Bat Surveys on USFS Northern Region Lands in Montana: 2007

Prepared for:

USDA Forest Service, Northern Region
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Montana Natural Heritage Program

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EXECUTIVE SUMMARY

The U.S. Forest Service Northern Region has conducted bat surveys each year during 2005-2007 to gather information on the distribution and status of bats on Forest Service lands in Montana. During 2005, 57 sites were surveyed on selected National Forest (NF) Ranger Districts (RD); the 2005 field season provided information for areas previously without documented bat activity and resulted in numerous new county records for several species. In 2006, with an increased number of surveyors, 75 new sites were surveyed using both mist-net and acoustic sampling methods. A pilot project was undertaken following the 2006 field season to investigate bat detection probabilities for surveys using more than one detection method (mist-netting and acoustic sampling). During the 2007 field season, 87 new sites were surveyed: 59 acoustically, 28 mist-netted. Areas targeted for survey included RDs and/or backcountry areas of select RDs lacking any survey coverage. These included the Dillon, Jefferson, Madison, Pintler, Wisdom, and Wise River RDs of the Beaverhead-Deerlodge NF; the Ashland and Beartooth RDs of the Custer NF; Glacier View, Hungry Horse, Spotted Bear, Swan Lake, and Tally Lake RDs of the Flathead NF; the Gardiner RD of the Gallatin NF; the Rocky Mountain RD of the Lewis and Clark NF; and the Seeley Lake and Superior RDs of the Lolo NF.

Ten species of bats, represented by 218 individuals, were captured by mist-net during mid June-late August 2007. Species captured included Little Brown Myotis (*Myotis lucifugus*), Western Long-eared Myotis (*M. evotis*), Long-legged Myotis (*M. volans*), California Myotis (*M. californicus*), Big Brown Bat (*Eptesicus fuscus*), Hoary Bat (*Lasiurus cinereus*), Silver-haired Bat (*Lasionycteris noctivagans*), Townsend's Big-eared Bat (*Corynorhinus townsendii*), Eastern Red Bat (*Lasiurus borealis*), and Pallid Bat (*Antrozous pallidus*); the latter two are the first of their

respective species to be detected by any method during the first three years of the USFS Northern Region inventory. Call analysis on the 2007 acoustic surveys has not been completed at the time this report was prepared. Genetic analysis is needed to confirm tentative identifications of some *Myotis* taxa at several netting sites. No bats were detected at ten sites and are not included in the total number of site surveys for 2007.

The 2007 surveys filled important gaps in documented bat distributions in Montana, as well as on Ranger Districts formerly lacking any surveys. However, a summary of all existing Northern Region bat records continues to show large distribution gaps for all species, underscoring the need for additional surveys. In particular, large portions of the Bitterroot, Flathead, Gallatin, Kootenai, and Lewis and Clark National Forests lack records for any bat species or any recently documented activity. Up-to-date distribution maps for Montana's species can be queried and viewed with a variety of map layers on the Montana Natural Heritage Program's TRACKER website at: <http://mtnhp.org/Tracker>.

Morphometric data collected in Montana, Idaho, and South Dakota during 2005-2007 were comparable with previously documented measurements in the region, although a few records were outside the limits of published ranges. For the eight species where a significant difference was detected, females exceeded males in mean forearm length in all but Western Long-eared Myotis. Mean weight and ear length were not clearly differentiated by sex. Data collected from captured bats during the USFS Northern Region surveys can help identify regional differences in bat morphometrics, supplement regional natural history information, and assist in refining in-hand identification techniques.

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Lewis and Clark NF by Paul Hendricks; and on the Lolo NF by Paul Hendricks, Cori Lausen, Jenny Taylor, Amie Shovlain, Sarah Kaufman, Amanda Playter, Sam Skalak, and Zeeke Steele.

Scott Blum (MTNHP) entered survey data into the Montana Natural Heritage Program's Point Observation Database, facilitating the production of new distribution maps and the updating of element occurrence data in the Montana Natural Heritage Program's database. Coburn Currier (MTNHP) edited, formatted, and printed this report. We thank all of those involved, from the beginning of the project to the printing of this report.

TABLE OF CONTENTS

Introduction.....	1
Methods.....	3
Focus of 2007 Efforts.....	3
Field Methods	3
Results.....	5
Overview 2007.....	5
Species Captured During Mist Netting Surveys	5
Sex and Age Ratios	7
Evidence of Reproduction by Females	7
Survey Coverage with Sampling Grid	7
Overview of the 2005-2007 USFS Northern Region Bat Surveys	10
Species Captured.....	10
Sex Ratios	11
Age Class Ratios	12
Reproductive Status Ratios	12
Morphometric Comparison	13
Discussion.....	17
Recommendations.....	18
Literature Cited	19

Appendix A: Global / State Rank Definitions

Appendix B: Distribution Map for Bats in Montana

Appendix C: USFS Northern Region Montana Bat Survey Sites 2007

Appendix D: Records Deleted from USFS 2005-2007 Morphometric Summary

Appendix E: Documented Species List per Forest/District in Montana

LIST OF FIGURES

Figure 1.	Map of bat observations in Montana.....	4
Figure 2.	Protocol cells covered	8
Figure 3.	Districts without survey effort in 2005-2007	9

LIST OF TABLES

Table 1.	Number of survey sites per District in 2007.....	5
Table 2.	Bat species captured during Surveys in 2007.....	6
Table 3.	Number of sites where bats were netted and total number of individuals captured on four Region 1 National Forests in Montana, 12 June-29 August 2007	6
Table 4.	Sex and age ratios for bat species captured in Montana in 2007.....	7
Table 5.	Total number of cells per Forest with multiple surveys (Fit Protocol) for 2007 and combined 2005 - 2007 as percentage of overall total cells.....	10

LIST OF TABLES (CON'T)

Table 6.	Comparison of all Montana bat data (MTHNP Point Observation Database) and data collected in multiple survey cells in 2007 with overall predicted number of species	10
Table 7.	Individuals captured per year by sex	11
Table 8.	Sex ratio by age class for all species captured 2005-2007	11
Table 9.	Reproductive status across all species 2005-2007	12
Table 10.	Forearm length (mm) for adult bats of all species 2005-2007	14
Table 11.	Weight (g) for bats of all species 2005-2007	15
Table 12.	Ear length (mm) for bats of all species 2005-2007	16

INTRODUCTION

Recognition of a general lack of basic natural history information on native bat species, widespread disturbance, alteration, and/or complete removal of habitats traditionally used by bats for roosting and foraging have contributed to increasing concern in recent decades about the status of bats throughout North America (Fenton 1997, Pierson 1998, Hayes 2003). As a result, six species or subspecies of bats in the continental United States are currently classified as endangered under the United States Endangered Species Act of 1973 (O'Shea et al. 2003). While none of these federally listed bats occur in Montana, seven other species are recognized by the state as Species of Concern: Eastern Red Bat - *Lasiurus borealis* (G5 S2S3); Hoary Bat - *Lasiurus cinereus* (G5 S3); Fringed Myotis - *Myotis thysanodes* (G4G5 S3); Northern Long-eared Myotis - *Myotis septentrionalis* (G4 S2S3); Pallid Bat - *Antrozous pallidus* (G5 S2); Spotted Bat - *Euderma maculatum* (G4 S2); Townsend's Big-eared Bat - *Corynorhinus townsendii* (G4 S2) (See Appendix A for Rank Definitions) (MTNHP and MFWP 2008). The U.S. Forest Service Northern Region lists Townsend's Big-eared Bat, Pallid Bat and Spotted Bat as Species of Concern.

While conservation and protection of roosts are important long-term management considerations for many North American bat species (Sheffield et al. 1992), efforts to conserve bats in Montana are often hampered by a lack of data on general habitat requirements. For example, the little data available from Montana on foraging behavior and diet of bats have largely been obtained at water sources (Jones et al. 1973), with no knowledge of where the foraging bats are roosting (Thomas 1988). Conversely, studies of bat roosts in Montana (e.g., Worthington 1991a, 1991b, Hendricks et al. 2000, 2004) lack information on where and how far roost members go to feed and drink. In addition, patterns of roost selection and fidelity (e.g., Sherwin et al. 2003) have not been studied in Montana, even though it is understood that suitable summer and winter roosts may limit the local and regional distribution and abundance of many temperate-

zone bats (Humphrey 1975, Dobkin et al. 1995), especially cave- and crevice-dwelling taxa.

Most bat species use a variety of localized habitats for roosting, whether they are natural sites (e.g., caves, trees, rock crevices) or man-made sites (e.g., buildings, mines, bridges). Sites may be used only for specific purposes during specific seasons of the year. Recent field studies of bats in Montana have followed the national pattern of inventorying and monitoring roosts in caves, abandoned mines, and bridges (e.g., Worthington 1991a, 1991b, Hendricks et al. 2000, 2004, 2005; Hendricks and Kampwerth 2001); survey and monitoring of roosts remains an important activity for a state bat conservation plan. Nevertheless, sampling bats across the landscape at foraging sites also is critical for filling gaps in documented distributions and assessing the relative abundance of local populations, and can contribute to the discovery of new roosts.

Inventory efforts over the past three years have improved understanding of the distribution and status of bats on U.S. Forest Service Northern Region lands in Montana. The USFS Northern Region inventory has generally followed the Oregon Bat Grid Protocols, by sampling the presence of bat species using a standardized effort and sample unit across the state. The protocol includes collecting baseline data on acoustic, morphologic, and genetic characteristics for bat species occupying the Northern Region. While important information has already been gathered on Montana's bats, more work needs to be done; substantial distribution holes remain and little progress has been made in identifying important roosting locations.

A summary of all existing bat records across the region clearly shows large distribution gaps for all species, further underscoring the need for additional surveys (Appendix B). In particular, large portions of the Bitterroot NF, Custer NF, Flathead NF, Gallatin NF, Kootenai NF, and Lewis and Clark NF lack records or standard surveys for any bat species.

Management activities may have unintended consequences for bat populations and the habitats they use for roosting and foraging as a result of insufficient data on which species are present on the landscape, and where they concentrate their activities. The Northern Region recognized the need for additional documentation of bats on Forest Service lands to address inventory and monitoring requirements, and initiated bat surveys across the Region on selected National Forest Ranger Districts in 2005. Given that large areas of the Region still lack bat data, the primary goal of the 2007 field season was to document bat species richness (number of species) within sample units for areas with limited or no bat data. These surveys were conducted generally following the 2005 protocols.

Effective inventory requires accurate identification of the target species, in this case a suite of bats. One objective of the USFS Northern Region bat inventory is the collection of morphometric and ultrasonic data to improve species identifications, as well as to determine if significant differences in these traits occur within the region. Many bat species present confusing attributes to field workers, even personnel with field experience, confounding correct identification of captured animals. Morphological traits often used in dichotomous keys to identify bats (e.g., forearm length) can vary substantially between sexes of single species (Hendricks et al. 2000, Solick and Barclay 2006), and across large geographical ranges or among habitats in which different

populations reside, for example mountain versus prairie environments (Solick and Barclay 2006). The confusion can be confounded further when sympatric species are nearly indistinguishable in the hand, the case for the Little Brown Myotis (*Myotis lucifugus*) and Yuma Myotis (*Myotis yumanensis*) (Weller et al. 2007, Rodhouse et al. 2008).

Variable external morphology is not the only problem, however. Some species, such as Silver-haired Bat (*Lasionycteris noctivagans*) and Big Brown Bat (*Eptesicus fuscus*), are readily identified in-hand but their individual ultrasonic calls often have overlapping frequency and shape characteristics (Betts 1998). Thus, it is often desirable to gather morphometric, ultrasonic, and genetic (tissue) data from individuals to maximize likelihood of detection and positive identification, as well as to determine where and when identification may be problematic; gathering the necessary information often requires using more than one sampling method (trapping and ultrasonic call capture analysis).

In this report we present 1) inventory results of the 2007 field season, 2) a summary of grid cell coverage for the effort to date (2005-2007), and 3) an analysis of all standard morphometric traits taken from bats captured during 2005-2007, with discussion of their utility for making species determinations. Analyses of tissue samples and data call are still pending.

METHODS

Location of 2007 Efforts

Surveys for bats in Montana were conducted during summer (12 June-29 August) 2007 on Ranger Districts (RD) in each of six National Forests (NF) of the Northern Region: Beaverhead-Deerlodge NF (Dillon, Jefferson, Madison, Pintler, Wisdom, and Wise River RDs); Custer NF (Ashland and Beartooth RDs), Flathead NF (Glacier View, Hungry Horse, Spotted Bear, Swan Lake, and Tally Lake RDs); Gallatin NF (Gardiner RD); Lewis & Clark NF (Rocky Mountain RD); and the Lolo NF (Seeley Lake and Superior RDs). All Flathead NF, Lolo NF, and five of 45 Beaverhead-Deerlodge NF survey sites were west of the Continental Divide. The remaining survey sites were in the southwestern, south central, and southeastern portions of Montana east of the Continental Divide. The 87 survey sites on 17 RDs ranged in elevation from 3121 to 9599 feet (Figure 1 and Appendix C).

Field Methods

Specific sites for mist-netting were determined in the field by survey crews, sometimes using information provided by Forest Service personnel. Sites usually contained features that might concentrate bat activity, such as ponds and streams, less often bridges over streams, caves and mines, and least often at or near abandoned buildings. Bats were captured using mist-nets of various lengths and configurations; the number of nets deployed varied from site to site. Nets were deployed at twilight and left open for at least 3.5 hours, weather permitting, or until one hour passed with no acoustic detections.

Identifications in the field were based on measurements recorded for each captured bat, and then run through keys and compared to published species descriptions (van Zyll de Jong 1985, Nagorsen and Brigham 1993, Adams 2003). Weight was measured to the nearest 0.5 g using a Pesola spring scale (30 g or 50 g capacity). Forearm length was measured to the nearest 0.1 mm using a dial caliper, ear length to the nearest mm using a ruler. Age (adult, juvenile) was determined by ossification of digit joints, and

reproductive status (non-reproductive or testicular for males; nulliparous, parous, pregnant, lactating, post-lactating for females) were also recorded for each individual. Morphometric data was pooled for the three states included in Northern Region (Idaho, Montana, and South Dakota) and collected during 2005-2007; these were compared with published values for each species. Copies of the original datasheets for Idaho and South Dakota were not provided and the data could not be verified; measurements falling outside of the regionally documented extremes for the species were deleted from the summary (Appendix D).

Tissue samples were collected via wing punches from each captured bat or until five punches per species were accumulated at a site. Tissue was collected using sterile procedures and stored in biopsy tubes containing desiccant or 95% ethanol. Tissues are to be used for genetic identification of species pairs difficult to distinguish in the field, especially Little Brown Myotis (*Myotis lucifugus*) and Yuma Myotis (*M. yumanensis*) (Weller et al. 2007, Rodhouse et al. 2008); genetic analysis on these tissue samples has not been completed.

The survey protocol also called for acoustic monitoring at each site using a Pettersson D-240x detector and an MP3 recording device. Acoustic surveys were conducted either by hand or by remote recording; remote recordings off-site from the netting location by at least one kilometer were counted as separate surveys. Calls recorded during the 2007 field season will be analyzed using Sonobat software; analyses are still pending at the time of writing of this report.

Data for the mist-netting efforts was recorded on standardized data sheets and later entered in a Point Observation Database at the Montana Natural Heritage Program (MTNHP) in Helena. Species presence data derived from the call analysis will also be entered in the MTNHP Point Observation Database and available through the online map-based TRACKER website at: <http://mtnhp.org/Tracker>.

Figure 1. Map of bat observations in Montana.

Montana Bat Observation Points

RESULTS

Overview 2007

The 2007 surveys helped fill a number of large distribution gaps for bats on USFS lands in Montana. New locations were recorded for Townsend's Big-eared Bat and Pallid Bat, Northern Region Sensitive Species and state Species of Concern (SOC), and the Eastern Red Bat, also a state SOC. Although not recorded during the 2007 mist-netting survey efforts, other state SOC bats may have been recorded during the acoustic sampling. Acoustic analysis (59 sites) was not completed at the writing of this report, thus no specific data on these sites is summarized here. This data will be entered into the MTNHP Point Observation Database as it becomes available.

Species Captured During Mist-Netting Surveys

Eighty-seven sites were sampled for bats across the eight USFS Northern Region Forests in Montana in 2007 (Figure 1, Table 1, see Appendix C), 22 west of the Continental Divide and 65 east of the Divide. These included 59 sites sampled acoustically and 28 sampled with mist-nets. The

Beaverhead-Deerlodge NF and Custer NF had the greatest number of site surveys, with 45 and 16, respectively.

Ten bat species represented by 218 individuals were captured at the 28 sites sampled with mist-nets in 2007 (Tables 2 and 3); eight species were captured at sites west and seven species east of the Continental Divide. Townsend's Big-eared Bat, California Myotis, and Little Brown Myotis were caught only west of the Divide while the Pallid Bat and the Eastern Red Bat were caught only east of the Divide; the Pallid Bat and Eastern Red Bat captures were the first for the USFS survey during 2005-2007.

The 2007 Northern Region mist-net surveys resulted in 17 new district records (see maps in Appendix B): Beaverhead-Deerlodge NF: Madison RD - Long-legged Myotis; Wise River RD - Western Long-eared Myotis, Hoary Bat, and Big Brown Bat; Custer NF: Ashland RD - Eastern Red Bat and Pallid Bat; Flathead NF: Hungry Horse RD - Long-legged Myotis, California Myotis, and Townsend's Big-eared Bat; Glacier

Table 1. Number of survey sites per District in 2007.

Forest	Ranger District	Number of survey sites
Beaverhead-Deerlodge	Dillon	12
	Jefferson	4
	Madison	9
	Pintler	5
	Wisdom	4
Custer	Wise River	11
	Ashland	11
	Beartooth	5
Flathead	Glacier View	3
	Hungry Horse	3
	Spotted Bear	2
	Swan Lake	2
	Tally Lake	2
Gallatin	Gardiner	7
Lewis and Clark	Rocky Mountain	2
Lolo	Seeley Lake	2
Total	Superior	3
		87

Table 2. Bat species captured during surveys in 2007. State Species of Concern are in **bold**.

Species	Number of survey sites where species was captured
California Myotis (<i>Myotis californicus</i>)	1
Western Long-eared Myotis (<i>M. evotis</i>)	17
Little Brown Myotis (<i>M. lucifugus</i>)	10
Long-legged Myotis (<i>M. volans</i>)	7
Pallid Bat (<i>Antrozous pallidus</i>)	1
Townsend's Big-eared Bat (<i>Corynorhinus townsendii</i>)	2
Big Brown Bat (<i>Eptesicus fuscus</i>)	10
Silver-haired Bat (<i>Lasionycteris noctivagans</i>)	7
Eastern Red Bat (<i>Lasiurus borealis</i>)	1
Hoary Bat (<i>Lasiurus cinereus</i>)	6

Table 3. Number of sites where bats were netted and total number of individuals captured (in parentheses) on four Northern Region National Forests in Montana, 12 June-29 August 2007; number of sites surveyed varied across forests. Species richness does not include acoustic data.

Species ^a	Forest				
	Beaverhead-Deerlodge	Custer	Flathead	Lolo	Total
ANPA	-	1 (2)	--	-	1 (2)
COTO	-	-	1 (1)	1 (1)	2 (2)
EPFU	4 (4)	5 (14)	1 (1)	-	10 (19)
LABO	-	1 (1)	-	-	1 (1)
LACI	2 (6)	3 (15)	-	1 (2)	6 (23)
LANO	-	4 (24)	3 (8)	-	7 (32)
MYCA	-	-	2 (2)	1 (2)	3 (4)
MYEV	4 (5)	4 (9)	6 (11)	3 (15)	17 (40)
MYLU	-	-	9 (77)	1 (1)	10 (78)
MYVO	2 (6)	4 (7)	-	1 (4)	7 (17)
Total Captures	21	71	100	25	217
Species Richness	4	7	6	6	10

^a Species codes: ANPA (*Antrozous pallidus* - Pallid Bat), COTO (*Corynorhinus townsendii* - Townsend's Big-eared Bat), EPFU (*Eptesicus fuscus* - Big Brown Bat), LABO (*Lasiurus borealis* - Eastern Red Bat), LACI (*Lasiurus cinereus* - Hoary Bat), LANO (*Lasionycteris noctivagans* - Silver-haired Bat), MYCA (*Myotis californicus* - California Myotis), MYEV (*Myotis evotis* - Western Long-eared Myotis), MYLU (*Myotis lucifugus* - Little Brown Myotis), MYVO (*Myotis volans* - Long-legged Myotis).

View RD - Little Brown Myotis, Western Long-eared Myotis, and Silver-haired Bat; Spotted Bear RD - Little Brown Myotis, Western Long-eared Myotis, Silver-haired Bat, and Townsend's Big-eared Bat; and Tally Lake RD - Little Brown Myotis.

Numerous captured bats were originally identified in the field as Little Brown/Yuma Myotis. We

designated all of these as Little Brown Myotis because Yuma Myotis have not been confirmed in Montana from either acoustic or genetic analyses (Montana Bat Working Group, Annual Meeting, February 2007). In 2006 it was noted that all previously recognized observations of Yuma Myotis were misidentifications of Little Brown Myotis (Montana Bat Training Session 2006).

Sex and Age Ratios

More female than male bats were caught in 2007 and adults were captured more often than juveniles (Table 4). Three *Myotis* species contributed most to the higher proportion of total female captures: Little Brown *Myotis*, Western Long-eared *Myotis*, Long-legged *Myotis*. Only female Pallid Bat and Eastern Red Bat (three total individuals) and only male Townsend's Big-eared Bat and California *Myotis* (six total individuals) were caught. Males were captured more frequently for Big Brown Bat, Hoary Bat, and Silver-haired Bat. Adult sex ratios differed significantly (Chi-square tests) from 50:50 for two of six species with more than ten captures in pooled samples using all sites: Hoary Bat (more males; $P < 0.05$), and Little Brown *Myotis* (more females; $P < 0.02$).

Evidence of Reproduction by Females

The best evidence of reproduction by a particular bat species on a Forest is the presence of pregnant and lactating females. Testicular males are reproductively active, but their presence in a sample does not necessarily indicate reproduction near the survey site, while post-lactating females and volant juveniles may have dispersed from adjacent areas. Pregnant or lactating females (27% of the individuals captured in 2007) were documented for five species on seven Ranger Districts (RD-NF): Pallid Bat (Ashland-Custer); Little Brown *Myotis* (Glacier View-Flathead);

Silver-haired Bat, Western Long-eared *Myotis*, and Little Brown Bat (Spotted Bear-Flathead); Little Brown *Myotis* (Swan Lake-Flathead); and Western Long-eared *Myotis* and Long-legged *Myotis* (Lolo-Lolo). We anticipate reproduction by females of all species will be documented on Northern Region lands with additional survey effort, although not by all species on all Forests and perhaps not by some species on all Ranger Districts within a Forest.

Survey Coverage with Sampling Grid

Multiple surveys were conducted in 14 different grid cells (Figure 2) in 2007, representing 37 of the 87 sites surveyed that year. These fit the protocol requirement designed for Montana of at least two surveys per sample unit (Table 5) (Montana Bat Grid Draft Protocol, unpublished document, 2006). Combined with data from 2005 and 2006, 46 cells fit the protocol requirement and were surveyed at two or more locations per cell. The Forest with the greatest overall cell coverage (as a percent of the total number) is the Custer at 10%, followed by the Beaverhead-Deerlodge, Flathead, and Lewis and Clark at 8% each. All other Forests have had 7% or fewer cells surveyed under the Montana Bat Grid Protocol, with 12 Ranger Districts across five Forests lacking any USFS bat survey effort (Figure 3).

One of the requirements of the bat grid protocols involves identifying species predicted to occur in

Table 4. Sex and age ratios for bat species captured in Montana in 2007.

Species ^a	Males (adult:juvenile)	Females (adult:juvenile)	Adults (males:females)
ANPA	-	2:0	0:2
COTO	2:0	-	2:0
EPFU	6:5	6:2	6:6
LABO	-	1:0	0:1
LACI	18:0	5:0	18:5
LANO	9:9	12:2	9:12
MYCA	4:0	-	4:0
MYEV	17:0	23:0	17:23
MYLU	24:0	54:0	24:54
MYVO	6:0	9:2	6:9
Total	86:14	112:6	86:112

^a See Table 3 for species codes

Figure 2. Protocol cells covered.

Montana Bat Grid Cell Survey Status

Figure 3. Districts without survey effort in 2005-2007.

USFS Bat Survey Locations 2005-2007

Table 5. Total number of cells per Forest with multiple surveys (Fit Protocol) for 2007 and combined 2005 - 2007 as percentage of overall total cells.

Forest	Cell Count	Fit Protocol 2007	Fit Protocol for years 2005 - 2007	Percent of "Protocol cells" surveyed in Forest
Beaverhead-Deerlodge	151	9	12	8%
Bitterroot	60	0	2	3%
Custer	50	3	5	10%
Gallatin	86	1	2	2%
Flathead	104	1	8	8%
Helena	43	0	3	7%
Kootenai	114	0	5	4%
Lewis and Clark	79	0	6	8%
Lolo	95	1	3	3%
TOTAL	782	15	46	6%

each cell based upon existing information on the general distributions of species. The success rate (i.e. the percentage of species detected compared to the predicted species for that location) during 2005-2007 ranged from 10% to 82% (Table 6). Again, this dataset is not complete, because the analysis of calls recorded during 2007 surveys was not received at the writing of this report.

While the predicted species lists are generated from general distribution maps (based primarily, though not exclusively, upon data from the MTNHP Point Observation Database), it might be anticipated that not all species will ultimately be documented where predicted. The limited success rates for the three years of survey suggest, however, that greater effort needs to be employed with appropriate

techniques to adequately survey all Districts for bat species. Only when species are documented by field surveys will better understanding of their distribution and habitat needs be gained (see Appendix F for a list of documented bat species per Northern Region USFS Districts).

Overview of the 2005-2007 USFS Northern Region Bat Surveys Species Captured

A total of 1,586 individuals of 14 bat species were captured during 2005-2007 mist-nets survey efforts in the Northern Region. Three hundred fifty-five individuals were collected in Idaho and 1,168 in Montana during the three summers, while 63 individuals were captured in South Dakota in 2005

Table 6. Comparison of All Montana bat data (MTHNP Point Observation Database) and data collected in multiple survey cells in 2007 with overall predicted number of species.

FOREST	DISTRICT	Predicted Number of Species	% of Predicted Species in Point Observation Database	2005 - 2007 Data as % of Predicted
Beaverhead-Deerlodge	Dillon	10	70%	70%
	Jefferson	10	70%	*
	Madison	10	30%	10%
	Wise River	10	30%	30%
Custer	Ashland	12	92%	83%
	Beartooth	12	92%	75%
Flathead	Hungry Horse	11	45%	36%
Gallatin	Gardiner	10	40%	*
Lolo	Superior	11	82%	82%

* acoustic surveys only, call analysis not yet complete.

only (Table 7). Five species were captured in all three states: Big Brown Bat, Hoary Bat, Western Long-eared Myotis, Little Brown Myotis, and Long-legged Myotis. Townsend's Big-eared Bat, Silver-haired Bat, California Myotis, and Fringed Myotis were captured in Idaho and Montana, but not South Dakota. Five species were unique to one state: Idaho (Yuma Myotis), South Dakota (Northern Long-eared Myotis), and Montana (Pallid Bat, Western Small-footed Myotis, and Eastern Red Bat). Up-to-date distribution maps for

Montana's species can be queried and viewed with a variety of map layers on the Montana Natural Heritage Program's Tracker website at: <http://mtnhp.org/Tracker>.

Sex Ratios

Adult males (n=949) were captured significantly more often than females (n=521) ($\chi^2 = 63.66$, $P < 0.00001$) where bats were sampled during 2005-2007 (Table 8); a ratio of 1.8 males for every female and reflecting a male bias that has been

Table 7. Individuals captured per Year by Sex.

Year	Idaho		Montana		South Dakota		Total
	Female	Male	Female	Male	Female	Male	
2005	43	97	223	520	21	42	947
2006	31	52	66	141	-	-	290
2007	60	72	118	100	-	-	350
Total	134	221	407	761	21	42	1586

Table 8. Sex ratio by age class for all species captured 2005-2007.

Species ^a	Adult (male:female)	P ^b	Juvenile (male:female)	P ^b	Age Undetermined
ANPA	0:2	-	-	-	-
COTO	5:8	NS	-	-	-
EPFU	81:27	0.0001	8:3	NS	1:0
LABO	0:1	-	-	-	-
LACI	111:20	<0.00001	6:5	NS	-
LANO	193:121	0.0038	28:13	NS	0:1
MYCA	22:20	NS	4:1	-	-
MYCI	23:1	0.0012	-	-	-
MYEV	137:123	NS	8:6	NS	2:0
MYLU	254:88	<0.00001	2:2	-	0:1
MYSE	20:9	NS	3:1	-	-
MYTH	9:29	0.0323	1:0	-	-
MYVO	92:71	NS	10:8	NS	1:1
MYYU	2:1	-	-	-	-
Total	949:521	<0.00001	70:39	0.0343	5:2

^a Species codes: ANPA (*Antrozous pallidus* - Pallid Bat), COTO (*Corynorhinus townsendii* - Townsend's Big-eared Bat), EPFU (*Eptesicus fuscus* - Big Brown Bat), LABO (*Lasiurus borealis* - Eastern Red Bat), LACI (*Lasiurus cinereus* - Hoary Bat), LANO (*Lasionycteris noctivagans* - Silver-haired Bat), MYCA (*Myotis californicus* - California Myotis), MYCI (*Myotis ciliolabrum* - Western Small-footed Myotis), MYEV (*Myotis evotis* - Western Long-eared Myotis), MYLU (*Myotis lucifugus* - Little Brown Myotis), MYSE (*Myotis septentrionalis* - Northern Long-eared Myotis), MYTH (*Myotis thysanodes* - Fringed Myotis), MYVO (*Myotis volans* - Long-legged Myotis), MYYU (*Myotis yumanensis* - Yuma Myotis).

^b χ^2 Test for the null assumption of adult or juvenile sex ratios of 50:50, for species where number of age-class captures ≥ 10 ; Yates' Correction for Continuity used for species with cell values < 10 . NS = not significantly different from 50:50 at $\alpha = 0.05$.

noted elsewhere in Montana (Worthington 1991a, 1991b, Hendricks et al. 2000, 2004), although not uniformly. Hendricks et al. (2006) noted a higher ratio of females to males (2.5:1) in a riparian study in Eastern Montana and our efforts in 2007 resulted in a higher capture rate of females (Table 4). A male bias was also evident in samples of all juveniles captured, similar to the pooled adult sample, again with males ($n = 70$) captured more often ($\chi^2 = 4.48$, $P = 0.0343$) than females ($n = 39$). In the pooled 2005-2007 samples (Table 8), adult sex ratio differed significantly from 50:50 (χ^2 tests) for six species: Big Brown Bat (more males), Hoary Bat (more males), Silver-haired Bat (more males), Western Small-footed Myotis (more males), Little Brown Myotis (more males), and Fringed Myotis (more females). Sex ratio of juveniles did not differ significantly from parity for any single species, although the sample for Silver-haired Bat showed a strong (68.3%) male bias.

While it is possible males outnumber females throughout the landscape, the bias toward males in overall captures could result from differential habitat use by the sexes (Thomas 1988, Bogan et al. 1996, Cryan et al. 2000) during different times of the summer season, or sex differences in capture probabilities within habitats. The USFS Northern Region bat surveys were conducted primarily in conifer forests and early in summer (58% of the surveys were conducted in June-July versus July-August). Because niche segregation of the sexes is a possibility, information on differences in habitat use by males and females is necessary for monitoring bat populations, developing conservation plans for Species of Concern (e.g., Pierson et al. 1999), and effectively managing landscapes for bats.

Age Class Ratios

For the 2005-2007 data, adults were caught more often than juveniles (93% adults to 7% juveniles) (Table 8). Juveniles comprised 1.2-12.1% of the captures for species where juveniles were part of the total sample; 1% of captured bats for six species were of undetermined age. Juveniles comprised > 10% of all captures for only three species: Silver-haired Bat (11.4%), California

Myotis (10.6%), and Fringed Myotis (12.1%). Juvenile Silver-haired Bats comprised by far the largest proportion (37.6%) of all juvenile bats captured. No juveniles were captured for six species (Pallid Bat, Townsend's Big-eared Bat, Eastern Red Bat, Western Small-footed Myotis, Yuma Myotis), each of which was represented by <15 total captures except the Western Small-footed Myotis with 24 total captures. The extreme preponderance of adults in our capture samples may be attributed to the majority of the trapping occurring primarily earlier in summer when young are yet to be born or are present but not yet volant (Nagorsen and Brigham 1993); parous, pregnant and lactating females comprised 50.5% of the total adult female sample, supporting this conclusion.

Reproductive Status Ratios

Because surveys spanned the breeding season (24 June-28 August 2005; 2 July-1 September 2006; 12 June-29 August 2007) caught bats could be assigned to every category of bat reproductive status. The majority across all species were reproductive females (322 of 562) and non-reproductive males (571 of 1024) (Table 9). Lactating, pregnant, and/or post-lactating females were documented in eleven species: Pallid Bat (lactating); Townsend's Big-eared Bat (pregnant), Big Brown Bat (lactating and post-lactating); Fringed Myotis (lactating and pregnant); Northern Long-eared Myotis (lactating and post-lactating).

Table 9. Reproductive status across all species 2005-2007.

Female Reproductive Status All Species	N	% total
Nulliparous	232	41.3%
Parous	162	28.8%
Pregnant	81	14.4%
Lactating	41	7.3%
Post Lactating	38	6.8%
Undetermined	8	1.4%
Male Reproductive Status All Species	N	% total
Non-reproductive	571	55.8%
Testicular	386	37.7%
Undetermined	67	6.5%

Lactating, pregnant, and post-lactating females were documented for Hoary Bat, Silver-haired Bat, California Myotis, Western Long-eared Myotis, Little Brown Myotis, and Long-legged Myotis. Testicular males were recorded for ten species: Townsend's Big-eared Bat, Big Brown Bat, Hoary Bat, Silver-haired Bat, California Myotis, Western Small-footed Myotis, Western Long-eared Myotis, Little Brown Myotis, Fringed Myotis, and Long-legged Myotis.

Morphometric Comparisons

Twenty-six records from South Dakota and Idaho were deleted from morphometric summaries because they were outliers to published forearm lengths (Nagorsen and Brigham 1993, Lemke 1999, Adams 2003, Ormsbee 2005), and could not be crosschecked against the original datasheets. One Montana record was deleted because it lacked sex and age information (Appendix D). Forearm length was the most frequently taken measurement (1574 of 1586 cases) with weight (1460) and ear length (518) the next most recorded.

Forearm Length: Mean forearm lengths for all species captured in 2005-2007 fall within published ranges (Table 10), including values available for three species in Montana (Hendricks et al. 2000). Adult differences related to sex have been documented, with females tending to be larger than males (Myers 1978). Indeed, mean forearm length for adult females in our samples was significantly larger than that of respective adult males for seven species (Table 10); only Western Long-eared Myotis showed adult male forearm length significantly larger than for adult females. The sex difference in forearm length for Little Brown Myotis and Fringed Myotis was very small and not statistically significant. While expecting overlapping ranges between the sexes, some individual males were larger than the largest females of the species (California Myotis, Western Small-footed Myotis, Little Brown Myotis, and Long-legged Myotis); this may be the result of small sample sizes or of measurement error, which may be high especially when taken from live animals (Blackwell et al. 2006).

Weight: Weight is more highly variable than forearm length, as the weight of an individual can fluctuate greatly throughout the night. Also, substantial variation among seasons may be occurring. Females gain then lose weight in conjunction with the process of prenatal offspring development and then birth. Bats captured later in summer and early fall may also be heavier than individuals captured in early and mid-summer because bats accumulate fat for winter (Hendricks et al. 2000). A wide range of weight measurements for each species would be anticipated, due to daily and seasonal variability.

The two species with the greatest weight ranges were Western Long-eared Myotis (more than a 4-fold difference) and Silver-haired Bat (a difference of more than 3.5-fold). Mean weight for all species fell within respective reported ranges except for the lone female Eastern Red Bat in the sample, which exceeded the greatest documented weight by 4 grams or 27% (Table 11). Pregnancy does not account for the weight of this female (at birth, newborns may weigh as much as 25% of their mothers) because she was determined to be a nulliparous adult. Nine other species exceeded their documented weight ranges: Townsend's Big-eared Bat, Big Brown Bat, Hoary Bat, Silver-haired Bat, California Myotis, Western Small-footed Myotis, Fringed Myotis, Long-legged Myotis, and Yuma Myotis. Pregnant females accounted for the heaviest individuals in only Townsend's Big-eared Bat and Fringed Myotis. No apparent patterns emerged in weight characteristics for the other bat species; both female and male individuals of various reproductive status emerged as the heaviest individuals.

Ear Length: All mean ear lengths fell within the documented ranges for each species recorded except the Yuma Myotis whose mean ear length was reported at 23% below the low end of the anticipated range of the species (Table 12). While all other means were consistently within range, the minimum ear lengths for the following eight species fell below the previously documented minimum ear lengths (all measurements in mm):

Table 10. Forearm length (mm) for adult bats of all species 2005-2007. Values are means +/- SD, ranges for 2005-2007 data are in parentheses.

Species ^a	Males	N	Females	N	P ^b	Published Mean Forearm Length (mm) ^c	Published Range Forearm Length (mm) ^c
ANPA	-	-	59.3 (58.5-60.1)	2	-	52.5	48.0 – 60.0 ⁺⁺
COTO	42.5±0.5 (41.9 - 43.1)	5	44.5±0.5 (43.9 - 45.5)	8	<0.0001	42.6	39.9 - 45.2
EPFU	46.1±1.4 (43.2 - 49.0)	81	47.0±1.3 (44.4 - 49.5)	27	0.0054	47.5	43.0 - 52.0
LABO	-	-	40.8	1	-	39.5 ⁺	38.0 – 40.0 ⁺
LACI	53.1±1.6 (47.4 - 57.5)	111	55.0±1.5 (51.4 - 57.5)	20	<0.0001	54.5	50.3 - 57.4
LANO	41.1±1.0 (38.2 - 44.0)	192	41.7±1.1 (38.0 - 45.1)	120	<0.0001	41.4	39.1 - 43.9
MYCA	32.7±1.7 (31.1 - 34.1)	20	33.6±0.7 (32.5 - 34.8)	19	0.0021	32.1	29.4 - 35.0
MYCI	31.5±1.7 (28.8 - 33.5)	22	32.5	1	-	31.8	28.8 - 33.4
MYEV	38.5±1.2 (33.5 - 41.1)	135	38.0±1.1 (35.0 - 40.9)	123	0.0029	38.4	36.0 - 42.0
MYLU	36.9±1.0 (34.4 - 39.9)	254	36.8±1.1 (34.8 - 39.3)	87	0.5024	36.4	33.0 - 40.3
MYSE	36.9±0.9 (36.0 - 39.0)	20	37.7±1.0 (36.0 - 39.0)	9	0.0345	36.1	34.0 - 38.0
MYTH	41.7±1.9 (39.0 - 44.5)	9	41.8±1.5 (38.8 - 45.0)	29	0.8312	42.2	40.0 - 44.5
MYVO	38.6±0.9 (36.8 - 41.0)	89	39.4±1.0 (36.0 - 42.4)	70	<0.0001	38.3	34.0 - 43.0
MYYU	34.0 (33.5 - 34.5)	2	37.5	1	-	34.3	30.0 - 38.0

^a See Table 8 for species codes

^b Two-sample t-test for the null assumption of parity between the sexes in adult forearm length; $\alpha = 0.05$.

^c From Nagorsen and Brigham (1993), Adams (2003) from Wyoming.

Big Brown Bat (10.0 vs 13.0), Silver-haired Bat (9.8 vs 12.0), California Myotis (9.0 vs 11.0), Western Long-eared Myotis (13.5 vs 17.0), Little Brown Myotis (8.0 vs 10.0), Northern Long-eared Myotis (14.0 vs 15.0), Long-legged Myotis

(8.0 vs 10.3), and, as noted, Yuma Myotis (9.0 vs 12.0). While these measurements may be accurate, measurement error or a need for refining the method of collecting this measurement cannot be discounted.

Table 11. Weight (g) for bats of all species 2005-2007.

Species ^a	Sex	Weight		N	Published Mean Weight *	Published Weight Range*
		Mean±SD	Range			
ANPA	F	20.2	-	1	17.0	12.0-24.3
COTO	Overall	11.3±2.3	8.5-14.3	13	8.6	6.0-13.5
	F	12.5±2.1	8.9-14.3	8		
	M	9.5±1.0	8.5-10.6	5		
EPFU	Overall	17.4±2.7	11.7-26.5	112	15.2	8.8-21.9
	F	19.0±2.8	11.8-23.4	29		
	M	16.9±2.4	11.7-26.5	83		
LABO	F	19.0	-	1	11.0	9.0-15.0 ⁺
LACI	Overall	26.0±3.6	18.2-39.1	127	31.5	20.1-37.9
	F	28.3±4.7	20.4-39.1	25		
	M	25.4±3.1	18.2-34.5	102		
LANO	Overall	11.6±1.6	5.0-17.6	320	9.0	5.8-12.4
	F	12.0±1.7	5.0-15.5	122		
	M	11.4±1.5	5.7-17.6	198		
MYCA	Overall	5.0±0.8	3.5-6.8	42	4.4	3.3-5.4
	F	5.3±0.7	4.0-6.5	19		
	M	4.7±0.7	3.5-6.8	23		
MYCI	Overall	4.6±0.6	4.0-7.0	24	4.6	2.8-5.5
	F	4.2	-	1		
	M	4.7±0.6	4.0-7.0	23		
MYEV	Overall	6.5±1.1	4.0-17.0	254	5.5	4.2-8.6
	F	6.5±0.8	4.7-9.5	121		
	M	6.4±1.3	4.0-17.0	133		
MYLU	Overall	6.6±0.8	4.8-9.1	340	6.2	6.2-10.4
	F	6.8±0.9	5.1-9.0	90		
	M	6.6±0.8	4.8-9.1	250		
MYSE	Overall	7.7±1.3	6.0-12.0	33	6.5	5.0-10.0
	F	7.6±1.1	6.0-9.0	10		
	M	7.8±1.5	6.0-12.0	23		
MYTH	Overall	7.5±1.1	5.5-10.7	37	7.1	5.4-8.4
	F	7.6±1.1	5.5-10.7	29		
	M	6.9±0.8	5.5-7.7	8		
MYVO	Overall	7.8±1.0	5.7-13.5	152	7.2	5.5-10.0
	F	8.1±1.0	6.0-12.1	61		
	M	7.6±1.0	5.7-13.5	91		
MYYU	Overall	6.4±2.7	4.7-9.5	3	6.6	4.0-8.5
	F	9.5	-	1		
	M	4.9	4.7-5.0	2		

^a See Table 8 for species codes

* From Nagorsen and Brigham 1993 and Adams 2003.

Table 12. Ear Length (mm) for bats of all species 2005-2007. All measurements for juveniles fell within adult ranges.

Species ^a	Sex	Ear Length		N	Published Range Ear Length*
		Mean±SD	Range		
ANPA	F	27.3	-	1	23-37
COTO	Overall	31.7±1.2	29.5-33.0	8	29.5-39
	F	31.8±1.2	29.5-33.0	7	
	M	31.0	-	1	
EPFU	Overall	12.9±1.2	10.0-14.5	22	13-19
	F	12.9±1.5	10.0-14.0	8	
	M	12.9±1.1	11.0-14.5	14	
LABO	-	-	-	1	9-19
LACI	Overall	13.1±0.8	12.0-15.0	8	11-19
	F	13.0	-	1	
	M	13.1±0.9	12.0-15.0	7	
LANO	Overall	11.5±1.0	9.8-13.0	29	12-19
	F	12.3±0.5	12.0-13.0	6	
	M	11.3±1.0	9.8-13.0	23	
MYCA	Overall	10.6±1.4	9.0-13.0	19	11-15
	F	10.8±1.5	9.0-13.0	10	
	M	10.4±1.5	9.0-13.0	9	
MYCI	Overall	12.0	12.0-12.0	2	11-14
	F	-	-	0	
	M	12.0	12.0-12.0	2	
MYEV	Overall	17.6±1.3	13.5-22.0	263	17-23
	F	17.7±1.4	13.5-22.0	124	
	M	17.6±1.2	14.5-22.0	139	
MYLU	Overall	11.8±1.0	8.0-13.0	62	10-16
	F	11.3±2.0	8.0-13.0	9	
	M	11.8±0.8	9.5-13.0	53	
MYSE	Overall	14.0	-	1	15-18
	F	-	-	0	
	M	14.0	-	1	
MYTH	Overall	15.5±1.2	13.0-19.0	36	12-22
	F	15.7±1.0	13.0-18.0	27	
	M	15.1±1.8	13.0-19.0	9	
MYVO	Overall	10.6±1.4	8.0-17.0	63	10.3-20
	F	10.7±1.7	8.0-17.0	29	
	M	10.5±1.2	8.0-12.0	34	
MYYU	Overall	9.2±0.3	9.0-9.5	3	12-16
	F	9.0	-	1	
	M	9.3	9.0-9.5	2	

^a See Table 8 for species codes.

* Range of ear length was derived from the upper and lower limits of regional data presented in Adams (2003).

DISCUSSION

As in the previous two years (Hendricks and Maxell 2005; Lenard et al 2007), surveys in 2007 sampled primarily where bats would be expected to concentrate their activity while seeking food and water resources. Some of these sites, especially those used by several bat species, may be useful in the future for monitoring efforts across Forest Districts. While these sites could be used to develop a comprehensive survey and monitoring scheme, both for the Northern Region and all of Montana, one of the important next steps is to adopt a sampling grid both easily implemented and broadly applicable. While the Oregon Bat Grid is useful and provides a uniform basis from which sampling sites can be selected (see Weller 2008 for example), the application of this grid is somewhat cumbersome. The grid's orientation is skewed (trending northwest to southeast) and follows no standard lines of orientation. The uniform grid cell size (10 x 10 km²) may be desirable, but identifying one's location on the ground, or its associated identifying label is impossible without a GIS grid overlay in hand. This makes field organization and navigation somewhat problematic, especially when the number of surveys conducted per cell, as described in the draft Oregon protocols, is important.

Timing of field surveys affected the demographic patterns of capture results. During the first half of the summer breeding season, the majority of adult females should be parous, pregnant, or lactating; the large proportion (41.3%) of adult females classified as nulliparous perhaps reflects substantial sampling early in the breeding season before pregnancy is apparent, especially in first-year females. Few juveniles at this time should be volant and available for capture. Also, few males captured in early summer should be testicular because reproductive behavior is most prevalent in late summer and fall. Each of these patterns is reflected in the capture results (Tables 8 and 9).

The span of dates each year (24 June-28 August 2005; 2 July-1 September 2006; 12 June-29 August 2007) resulted in the capture of individual bats of all ages and reproductive classes, but in the rush to complete surveys each year the majority (84.5%) of surveys occurred by mid-August. While the primary goal of the monitoring program is to document and reasonably predict bat presence across the landscape (as defined by grid blocks), the next level of inventory and monitoring should include equitable sampling from the entire breeding and post-breeding periods, especially late August and September. This will help define the breeding phenology of the bat fauna as well as aid in identifying sites and sample blocks in important breeding areas or significant passage sites.

Few prior morphometric data have been published that were collected from the area encompassed by the USFS Northern Region. What little exists (weight and forearm measurements) for three bat species in north-central Montana (Hendricks et al. 2000) are very similar to that summarized in this report. Morphometric comparisons can assist in identifying captured individuals to species and promote the development of new tools for species identification. One of the primary needs, however, is a standard methodology for field data collection, especially those used for recording morphometric measurements (forearm length, weight, ear length). While most of the data fell within previously published ranges for the physical trait under consideration, limited data, especially on weight and ear length (in contrast to forearm length), and the number of records that deviated from published data, support efforts to standardize techniques and to gather as much complete information while bats are in hand. This is especially important for correct identification of species difficult to distinguish using current field techniques, such as Little Brown Myotis and Yuma Myotis (Weller et al. 2007, Rodhouse et al. 2008).

RECOMMENDATIONS

1. Adopt a state-wide bat sampling scheme to guide future inventory efforts. Greater numbers of surveys with higher detection rates and total numbers of species detected will clearly enhance any bat inventory scheme. Encourage both acoustic and mist-netting efforts to gather reproductive status information in addition to species diversity.
2. Target Forests and Ranger Districts without bat survey effort (Darby, Stevensville, and West Fork RD of the Bitterroot NF; Big Timber, Hebgen Lake, and Livingston RD of the Gallatin NF; Cabinet, Rexford, and Three Rivers RD of the Kootenai NF; Belt Creek and Kings Hill of the Lewis and Clark NF; and the Plains/Thompson Falls RD of the Lolo NF).
3. Employ standard data collection methods to promote highest quality data collection and to assist in enhancing regional morphometric keys. Insure proficiency of field personnel in data collection methods prior to field season, especially morphometrics, sex and age classifications, and reproductive status classifications.
4. Complete genetic analysis on tissue samples collected 2005-2007 to confirm species identification.
5. Conduct pilot surveys to evaluate baseline levels of site occupancy and detection probability for the remainder of the bat species in Montana not evaluated with the pilot effort presented in the 2006 USFS Northern Region bat report. Pilot surveys also need to address how detection probabilities vary with site (e.g., elevation, cover type, forest management regime) and sampling (e.g., weather, survey duration, survey methods) covariates. This pilot survey work will place future inventory and monitoring efforts on a sound base for making management decisions and evaluating changes in status.

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APPENDIX A. GLOBAL AND STATE RANK DEFINITIONS

HERITAGE PROGRAM RANKS

The international network of Natural Heritage Programs employs a standardized ranking system to denote global (range-wide) and state status. Species are assigned numeric ranks ranging from 1 to 5, reflecting the relative degree to which they are “at-risk”. Rank definitions are given below. A number of factors are considered in assigning ranks — the number, size and distribution of known “occurrences” or populations, population trends (if known), habitat sensitivity, and threat. Factors in a species’ life history that make it especially vulnerable are also considered (e.g., dependence on a specific pollinator).

GLOBAL RANK DEFINITIONS (NatureServe 2003)

- G1 Critically imperiled because of extreme rarity and/or other factors making it highly vulnerable to extinction
- G2 Imperiled because of rarity and/or other factors making it vulnerable to extinction
- G3 Vulnerable because of rarity or restricted range and/or other factors, even though it may be abundant at some of its locations
- G4 Apparently secure, though it may be quite rare in parts of its range, especially at the periphery
- G5 Demonstrably secure, though it may be quite rare in parts of its range, especially at the periphery
- T1-5 **Intraspecific Taxon** (trinomial) —The status of infraspecific taxa (subspecies or varieties) are indicated by a “T-rank” following the species’ global rank

STATE RANK DEFINITIONS

- S1 At high risk because of extremely limited and potentially declining numbers, extent and/or habitat, making it highly vulnerable to extirpation in the state
- S2 At risk because of very limited and potentially declining numbers, extent and/or habitat, making it vulnerable to extirpation in the state
- S3 Potentially at risk because of limited and potentially declining numbers, extent and/or habitat, even though it may be abundant in some areas
- S4 Uncommon but not rare (although it may be rare in parts of its range), and usually widespread. Apparently not vulnerable in most of its range, but possibly cause for long-term concern
- S5 Common, widespread, and abundant (although it may be rare in parts of its range). Not vulnerable in most of its range

COMBINATION RANKS

G#G# or S#S# **Range Rank**—A numeric range rank (e.g., G2G3) used to indicate uncertainty about the exact status of a taxon

QUALIFIERS

- NR Not ranked
- Q **Questionable taxonomy that may reduce conservation priority**—Distinctiveness of this entity as a taxon at the current level is questionable; resolution of this uncertainty may result in change from a species to a subspecies or hybrid, or inclusion of this taxon in another taxon, with the resulting taxon having a lower-priority (numerically higher) conservation status rank

X	Presumed Extinct —Species believed to be extinct throughout its range. Not located despite intensive searches of historical sites and other appropriate habitat, and virtually no likelihood that it will be rediscovered
H	Possibly Extinct —Species known from only historical occurrences, but may never-the-less still be extant; further searching needed
U	Unrankable —Species currently unrankable due to lack of information or due to substantially conflicting information about status or trends
HYB	Hybrid —Entity not ranked because it represents an interspecific hybrid and not a species
?	Inexact Numeric Rank —Denotes inexact numeric rank
C	Captive or Cultivated Only —Species at present is extant only in captivity or cultivation, or as a reintroduced population not yet established
A	Accidental —Species is accidental or casual in Montana, in other words, infrequent and outside usual range. Includes species (usually birds or butterflies) recorded once or only a few times at a location. A few of these species may have bred on the one or two occasions they were recorded
Z	Zero Occurrences —Species is present but lacking practical conservation concern in Montana because there are no definable occurrences, although the taxon is native and appears regularly in Montana
P	Potential —Potential that species occurs in Montana but no extant or historic occurrences are accepted
R	Reported —Species reported in Montana but without a basis for either accepting or rejecting the report, or the report not yet reviewed locally. Some of these are very recent discoveries for which the program has not yet received first-hand information; others are old, obscure reports
SYN	Synonym —Species reported as occurring in Montana, but the Montana Natural Heritage Program does not recognize the taxon; therefore the species is not assigned a rank
*	A rank has been assigned and is under review. Contact the Montana Natural Heritage Program for assigned rank
B	Breeding —Rank refers to the breeding population of the species in Montana
N	Nonbreeding —Rank refers to the non-breeding population of the species in Montana

APPENDIX B. DISTRIBUTION MAPS FOR BATS IN MONTANA

Montana Bat Observation Points

Observation Points for Pallid Bat (*Antrozous pallidus*)

Observation Points for Townsend's Big-eared Bat (*Corynorhinus townsendii*)

Observation Points for Big Brown Bat (*Eptesicus fuscus*)

Observation Points for Eastern Red Bat (*Lasiurus borealis*)

Observation Points for Hoary Bat (*Lasiurus cinereus*)

Observation Points for Silver-haired Bat (*Lasionycteris noctivagans*)

Observation Points for California Myotis (*Myotis californicus*)

Observation Points for Long-eared Myotis (*Myotis evotis*)

Observation Points for Little Brown Myotis (*Myotis lucifugus*)

Observation Points for Long-legged Myotis (*Myotis volans*)

**APPENDIX C. USFS NORTHERN REGION MONTANA BAT SURVEY
SITES; 2007**

Forest	Ranger District	Site Name	Date	Latitude	Longitude	Elevation	Survey Type ^b	Divide ^c	Species ^a
Beaverhead-Deerlodge	Dillon	Apex Sagebrush	30 JUL	45.39278	-112.7901	6339	A	E	call analysis not completed
Beaverhead-Deerlodge	Dillon	Best Spring pond (July survey)	18 JUL	45.31025	-112.92807	6650	M	E	EPFU, MYEV
Beaverhead-Deerlodge	Dillon	Best Spring pond (August survey)	15 AUG	45.31025	-112.92807	6650	M	E	EPFU, LACL, MYVO
Beaverhead-Deerlodge	Dillon	Birch Creek Rock Cliffs	6 AUG	45.37789	-112.79796	5971	A	E	call analysis not completed
Beaverhead-Deerlodge	Dillon	Caboose Water Tank	16 JUL	44.60574	-112.8297	7392	A	E	call analysis not completed
Beaverhead-Deerlodge	Dillon	Cross Mine	15 JUL	45.32697	-112.90866	6939	A	E	call analysis not completed
Beaverhead-Deerlodge	Dillon	Greenstone Mountain Mine	30 JUL	45.41116	-112.80336	7208	A	E	call analysis not completed
Beaverhead-Deerlodge	Dillon	Stinson Mine	15 JUL	45.31284	-112.92423	6867	A	E	call analysis not completed
Beaverhead-Deerlodge	Dillon	Trout Creek	6 AUG	45.41837	-112.88601	7051	A	E	call analysis not completed
Beaverhead-Deerlodge	Dillon	Williamson Wood Canyon Upper Cl	9 AUG	44.60989	-112.85822	7615	A	E	call analysis not completed
Beaverhead-Deerlodge	Dillon	Williamson Wood Canyon Lower C	9 AUG	44.61362	-112.84995	7257	A	E	call analysis not completed
Beaverhead-Deerlodge	Dillon	Williamson Wood Canyon Middle	9 AUG	44.61032	-112.85404	7362	A	E	call analysis not completed
Beaverhead-Deerlodge	Jefferson	Pipestone Cliffs	7 AUG	45.94998	-112.28939	5617	A	E	call analysis not completed
Beaverhead-Deerlodge	Jefferson	Pipestone Rocks	7 AUG	45.96015	-112.31023	5892	A	E	call analysis not completed
Beaverhead-Deerlodge	Jefferson	RD 442 Overlook	11 JUL	46.24358	-112.41009	5915	A	E	call analysis not completed
Beaverhead-Deerlodge	Jefferson	RD 442 Pond	11 JUL	46.22436	-112.43979	5912	A	E	call analysis not completed
Beaverhead-Deerlodge	Madison	Bear Creek Cabin	27 JUL	45.15462	-111.55288	6263	A	E	call analysis not completed
Beaverhead-Deerlodge	Madison	Bear Creek Ranger Station	23 JUL	45.15649	-111.55368	6263	M	E	MYVO
Beaverhead-Deerlodge	Madison	Black Butte Cabin	24 JUL	44.91419	-111.82087	8898	A	E	call analysis not completed
Beaverhead-Deerlodge	Madison	Black Butte Cliffs	25 JUL	44.9039	-111.84846	9521	A	E	call analysis not completed
Beaverhead-Deerlodge	Madison	Cave Mountain Cliffs	25 JUL	44.89396	-111.76553	8940	A	E	call analysis not completed
Beaverhead-Deerlodge	Madison	Mill Creek	13 AUG	45.47719	-112.06961	6955	A	E	call analysis not completed
Beaverhead-Deerlodge	Madison	Shell Creek Cave	23 JUL	45.26802	-111.61136	6512	A	E	call analysis not completed
Beaverhead-Deerlodge	Madison	Shell Creek Cliffs	23 JUL	45.26742	-111.61243	6286	A	E	call analysis not completed
Beaverhead-Deerlodge	Madison	Smuggler Mine	13 AUG	45.48004	-112.03789	7041	A	E	call analysis not completed
Beaverhead-Deerlodge	Pintler	Coal Creek Adit	9 JUL	46.26539	-113.64272	5607	A	W	call analysis not completed
Beaverhead-Deerlodge	Pintler	Gerrity Cave	10 JUL	46.21934	-113.08093	8225	A	W	call analysis not completed
Beaverhead-Deerlodge	Pintler	Mud Lake	9 JUL	46.231	-113.75368	6680	A	W	call analysis not completed
Beaverhead-Deerlodge	Pintler	Peterson Cave	10 JUL	46.11856	-113.30369	6401	A	W	call analysis not completed
Beaverhead-Deerlodge	Pintler	West Fork Rock Creek	9 JUL	46.22719	-113.54846	4357	A	W	call analysis not completed
Beaverhead-Deerlodge	Wisdom	Bloody Dick Pond	1 AUG	45.24854	-113.44225	7024	A	E	call analysis not completed
Beaverhead-Deerlodge	Wisdom	Johnson Creek	31 JUL	45.74271	-113.68679	6483	A	E	call analysis not completed
Beaverhead-Deerlodge	Wisdom	Nymphaea Pond	31 JUL	45.74332	-113.67596	6486	A	E	call analysis not completed
Beaverhead-Deerlodge	Wisdom	Iwin Lakes	1 AUG	45.40915	-113.68745	7037	A	E	call analysis not completed
Beaverhead-Deerlodge	Wise River	Anderson Cow Camp	8 AUG	45.56746	-113.12843	7021	A	E	call analysis not completed
Beaverhead-Deerlodge	Wise River	Boulder Creek Scree	8 AUG	45.64321	-113.07134	6496	A	E	call analysis not completed
Beaverhead-Deerlodge	Wise River	Canyon Creek, Maiden Rock camp site	4 JUL	45.68704	-112.76733	5558	M	E	MYEV
Beaverhead-Deerlodge	Wise River	Jacobson's Creek	14 AUG	45.53206	-113.07936	6581	A	E	call analysis not completed
Beaverhead-Deerlodge	Wise River	Jerry Creek	10 AUG	45.8393	-112.86271	6850	A	E	call analysis not completed
Beaverhead-Deerlodge	Wise River	Lower Seymour Lake	10 AUG	45.98317	-113.18313	6772	A	E	call analysis not completed
Beaverhead-Deerlodge	Wise River	Moose Park Pond	8 AUG	45.50016	-113.10493	7634	A	E	call analysis not completed
Beaverhead-Deerlodge	Wise River	Moose Park ponds	14 AUG	45.50203	-113.10581	7635	M	E	EPFU, LACL, MYEV
Beaverhead-Deerlodge	Wise River	Picketts Pasture	4 JUL	45.662	-112.79823	6329	M	E	MYEV
Beaverhead-Deerlodge	Wise River	Viapond Park ponds	6 JUL	45.67401	-112.9307	7805	M	E	EPFU, LACL
Beaverhead-Deerlodge	Wise River	Willow Campground	8 AUG	45.63657	-113.07223	6473	A	E	call analysis not completed

Forest	Ranger District	Site Name	Date	Latitude	Longitude	Elevation	Survey Type ^a	Divide ^c	Species ^a
Custer	Ashland	Beaver-Pumpkin Divide	29 AUG	45.65722	-105.96388	4142	A	E	call analysis not completed
Custer	Ashland	Cow Creek	10 AUG	45.3071	-106.23443	3803	M	E	EPFU, LACL, MYVO, LANO
Custer	Ashland	Drop Tude Reservoir	27 AUG	45.39306	-106.17222	3314	A	E	call analysis not completed
Custer	Ashland	Holiday Campground	29 AUG	45.63944	-105.97444	4043	M	E	EPFU, MYEV, MYVO
Custer	Ashland	Lee Creek	28 AUG	45.23081	-106.39781	3521	M	E	MYEV, LANO
Custer	Ashland	Mud Turtle Reservoir	12 AUG	45.28166	-105.97028	3838	M	E	MYEV
Custer	Ashland	Road Creek Reservoir	13 AUG	45.65379	-105.99889	3650	M	E	EPFU, LACL, MYVO, LANO
Custer	Ashland	South Fork Taylor Creek	30 AUG	45.23694	-106.05306	3637	A	E	call analysis not completed
Custer	Ashland	Timber Creek Reservoir	9 AUG	45.31026	-106.41559	not recorded	M	E	EPFU, LABO, LACL, MYEV, MYVO, ANPA, LANO
Custer	Ashland	Tooley Creek	11 AUG	45.21357	-106.25752	3803	M	E	EPFU, LANO
Custer	Ashland	Yonkee Reservoir	30 AUG	45.24639	-106.03111	3926	A	E	call analysis not completed
Custer	Beartooth	Big Park Lake	18 AUG	45.12567	-109.71978	8245	A	E	call analysis not completed
Custer	Beartooth	Dewey Lake Ponds	17 AUG	45.11152	-109.76118	9366	A	E	call analysis not completed
Custer	Beartooth	Elk Lake	19 AUG	45.16338	-109.65982	6774	A	E	call analysis not completed
Custer	Beartooth	Forested wetland - Big Park Lake	18 AUG	45.12246	-109.72941	8565	A	E	call analysis not completed
Custer	Beartooth	Pond btwn Oly and Dewey Lakes	17 AUG	45.10857	-109.76711	9599	A	E	call analysis not completed
Flathead	Glacier View	Coal Creek	21 JUN	48.70630	-114.45474	4660	M	W	LANO
Flathead	Glacier View	North Fork Flathead River, across from Wurtz Cabin	22 JUN	48.89934	-114.38691	3770	M	W	MYLU, MYEV
Flathead	Hungry Horse	Anna Creek Work Center	25 JUN	48.16843	-113.79093	3870	M	W	MYEV
Flathead	Hungry Horse	Betty Creek Work Center	28 JUN	48.15686	-113.7319	3800	M	W	MYCA, MYLU, MYEV, COTO
Flathead	Hungry Horse	Wounded Buck Creek	24 JUN	48.27952	-113.93588	3740	M	W	MYLU
Flathead	Spotted Bear	Bunker Creek	27 JUN	47.82078	-113.44473	3925	M	W	MYLU, MYEV, LANO, COTO
Flathead	Spotted Bear	Spotted Bear Ranger Station	26 JUN	47.92488	-113.52487	3760	M	W	MYLU, MYEV
Flathead	Swan Lake	Condon Guard Station	18 JUN	47.5848	-113.73706	3670	M	W	MYLU
Flathead	Swan Lake	Swan Lake Ranger Station	17 JUN	47.90827	-113.83561	3121	M	W	MYLU
Flathead	Tally Lake	Sheppard Creek, Star Meadow Guard Station	19 JUN	48.38087	-114.70874	4020	M	W	EPFU, MYLU
Flathead	Tally Lake	Sylvia Lake Wetland	15 JUN	48.35561	-114.83731	4710	M	W	EPFU, MYLU, MYEV, LANO
Flathead	Glacier View	Lewis Creek I	23 JUN	48.91522	-114.63195	4780	A	W	call analysis not completed
Gallatin	Gardiner	Fox Lake	15 AUG	45.03422	-109.80557	8086	A	E	call analysis not completed
Gallatin	Gardiner	Lake below Bald Knob	16 AUG	45.07667	-109.79446	9495	A	E	call analysis not completed
Gallatin	Gardiner	Pond SW of Ouzel Lake	16 AUG	45.07406	-109.78882	9354	A	E	call analysis not completed
Gallatin	Gardiner	Rock Island Lake	26 AUG	45.02195	-109.81194	8139	A	E	call analysis not completed
Gallatin	Gardiner	Russell Creek	16 AUG	45.0766	-109.79051	9464	A	E	call analysis not completed
Gallatin	Gardiner	Vernon Lake	28 AUG	45.01025	-109.83344	7917	A	E	call analysis not completed
Gallatin	Gardiner	Wand Lake	27 AUG	45.06523	-109.7686	9333	A	E	call analysis not completed
LewisandClark	Rocky Mountain	Upper Half Moon Creek	22 JUL	47.33156	-112.82243	6950	A	E	call analysis not completed
LewisandClark	Rocky Mountain	Welcome Guard Station	21 JUL	47.33045	-112.73167	5930	A	E	call analysis not completed
LewisandClark	Seeley Lake	Carmichael Guard Station	25 JUL	47.2596	-112.81615	5940	A	W	call analysis not completed
LewisandClark	Seeley Lake	North Fork Guard Station	26 JUL	47.19146	-112.90907	5130	A	W	call analysis not completed

Forest	Ranger District	Site Name	Date	Latitude	Longitude	Elevation	Survey Type ^b	Divide ^c	Species ^a
Lolo	Superior	Mud Lake, off Forest Service Road 7753, Slowey Gulch area	14 JUN	47.24832	-115.02491	not recorded	M	W	MYCA, LACI, MYLU, MYEV
Lolo	Superior	Prosperity Mine	12 JUN	47.2745	-114.92967	3675	M	W	MYEV, MYVO, COTO
Lolo	Superior	Upper Keesey Mine	13 JUN	47.3021	-114.95864	not recorded	M	W	MYEV

^a species codes: ANPA (*Antrozous pallidus*, Pallid Bat), EPFU (*Eptesicus fuscus*, Big Brown Bat), LACI (*Lasionycteris cinereus*, Hoary Bat), LANO (*Lasionycteris noctivagans*, Silver-haired Bat), MYCA (*Myotis californicus*, California Myotis), MYCI (*Myotis ciliolabrum*, Western Small-footed Myotis), MYEV (*Myotis evotis*, Western Long-eared Myotis), MYLU (*Myotis lucifugus*, Little Brown Myotis), MYTH (*Myotis thysanodes*, Fringed Myotis), MYVO (*Myotis volans*, Long-legged Myotis).

^b A= acoustic recording

M= in hand identification/mist net capture

^c E= East of Continental Divide

W= West of Continental Divide

APPENDIX D. RECORDS DELETED FROM USFS 2005-2007
MORPHOMETRIC SUMMARY

State	National Forest	Ranger District	Start Date	Site Name	Elevation (ft)	Scientific Name (4 letter code)	Sex	Reproductive Status	Age (Adult or Juvenile)	Weight (g)	Forearm Length (mm)	Ear (mm)	Thumb (mm)	Foot (mm)	Toe Hair	Keel
ID	Nez Perce	Salmon River	08/04/05	Grouse Creek	5915	EPFU	M	NR	A	19.2	36	10				
ID	Nez Perce	Salmon River	08/06/05	Crawford Creek	4845	LANO	F	LAC	A	15	44.5					
ID	Idaho Panhandle	Sandpoint	07/09/07	North Gold		LANO	M	T	A	12.6	44.8					
ID	Nez Perce	Salmon River	08/07/05	North Fork Slate Creek Meadows	5370	LANO	F	NP	A	13.5	45					
ID	Clearwater	Palouse	07/21/05	Little Sand Creek	2847	LANO	M	NR	A	12.5	46					
ID	Nez Perce	Clearwater	08/16/06	Cascade Creek Trough	5066	MYCI	M	T	A	6	38		6	8		Y
ID	Nez Perce	Clearwater	08/16/06	Cascade Creek Trough	5066	MYCI	F	NP	A	7	39.9		4	9		Y
ID	Idaho Panhandle	Sandpoint	07/11/07	Phil Sheridan Mine		MYCA	M	T	A	6.8	37.6					
ID	Idaho Panhandle	Sandpoint	07/09/07	North Gold		MYCA	F	PG	A	8.4	38.5					Y
ID	Idaho Panhandle	Sandpoint	07/11/07	Phil Sheridan Mine		MYCI	F	NP	A	6.9	37.8			7		Y
ID	Idaho Panhandle	Sandpoint	07/09/07	North Gold		MYCI	M	T	A	7.4	38.3			7		
ID	Idaho Panhandle	Sandpoint	07/11/07	Phil Sheridan Mine		MYCI	F	NP	A	7.6	38.8			9		Y
ID	Idaho Panhandle	Sandpoint	07/09/07	North Gold		MYCI	F	PG	A	7.4	39.8			8		Y
ID	Idaho Panhandle	Coeur D'Alene River RD	07/29/07	Blue Creek	2350	MYEV	F	LAC	A	6	35.2	17				
ID	Nez Perce	Elk City	08/12/07	Clearwater Mine	3890	MYEV	M	T	A	5.6	35.3	16				
ID	Idaho Panhandle	Coeur D'Alene River RD	07/31/07	Yellowdog Beaver Ponds	2994	MYEV	M	NR	A	5.1	35.9	17				
ID	Idaho Panhandle	Sandpoint	07/10/07	Hidden Treasure Mine		MYTH	M	NR	J	5.2	35.9	15				
ID	Idaho Panhandle	Sandpoint	07/10/07	Hidden Treasure Mine		MYTH	M	T	A	6.5	37	16				
ID	Idaho Panhandle	Coeur D'Alene River RD	08/24/07	Drill Hole #4 (Two Mile Creek)		MYTH	M	NR	J	4.6	37.2	18				
ID	Idaho Panhandle	Sandpoint	07/11/07	Phil Sheridan Mine		MYTH	F	PG	A	6.6	37.8					
SD	Dakota Prairie	Grand River National Grassland	08/02/05	GR-Humphrey Dam	2405	MYTH	M	Not Recorded	J	6.5	38	18			N	
SD	Dakota Prairie	Grand River National Grassland	08/02/05	GR-Humphrey Dam	2405	MYTH	F	LAC	A	8	38	18			N	
ID	Nez Perce	Slate Creek	08/08/05	Peter Ready Creek	5470	MYTH	M	NR	A	6	38.5	15.5				
ID	Idaho Panhandle	Sandpoint	07/10/07	Hidden Treasure Mine		MYTH	M	T	A	6.2	38.8	17				
MT	Beaverhead-Deerlodge	Butte	07/03/06	Beaver Dam	6600	LANO			A	11.5	40.8	13			Y	N
ID	Nez Perce	Salmon River	07/31/05	Slaughter Gulch	4492	MYEV	M	NR	A	6.3	48	16				

**APPENDIX E. DOCUMENTED SPECIES LIST PER FOREST/DISTRICT
IN MONTANA**

BEAVERHEAD-DEERLODGE	
Butte	
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>
Dillon	
Big Brown Bat	<i>Eptesicus fuscus</i>
Hoary Bat	<i>Lasiurus cinereus</i>
California Myotis*	<i>Myotis californicus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Fringed Myotis	<i>Myotis thysanodes</i>
Long-legged Myotis	<i>Myotis volans</i>
Jefferson	
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Fringed Myotis	<i>Myotis thysanodes</i>
Madison	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Long-legged Myotis	<i>Myotis volans</i>
Pintler (Philipsburg/Deer Lodge)	
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>
Yuma Myotis	<i>Myotis yumanensis</i> +
Wisdom	
Little Brown Myotis	<i>Myotis lucifugus</i>
Wise River	
Big Brown Bat	<i>Eptesicus fuscus</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Western Long-eared Myotis	<i>Myotis evotis</i>

BITTERROOT	
Darby	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Stevensville	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Sula	
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
California Myotis	<i>Myotis californicus</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Long-legged Myotis	<i>Myotis volans</i>
West Fork	
Little Brown Myotis	<i>Myotis lucifugus</i>
CUSTER	
Ashland	
Pallid Bat	<i>Antrozous pallidus</i>
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Spotted Bat	<i>Euderma maculatum</i>
Eastern Red Bat	<i>Lasiurus borealis</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>
Beartooth	
Pallid Bat	<i>Antrozous pallidus</i>
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Spotted Bat	<i>Euderma maculatum</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
California Myotis*	<i>Myotis californicus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Fringed Myotis	<i>Myotis thysanodes</i>
Long-legged Myotis	<i>Myotis volans</i>

Sioux	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>
FLATHEAD	
Glacier View	
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Hungry Horse	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
California Myotis	<i>Myotis californicus</i>
Spotted Bear	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>
Swan Lake	
Hoary Bat	<i>Lasiurus cinereus</i>
California Myotis	<i>Myotis californicus</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>
Tally Lake	
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
California Myotis	<i>Myotis californicus</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>
GALLATIN	
Big Timber	
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Little Brown Myotis	<i>Myotis lucifugus</i>

Bozeman	
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>
Gardiner	
Big Brown Bat	<i>Eptesicus fuscus</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Hebgen Lake	
Little Brown Myotis	<i>Myotis lucifugus</i>
Livingston	
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>
HELENA	
Helena	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Fringed Myotis	<i>Myotis thysanodes</i>
Long-legged Myotis	<i>Myotis volans</i>
Lincoln	
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Fringed Myotis	<i>Myotis thysanodes</i>
Long-legged Myotis	<i>Myotis volans</i>
Townsend	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Fringed Myotis	<i>Myotis thysanodes</i>
Long-legged Myotis	<i>Myotis volans</i>
Yuma Myotis	<i>Myotis yumanensis</i> +

KOOTENAI	
Cabinet	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
California Myotis	<i>Myotis californicus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>
Yuma Myotis	<i>Myotis yumanensis</i> +
Fortine	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
California Myotis	<i>Myotis californicus</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>
Libby	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
California Myotis	<i>Myotis californicus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Fringed Myotis	<i>Myotis thysanodes</i>
Long-legged Myotis	<i>Myotis volans</i>
Yuma Myotis	<i>Myotis yumanensis</i> +
Rexford	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
California Myotis	<i>Myotis californicus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Western Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>

Three Rivers	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
California Myotis	<i>Myotis californicus</i>
Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>
LEWIS AND CLARK	
Belt Creek	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Judith	
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>
White Sulphur Spring	
Long-eared Myotis	<i>Myotis evotis</i>
Fringed Myotis	<i>Myotis thysanodes</i>
Yuma Myotis	<i>Myotis yumanensis</i> +
Musselshell	
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>
Rocky Mountain	
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>
Yuma Myotis	<i>Myotis yumanensis</i> +
LOLO	
Missoula	
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
California Myotis	<i>Myotis californicus</i>
Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>

Plains/Thompson Falls	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
California Myotis	<i>Myotis californicus</i>
Long-eared Myotis	<i>Myotis evotis</i>
Long-legged Myotis	<i>Myotis volans</i>
Superior	
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>
Hoary Bat	<i>Lasiurus cinereus</i>
California Myotis	<i>Myotis californicus</i>
Western Small-footed Myotis	<i>Myotis ciliolabrum</i>
Long-eared Myotis	<i>Myotis evotis</i>
Little Brown Myotis	<i>Myotis lucifugus</i>
Long-legged Myotis	<i>Myotis volans</i>

* tentative identification

+ species presence in the state in question