	21:10	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	21:10	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	21:30	F	A	L					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	COTO	21:30	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	21:45	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	21:45	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	21:45	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	21:45	F	A	L					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	22:05	F	J	N					0

Location	Zone	Easting	Northing	Date	Species	TOC	Sex	Age	Repro	FA (mm)	E (mm)	Wt(g)	Keel (y/n)	WDI
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	22:10	F	J	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	22:15	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	22:15	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	22:15	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	22:15	F	A	L					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	22:30	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	22:30	F	A	L					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	22:40	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	22:40	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	22:30	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	22:30	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	23:10	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	ANPA	23:20	M	J	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYCI	23:30	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	23:55	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	23:55	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	0:07	F	A	L					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	0:07	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	ANPA	0:15	F	A	L					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	0:15	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	m	a	n					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:45	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	M	J	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	M	J	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	F	A	N					0

Location	Zone	Easting	Northing	Date	Species	TOC	Sex	Age	Repro	FA (mm)	E (mm)	Wt(g)	Keel (y/n)	WDI
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	F	A	PL					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	F	A	PL					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	F	A	PL					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	20:40	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	LANO	23:20	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	23:20	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	23:20	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	23:20	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	23:20	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	23:20	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	23:20	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	23:20	F	A	PL					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	23:20	F	A	PL					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	23:23	F	O						0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	23:20	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	23:20	M	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	23:20	F	A	N					0
Cow Crk Ranch	12	720521	4554924	8/7/2012	MYEV	0:30	M	A	N					0
Grindstone Spring	12	740066	4553072	8/8/2012	EPFU	20:49	M	A	N	46.7	14	24.5	Y	0
Grindstone Spring	12	740066	4553072	8/8/2012	MYCI	21:15	M	A	N	32.5	11	6	Y	0
Grindstone Spring	12	740066	4553072	8/8/2012	MYCI	21:20	M	A	N	33.9	12	6	Y	0
Grindstone Spring	12	740066	4553072	8/8/2012	MYEV	21:25	M	A	N	37.4	20	6	Y	0P
Grindstone Spring	12	740066	4553072	8/8/2012	COTO	22:10	M	A	D	42.3	30	8	N	0P
Grindstone Spring	12	740066	4553072	8/8/2012	EPFU	22:10	M	A	N	45.5	13	16.5	Y	0

Location	Zone	Easting	Northing	Date	Species	TOC	Sex	Age	Repro	FA (mm)	E (mm)	Wt(g)	Keel (y/n)	WDI
Grindstone Spring	12	740066	4553072	8/8/2012	ANPA	22:36	F	A	L	59	26	30.5	N	0
Grindstone Spring	12	740066	4553072	8/8/2012	COTO	22:45	F	A	L	43.1	31.2	9.5	N	0
Grindstone Spring	12	740066	4553072	8/8/2012	ANPA	22:52	F	A	N	57.7	30.5	23	N	0
Grindstone Spring	12	740066	4553072	8/8/2012	MYEV	22:53	F	A	N	37.6	20	6	N	0
Grindstone Spring	12	740066	4553072	8/8/2012	ANPA	22:53	F	J	N	55.6	28	19	N	0
Grindstone Spring	12	740066	4553072	8/8/2012	MYEV	23:15	F	A	L	42.2	20	8	Y	0
Grindstone Spring	12	740066	4553072	8/8/2012	ANPA	23:50	F	J	N	57.7	29	17	N	0
Grindstone Spring	12	740066	4553072	8/8/2012	LACI	0:00	F	J	N	57.2	14	31	N	0
Grindstone Spring	12	740066	4553072	8/8/2012	ANPA	0:38	F	A	L	57	29	25	N	0
Grindstone Spring	12	740066	4553072	8/8/2012	ANPA	0:50	F	J	N	55	29	20	N	0
Rotten Spring	12	746406	4553725	8/9/2012	MYEV	21:02	F	A	N	40.7	18	6	N	0
Rotten Spring	12	746406	4553725	8/9/2012	EPFU	21:15	M	A	N	48.2	14.5	15	Y	0
Rotten Spring	12	746406	4553725	8/9/2012	EPFU	21:10	M	A	N	46	14	19	Y	0
Rotten Spring	12	746406	4553725	8/9/2012	MYCI	21:35	M	A	N	33.1	12	6.5	Y	0
Rotten Spring	12	746406	4553725	8/9/2012	MYEV	21:45	F	A	N	38.9	19.5	6.5	N	0P
Rotten Spring	12	746406	4553725	8/9/2012	EPFU	21:56	M	A	N	44.4	13	13	Y	0
Rotten Spring	12	746406	4553725	8/9/2012	MYCI	21:56	M	A	N	31.3	12	4.5	Y	0
Rotten Spring	12	746406	4553725	8/9/2012	ANPA	21:56	F	J	N	58.3	30	20.5	N	0
Rotten Spring	12	746406	4553725	8/9/2012	MYEV	22:30	F	A	N	39.5	20	7.5	N	0
Shell Crk.	12	717265	4544752	8/10/2012	ANPA	22:25	F	J	N					0
Shell Crk.	12	717265	4544752	8/10/2012	ANPA	0:00	M	A	N	56.9	31.5	21.5	Y	0
Shell Crk.	12	717265	4544752	8/10/2012	ANPA	0:00	F	A	N					0
Flowing Well Sprg	12	735728	4553693	8/10/2012	EPFU	21:12	M	A	N	45	13	16	Y	0
Shell Crk.	12	717265	4544752	8/10/2012	EPFU	21:12	M	A	N	45	13	13	Y	0P
Shell Crk.	12	717265	4544752	8/10/2012	EPFU	21:56								0
Cherokee Rim Rd	12	722925	4548456	8/11/2012	MYEV	21:30	F	A	N	38.1	21	6.5	N	0
Cherokee Rim Rd	12	722925	4548456	8/11/2012	MYEV	21:30	F	A	N	38	18	7	N	0
Cherokee Rim Rd	12	722925	4548456	8/11/2012	MYEV	21:30	F	A	N	38	21	9	N	0
Cherokee Rim Rd	12	722925	4548456	8/11/2012	MYEV	21:30	F	A	N	38.5	19	8	N	0

Location	Zone	Easting	Northing	Date	Species	TOC	Sex	Age	Repro	FA (mm)	E (mm)	Wt(g)	Keel (y/n)	WDI
Cherokee Rim Rd	12	722925	4548456	8/11/2012	MYEV	21:30	F	A	L	38.5	18	7	N	0
Cherokee Rim Rd	12	722925	4548456	8/11/2012	MYEV	21:30	F	A	N	38.3	21	6	N	0
Cherokee Rim Rd	12	722925	4548456	8/11/2012	MYEV	21:55	M	A	N	36.5	18	6	N	0P
Cherokee Rim Rd	12	722925	4548456	8/11/2012	MYEV	23:10	F	A	N	39.3	19	8.5	N	0
Cherokee Rim Rd	12	722925	4548456	8/11/2012	MYEV	21:24	F	J	N	40.6	20.7		N	0
Sand Draw res.	12	722252	4546876	8/11/2012	MYEV	23:20	F	A	PL	37.5	20	5.5	N	0
Sand Reservoir	12	743829	4556948	8/12/2012	MYEV	22:15	M	A	N	37.1	18	6	N	0
Sand Reservoir	12	743829	4556948	8/12/2012	MYEV	22:15	M	A	N	37.1	18	6	N	0
Sand Reservoir	12	743829	4556948	8/12/2012	MYEV	22:15	M	A	N	37.1	18	6	N	0
Sand Reservoir	12	743829	4556948	8/12/2012	MYEV	22:15	M	A	N	37.1	18	6	N	0
Sand Reservoir	12	743829	4556948	8/12/2012	MYEV	22:15	M	A	N	37.1	18	6	N	0
Sand Reservoir	12	743829	4556948	8/12/2012	MYEV	22:15	M	A	N	37.1	18	6	N	0
Hwy77	13	387260	4676000	8/21/2012	MYLU	22:15	M	A	N	39.2	12	9	N	0
Hwy77	13	387260	4676000	8/21/2012	MYLU	22:45	M	A	N	37.8	13	9	N	0
Hwy77	13	387260	4676000	8/21/2012	MYEV	23:15	F	A	N	39.5	20	8.5	N	0
Laramie River	13	465644	4641931	8/21/2012	MYCI	20:55	M	A	N	33.8	13.8	6	Y	0
Laramie River	13	465644	4641931	8/21/2012	LANO	20:55	M	A	N	42.4	15	13.5	N	0
Laramie River	13	465644	4641931	8/21/2012	MYLU	20:55	F	A	N	38.7	13.7	6	Y	0
Laramie River	13	465644	4641931	8/21/2012	MYLU	21:00	F	J	N				N	0
Laramie River	13	465644	4641931	8/21/2012	MYLU	21:00	M	A	D				N	0
Laramie River	13	465644	4641931	8/21/2012	MYLU	21:12	M	A	N				N	0
Laramie River	13	465644	4641931	8/21/2012	MYLU	21:12	F	A	N				N	0
Laramie River	13	465644	4641931	8/21/2012	MYLU	21:26	M	A	N	36.9	11.2	10	N	0
Laramie River	13	465644	4641931	8/21/2012	MYLU	21:26	M	A	N	38.7	13	5	N	0
Laramie River	13	465644	4641931	8/21/2012	LANO	21:30								0
Laramie River	13	465644	4641931	8/21/2012	EPFU	21:30								0
Laramie River	13	465644	4641931	8/21/2012	MYLU	21:35	M	A	N	40	13.3	6	N	0
Laramie River	13	465644	4641931	8/21/2012	MYLU	21:40	F	A	N	37.4	10.7	6	N	0
Laramie River	13	465644	4641931	8/21/2012	EPFU	21:40	F	A	N	46.6	14.2		N	0
Laramie River	13	465644	4641931	8/21/2012	MYLU	21:50	F	A	N	38.5	14	8	N	0

Location	Zone	Easting	Northing	Date	Species	TOC	Sex	Age	Repro	FA (mm)	E (mm)	Wt(g)	Keel (y/n)	WDI
Laramie River	13	465644	4641931	8/21/2012	MYLU	21:20	F	J	N				N	0
Laramie River	13	465644	4641931	8/21/2012	MYLU	21:20	F	A	N				N	0
Laramie River	13	465644	4641931	8/21/2012	MYLU	21:20	M	A	N				N	0
Laramie River	13	465644	4641931	8/21/2012	MYCI	22:28	F	A	L	31.9	11.2	6	Y	0
Laramie River	13	465644	4641931	8/21/2012	MYLU	22:28	F	J	I	34	10.8	5.5	N	0
Laramie River	13	465644	4641931	8/21/2012	MYLU	22:30	F	J	N	36	12	6.5	N	0
Laramie River	13	465644	4641931	8/21/2012	MYLU	23:25	M	A	N				N	0
Shrily mtn road	13	375068	4665141	8/22/2012	MYVO	21:05	M	A	N	40.7	12	8.5	Y	0
Rock River	13	405191	4613759	8/22/2012	MYLU	19:28	M	A	N	40.9	11.5	9	N	0
Rock River	13	405191	4613759	8/22/2012	MYLU	22:35	F	A	N	39.5	12.5	9	N	0
Rock River	13	405191	4613759	8/22/2012	MYLU	23:10	F	A	PL	39.5	14	9	N	0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	20:30	M	A	N	38	20	6	Y	0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYVO	20:34	M	A	N	36.7	9	7.5	Y	0
Cave Creek Cave	13	368532	4673590	8/23/2012	COTO	20:43	M	A	D	43.3	29	10	N	0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	20:45	M	A	N	38.6	20	6.5	Y	0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	20:50	M	A	N	37.3	7	7	N	0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	20:55	M	A	N	36.9	18	6	Y	0P
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	21:08	M	A	N	37.6	18	7	Y	0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYVO	21:15	M	J	N	38.1	12	8	Y	0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	21:20	M	A	N	38.3	19	6.5	Y	0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	21:20	M	A	N	37.5	20	7.5	Y	0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYVO	21:32	M	A	N	37.9	12.5	7.5	Y	0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	21:39	M	A	N	39.7	21	8.5	Y	0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	21:39	M	A	N	40.1	18	6.5	Y	0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYLU	21:39	M	J	N	37.5	6.8	6	N	0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYLU	20:50	M	A	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYLU	21:57	M	A	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYLU	21:57	M	A	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYLU	21:57	M	J	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	21:59	M	A	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYVO	21:59	M	A	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	22:00	M	U	N					0

Location	Zone	Easting	Northing	Date	Species	TOC	Sex	Age	Repro	FA (mm)	E (mm)	Wt(g)	Keel (y/n)	WDI
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	22:00	M	J	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	22:04	M	J	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYLU	22:00	M	U	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYVO	22:00	M	A	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYVO	22:00	M	U	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	22:10	M	J	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYVO	22:10	M	U	U				Y	0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYVO	22:10	M	U						0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYVO	22:12	M	J	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYVO	22:16	M	J	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYVO	22:20	F	J	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	22:25	F	J	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	22:30	F	J	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYVO	22:35	M	A	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYLU	22:40	F		N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYVO	22:45	M	J	N					0P
Cave Creek Cave	13	368532	4673590	8/23/2012	MYLU	22:50	M							0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	20:56	M	J	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	23:00	M	J	N					0
Cave Creek Cave	13	368532	4673590	8/23/2012	MYEV	23:00	M	J	N					0
Laramie River	13	465436	4641761	8/23/2012	MYLU	22:30	F	J	N	37.2	11.7	8.5	N	0
Laramie River	13	465436	4641761	8/23/2012	MYLU	23:42	F	A	N	36.4	12	6.5	N	0
Laramie River	13	465436	4641761	8/23/2012	LACI	0:00	F	A	N	51.5	13.5	21	Y	0
3-mile Crk	13	416486	4689727	8/26/2012	MYCI	22:05	F	A	N	40.1	11.4	8	Y	0
CR 19	12	720498	4554916	8/29/2012	MYEV	20:33	M	A	N	39.7	16.5		N	0P
CR 19	12	720498	4554916	8/29/2012	MYEV	20:35	M	J	N	37.1	19	5	N	0P
CR 19	12	720498	4554916	8/29/2012	MYEV	20:43	M	J	N	38.5	19.5	6.5	Y	0
CR 19	12	720498	4554916	8/29/2012	MYEV	20:47	F	A	N	38.1	18.4	4.5	N	0P
CR 19	12	720498	4554916	8/29/2012	MYEV	20:49	M	A	N	38.7	20	5	N	0
CR 19	12	720498	4554916	8/29/2012	MYEV	20:50	M	A	N	38.2	7.5	18	4	0
CR 19	12	720498	4554916	8/29/2012	MYEV	20:53	F	A	N	38.5	19	7.5	N	0
CR 19	12	720498	4554916	8/29/2012	MYEV	20:59	F	A	N	38.5	19.5	6.5	N	0P
CR 19	12	720498	4554916	8/29/2012	MYEV	20:59	M	A	N	38.2	18	7.5	N	0P

Location	Zone	Easting	Northing	Date	Species	TOC	Sex	Age	Repro	FA (mm)	E (mm)	Wt(g)	Keel (y/n)	WDI
CR 19	12	720498	4554916	8/29/2012	MYCI	21:00	M	J	N	21.2	12.6	5	Y	0
CR 19	12	720498	4554916	8/29/2012	MYEV	21:02	F	J	N	39.5	20	7.5	N	0P
CR 19	12	720498	4554916	8/29/2012	MYEV	21:08	M	A	N	37.9	18.7	7.5	N	0
CR 19	12	720498	4554916	8/29/2012	MYCI	21:16	M	A	N	33.3	12	5	Y	0P
CR 19	12	720498	4554916	8/29/2012	MYTH	21:20	F	A	PL	41.2	18.2	8	N	0P
CR 19	12	720498	4554916	8/29/2012	MYEV	21:20	M	A	N	37.9	19	7	N	0P
CR 19	12	720498	4554916	8/29/2012	MYEV	21:30	F	A	PL	39.5	19	7	N	0P
CR 19	12	720498	4554916	8/29/2012	MYEV	21:00	F	J	N					0
CR 19	12	720498	4554916	8/29/2012	MYTH	21:55	F	A	PL	39.1	19	7	Y	0P
CR 19	12	720498	4554916	8/29/2012	MYEV	22:11	F	J	N	40	20	6.5	Y	0P
CR 19	12	720498	4554916	8/29/2012	MYEV	22:22	M	A	N	38	18	7	N	0
CR 19	12	720498	4554916	8/29/2012	MYTH	22:40	F	A	N	37.4	19	5	Y	0
CR 19	12	720498	4554916	8/29/2012	MYEV	22:42	M	A	N	38.5	19	8.5	N	0
CR 19	12	720498	4554916	8/29/2012	MYEV	22:50	M	A	N	40.1	19	8	N	0
CR 19	12	720498	4554916	8/29/2012	MYEV	22:55	F	A	N	41	19	7	Y	0P
CR 19	12	720498	4554916	8/29/2012	MYEV	23:15	F	A	PL	38.5	18	6	N	0P
CR 19	12	720498	4554916	8/29/2012	MYEV	23:20	F	A	PL	39.8	20	8	N	0P
CR 19	12	720498	4554916	8/29/2012	MYEV	23:20	F	A	N	40	18	7	N	0P
CR 19	12	720498	4554916	8/29/2012	MYEV	23:28	M	A	N	40	19	7	N	0P
CR 19	12	726385	4547046	9/1/2012	MYYU	20:59	M	J	N	36.9	12	6	N	0
CR 19	12	726385	4547046	9/1/2012	MYEV	21:19	F	A	N	40.1	21	8.5	N	0P
CR 19	12	726385	4547046	9/2/2012	MYCI	20:18	M	J	N	33.3	11	4	Y	0
Powder Rim Rd.	12	748479	4558492	9/3/2012	MYTH	20:20	M	A	N	38.9	18	7.5	Y	0P
Powder Rim Rd.	12	748479	4558492	9/3/2012	MYCI	20:32	M	A	N	33.5	18	7.5	Y	0P
Powder Rim Rd.	12	748479	4558492	9/3/2012	EPFU	20:56	M	J	N	45.7	13	21.5	Y	0P
Powder Rim Rd.	12	748479	4558492	9/3/2012	MYEV	21:02	F	A	N	38.7	19	8.5	N	0
	12	725164	4545156	9/7/2012	MYEV	21:40	F	A	N	40.9	18	5.5	N	0P
	12	725164	4545156	9/7/2012	ANPA	22:46	M	A	N	57.5	30.6	30.6	N	0P
	12	725164	4545156	9/7/2012	MYCI	23:35	F	A	N	33.8		5.5	Y	0
JO Ranch	13	282497	4581151	9/9/2012	MYLU	20:15	F	A	N	37.5	13.5	8	N	0
JO Ranch	13	282497	4581151	9/9/2012	MYLU	21:20	M	A	N	37.8		8	N	0
Dry Cow Creek	13	277493	4578123	9/10/2012	MYCI	20:40	F	A	N	33.7	12	5.5	Y	0

Location	Zone	Easting	Northing	Date	Species	TOC	Sex	Age	Repro	FA (mm)	E (mm)	Wt(g)	Keel (y/n)	WDI
Dry Cow Creek	13	277493	4578123	9/10/2012	MYCI	21:10	M	A	N	31.6	5.1	4.5	Y	0
Little Snake River	13	261308	4545054	9/14/2012	MYYU	21:30	M	A	J	35.7	13	7	N	0
Cottonwood Crk	13	290397	4553082	9/15/2012	LANO	21:33	F	A	N	43.2	12.9	14	N	0

Appendix 5: 2012 Acoustic Monitoring Data

Common Name	Scientific Name	Date	Recording Type	Northing Wylam	Easting Wylam
Little Brown Myotis	*Myotis lucifugus*	2012-06-12	Songmeter	432721	376745
Little Brown Myotis	*Myotis lucifugus*	2012-06-14	Songmeter	451600	374417
Little Brown Myotis	*Myotis lucifugus*	2012-06-15	Songmeter	424479	366583
Little Brown Myotis	*Myotis lucifugus*	2012-06-16	Songmeter	420857	361538
Little Brown Myotis	*Myotis lucifugus*	2012-06-27	Songmeter	609807	350241
Little Brown Myotis	*Myotis lucifugus*	2012-06-29	Songmeter	622332	351556
Little Brown Myotis	*Myotis lucifugus*	2012-06-30	Songmeter	623277	361174
Little Brown Myotis	*Myotis lucifugus*	2012-07-09	Songmeter	438438	201000
Little Brown Myotis	*Myotis lucifugus*	2012-07-12	Songmeter	459764	202417
Little Brown Myotis	*Myotis lucifugus*	2012-07-14	Songmeter	354687	312131
Little Brown Myotis	*Myotis lucifugus*	2012-07-23	Songmeter	516975	267450
Little Brown Myotis	*Myotis lucifugus*	2012-07-24	Songmeter	518293	266403
Little Brown Myotis	*Myotis lucifugus*	2012-07-25	Songmeter	529035	256581
Little Brown Myotis	*Myotis lucifugus*	2012-08-08	Songmeter	447822	222036
Little Brown Myotis	*Myotis lucifugus*	2012-08-09	Songmeter	453105	213641
Little Brown Myotis	*Myotis lucifugus*	2012-08-10	Songmeter	428743	210250
Little Brown Myotis	*Myotis lucifugus*	2012-08-11	Songmeter	428474	207655
Little Brown Myotis	*Myotis lucifugus*	2012-08-21	Songmeter	585000	336275
Little Brown Myotis	*Myotis lucifugus*	2012-08-22	Songmeter	581780	329397
Little Brown Myotis	*Myotis lucifugus*	2012-08-23	Songmeter	571726	335325
Little Brown Myotis	*Myotis lucifugus*	2012-08-25	Songmeter	627943	361611
Little Brown Myotis	*Myotis lucifugus*	2012-08-26	Songmeter	617908	351688
Little Brown Myotis	*Myotis lucifugus*	2012-08-27	Songmeter	605615	354527
Little Brown Myotis	*Myotis lucifugus*	2012-08-28	Songmeter	415919	215637
Little Brown Myotis	*Myotis lucifugus*	2012-09-03	Songmeter	459090	213435
Little Brown Myotis	*Myotis lucifugus*	2012-09-05	Songmeter	526236	254206
Little Brown Myotis	*Myotis lucifugus*	2012-09-12	Songmeter	494798	230933
Little Brown Myotis	*Myotis lucifugus*	2012-06-28	Songmeter	577214	338446
Little Brown Myotis	*Myotis lucifugus*	2012-07-01	Songmeter	585599	342174
Little Brown Myotis	*Myotis lucifugus*	2012-07-09	Songmeter	499391	214900
Little Brown Myotis	*Myotis lucifugus*	2012-07-11	Songmeter	471126	203153
Little Brown Myotis	*Myotis lucifugus*	2012-07-13	Songmeter	490597	202361
Little Brown Myotis	*Myotis lucifugus*	2012-07-14	Songmeter	359203	308428
Little Brown Myotis	*Myotis lucifugus*	2012-07-25	Songmeter	502150	243733
Little Brown Myotis	*Myotis lucifugus*	2012-07-26	Songmeter	496405	244156
Little Brown Myotis	*Myotis lucifugus*	2012-08-23	Songmeter	577441	335914
Little Brown Myotis	*Myotis lucifugus*	2012-08-24	Songmeter	603452	332552

Common Name	Scientific Name	Date	Recording Type	Northing Wylam	Easting Wylam
Little Brown Myotis	*Myotis lucifugus*	2012-08-25	Songmeter	621531	361462
Little Brown Myotis	*Myotis lucifugus*	2012-08-26	Songmeter	619397	352042
Little Brown Myotis	*Myotis lucifugus*	2012-08-27	Songmeter	607961	357392
Little Brown Myotis	*Myotis lucifugus*	2012-08-29	Songmeter	421234	204833
Little Brown Myotis	*Myotis lucifugus*	2012-09-05	Songmeter	529034	256582
Little Brown Myotis	*Myotis lucifugus*	2012-06-13	Songmeter	422921	378933
Little Brown Myotis	*Myotis lucifugus*	2012-06-26	Songmeter	602221	339124
Little Brown Myotis	*Myotis lucifugus*	2012-06-27	Songmeter	593176	338512
Little Brown Myotis	*Myotis lucifugus*	2012-06-28	Songmeter	574891	337696
Little Brown Myotis	*Myotis lucifugus*	2012-06-29	Songmeter	603971	335164
Little Brown Myotis	*Myotis lucifugus*	2012-07-01	Songmeter	587894	341111
Little Brown Myotis	*Myotis lucifugus*	2012-07-26	Songmeter	524487	246697
Little Brown Myotis	*Myotis lucifugus*	2012-07-27	Songmeter	530312	250639
Little Brown Myotis	*Myotis lucifugus*	2012-07-29	Songmeter	512266	265891
Little Brown Myotis	*Myotis lucifugus*	2012-08-09	Songmeter	452468	211080
Little Brown Myotis	*Myotis lucifugus*	2012-08-11	Songmeter	428172	208727
Little Brown Myotis	*Myotis lucifugus*	2012-08-12	Songmeter	455502	212413
Little Brown Myotis	*Myotis lucifugus*	2012-08-21	Songmeter	586009	335719
Little Brown Myotis	*Myotis lucifugus*	2012-08-23	Songmeter	571293	336813
Little Brown Myotis	*Myotis lucifugus*	2012-08-24	Songmeter	603971	335165
Little Brown Myotis	*Myotis lucifugus*	2012-09-03	Songmeter	452910	212174
Little Brown Myotis	*Myotis lucifugus*	2012-09-04	Songmeter	520424	267173
Little Brown Myotis	*Myotis lucifugus*	2012-09-09	Songmeter	491623	239152
Long-eared Myotis	*Myotis evotis*	2012-06-16	Songmeter	420857	361538
Long-eared Myotis	*Myotis evotis*	2012-06-17	Songmeter	420856	361539
Long-eared Myotis	*Myotis evotis*	2012-06-30	Songmeter	623277	361174
Long-eared Myotis	*Myotis evotis*	2012-07-11	Songmeter	456278	206111
Long-eared Myotis	*Myotis evotis*	2012-07-12	Songmeter	459764	202417
Long-eared Myotis	*Myotis evotis*	2012-07-13	Songmeter	464501	201518
Long-eared Myotis	*Myotis evotis*	2012-07-14	Songmeter	354687	312131
Long-eared Myotis	*Myotis evotis*	2012-07-15	Songmeter	354789	305082
Long-eared Myotis	*Myotis evotis*	2012-07-25	Songmeter	529035	256581
Long-eared Myotis	*Myotis evotis*	2012-07-28	Songmeter	515922	247871
Long-eared Myotis	*Myotis evotis*	2012-08-08	Songmeter	447822	222036
Long-eared Myotis	*Myotis evotis*	2012-08-09	Songmeter	453105	213641
Long-eared Myotis	*Myotis evotis*	2012-08-11	Songmeter	428474	207655
Long-eared Myotis	*Myotis evotis*	2012-08-12	Songmeter	449406	215489
Long-eared Myotis	*Myotis evotis*	2012-08-21	Songmeter	585000	336275
Long-eared Myotis	*Myotis evotis*	2012-08-22	Songmeter	581780	329397

Common Name	Scientific Name	Date	Recording Type	Northing Wylam	Easting Wylam
Long-eared Myotis	*Myotis evotis*	2012-08-23	Songmeter	571726	335325
Long-eared Myotis	*Myotis evotis*	2012-08-25	Songmeter	627943	361611
Long-eared Myotis	*Myotis evotis*	2012-08-27	Songmeter	605615	354527
Long-eared Myotis	*Myotis evotis*	2012-08-28	Songmeter	415919	215637
Long-eared Myotis	*Myotis evotis*	2012-09-12	Songmeter	494798	230933
Long-eared Myotis	*Myotis evotis*	2012-09-15	Songmeter	503851	212749
Long-eared Myotis	*Myotis evotis*	2012-06-30	Songmeter	581527	327214
Long-eared Myotis	*Myotis evotis*	2012-07-10	Songmeter	512510	201366
Long-eared Myotis	*Myotis evotis*	2012-07-25	Songmeter	502150	243733
Long-eared Myotis	*Myotis evotis*	2012-07-26	Songmeter	496405	244156
Long-eared Myotis	*Myotis evotis*	2012-07-27	Songmeter	503727	238444
Long-eared Myotis	*Myotis evotis*	2012-07-29	Songmeter	488802	216739
Long-eared Myotis	*Myotis evotis*	2012-08-07	Songmeter	418214	217561
Long-eared Myotis	*Myotis evotis*	2012-08-08	Songmeter	420312	207306
Long-eared Myotis	*Myotis evotis*	2012-08-09	Songmeter	419081	207907
Long-eared Myotis	*Myotis evotis*	2012-08-11	Songmeter	428008	205157
Long-eared Myotis	*Myotis evotis*	2012-08-12	Songmeter	415162	218694
Long-eared Myotis	*Myotis evotis*	2012-08-23	Songmeter	577441	335914
Long-eared Myotis	*Myotis evotis*	2012-08-25	Songmeter	621531	361462
Long-eared Myotis	*Myotis evotis*	2012-08-26	Songmeter	619397	352042
Long-eared Myotis	*Myotis evotis*	2012-08-29	Songmeter	421234	204833
Long-eared Myotis	*Myotis evotis*	2012-09-01	Songmeter	431030	203474
Long-eared Myotis	*Myotis evotis*	2012-89-03	Songmeter	454669	215691
Long-eared Myotis	*Myotis evotis*	2012-09-04	Songmeter	518343	262532
Long-eared Myotis	*Myotis evotis*	2012-09-06	Songmeter	515275	245102
Long-eared Myotis	*Myotis evotis*	2012-09-07	Songmeter	525693	249505
Long-eared Myotis	*Myotis evotis*	2012-09-17	Songmeter	491977	205241
Long-eared Myotis	*Myotis evotis*	2012-06-28	Songmeter	574891	337696
Long-eared Myotis	*Myotis evotis*	2012-07-26	Songmeter	524487	246697
Long-eared Myotis	*Myotis evotis*	2012-07-28	Songmeter	515273	245096
Long-eared Myotis	*Myotis evotis*	2012-08-07	Songmeter	442112	234786
Long-eared Myotis	*Myotis evotis*	2012-08-08	Songmeter	445513	221385
Long-eared Myotis	*Myotis evotis*	2012-08-09	Songmeter	452468	211080
Long-eared Myotis	*Myotis evotis*	2012-08-11	Songmeter	428172	208727
Long-eared Myotis	*Myotis evotis*	2012-08-12	Songmeter	455502	212413
Long-eared Myotis	*Myotis evotis*	2012-08-23	Songmeter	571293	336813
Long-eared Myotis	*Myotis evotis*	2012-08-28	Songmeter	412363	219962
Long-eared Myotis	*Myotis evotis*	2012-09-04	Songmeter	520424	267173
Long-eared Myotis	*Myotis evotis*	2012-09-06	Songmeter	514460	241325

Common Name	**Scientific Name**	**Date**	**Recording Type**	**Northing Wylam**	**Easting Wylam**
Long-eared Myotis	*Myotis evotis*	2012-09-08	Songmeter	504564	237173
Long-eared Myotis	*Myotis evotis*	2012-09-14	Songmeter	472560	206908
Fringed Myotis	*Myotis thysanodes*	2012-07-26	Songmeter	496405	244156
Fringed Myotis	*Myotis thysanodes*	2012-07-27	Songmeter	503727	238444
Fringed Myotis	*Myotis thysanodes*	2012-08-12	Songmeter	415162	218694
Long-legged Myotis	*Myotis volans*	2012-06-16	Songmeter	420857	361538
Long-legged Myotis	*Myotis volans*	2012-06-28	Songmeter	607961	357394
Long-legged Myotis	*Myotis volans*	2012-07-25	Songmeter	529035	256581
Long-legged Myotis	*Myotis volans*	2012-06-28	Songmeter	577214	338446
Long-legged Myotis	*Myotis volans*	2012-07-11	Songmeter	471126	203153
Long-legged Myotis	*Myotis volans*	2012-07-30	Songmeter	491741	230837
Long-legged Myotis	*Myotis volans*	2012-09-05	Songmeter	529034	256582
Long-legged Myotis	*Myotis volans*	2012-09-14	Songmeter	474549	203901
Long-legged Myotis	*Myotis volans*	2012-06-26	Songmeter	602221	339124
Long-legged Myotis	*Myotis volans*	2012-06-27	Songmeter	593176	338512
Long-legged Myotis	*Myotis volans*	2012-08-23	Songmeter	571293	336813
Long-legged Myotis	*Myotis volans*	2012-08-24	Songmeter	603971	335165
Long-legged Myotis	*Myotis volans*	2012-09-17	Songmeter	490597	202361
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-12	Songmeter	432721	376745
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-13	Songmeter	422920	378933
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-14	Songmeter	451600	374417
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-15	Songmeter	424479	366583
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-16	Songmeter	420857	361538
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-27	Songmeter	609807	350241
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-29	Songmeter	622332	351556
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-09	Songmeter	438438	201000
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-10	Songmeter	452216	202669
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-11	Songmeter	456278	206111
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-12	Songmeter	459764	202417
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-13	Songmeter	464501	201518
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-14	Songmeter	354687	312131
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-15	Songmeter	354789	305082

Common Name	Scientific Name	Date	Recording Type	Northing Wylam	Easting Wylam
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-25	Songmeter	529035	256581
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-08	Songmeter	447822	222036
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-09	Songmeter	453105	213641
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-10	Songmeter	428743	210250
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-11	Songmeter	428474	207655
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-12	Songmeter	449406	215489
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-21	Songmeter	585000	336275
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-23	Songmeter	571726	335325
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-25	Songmeter	627943	361611
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-27	Songmeter	605615	354527
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-28	Songmeter	415919	215637
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-30	Songmeter	449579	203034
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-31	Songmeter	463193	202707
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-03	Songmeter	459090	213435
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-04	Songmeter	518296	266405
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-11	Songmeter	477345	235454
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-12	Songmeter	494798	230933
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-14	Songmeter	471481	202655
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-27	Songmeter	592721	335110
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-01	Songmeter	585599	342174
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-11	Songmeter	471126	203153
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-12	Songmeter	476351	206287
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-14	Songmeter	359203	308428
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-15	Songmeter	362623	305445
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-24	Songmeter	486012	244987
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-26	Songmeter	496405	244156

Common Name	Scientific Name	Date	Recording Type	Northing Wylam	Easting Wylam
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-27	Songmeter	503727	238444
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-29	Songmeter	488802	216739
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-30	Songmeter	491741	230837
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-07	Songmeter	418214	217561
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-08	Songmeter	420312	207306
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-09	Songmeter	419081	207907
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-10	Songmeter	426492	211871
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-11	Songmeter	428008	205157
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-12	Songmeter	415162	218694
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-21	Songmeter	588430	338820
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-23	Songmeter	577441	335914
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-25	Songmeter	621531	361462
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-26	Songmeter	619397	352042
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-28	Songmeter	417788	221121
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-29	Songmeter	421234	204833
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-05	Songmeter	529034	256582
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-17	Songmeter	491977	205241
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-13	Songmeter	422921	378933
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-26	Songmeter	602221	339124
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-27	Songmeter	593176	338512
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-29	Songmeter	603971	335164
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-26	Songmeter	524487	246697
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-29	Songmeter	512266	265891
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-07	Songmeter	442112	234786
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-08	Songmeter	445513	221385
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-09	Songmeter	452468	211080

Common Name	Scientific Name	Date	Recording Type	Northing Wylam	Easting Wylam
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-11	Songmeter	428172	208727
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-12	Songmeter	455502	212413
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-21	Songmeter	586009	335719
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-23	Songmeter	571293	336813
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-24	Songmeter	603971	335165
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-26	Songmeter	622698	349566
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-29	Songmeter	421217	207971
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-04	Songmeter	520424	267173
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-09	Songmeter	491623	239152
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-14	Songmeter	472560	206908
Silver-haired Bat	*Lasionycteris noctivagans*	2012-07-26	Songmeter	526990	247626
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-23	Songmeter	571726	335325
Silver-haired Bat	*Lasionycteris noctivagans*	2012-09-17	Songmeter	491361	206148
Silver-haired Bat	*Lasionycteris noctivagans*	2012-09-22	Songmeter	427619	379710
Silver-haired Bat	*Lasionycteris noctivagans*	2012-06-28	Songmeter	577214	338446
Silver-haired Bat	*Lasionycteris noctivagans*	2012-07-26	Songmeter	496405	244156
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-24	Songmeter	603452	332552
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-26	Songmeter	619397	352042
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-31	Songmeter	455842	201543
Silver-haired Bat	*Lasionycteris noctivagans*	2012-09-14	Songmeter	474549	203901
Silver-haired Bat	*Lasionycteris noctivagans*	2012-09-16	Songmeter	512866	200802
Silver-haired Bat	*Lasionycteris noctivagans*	2012-09-17	Songmeter	491977	205241
Silver-haired Bat	*Lasionycteris noctivagans*	2012-09-19	Songmeter	610401	348641
Silver-haired Bat	*Lasionycteris noctivagans*	2012-06-13	Songmeter	422921	378933
Silver-haired Bat	*Lasionycteris noctivagans*	2012-06-27	Songmeter	593176	338512
Silver-haired Bat	*Lasionycteris noctivagans*	2012-06-28	Songmeter	574891	337696

Common Name	Scientific Name	Date	Recording Type	Northing Wylam	Easting Wylam
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-09	Songmeter	452468	211080
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-10	Songmeter	428174	211114
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-12	Songmeter	455502	212413
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-24	Songmeter	603971	335165
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-25	Songmeter	624044	361868
Silver-haired Bat	*Lasionycteris noctivagans*	2012-09-04	Songmeter	520424	267173
Silver-haired Bat	*Lasionycteris noctivagans*	2012-09-09	Songmeter	491623	239152
Silver-haired Bat	*Lasionycteris noctivagans*	2012-09-14	Songmeter	472560	206908
Silver-haired Bat	*Lasionycteris noctivagans*	2012-09-15	Songmeter	500822	211504
Silver-haired Bat	*Lasionycteris noctivagans*	2012-09-16	Songmeter	512390	204161
Silver-haired Bat	*Lasionycteris noctivagans*	2012-09-17	Songmeter	490597	202361
Silver-haired Bat	*Lasionycteris noctivagans*	2012-09-19	Songmeter	612183	347986
Big Brown Bat	*Eptesicus fuscus*	2012-06-30	Songmeter	623277	361174
Big Brown Bat	*Eptesicus fuscus*	2012-07-10	Songmeter	452216	202669
Big Brown Bat	*Eptesicus fuscus*	2012-07-28	Songmeter	515922	247871
Big Brown Bat	*Eptesicus fuscus*	2012-08-09	Songmeter	453105	213641
Big Brown Bat	*Eptesicus fuscus*	2012-08-11	Songmeter	428474	207655
Big Brown Bat	*Eptesicus fuscus*	2012-06-28	Songmeter	577214	338446
Big Brown Bat	*Eptesicus fuscus*	2012-07-26	Songmeter	496405	244156
Big Brown Bat	*Eptesicus fuscus*	2012-07-28	Songmeter	515273	245096
Big Brown Bat	*Eptesicus fuscus*	2012-08-09	Songmeter	452468	211080
Big Brown Bat	*Eptesicus fuscus*	2012-08-11	Songmeter	428172	208727
Big Brown Bat	*Eptesicus fuscus*	2012-08-12	Songmeter	455502	212413
Big Brown Bat	*Eptesicus fuscus*	2012-09-14	Songmeter	472560	206908
Hoary Bat	*Lasiurus cinereus*	2012-06-14	Songmeter	451600	374417
Hoary Bat	*Lasiurus cinereus*	2012-06-29	Songmeter	622332	351556
Hoary Bat	*Lasiurus cinereus*	2012-07-14	Songmeter	354687	312131
Hoary Bat	*Lasiurus cinereus*	2012-07-27	Songmeter	530711	251890
Hoary Bat	*Lasiurus cinereus*	2012-08-10	Songmeter	428743	210250
Hoary Bat	*Lasiurus cinereus*	2012-08-13	Songmeter	449490	207648
Hoary Bat	*Lasiurus cinereus*	2012-08-23	Songmeter	571726	335325
Hoary Bat	*Lasiurus cinereus*	2012-08-28	Songmeter	415919	215637
Hoary Bat	*Lasiurus cinereus*	2012-09-01	Songmeter	428009	205159

Common Name	Scientific Name	Date	Recording Type	Northing Wylam	Easting Wylam
Hoary Bat	*Lasiurus cinereus*	2012-09-11	Songmeter	477345	235454
Hoary Bat	*Lasiurus cinereus*	2012-07-13	Songmeter	490597	202361
Hoary Bat	*Lasiurus cinereus*	2012-07-15	Songmeter	362623	305445
Hoary Bat	*Lasiurus cinereus*	2012-07-26	Songmeter	496405	244156
Hoary Bat	*Lasiurus cinereus*	2012-07-27	Songmeter	503727	238444
Hoary Bat	*Lasiurus cinereus*	2012-07-29	Songmeter	488802	216739
Hoary Bat	*Lasiurus cinereus*	2012-08-08	Songmeter	420312	207306
Hoary Bat	*Lasiurus cinereus*	2012-08-22	Songmeter	581999	325150
Hoary Bat	*Lasiurus cinereus*	2012-08-26	Songmeter	619397	352042
Hoary Bat	*Lasiurus cinereus*	2012-09-19	Songmeter	610401	348641
Hoary Bat	*Lasiurus cinereus*	2012-06-26	Songmeter	602221	339124
Hoary Bat	*Lasiurus cinereus*	2012-06-28	Songmeter	574891	337696
Hoary Bat	*Lasiurus cinereus*	2012-08-09	Songmeter	452468	211080
Hoary Bat	*Lasiurus cinereus*	2012-08-10	Songmeter	428174	211114
Hoary Bat	*Lasiurus cinereus*	2012-08-21	Songmeter	586009	335719
Hoary Bat	*Lasiurus cinereus*	2012-08-23	Songmeter	571293	336813
Hoary Bat	*Lasiurus cinereus*	2012-08-28	Songmeter	412363	219962
Hoary Bat	*Lasiurus cinereus*	2012-08-31	Songmeter	459843	202192
Hoary Bat	*Lasiurus cinereus*	2012-09-01	Songmeter	429803	201972
Hoary Bat	*Lasiurus cinereus*	2012-09-14	Songmeter	472560	206908
Pallid Bat	*Antrozous pallidus*	2012-08-09	Songmeter	453105	213641
Pallid Bat	*Antrozous pallidus*	2012-08-23	Songmeter	571726	335325
Pallid Bat	*Antrozous pallidus*	2012-08-28	Songmeter	415919	215637
Pallid Bat	*Antrozous pallidus*	2012-09-06	Songmeter	513930	243266
Pallid Bat	*Antrozous pallidus*	2012-07-24	Songmeter	486012	244987
Pallid Bat	*Antrozous pallidus*	2012-07-25	Songmeter	502150	243733
Pallid Bat	*Antrozous pallidus*	2012-07-27	Songmeter	530312	250639
Pallid Bat	*Antrozous pallidus*	2012-07-28	Songmeter	515273	245096
Pallid Bat	*Antrozous pallidus*	2012-08-09	Songmeter	452468	211080
Pallid Bat	*Antrozous pallidus*	2012-08-11	Songmeter	428172	208727
Pallid Bat	*Antrozous pallidus*	2012-08-12	Songmeter	455502	212413
Pallid Bat	*Antrozous pallidus*	2012-08-23	Songmeter	571293	336813
Pallid Bat	*Antrozous pallidus*	2012-08-24	Songmeter	603971	335165
Pallid Bat	*Antrozous pallidus*	2012-09-17	Songmeter	490597	202361
Townsend's Big-eared Bat	*Corynorhinus townsendii*	2012-07-24	Songmeter	518293	266403
Townsend's Big-eared Bat	*Corynorhinus townsendii*	2012-08-21	Songmeter	585000	336275
Townsend's Big-eared Bat	*Corynorhinus townsendii*	2012-08-23	Songmeter	571726	335325
Townsend's Big-eared Bat	*Corynorhinus*	2012-09-02	Songmeter	437458	202801

Common Name	Scientific Name	Date	Recording Type	Northing Wylam	Easting Wylam
	townsendii				
Townsend's Big-eared Bat	*Corynorhinus townsendii*	2012-07-26	Songmeter	524487	246697
Townsend's Big-eared Bat	*Corynorhinus townsendii*	2012-08-09	Songmeter	452468	211080
Townsend's Big-eared Bat	*Corynorhinus townsendii*	2012-08-12	Songmeter	455502	212413
Townsend's Big-eared Bat	*Corynorhinus townsendii*	2012-08-21	Songmeter	586009	335719
Townsend's Big-eared Bat	*Corynorhinus townsendii*	2012-08-23	Songmeter	571293	336813
Townsend's Big-eared Bat	*Corynorhinus townsendii*	2012-09-06	Songmeter	514460	241325
Townsend's Big-eared Bat	*Corynorhinus townsendii*	2012-09-08	Songmeter	504564	237173
Yuma Myotis	*Myotis yumanensis*	2012-07-09	Songmeter	438438	201000
Yuma Myotis	*Myotis yumanensis*	2012-08-22	Songmeter	581780	329397
Yuma Myotis	*Myotis yumanensis*	2012-07-09	Songmeter	499391	214900
Yuma Myotis	*Myotis yumanensis*	2012-08-11	Songmeter	428008	205157
Yuma Myotis	*Myotis yumanensis*	2012-08-29	Songmeter	421234	204833
Yuma Myotis	*Myotis yumanensis*	2012-09-09	Songmeter	493804	241138
Yuma Myotis	*Myotis yumanensis*	2012-09-11	Songmeter	479289	234035
Yuma Myotis	*Myotis yumanensis*	2012-08-09	Songmeter	452468	211080
Yuma Myotis	*Myotis yumanensis*	2012-09-09	Songmeter	491623	239152
California Myotis	*Myotis californicus*	2012-08-12	Songmeter	449406	215489
California Myotis	*Myotis californicus*	2012-08-21	Songmeter	585000	336275
California Myotis	*Myotis californicus*	2012-07-11	Songmeter	471126	203153
Big Brown Bat	*Eptesicus fuscus*	2012-08-21	Echometer 3	672896	305254
Big Brown Bat	*Eptesicus fuscus*	2012-08-23	Echometer 3	672694	305078
Big Brown Bat	*Eptesicus fuscus*	2012-09-03	Echometer 3	454717	215660
Hoary Bat	*Lasiurus cinereus*	2012-08-21	Echometer 3	672896	305254
Hoary Bat	*Lasiurus cinereus*	2012-08-23	Echometer 3	672694	305078
Hoary Bat	*Lasiurus cinereus*	2012-08-24	Echometer 3	642622	303416
Hoary Bat	*Lasiurus cinereus*	2012-08-25	Echometer 3	631186	360462
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-21	Echometer 3	672896	305254
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-23	Echometer 3	672694	305078
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-24	Echometer 3	642622	303416
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-25	Echometer 3	631186	360462
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-26	Echometer 3	622351	351567
Silver-haired Bat	*Lasionycteris noctivagans*	2012-09-03	Echometer 3	454717	215660

Common Name	Scientific Name	Date	Recording Type	Northing Wylam	Easting Wylam
Silver-haired Bat	*Lasionycteris noctivagans*	2012-09-21	Echometer 3	476517	369512
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-21	Echometer 3	672896	305254
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-23	Echometer 3	672694	305078
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-24	Echometer 3	642622	303416
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-26	Echometer 3	622351	351567
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-28	Echometer 3	415111	218688
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-29	Echometer 3	426624	213221
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-30	Echometer 3	447957	201281
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-01	Echometer 3	432186	205121
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-02	Echometer 3	432186	205121
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-03	Echometer 3	454717	215660
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-04	Echometer 3	512147	265938
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-05	Echometer 3	525164	252123
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-09	Echometer 3	491635	239149
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-10	Echometer 3	486722	235979
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-13	Echometer 3	490911	216503
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-14	Echometer 3	471495	202472
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-09-21	Echometer 3	476517	369512
Long-eared Myotis	*Myotis evotis*	2012-08-21	Echometer 3	672896	305254
Long-eared Myotis	*Myotis evotis*	2012-08-23	Echometer 3	672694	305078
Long-eared Myotis	*Myotis evotis*	2012-08-24	Echometer 3	642622	303416
Long-eared Myotis	*Myotis evotis*	2012-08-25	Echometer 3	631186	360462
Long-eared Myotis	*Myotis evotis*	2012-08-28	Echometer 3	415111	218688
Long-eared Myotis	*Myotis evotis*	2012-08-29	Echometer 3	426624	213221
Long-eared Myotis	*Myotis evotis*	2012-09-02	Echometer 3	432186	205121
Long-eared Myotis	*Myotis evotis*	2012-09-03	Echometer 3	454717	215660
Long-eared Myotis	*Myotis evotis*	2012-09-08	Echometer 3	504673	238334
Long-eared Myotis	*Myotis evotis*	2012-09-13	Echometer 3	490911	216503
Little Brown Myotis	*Myotis lucifugus*	2012-08-21	Echometer 3	672896	305254
Little Brown Myotis	*Myotis lucifugus*	2012-08-23	Echometer 3	672694	305078

Common Name	Scientific Name	Date	Recording Type	Northing Wylam	Easting Wylam
Little Brown Myotis	*Myotis lucifugus*	2012-08-24	Echometer 3	642622	303416
Little Brown Myotis	*Myotis lucifugus*	2012-08-25	Echometer 3	631186	360462
Little Brown Myotis	*Myotis lucifugus*	2012-08-26	Echometer 3	622351	351567
Little Brown Myotis	*Myotis lucifugus*	2012-09-04	Echometer 3	512147	265938
Little Brown Myotis	*Myotis lucifugus*	2012-09-09	Echometer 3	491635	239149
Little Brown Myotis	*Myotis lucifugus*	2012-09-14	Echometer 3	471495	202472
Little Brown Myotis	*Myotis lucifugus*	2012-09-16	Echometer 3	517186	200465
Long-legged Myotis	*Myotis volans*	2012-08-26	Echometer 3	622351	351567
Yuma Myotis	*Myotis yumanensis*	2012-08-29	Echometer 3	426624	213221
Yuma Myotis	*Myotis yumanensis*	2012-09-01	Echometer 3	432186	205121
Yuma Myotis	*Myotis yumanensis*	2012-09-10	Echometer 3	486722	235979
Pallid Bat	*Antrozous pallidus*	2012-06-13	Anabat	435161	366080
Pallid Bat	*Antrozous pallidus*	2012-06-14	Anabat	476490	369539
Pallid Bat	*Antrozous pallidus*	2012-06-17	Anabat	424630	356508
Pallid Bat	*Antrozous pallidus*	2012-07-11	Anabat	462218	209412
Pallid Bat	*Antrozous pallidus*	2012-07-14	Anabat	354914	312001
Pallid Bat	*Antrozous pallidus*	2012-07-26	Anabat	525304	247870
Pallid Bat	*Antrozous pallidus*	2012-07-26	Anabat	491667	239177
Pallid Bat	*Antrozous pallidus*	2012-07-27	Anabat	503613	238469
Pallid Bat	*Antrozous pallidus*	2012-07-28	Anabat	514375	245094
Pallid Bat	*Antrozous pallidus*	2012-07-29	Anabat	489006	216661
Pallid Bat	*Antrozous pallidus*	2012-08-08	Anabat	446095	210587
Pallid Bat	*Antrozous pallidus*	2012-08-10	Anabat	441787	211383
Pallid Bat	*Antrozous pallidus*	2012-08-11	Anabat	428787	206670
Pallid Bat	*Antrozous pallidus*	2012-08-21	Anabat	593551	336985
Pallid Bat	*Antrozous pallidus*	2012-08-22	Anabat	581687	325775
Pallid Bat	*Antrozous pallidus*	2012-08-24	Anabat	601544	337074
Pallid Bat	*Antrozous pallidus*	2012-06-12	Anabat	432719	376745
Townsend's Big-eared Bat	*Corynorhinus townsendii*	2012-08-08	Anabat	446095	210587
Townsend's Big-eared Bat	*Corynorhinus townsendii*	2012-08-10	Anabat	441787	211383
Townsend's Big-eared Bat	*Corynorhinus townsendii*	2012-08-23	Anabat	574907	334025
Big Brown Bat	*Eptesicus fuscus*	2012-06-14	Anabat	476490	369539
Big Brown Bat	*Eptesicus fuscus*	2012-06-15	Anabat	423881	365304
Big Brown Bat	*Eptesicus fuscus*	2012-06-25	Anabat	606074	347626
Big Brown Bat	*Eptesicus fuscus*	2012-07-10	Anabat	447973	201318
Big Brown Bat	*Eptesicus fuscus*	2012-07-11	Anabat	462218	209412
Big Brown Bat	*Eptesicus fuscus*	2012-07-12	Anabat	469550	202859
Big Brown Bat	*Eptesicus fuscus*	2012-07-12	Anabat	467457	206162

Common Name	Scientific Name	Date	Recording Type	Northing Wylam	Easting Wylam
Big Brown Bat	*Eptesicus fuscus*	2012-07-13	Anabat	500326	211356
Big Brown Bat	*Eptesicus fuscus*	2012-07-15	Anabat	355555	311474
Big Brown Bat	*Eptesicus fuscus*	2012-07-24	Anabat	520271	267135
Big Brown Bat	*Eptesicus fuscus*	2012-07-25	Anabat	526010	254171
Big Brown Bat	*Eptesicus fuscus*	2012-07-26	Anabat	525304	247870
Big Brown Bat	*Eptesicus fuscus*	2012-07-28	Anabat	514375	245094
Big Brown Bat	*Eptesicus fuscus*	2012-08-08	Anabat	446095	210587
Big Brown Bat	*Eptesicus fuscus*	2012-08-10	Anabat	441787	211383
Big Brown Bat	*Eptesicus fuscus*	2012-08-21	Anabat	593551	336985
Big Brown Bat	*Eptesicus fuscus*	2012-08-24	Anabat	601544	337074
Red Bat	*Lasiurus borealis*	2012-07-28	Anabat	514375	245094
Red Bat	*Lasiurus borealis*	2012-08-08	Anabat	446095	210587
Red Bat	*Lasiurus borealis*	2012-08-12	Anabat	450010	214306
Hoary Bat	*Lasiurus cinereus*	2012-06-13	Anabat	435161	366080
Hoary Bat	*Lasiurus cinereus*	2012-06-14	Anabat	476490	369539
Hoary Bat	*Lasiurus cinereus*	2012-06-15	Anabat	423881	365304
Hoary Bat	*Lasiurus cinereus*	2012-07-10	Anabat	447973	201318
Hoary Bat	*Lasiurus cinereus*	2012-07-12	Anabat	469550	202859
Hoary Bat	*Lasiurus cinereus*	2012-07-13	Anabat	500326	211356
Hoary Bat	*Lasiurus cinereus*	2012-07-14	Anabat	354914	312001
Hoary Bat	*Lasiurus cinereus*	2012-07-15	Anabat	355555	311474
Hoary Bat	*Lasiurus cinereus*	2012-07-26	Anabat	525304	247870
Hoary Bat	*Lasiurus cinereus*	2012-07-27	Anabat	503613	238469
Hoary Bat	*Lasiurus cinereus*	2012-07-28	Anabat	514375	245094
Hoary Bat	*Lasiurus cinereus*	2012-07-29	Anabat	512152	265950
Hoary Bat	*Lasiurus cinereus*	2012-07-29	Anabat	489006	216661
Hoary Bat	*Lasiurus cinereus*	2012-07-30	Anabat	486120	232534
Hoary Bat	*Lasiurus cinereus*	2012-08-12	Anabat	450010	214306
Hoary Bat	*Lasiurus cinereus*	2012-08-13	Anabat	449857	207714
Hoary Bat	*Lasiurus cinereus*	2012-08-22	Anabat	581687	325775
Silver-haired Bat	*Lasionycteris noctivagans*	2012-06-14	Anabat	476490	369539
Silver-haired Bat	*Lasionycteris noctivagans*	2012-06-15	Anabat	423881	365304
Silver-haired Bat	*Lasionycteris noctivagans*	2012-06-25	Anabat	606074	347626
Silver-haired Bat	*Lasionycteris noctivagans*	2012-07-10	Anabat	447973	201318
Silver-haired Bat	*Lasionycteris noctivagans*	2012-07-11	Anabat	462218	209412
Silver-haired Bat	*Lasionycteris noctivagans*	2012-07-12	Anabat	469550	202859

Common Name	Scientific Name	Date	Recording Type	Northing Wylam	Easting Wylam
Silver-haired Bat	*Lasionycteris noctivagans*	2012-07-12	Anabat	467457	206162
Silver-haired Bat	*Lasionycteris noctivagans*	2012-07-13	Anabat	500326	211356
Silver-haired Bat	*Lasionycteris noctivagans*	2012-07-14	Anabat	354914	312001
Silver-haired Bat	*Lasionycteris noctivagans*	2012-07-15	Anabat	355555	311474
Silver-haired Bat	*Lasionycteris noctivagans*	2012-07-24	Anabat	520271	267135
Silver-haired Bat	*Lasionycteris noctivagans*	2012-07-26	Anabat	525304	247870
Silver-haired Bat	*Lasionycteris noctivagans*	2012-07-28	Anabat	514375	245094
Silver-haired Bat	*Lasionycteris noctivagans*	2012-07-30	Anabat	486120	232534
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-07	Anabat	436748	227624
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-08	Anabat	446095	210587
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-10	Anabat	441787	211383
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-11	Anabat	428787	206670
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-12	Anabat	450010	214306
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-13	Anabat	449857	207714
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-21	Anabat	593551	336985
Silver-haired Bat	*Lasionycteris noctivagans*	2012-08-24	Anabat	601544	337074
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-13	Anabat	435161	366080
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-14	Anabat	476490	369539
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-15	Anabat	423881	365304
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-16	Anabat	419310	364554
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-16	Anabat	416804	361241
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-10	Anabat	447973	201318
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-11	Anabat	462218	209412
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-12	Anabat	469550	202859
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-12	Anabat	467457	206162
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-13	Anabat	500326	211356

Common Name	Scientific Name	Date	Recording Type	Northing Wylam	Easting Wylam
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-14	Anabat	354914	312001
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-15	Anabat	355555	311474
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-24	Anabat	520271	267135
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-24	Anabat	-16585	261931
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-25	Anabat	526010	254171
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-25	Anabat	499173	240231
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-26	Anabat	525304	247870
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-26	Anabat	491667	239177
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-27	Anabat	503613	238469
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-28	Anabat	514375	245094
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-29	Anabat	512152	265950
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-29	Anabat	489006	216661
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-07-30	Anabat	486120	232534
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-08	Anabat	446095	210587
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-10	Anabat	441787	211383
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-21	Anabat	593551	336985
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-23	Anabat	574907	334025
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-08-24	Anabat	601544	337074
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-17	Anabat	419753	359013
Western Small-footed Myotis	*Myotis ciliolabrum*	2012-06-12	Anabat	432719	376745
Long-eared Myotis	*Myotis evotis*	2012-06-14	Anabat	476490	369539
Long-eared Myotis	*Myotis evotis*	2012-07-10	Anabat	447973	201318
Long-eared Myotis	*Myotis evotis*	2012-07-11	Anabat	462218	209412
Long-eared Myotis	*Myotis evotis*	2012-07-13	Anabat	500326	211356
Long-eared Myotis	*Myotis evotis*	2012-07-15	Anabat	355555	311474
Long-eared Myotis	*Myotis evotis*	2012-07-24	Anabat	520271	267135
Long-eared Myotis	*Myotis evotis*	2012-07-26	Anabat	525304	247870
Long-eared Myotis	*Myotis evotis*	2012-07-27	Anabat	503613	238469
Long-eared Myotis	*Myotis evotis*	2012-07-28	Anabat	514375	245094

Common Name	Scientific Name	Date	Recording Type	Northing Wylam	Easting Wylam
Long-eared Myotis	*Myotis evotis*	2012-07-29	Anabat	489006	216661
Long-eared Myotis	*Myotis evotis*	2012-07-30	Anabat	486120	232534
Long-eared Myotis	*Myotis evotis*	2012-08-08	Anabat	446095	210587
Long-eared Myotis	*Myotis evotis*	2012-08-10	Anabat	441787	211383
Long-eared Myotis	*Myotis evotis*	2012-08-21	Anabat	593551	336985
Long-eared Myotis	*Myotis evotis*	2012-08-22	Anabat	581687	325775
Long-eared Myotis	*Myotis evotis*	2012-08-24	Anabat	601544	337074
Long-eared Myotis	*Myotis evotis*	2012-06-17	Anabat	419753	359013
Little Brown Myotis	*Myotis lucifugus*	2012-06-13	Anabat	435161	366080
Little Brown Myotis	*Myotis lucifugus*	2012-06-14	Anabat	476490	369539
Little Brown Myotis	*Myotis lucifugus*	2012-06-15	Anabat	423881	365304
Little Brown Myotis	*Myotis lucifugus*	2012-06-16	Anabat	419310	364554
Little Brown Myotis	*Myotis lucifugus*	2012-06-16	Anabat	416804	361241
Little Brown Myotis	*Myotis lucifugus*	2012-06-17	Anabat	424630	356508
Little Brown Myotis	*Myotis lucifugus*	2012-06-25	Anabat	606074	347626
Little Brown Myotis	*Myotis lucifugus*	2012-07-10	Anabat	447973	201318
Little Brown Myotis	*Myotis lucifugus*	2012-07-11	Anabat	462218	209412
Little Brown Myotis	*Myotis lucifugus*	2012-07-12	Anabat	469550	202859
Little Brown Myotis	*Myotis lucifugus*	2012-07-12	Anabat	467457	206162
Little Brown Myotis	*Myotis lucifugus*	2012-07-13	Anabat	500326	211356
Little Brown Myotis	*Myotis lucifugus*	2012-07-14	Anabat	354914	312001
Little Brown Myotis	*Myotis lucifugus*	2012-07-15	Anabat	355555	311474
Little Brown Myotis	*Myotis lucifugus*	2012-07-24	Anabat	520271	267135
Little Brown Myotis	*Myotis lucifugus*	2012-07-25	Anabat	526010	254171
Little Brown Myotis	*Myotis lucifugus*	2012-07-25	Anabat	499173	240231
Little Brown Myotis	*Myotis lucifugus*	2012-07-26	Anabat	491667	239177
Little Brown Myotis	*Myotis lucifugus*	2012-07-28	Anabat	514375	245094
Little Brown Myotis	*Myotis lucifugus*	2012-07-29	Anabat	489006	216661
Little Brown Myotis	*Myotis lucifugus*	2012-07-30	Anabat	486120	232534
Little Brown Myotis	*Myotis lucifugus*	2012-08-08	Anabat	446095	210587
Little Brown Myotis	*Myotis lucifugus*	2012-08-10	Anabat	441787	211383
Little Brown Myotis	*Myotis lucifugus*	2012-08-21	Anabat	593551	336985
Little Brown Myotis	*Myotis lucifugus*	2012-08-22	Anabat	581687	325775
Little Brown Myotis	*Myotis lucifugus*	2012-08-24	Anabat	601544	337074
Little Brown Myotis	*Myotis lucifugus*	2012-06-17	Anabat	419753	359013
Little Brown Myotis	*Myotis lucifugus*	2012-06-12	Anabat	432719	376745
Fringed Myotis	*Myotis thysanodes*	2012-06-16	Anabat	419310	364554
Fringed Myotis	*Myotis thysanodes*	2012-07-15	Anabat	355555	311474
Fringed Myotis	*Myotis thysanodes*	2012-07-27	Anabat	503613	238469

Common Name	**Scientific Name**	**Date**	**Recording Type**	**Northing Wylam**	**Easting Wylam**
Fringed Myotis	*Myotis thysanodes*	2012-07-29	Anabat	489006	216661
Fringed Myotis	*Myotis thysanodes*	2012-08-23	Anabat	574907	334025
Fringed Myotis	*Myotis thysanodes*	2012-06-17	Anabat	419753	359013
Long-legged Myotis	*Myotis volans*	2012-06-13	Anabat	435161	366080
Long-legged Myotis	*Myotis volans*	2012-06-16	Anabat	416804	361241
Long-legged Myotis	*Myotis volans*	2012-07-24	Anabat	520271	267135
Long-legged Myotis	*Myotis volans*	2012-07-26	Anabat	491667	239177
Long-legged Myotis	*Myotis volans*	2012-08-08	Anabat	446095	210587
Long-legged Myotis	*Myotis volans*	2012-08-13	Anabat	449857	207714
Long-legged Myotis	*Myotis volans*	2012-08-21	Anabat	593551	336985
Long-legged Myotis	*Myotis volans*	2012-08-22	Anabat	581687	325775
Long-legged Myotis	*Myotis volans*	2012-08-23	Anabat	574907	334025
Yuma Myotis	*Myotis yumanensis*	2012-08-08	Anabat	446095	210587

Appendix 6: Key to Wyoming Bats

Key to the Bats of Wyoming: GYE Version

Doug Keinath, WYNDD Zoologist

#	If this is true …	… then go to …
1a	Tail extends 1/3 or more beyond rear edge of uropatagium.	2
1b	Tail does not extend more than barely beyond rear edge of uropatagium	3
2a	Forearm > 50mm. [Large bat. Ears join at forehead. Pale-brown to black fur.]	Nyctinomops macrotus
2b	Forearm < 50mm. [Smallish bat. Ears almost joined at forehead. Gray-brown fur.]	Tadarida brasiliensis
3a	Conspicuous pair of white spots on shoulders and one on rump contrast with black dorsal fur. Pink ears.	Euderma maculatum
3b	Lacks white dorsal spots.	4
4a	At least anterior half of dorsal surface of uropatagium heavily furred.	5
4b	Dorsal surface of uropatagium mostly naked or scantily furred.	7
5a	Distinct white patches of fur at dorsal bases of thumbs and often on shoulders. Dorsal surface of uropatagium fully furred.	6
5b	No white patches of fur at dorsal bases of thumbs or on shoulders. Dorsal surface of uropatagium ranging from half to fully furred. Black dorsal fur with silver tips. Black face and uropatagium.	Lasionycteris noctivagans
6a	Light colored ear distinctively edged in black. Dorsal hairs dark gray and tipped with a broad band of white giving a hoary colored appearance. Forearm 46-58mm.	Lasiurus cinereus
6b	Light colored ear never edged in black. Fur bright reddish-orange to yellow in males and tending toward light brownish – grayish in females. Dorsal hairs never dark gray and tipped with white, though possibly frosted. Forearm 35-45mm.	Lasiurus borealis
7a	Dorsal fur lighter at base (pale yellow-blond) than tips (brown). Pale translucent ears 25-33mm long. Forearm 50-55mm. Blunt snout.	Antrozous pallidus
7b	Dorsal fur darker at base than tips. Fur color, ear and forearm lengths highly variable.	8
8a	Prominent pair of lumps above nose on each side of muzzle (see picture). Ear length 30-39mm. Slate-gray fur.	Corynorhinus townsendii
8b	No lumps on nose.	9
9a	Very small bat (mass ≤ 6g; forearm usu. < 33mm). Tragus relatively short and not sharply pointed.	10
9b	Larger (mass > 6g; forearm usu. > 33mm). Tragus longer and somewhat pointed.	11
10a	Small-bodied (3-6g). Tragus short (<5mm), blunt, and club-shaped. Body fur medium to pale brown in contrast to jet black face and ears. Tail membrane sparsely furred on anterior third of dorsal surface. Forearm 27-33mm.	Pipistrellus Hesperus
10b	Hair distinctively tricolored (dark base / light middle / dark tip). Lighter ears and no distinct face mask. Leading edge of wing noticeably paler than rest of membrane. Forearm 30-35mm.	Pipistrellus subflavus
11a	Large, medium to dark brown with keeled calcar. First upper premolar ≥ ½ canine length (see Fig. 11a). Forearm 42-51mm (wingspan 325-350mm). Tragus rounded.	Eptesicus fuscus
11b	Smallish bat. First upper premolar less than ¼ as tall as canine (see Fig. 11b).	12 (myotis spp.)

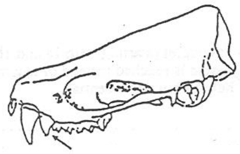


Fig. 11a. First upper premolar ½ as tall as canine (*Eptesicus fuscus*)

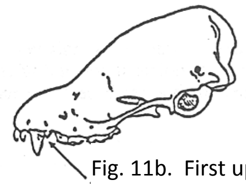


Fig. 11b. First upper premolar < ¼ as tall as canine (*Myotis spp.*)

Myotis species

#	If this is true …	… then go to …
12a	Calcar keeled. (see Fig. 12a)	13
12b	Calcar NOT keeled. (see Fig. 12b)	15

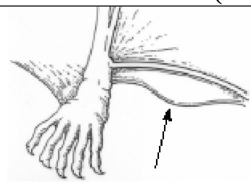


Fig. 12a. Keeled calcar (go to 12)

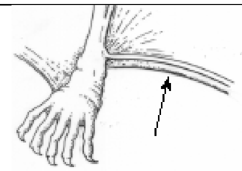


Fig. 12b. Keel absent (go to 14)

Keeled

13a	Forearm 38-42mm (wingspan 250-270mm). Body fur uniformly dark brown or grayish brown with no distinctively darker face mask. [Underside of wing furred from side to elbow.]	Myotis volans
13b	Forearm 29-36mm. Body fur medium to very light tan or reddish brown with clearly darker face mask. [Underside of wing not furred from side to elbow.]	14

14a	Thumb length < 4.2mm. Tail does NOT extend beyond uropatagium. Braincase has an abruptly rising profile (convex forehead). Length of bare snout ≈ width across nostrils. Dorsal fur dull, pale colored, with slightly-contrasting dark brown face mask.(Fig. 14a)	Myotis californicus
14b	Thumb length > 4.2mm. Tail often extends slightly beyond uropatagium. No distinct rise in braincase profile (sloping forehead). Length across snout ≈ 1.5 times width across nostrils. Dorsal fur slightly shiny, pale colored, and sharply contrasting with black face mask. (Fig. 14b)	Myotis ciliolabrum

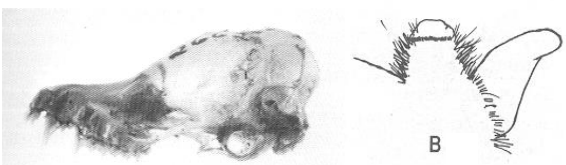


Fig. 14a. *M. californicus:* Rising braincase. Length of bare snout ≈ width across nostrils.

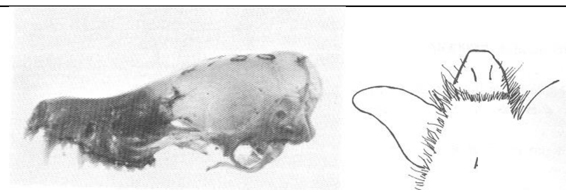


Fig 14b. *M.ciliolabrum*: Shallow braincase. Length across snout ≈ 1.5 times width across nostrils

Long

15a	Distinct fringe of hair extending 1.0-1.5mm beyond edge of uropatagium (picture). Ears darkly pigmented and 16-20mm long. Belly fur light. Forearm 39-46mm.	Myotis thysanodes
15b	Fringe absent (no more than scattered hairs on edge of uropatagium).	16

16a	Ear length ≥17mm.	17
16b	Ear length ≤ 16mm.	18

17a	Ears, wings, and uropatagium are blackish and opaque. Ear length 17-24mm (WY: 17-23mm, but usu. ~20mm). Ears extend past end of nose when laid down. Fur light brown with hairs black at base. [May have an inconspicuous fringe of hairs on the posterior uropatagium.]	Myotis evotis
17b	Ears, wings, and uropatagium are brownish and translucent. Ear length 15-19mm (WY: 15-16mm).	Myotis septentrionalis

18a	Dorsal body fur brown to reddish-brown, long and glossy. Forearm usually 36.5-40.5mm (BC Range: 33.0-40.3mm). Ears dark, 14-16mm long, with short tragus. Forehead with a gradual slope (Fig. 18a), skull usually greater than 14mm. Ventral fur light-tipped but never white. Many foot hairs extend beyond toes.	Myotis lucifugus
18b	Dorsal body fur brown to reddish-brown, short and dull. Forearm usually 32-36mm (BC Range: 30.0-38.0mm). Ears paler, 12-14mm long. Forehead with steep slope (Fig. 18b), skull usually less than 14mm. Ventral fur with whitish tips.	Myotis yumanensis

Fig. 18a. *M. lucifugus*: Forehead with gradual slope

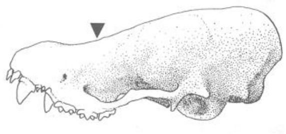
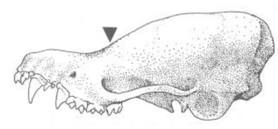
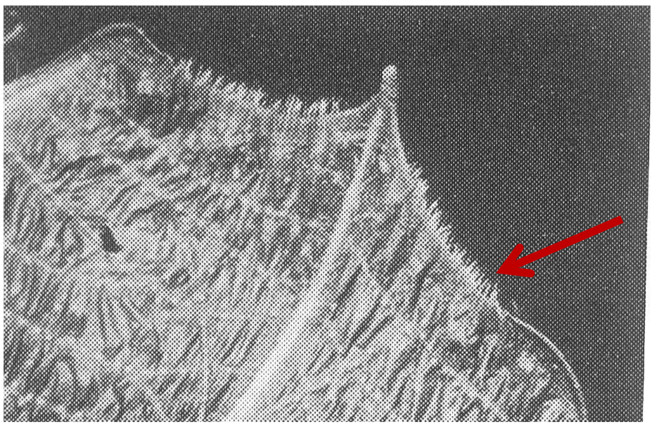
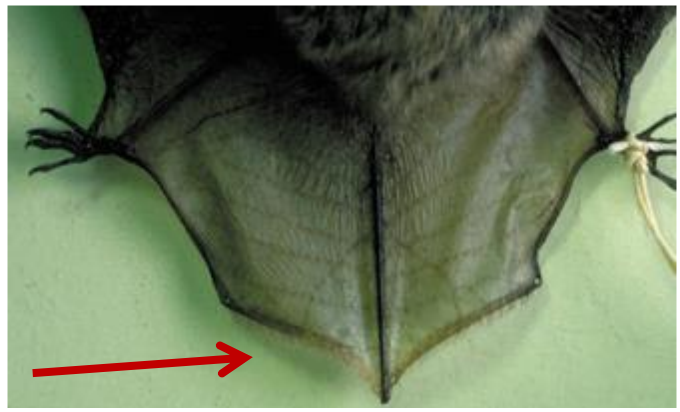


Fig. 18b. *M. yumanensis*: Forehead with steep slope



Supplementary Images for the Wyoming Bat Key

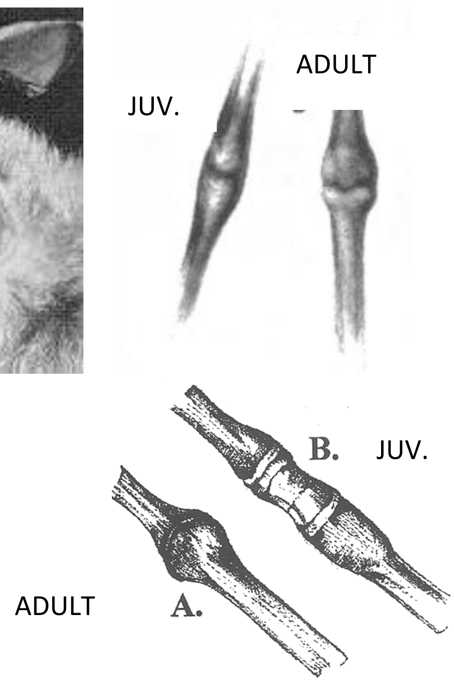




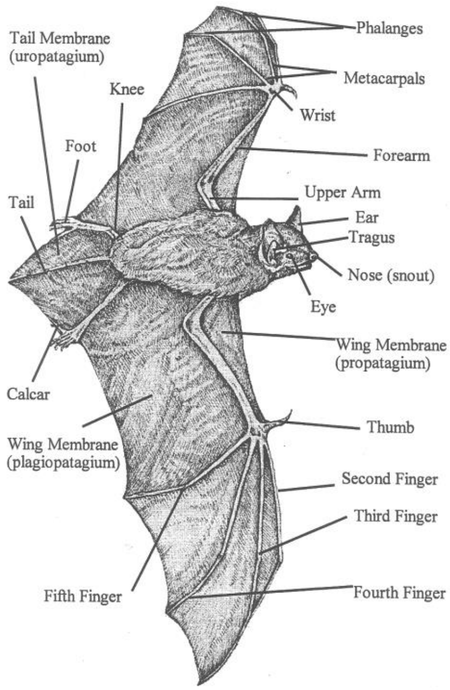
Uropatagial fringe of *Myotis thysanodes*

Face and tragus of *P. hesperus*

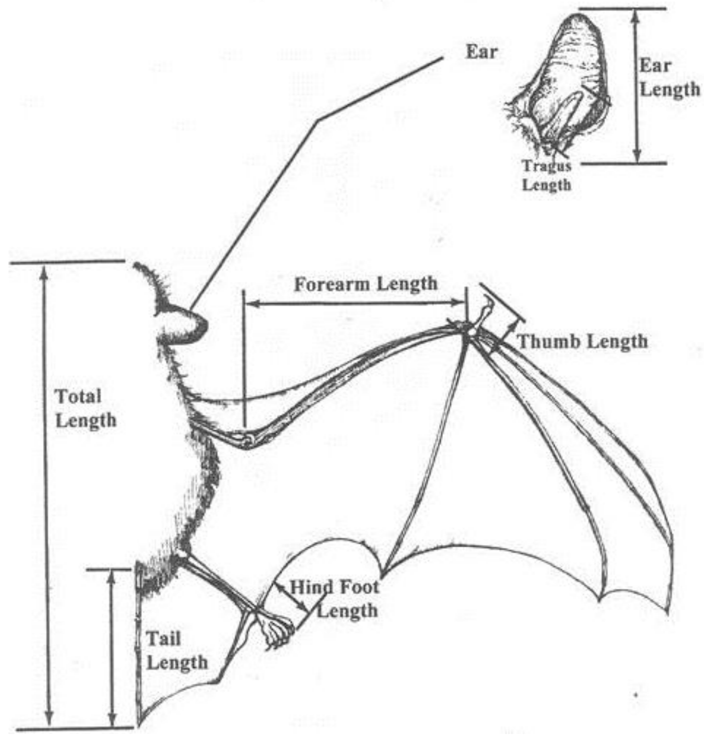
Nose folds of *C. townsendii*



Finger joint of juvenile (tapered, epiphesial plates visible) and adult (nobby and opaque) finger joints, as seen by illuminating the wing from behind (From Nagorsen and Brigham, 1993)



Bat Anatomy (from AZ bat conservation workshop)



Standard Bat Measurements (from The Bats of Texas)

Appendix 7: Anabat Classification Key to Wyoming Bats

Wyoming ANABAT Call Key (2011 DRAFT)

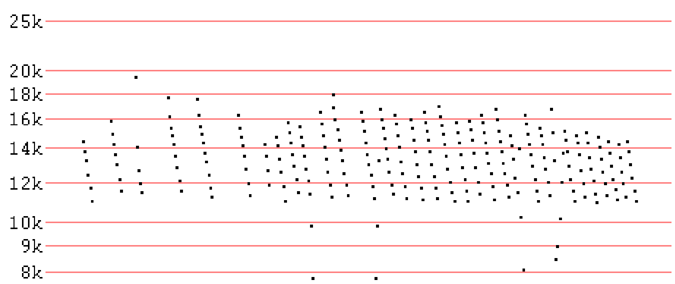
Developed by

Douglas A. Keinath

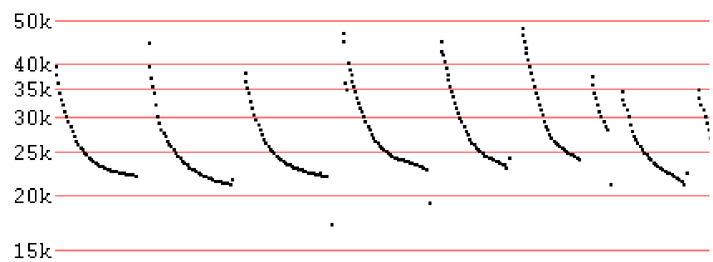
NOTE: Anabat® is a system designed to help users find and identify echolocating bats by digitally recording those calls and plotting them on a computer (for more information see: http://users.lmi.net/corben/anabat.htm #Anabat%20Contents). Before employing this key, users should be familiar with general principals of call analysis (e.g., http://users.lmi.net/corben/glossary.htm #Glossary). With such background information, this key can be used to roughly classify calls. Questionable calls, calls of difficult to distinguish species, or calls that represent new occurrences in an area should always be viewed by local Anabat® experts. In Wyoming, people should contact the Wyoming Natural Diversity Database (Doug Keinath: 307-766-3013, dkeinath@uwyo.edu) or the Wyoming Game and Fish Department (Martin Grenier).

Fmin (kHz)	**Description**	**ID**
< 10	1. Calls steep and sparse. Usually beginning above 10 and ending below 8. Calls can be heard audibly with unaided ear; sounds like two pebbles being struck together.	EUMA
16 – 20	2. Calls usually low slope & can be hook-shaped. Calls tend to jump around in Fmin, but typically ~20k or lower. Calls tend to vary in curvature throughout the sequence. Often give several calls at a higher freq, but with same shape.	LACI
~ 25	Fmin ~25 and with distinct tail. Two possibilities (LANO or EPFU), which are difficult to distinguish from each other, especially in clutter. Many call files must be reported simply as "**aB25k**"	a25k
	3. Calls are more bilinear than EPFU. Slope of tail is more variable than EPFU. Min Δslope often ~10 and Δslope plots usually "dribble off" rather than forming "fish-hook" ends. Calls rarely fall below 25k. Calls very regularly spaced ("metronome").	LANO
	4. Calls are more curvilinear than LANO, but can be more bilinear when they are short in sweep (i.e., ~25-40). Slope of tail is very consistent. On flat calls, Δslope plots may show many calls with "fish-hook" ends. Fmin often not uniform, with some calls falling below 25k. Calls sometimes irregularly spaced ("heart beat").	EPFU

1. EUMA (Div16, F7)

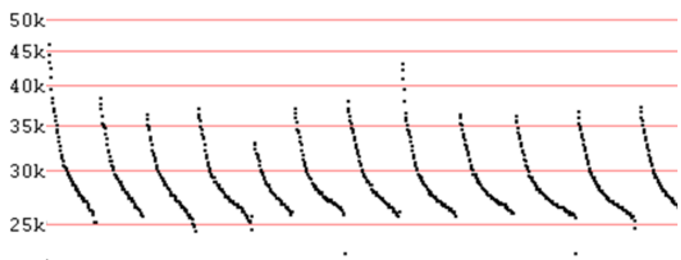


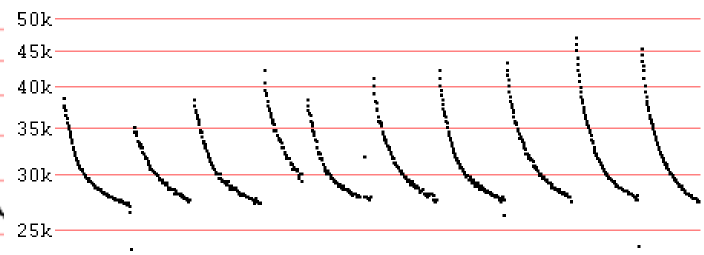
2. LACI (Div16, F7; stock file)



3. LANO (Div16, F6)

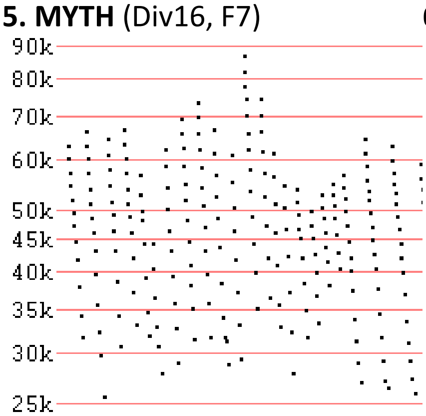
4. EPFU (Div16, F6)



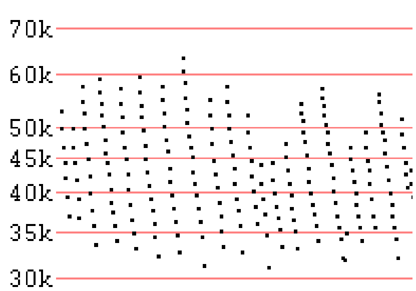


Fmin (kHz)	Description	ID
~ 25 - 30	F-min 25 – 30 and calls very steep with little tail. Four possibilities (MYTH, MYEV, COTO, ANPA). If sequences are not long and clean, many of these can be difficult to tell apart and must then be reported simply as "**aB30k**".	aB30k
	5. Calls very steep (Δslope ≥ 100) with huge freq. range (usu. > 50 and up to 20-100 in same call) and no tail. Variable Fmin with some calls usu. dropping to or below 25.	MYTH
	6. Calls very steep (Δslope usu > 150; often 300) and very sparse, with no tail. Fmin usu ~35, but varies within sequence, seldom dropping below 30. Freq range usu ~30.	MYEV
	7. Calls steep, but often slightly more curved than MYTH or MYEV and somewhat "thicker". Very little tail, but sometime "dribbling off" in a "lazy S" shape. Fmin ~30k and Fmax ≥50. Can also be difficult to tell from EPFU in clutter, which will usu. have time between calls of <100ms	ANPA
	8. Calls steep, weak, have ***two harmonics***. Fmin usu ~30, but can be ≤25. Harmonic-break often bet. 40-50. Sometimes only one harmonic captured: Upper can look like 50k myotis; lower can look like steep 25k getting thinner at tail	COTO
	9. Unique in its variability; calls vary between flat to steep in same sequence. Flat calls usually sweep 28-25 kHz, while steep usually sweep 60-27kHz. Behavior: open habitat, flying straight for moths and large insects.	TABR

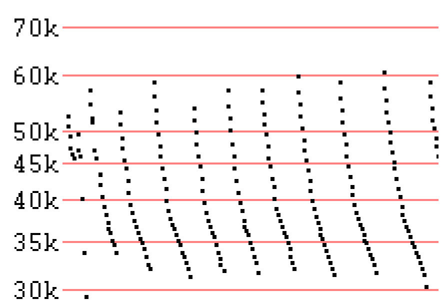
5. MYTH (Div16, F7)



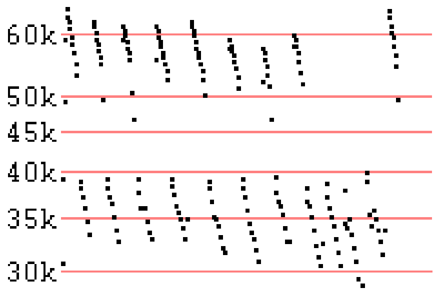
6. MYEV (Div16, F7)



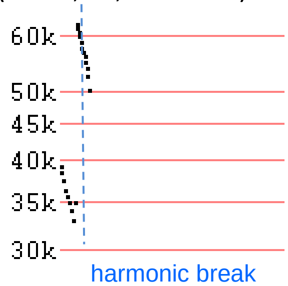
7. ANPA (Div16, F7)



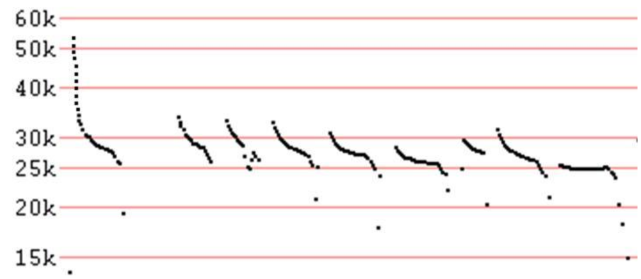
8a. COTO
(Div16, F7, compressed)

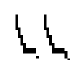


8b. COTO
(Div16, F7, real-time)

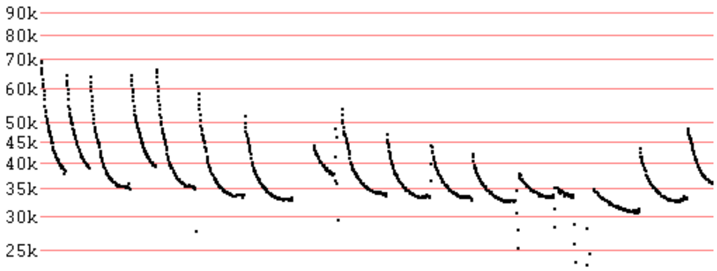


9. TABR
(Div16, F7, stock file)

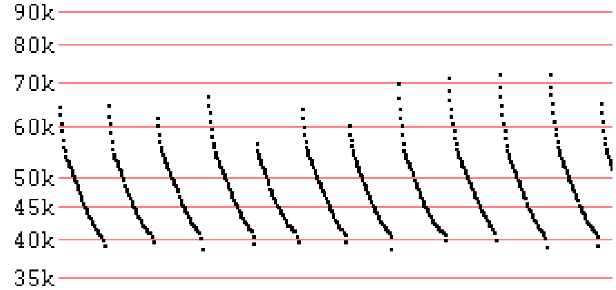


Fmin (kHz)	**Description**	**ID**
~ 27 - 35	10. Calls increases in frequency at end, creating a slight hook shape (like hoary bat). Calls sweep steeply from over 50k to just below 40k, with numerous calls often shifted downward so Fmin can be as low as 27k.	LABO
~ 40	Fmin usually at 40k, with some potentially falling above or below. Four possibilities (MYLU, MYCI, MYSE, MYVO). 40k myotis are very difficult to distinguish from each other, especially in clutter. Many call files must be reported simply as "**aM40k**".	aM40k
	11. Gently curved slope throughout call (but often get more bilinear in clutter and may "dribble off" at the end). Clean calls often sweep from ~100 to just over 40. On clean calls, Δslopemin can be as low as 40, but usually higher. Sometimes alternate curved call with a more linear one. Behavior: MYLU classically feed over water, which can result in "wobbly" calls."	MYLU
	12. Calls steep and regularly have a small "toe" at or just before the end, resulting in a "golfclub" or "S" shaped call. Even with a toe, calls usually have Δslopemin near 80. Clean calls usually straighter than MYLU, but can be more curvilinear than MYVO. Calls can have a wobble in the middle of the call (usually ≤50k). Behavior: MYCI feed around vegetation, like MYCA.	MYCI 
	13. Calls look similar to MYEV, but lower frequency limit is roughly 40kHz. Calls typically sweep from 80kHz to just over 40kHz. Clean calls are straighter than MYLU and MYCI and less vertical than MYVO. Behavior: MYSE feed around vegetation, often forests, gleaning and aerially pursuing insects.	MYSE
	14. Calls steep often with "wiggly look"; like MYLU in clutter, but greater call spacing. Calls tend to be more linear (or bilinear) than MYLU and have less "toe" than MYCI. Calls can have a wobble high in the sweep (usually ≥50k). Δslope is usually high (~100) but can drop to ~60. Difficult to distinguish from other 40k myotis	MYVO

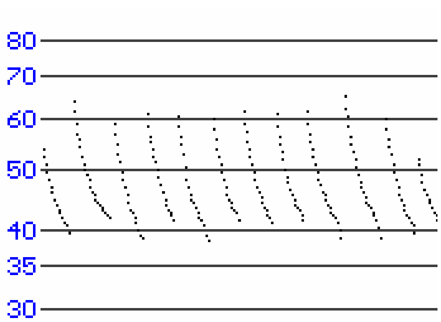
10. LABO (Div8, F7)



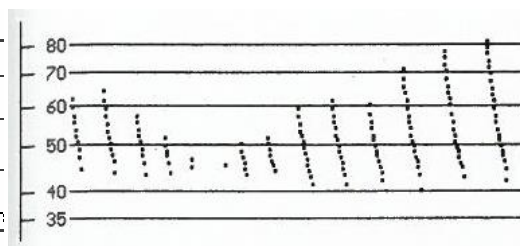
11. MYLU (Div16, F7)



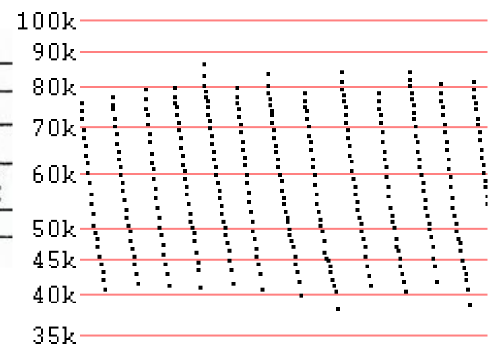
12. MYCI (Div16, F7)



13. MYSE (from Adams 2003)

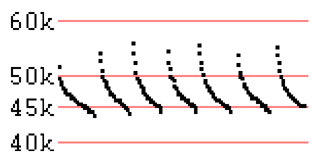


14. MYVO (Div 16, F7)

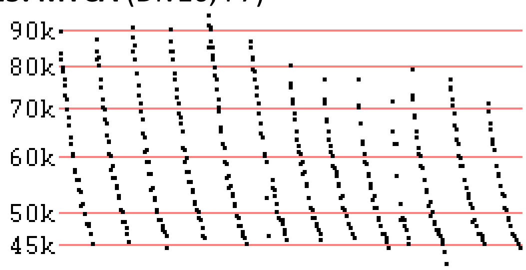


Fmin (kHz)	Description	ID
~50	15. Usually starting around 50 and often ending below (~45). Thick calls with flat tails often with a drooping tail. Duration>5.0ms.	PEHE
~ 50	Steeper than PIHE and usu. Fmin at or just below 50k. Single calls can drop to 40k, but not whole series (consistently above 43k). Difficult to distinguish from each other, especially in clutter, and many must be reported simply as "**aM50k**".	aM50k
	16. Often show calls dropping below 50k (~45k). Call shape similar to MYLU, but thicker tail. Calls often "dribble-off", rather than having constant toes. Dribble calls can have Δslope down to 40. In a series, there is often one call that is flatter than the rest. *Behavior*: MYYU often feed over water.	MYYU
	17. Calls frequently have a flat "toe" at the end, rather than dribbling off. Toed calls usually have Min. Δslope of 30ish. "Dribbling calls" usually have Min. Δslope greater than MYYU (i.e., above 40). Behavior: MYCA typically feed by hugging vegetation.	MYCA

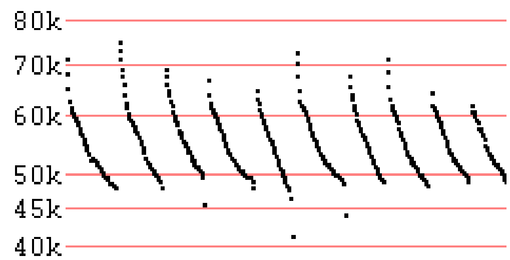
14. PEHE (Div16, F7)



15. MYCA (Div16, F7)



16. MYYU (Div 16, F7)



Appendix 8: Data Sheets

ANABAT / SONGMETER RECORDING FORM

(307-766-3035; P.O. Box 3381, UW, WYNDD, Laramie, WY 82071)

SITE INFORMATION

Site Name:		**Location** (eg. drainage, Hwy)**:**
Elevation **(m):**	**Land Owner:**	
GPS EPE (m):	**GPS Datum: NAD83**	**Observers:**
GPS Location of recording unit **(UTM): Zone_______; Easting _____________________; Northing _________________________**		

HABITAT

Site Description:	
Type of habitat recorder placed (choose from below):	
Type of habitat in the surrounding 2 km (choose from below):	
Distance to nearest rock outcrop/cliff:______________**m**	**Distance to nearest open water**:_______________**m**
Distance to nearest conifer stand:______________**m**	**Distance to nearest deciduous tree stand**:______________**m**

SESSION INFORMATION: ANABAT/SONGMETER

Date (mm/dd/yy):	**Time of civil sunset** (24hr):	**Phase of Moon (%):**
Time Activated:	**Time deactivated** (24hr):	
Division Ratio:	**Sensitivity/Sample Rate:**	**Height above Ground:**
Unit #:	**CF Card #:**	

Recording Configuration: Sketch (grid cell size: ________m)

Notes

ACOUSTIC ANALYSIS (call file # is of a representative call for that spp)

Species 1 (call file#): **# of calls:**	**Species 5 (call file#):** **# of calls:**
Species 2 (call file#): **# of calls:**	**Species 6 (call file#):** **# of calls:**
Species 3 (call file#): **# of calls:**	**Comments:**
Species 4 (call file#): **# of calls:**	

Habitat Types
1hrubland/ shrub steppe
2. Grassland
3. Wetland/ open water
4. Rock outcrop
5. Cliff (canyon, mountain)
6. Cave
7. Conifer forest
8. Deciduous forest
9. Foothills chaparral
10. Riparian shrub (ex. willows)
11. Badlands
12. Disturbed/ reclaimed/ mined/ oil & gas

Data Entered?

Bats of Southern Wyoming, Wyoming Natural Diversity Database, 2013

MISTNETTING FORM

(307-766-3013; P.O. Box 3381, UW, WYNDD, Laramie, WY 82071)

SITE INFORMATION

Site Name:		**Location** (eg. drainage, Hwy)**:**
Elevation (m):	**Land Owner:**	
GPS EPE (m):	**GPS Datum: NAD83**	**Observers:**
GPS Location of recording unit **(UTM): Zone_______; Easting ________________________; Northing ___________________________**		

HABITAT

Site Description:	
Type of habitat where mistnet or recorder placed (choose from below):	
Type of habitat in the surrounding 2 km (choose from below):	
Distance to nearest rock outcrop/cliff:_______________**m**	**Distance to nearest open water**:_______________**m**
Distance to nearest conifer stand:______________**m**	**Distance to nearest deciduous tree stand**:______________**m**

SESSION INFORMATION:

Date (mm/dd/yy):	**Time of civil sunset** (24hr):	**Phase of Moon** (%):
Time Nets Open (24 hr):	**Time Nets Closed** (24hr):	
Division Ratio:	**Sensitivity/Sample Rate:**	**CF Card #:**

Net Configuration and Anabat Placement: <u>Sketch</u> (grid cell size: ______m) **<u>NOTES</u>**

No. of Nets Set:

#6m: _______

#9m: _______

#12m: _______

#18m: _______

Canopy Net: _____
(circle net size):
6m, 9m, 12m, 18,

Harp Net: _______

CLIMATE DATA

Beginning Temperature (^oC):	**Ending Temperature** (^oC):
Beginning Cloud Cover (Code):	**Ending Cloud Cover** (Code):
Beginning Wind (Code):	**Ending Wind** (Code):
Precip in last 24 hrs (Y/N):	**NOTES:**

Cloud Cover Codes:
0. 0-15% cloud cover
1. 16-50% cloud cover
2. 51-75% cloud cover
3. 76-100% cloud cover
4. -------------------------
5. Fog or haze
6. Drizzle
7. Light Snow
8. Thunder storm
9. Rain

Wind Speed Codes:
0. Less than 1mph; smoke rises vertically
1. 1-3mph; smoke drift shows wind direction
2. 4-7mph; leaves rustle; wind felt on face
3. 8-12mph; leaves and small twigs in constant motion
4. 13-18mph; raises dust and leaves; small branches in motion

Stop Survey if Greater Than 4.

Habitat Types:
1. Shrubland/ shrub steppe
2. Grassland
3. Wetland/ open water
4. Rock outcrop
5. Cliff (canyon, mountain)
6. Cave
7. Conifer forest
8. Deciduous forest
9. Foothills chaparral
10. Riparian shrub (ex. willows)
11. Badlands
12. Disturbed/ reclaimed/ mined/ oil & gas

Bat#	Net#	SPECIES (4 letter code)	TOC (24hr)	Sex (m/f)	Age (j/a)	Repro*	FA (mm)	E (mm)	Wt (g)	Keel (y/n)	WDI* **	Release time	Notes (color, dentition, fringe, fur, etc)

*** Repro** = Males: **N** (Non-reproductive), **D** (descended); Females: **N** (non-reproductive), **P** (pregnant), **L** (lactating), **PL** (post-lactating)
TOC = Time of Capture, FA = Forearm Length, E = ear length,
***** WDI**: **0**=No damage, **1**=Light damage, **2**=Moderate damage, **3**=Heavy damage; Add "**-P**" to score if there is current physical damage.

CAPTURE TOTALS

	M/F		M/F		M/F		
ANPA		**MYCA**		**MYTH**		**TOTAL BATS**	
COTO		**MYCI**		**MYVO**		**TOTAL SPECIES**	
EPFU		**MYEV**		**MYYU**		**TOTAL ADULTS**	
EUMA		**MYLU**		**PIHE**		**TOT. JUVENILE**	
LABO		**MYSE**		**NYMA**		**TOTAL MALES**	
LACI		**LANO**		**TABR**		**TOTAL FEMALE**	