Year 2 NABat Surveys for the Rail Tie Wind Project, Albany County, Wyoming

Final Report

June 26 – July 1, 2020

Prepared for:

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EXECUTIVE SUMMARY

In June of 2020, Western EcoSystems Technology, Inc. initiated a second year of North American Bat Monitoring (NABat) surveys for the proposed Rail Tie Wind Project (Project) in Albany County, Wyoming. NABat surveys are acoustic and designed to inventory bat species that occur in the proposed Project Area while participating in a continent-wide program to monitor long-term bat activity trends by species. Comparisons are made to Year 1 NABat data within the Project Area where possible.

Between June 26 and July 1, 2020, NABat acoustic surveys were conducted at four quadrants of a grid assigned on a national level over five nights. Ultrasonic microphones for each Wildlife Acoustics Inc. Song Meter SM3BAT detector were placed near the ground at 5.0 feet (1.5 meters). Calls were initially analyzed using Kaleidoscope Pro 5.1.0 automated species identification software and then an experienced bat biologist qualitatively reviewed and labeled calls to species. A total of 1,254 bat passes were identified by the bat biologist over 20 detector-nights.

Kaleidoscope identified all 14 potentially occurring species, although only seven species were identified by the experienced bat biologist's subsequent qualitative review: big brown bat, eastern red bat, hoary bat, silver-haired bat, western long-eared bat, little brown bat, and fringed bat. These are the same seven species that were identified through qualitative call review in 2019 indicating there was no change in species composition between 2019 and 2020. Additionally, calls were labeled as the 40 kilohertz (kHz) *Myotis* frequency group, the high frequency group, low frequency group, and general *Myotis* group that could not be identified to species-level due to insufficient pulses or poor call quality, or because of call parameter overlap with sympatric species. The 40 kHz Myotis group includes three species with calls that are difficult to distinguish: little brown bat, western small-footed bat, and long-legged bat. It is possible western small-footed bat and long-legged bat occur in the Project although no diagnostic calls were identified. Hoary bat passes were the dominant species qualitatively labeled in both years, accounting for 14.5% of the bat calls in 2020 (13.7% in Year 1), followed by big brown bat (2.1%) and silver-haired bat (1.2%; both 3.2% in Year 1). As with the Year 1 results, no state- or federally listed species were documented in 2020. The pre-construction bat studies completed in the proposed Project Area will add to the growing body of research regarding the impacts of wind energy development on bats.

STUDY PARTICIPANTS

Larisa Bishop-Boros	Project Manager
Karl Kosciuch	Senior Project Manager
Larisa Bishop-Boros	Bat Biologist, Data Labeler, and Data Analyst
Kevin Murray	Report Reviewer
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REPORT REFERENCE

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INTRODUCTION

ConnectGen Albany County LLC (ConnectGen) is developing the proposed Rail Tie Wind Project (Project) in southeastern Albany County, Wyoming. Western EcoSystems Technology, Inc. (WEST) was contracted to complete a second year of North American Bat Monitoring (NABat) surveys. The objective of these surveys was to document a second year of species occurrence, at the same stations sampled in 2019. Following Wyoming Game and Fish Department (WGFD) recommendations in the April 12, 2019 coordination letter (WGFD 2019), the objective was met through qualitative call verification of automated species classifications during the summer maternity season. This report describes the results of the acoustic monitoring surveys conducted within the proposed Project Area June 26 – July 1, 2020 and provides comparisons to the Year 1 (2019) NABat data (Bishop-Boros and Kosciuch 2020) where possible.

STUDY AREA

ConnectGen's proposed 26,041-acre (10,538-hectare) Project Area is located near the town of Tie Siding and is situated along the Colorado-Wyoming border (Figure 1). The Project Area is at an approximate elevation of 7,700 feet (ft; 2,347 meters [m]) and is bisected by US Highway 287. Most of the Project Area is private land with approximately 5,000 ac (2,023 ha) of State land. The Project Area primarily consists of low mountain slopes with ponderosa pine (*Pinus ponderosa*) and lodgepole pine (*P. contorta*) habitat, with rock outcroppings and some rocky cliffs, and nearly level floodplains with grassland, shrub steppe, and rangeland habitat. According to the National Land Cover Database (Yang et al. 2018, Multi-Resolution Land Characteristics 2019), the Project area is dominated by shrub/scrub (16,711.9 ac [6,763.1 ha; 64.2%]) followed by herbaceous grassland (7,949.0 ac [3,216.8 ha; 30.5%]; Table 1, Figure 2). Evergreen forest (approximately 2.5% of the land cover), emergent herbaceous wetlands (2.1%), and woody wetlands (0.5%) provide bat foraging and roosting habitat (Table 1, Figure 2). Developed open space, open water, deciduous forest, barren land, and developed low and medium intensity land each compose less than 0.3% of the Project Area. Forested areas and rocky outcrops provide potential roosting habitat for bats, and the open water and wetlands provide good foraging and drinking habitat.

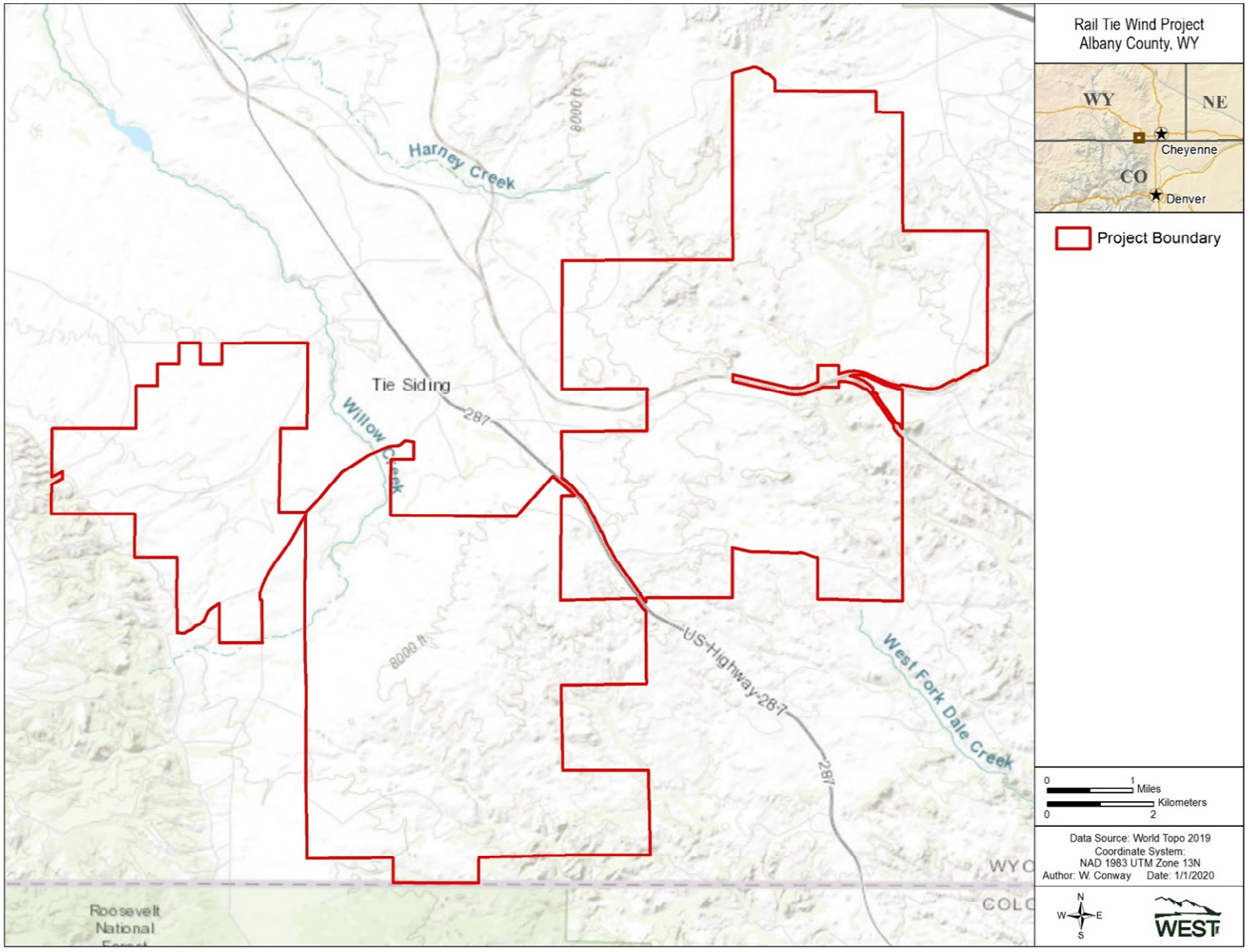

Figure 1. Location of the proposed Rail Tie Wind Project, Albany County, Wyoming.

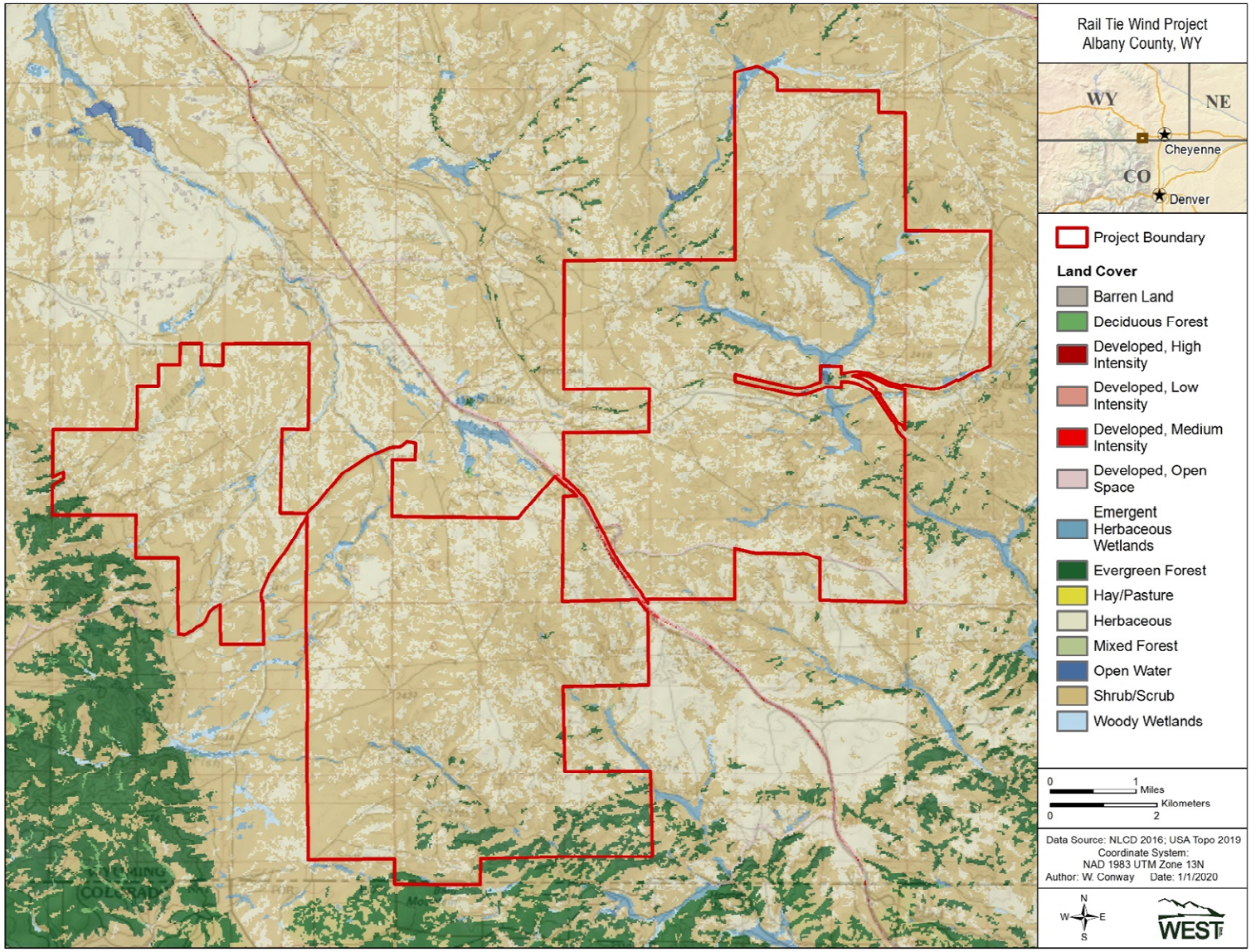

Figure 2. Land cover types and coverage within the proposed Rail Tie Wind Project, Albany County, Wyoming (Yang et al. 2018, Multi-Resolution Land Characteristics 2019).

Table 1. Land cover types, coverage, and percent (%) composition within the Rail Tie Wind Project, Albany County, Wyoming.

Land Cover Type	Coverage Acres	% Composition
Shrub/Scrub	16,711.9	64.2
Herbaceous Grassland	7,949.0	30.5
Evergreen Forest	641.9	2.5
Emergent Herbaceous Wetlands	554.7	2.1
Woody Wetlands	120.3	0.5
Developed, Open Space	48.3	0.2
Deciduous Forest	5.7	<0.1
Barren Land	5.0	<0.1
Developed, Low Intensity	4.0	<0.1
Open Water	0.2	<0.1
Developed, Medium Intensity	0.1	<0.1
Total	**26,041.1**	**100**

Source: National Land Cover Database (Yang et al. 2018, Multi-Resolution Land Characteristics 2019).
Note: Sums may not equal totals shown due to rounding.

Overview of Bat Diversity

Of the eighteen bat species that have been documented in Wyoming (Hester and Grenier 2005), fourteen species have some potential to occur within the Project Area (Table 2). The northern long-eared bat (*Myotis septentrionalis*; NLEB) is federally listed as threatened, although take by operating wind projects is exempt from the Federal Endangered Species Act of 1973 (ESA) take prohibitions (80 Federal Register [FR] 17974 [April 2, 2015], 81 FR 1900 [January 14, 2016]; US Fish and Wildlife Service [USFWS] 2016). Although the 2015 listing decision has not been vacated, a federal judge ruled on January 28, 2020 that the USFWS must make a new listing decision for the NLEB that does not include the current exemptions (Center for Biological Diversity v. Margaret Everson, Civil Action No. 15-477-EGS [D.D.C., filed January 28, 2020]). Wyoming marks the western extent of the NLEB range and the species has been documented almost exclusively in the Bear Lodge Mountains and Black Hills in the northeastern portion of the state (Abernethy 2019). The NLEB statewide range is limited to three counties in northeastern Wyoming (Crook, Campbell, and Weston counties). The species Area of Influence, which typically encompasses larger areas than the known occurrences (due to the direct and indirect effects development can cause to the species and the habitat they rely on), is also limited to those three counties (USFWS 2019). The closest Area of Influence is approximately 163 miles (mi; 262 kilometers [km]) north of the Project (USFWS 2019). NLEB do not migrate great distances and summer habitat is usually less than 35 mi (56 km) from winter hibernacula (Caceres and Barclay 2000). However, the NLEB has possibly been documented outside the Area of Influence; in August 2015, WGFD reported the mist-net capture of a NLEB in LaBonte Canyon, on the northern border of Albany County (Reeves 2017) although no further mist-net attempts in this area resulted in a NLEB capture and there is no photographic or genetic confirmation this individual was correctly identified as a NLEB (I. Abernethy, Wyoming Natural Diversity Database, pers. comm., 2020). Neither of these captures changed the expected occurrence range or Areas of Influence for the state (Reeves 2017, USFWS 2019). Historically within Wyoming, the NLEB was known exclusively from areas dominated by Ponderosa pine forest (Abernethy 2015), but recently NLEB were found to prefer aspen (*Populus* spp.) maternity roosts (61.5% of documented roosts)

followed by ponderosa pine (30.8%) and bur oak (*Quercus macrocarpa*; 7.7%) in the black hills of Wyoming (Wyoming Bat Working Group [WYBWG] 2019). Less than 1% of the Project contains Ponderosa pine and aspen habitat, so the Project is unlikely to be suitable even if it were within the species range. However, the western range of the NLEB has been expanding in recent years. In 2019, USFWS NLEB presence/probable absence surveys at oil and gas projects in Wyoming documented three acoustic calls, but no captures (WYBWG 2019), and in 2019, the NLEB range was extended an additional 62 mi (100 km) into Montana through capture surveys (WYBWG 2019). Therefore, qualitative review of acoustic data in the eastern portion of the Wyoming was recommended although the NLEB is unlikely to occur within the Project Area because it is not known to be a County resident and no Areas of Influence occur in the Project County or in any adjacent counties (USFWS 2019).

Eastern red bats (*Lasiurus borealis*), western small-footed bats (*Myotis ciliolabrum*), western long-eared bats (*M. evotis*), little brown bats (*M. lucifugus*), NLEB, long-legged bats (*M. volans*), spotted bat (*Euderma maculatum*), pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), and fringed bats (*M. thysanodes*) may also occur within the Project Area and are considered Species of Greatest Conservation Need by the WGFD (2017). Ten of the 14 potentially occurring species are known wind energy facility fatalities (Table 2).

Table 2. Bat species with potential to occur within the proposed Rail Tie Wind Project, Albany County, Wyoming, categorized by echolocation call frequency.

Common Name	Scientific Name
High-Frequency (≥30 kHz)	
eastern red bat[1,2,3]	*Lasiurus borealis*
little brown bat[1,2]	*Myotis lucifugus*
long-legged bat[1,2]	*Myotis volans*
northern long-eared bat[1,2,4]	*Myotis septentrionalis*
western long-eared bat[1,2]	*Myotis evotis*
western small-footed bat[1,2]	*Myotis ciliolabrum*
Low Frequency (15–30 kHz)	
big brown bat[1]	*Eptesicus fuscus*
fringed bat[2]	*Myotis thysanodes*
hoary bat[1,3]	*Lasiurus cinereus*
pallid bat[2]	*Antrozous pallidus*
silver-haired bat[1,3]	*Lasionycteris noctivagans*
Townsend's big-eared bat[2]	*Corynorhinus townsendii*
Very Low Frequency ≤15 kHz)	
big free-tailed bat[1,3]	*Nyctinomops macrotis*
spotted bat[2,3]	*Euderma maculatum*

[1] Carcasses detected at wind energy facilities (SWCA Environmental Consultants 2015, American Wind Wildlife Institute 2018).

[2] Species of Greatest Conservation Need (Wyoming Game and Fish Department 2017).

[3] Long-distance migrant.

[4] Federally listed as threatened under the Endangered Species Act of 1973.

Sources: International Union for Conservation of Nature 2017, US Fish and Wildlife Service 2019.

Khz = kilohertz.

White-nose Syndrome

Hibernating bats in North America are being severely impacted by white-nose syndrome (WNS), an infectious mycosis in which bats are infected with a psychrophilic fungus from Europe (*Pseudogymnoascus* [formerly *Geomyces*] *destructans*) thought to act as a chronic physiological disturbance during hibernation (USGS 2010, Minnis and Lindner 2013). Infected bats arouse frequently from hibernation, leading to premature loss of fat reserves and atypical behavior, which in turn, can lead to starvation prior to spring emergence (Boyles and Willis 2010, Reeder et al. 2012, Warnecke et al. 2012). Data suggests between 5.7 and 6.7 million bats died as a result of WNS by 2012 (USFWS 2012). WNS is the primary reason the USFWS recently listed the NLEB as threatened under the ESA (USFWS 2015). WNS was first discovered in New York State in 2006 (Frick et al. 2010) and the disease has spread to 33 states and seven Canadian provinces (WNS Response Team 2019), reaching as far south as Alabama, as far north as Newfoundland, and as far west as Washington (Heffernan 2016, WNS Response Team 2019). Recently, the fungus was identified in an additional five states, including Wyoming, Texas, Mississippi, North Dakota, and California, (WNS Response Team 2019) and low fungal levels were possibly detected in New Mexico and Arizona (National Park Service 2019, New Mexico Game and Fish Department 2019). In Wyoming, the fungus was first detected from skin-swab samples collected from a little brown bat at Fort Laramie National Historic Site in Goshen County on May 16, 2018 (WGFD 2018). The Fort Laramie National Historic Site is approximately 88 mi (141 km) to the northeast of the Project in Goshen County.

METHODS

At the recommendation of the WGFD, WEST conducted acoustic NABat monitoring studies to identify species occurrence from June 26 – July 1, 2020 at grid 18045 to overlap with the same dates surveyed in 2019.

North American Bat Stations

NABat is a national protocol that provides monitoring of local bat populations and regional bat population trends. Four full-spectrum Acoustics Song Meter SM3BAT ultrasonic detectors (SM3; Wildlife Acoustics Inc. [Wildlife Acoustics], Maynard, Massachusetts) were placed within a 6.2 x 6.2 mi (10.0 x 10.0 km) NABat grid section that overlapped the proposed Project Area (Table 3, Figure 3) between June 26 and July 1, 2019. Each detector was located in a separate 3.1 x 3.1 mi (5.0 x 5.0 km) quadrant within the grid, representing the northeast (NE), northwest (NW), southeast (SE), and southwest (SW) quadrants of the grid section. The NE detector was placed in grassland habitat representative of that quadrant near a stock pond (Appendix A). The SW detector was placed near a running stream near rocky outcrop habitat; habitat features likely to attract bats. The NW detector was placed at the top of a steep rocky ridge with isolated trees and above a thin trickling creek. The SE detector was placed on state land with the largest trees and some exposed rock. Microphones with windscreens were mounted atop approximately 5.0-ft (1.5-m) tall bamboo poles following the NABat protocol.

Table 3. Location and site description of 2020 North American Bat Monitoring Program survey sites at the proposed Rail Tie Wind Project.

Site ID	UTM Zone*	Easting	Northing	Site Description**
NE	13	463426	4545450	Open pond with herbaceous grassland
NW	13	458971	4542864	Steep ridge with trees across from rocky outcrop above creek
SE	13	465125	4538708	State land with trees and some exposed rock
SW	13	459474	4539245	Rocky outcrops and cliffs, stream with trees

*Collected using North American Datum 1983.

UTM = Universal Transverse Mercator.

**All sites in herbaceous grassland or shrub/scrub as classified by National Land Cover Database (Yang et al. 2018, Multi-Resolution Land Characteristics 2019).

Survey Schedule

Bat activity surveys were conducted from June 26 – July 1, 2020 to overlap with the nights of data collection in 2019 (June 27 – July 1), and the SM3 detectors were set to record from 18:00 until 08:00 to capture all bat calls within at least 30 minutes (min) before sunset until at least 30 min after sunrise.

Data Collection and Call Analysis

The SM3s were set using a trigger window of two seconds and a maximum file length of 15 seconds. SMM-U1 microphones with wind screens were used for data collection. All microphones were tested using an ultrasonic calibrator from Wildlife Acoustics and determined to meet factory threshold prior to deployment.

The SM3 is a full-spectrum bat detector that records complete acoustic waveforms by sampling sound waves at a rate of 256 kilohertz (kHz). This high sampling rate enables the detector to make high-resolution recordings of sound amplitude data at all frequencies up to 128 kHz. Full-spectrum data were transformed into zero-crossing data using the program Kaleidoscope Pro 5.1.0 (Kaleidoscope; Wildlife Acoustics [2009], Concord, Massachusetts), allowing data to be viewed in Analook© software (Analook 2004) as digital sonograms that show changes in echolocation call frequency over time. Frequency versus time displays were used to separate bat calls from other types of ultrasonic noise (e.g., wind, rain, insects) and to determine the call frequency category. The terms “bat pass” and “bat call” are used interchangeably. A bat pass was defined as a sequence of at least two echolocation calls (pulses) produced by an individual bat with no pause between calls of more than one second (Fenton 1980, Gannon et al. 2003).

Identification of calls was completed with the automated identification feature in Kaleidoscope using the Bats of North America classifier 5.1.0 at the neutral sensitivity setting (0). These settings and versions are approved by the USFWS for acoustic analysis of sensitive species. Kaleidoscope utilizes Hidden Markov Models and other statistical methods known for their application in temporal pattern recognition such as speech analysis, handwriting analysis, and deoxyribonucleic acid (DNA) sequencing (Agranat 2012).

Despite the capabilities of Kaleidoscope, many bat passes cannot be identified with absolute certainty, either because only call fragments were recorded due to the distance between the bat and microphone or because many bat species produce similar calls with overlapping call characteristics that often cannot be distinguished. Therefore, automated call identification is imperfect, and each identification has an associated error rate (USFWS 2013). In addition, the error rates associated with identifications of standard field-recorded bat calls have not been characterized for Kaleidoscope or other automated software packages. Error rates are usually determined using a subset of high-quality known calls collected as part of the same dataset used to build the statistical identification model, but were held out of the model-building process. For these reasons, the results of the automated acoustic identification can be misleading and should be viewed with caution. The Kaleidoscope output was used to generate a preliminary list of species that may have been present in the Project area and an experienced bat biologist reviewed all bat call identifications for accuracy. The experienced bat biologist (L. Bishop-Boros) qualitatively identified echolocation calls through visual comparison of echolocation call metrics (e.g., minimum frequency, slope, and duration) to reference calls of known bats (O'Farrell et al. 1999, Murray et al. 2001, Yates and Muzika 2006). A second qualified biologist with extensive acoustic identification experience (Dr. Kevin Murray) confirmed all qualitative call labels for quality assurance. If call sequences were not characteristic of the automated identification or contained distinct calls produced by a different species, or were of insufficient quality, they were reclassified.

Calls of insufficient quality or without diagnostic features present were instead sorted into groups by genus (such as 40 kHz Myotis), species group (such as big brown bat [*Eptesicus fuscus*] or silver-haired bat [*Lasionycteris noctivagans*], or pallid bat or big brown bat), or minimum frequencies. High-frequency (HF) bats, such as eastern red bats, have minimum frequencies greater than or equal to 30 kHz. Low-frequency (LF) bats, such as big brown bats, silver-haired bats, and hoary bats (*Lasiurus cinereus*), typically emit echolocation calls with minimum frequencies from 15–30 kHz. Very low-frequency (VLF) bats, such as big free-tailed bats and spotted bats, typically emit echolocation calls below 15 kHz. Table 2 lists HF, LF, and VLF species that could occur within the Project.

Statistical Analysis

The standard metric used for measuring bat activity is the number of bat passes per detector-night; this metric was used as an index of bat activity in the Project area. A detector-night was defined as one detector operating for one entire night. Bat passes per detector-night were calculated for all bats, HF bats, and LF bats. Bat pass rates represent indices of bat activity and do not represent numbers of individuals. An experienced bat biologist (L. Bishop-Boros) determined the number of bat passes using Analook.

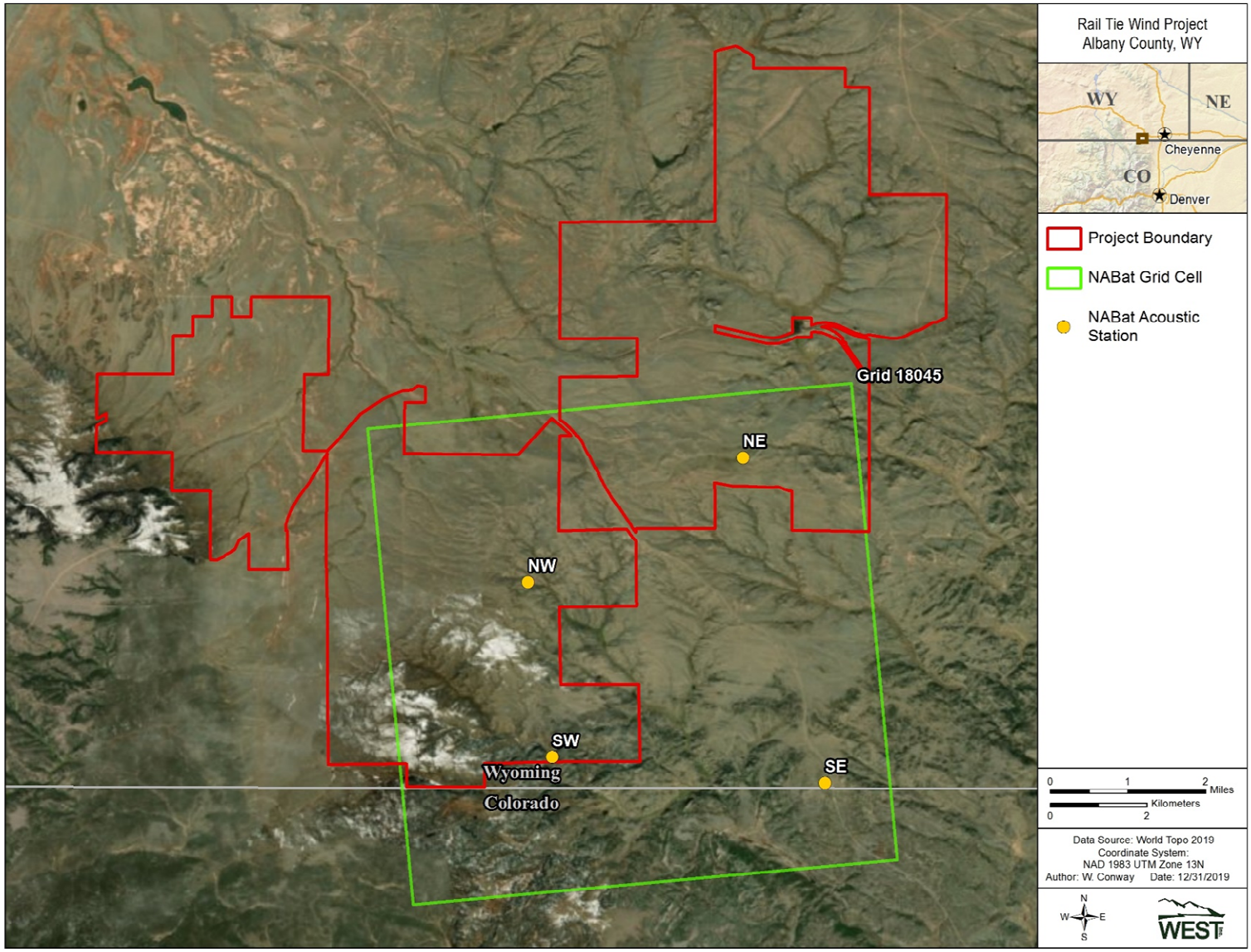

Figure 3. Location of North American Bat Monitoring (NABat) grid and stations within the proposed Rail Tie Wind Project, Albany County, Wyoming.

RESULTS

The four stations deployed concurrently for NABat surveys were 100% operational. Kaleidoscope identified 1,336 files as bat calls, 874 of which were identified to all 14 species that potentially occur within the Project area (Tables 2, 4, 5, and 6). A qualified bat biologist verified calls, reclassifying all but 205 of them, including reviewing 462 files (473 calls due to the presence of multiple bats in single call files) that Kaleidoscope could not identify to species (Tables 4 and 5). Eight species and 1,254 calls were identified as bat passes during qualitative review (Table 5). Hoary bat was the main species qualitatively identified to species-level, composing 14.5% of all bat calls. Big brown bats and silver-haired bats were the next most commonly detected species, composing 2.1% and 1.2% of calls, respectively (Table 6). Fifteen western long-eared bat calls, 11 fringed bat, four little brown bat, and one eastern red bat, were also identified to species-level (Table 6). The remaining calls were classified as big brown bat or silver-haired bat group (42.4%), unknown LF bats (18.4% of bat passes), unknown HF bats (8.3%), 40 kHz Myotis group (7.4%), pallid bat or big brown bat group (2.1%), or unknown Myotis group (0.9%; Table 6). The 40 kHz Myotis group includes three species (little brown bat, western small-footed bat, and long-legged bat) that have overlapping call characteristics and rarely produce calls with diagnostic features distinguishable from the other species. No calls were identified as big free-tailed bat, pallid bat, Townsend's big-eared bat, long-legged bat, NLEB, spotted bat, or western small-footed bat (Table 6). A single bat pass at the southwest station was identified as a potential NLEB call by Kaleidoscope, but determined to be an unknown *Myotis* species upon qualitative call review. This call had a minimum slope less than 100 octaves per second (ops), which is not characteristic of NLEB calls. The NW station recorded the third most bat passes with Kaleidoscope classifications, but the fewest calls due to Kaleidoscope labeling Noise files as bat passes (Table 5).

Table 4. Number of bat calls identified by Kaleidoscope during 2020 North American Bat Monitoring Program survey sites at the proposed Rail Tie Wind Project.

Survey Site	Total Call Files	Total Bat Calls	Calls Identified	Detector-Nights
NE	195	166	111	5
NW	432	178	66	5
SE	701	675	449	5
SW	355	317	248	5
Total	**1,683**	**1,336**	**874**	**20**

Table 5. Number of bat calls and species identified by Kaleidoscope and qualitative review at each station during 2020 North American Bat Monitoring Program survey sites at the proposed Rail Tie Wind Project.

	Kaleidoscope		Qualitative Review	
Survey Site	**Total Bat calls**	**# Species Identified**	**Total Bat calls**	**# Species Identified**
NE	166	8	165	3
NW	178	9	80	3
SE	675	8	686	5
SW	317	13	322	5
Total	**1,336**	**14**	**1,253**	**7**

Table 6. Species summaries after qualitative review of all Kaleidoscope Pro 5.1.0 auto classification of 2020 North American Bat surveys.

Site Identification	NE	NW	SE	SW	Total*
ANPA	0	0	0	0	0
ANPAEPFU	1	0	25	0	26
COTO	0	0	0	0	0
COTOMYTH	0	0	0	2	2
EPFU	0	0	26	0	26
EPFULANO	19	36	410	67	532
EUMA	0	0	0	0	0
LABO	1	0	0	0	1
LACI	44	9	6	123	182
LANO	0	0	11	4	15
40 kHz Myotis	38	12	34	9	93
MYCI	0	0	0	0	0
MYEV	0	1	12	2	15
MYLU	2	0	0	2	4
MYSE	0	0	0	0	0
MYSP	2	1	1	7	11
MYTH	0	6	1	4	11
MYVO	0	0	0	0	0
NYMA	0	0	0	0	0
HF	38	5	13	48	104
LF	20	10	147	54	231
Total	**165**	**81**	**686**	**322**	**1,253**

ANPA = pallid bat; ANPAEPFU = pallid bat or big brown bat; COTO = Townsend's big-eared bat; COTOMYTH = Townsend's big-eared bat or fringed bat; EPFU = big brown bat; EPFULANO = big brown bat or silver-haired bat; EUMA = spotted bat; LABO = eastern red bat; LACI = hoary bat; LANO = silver-haired bat; 40 kilohertz (kHz) Myotis = Myotis in the 40 kHz frequency range (such as MYCI, MYVO, MYLU); MYCI = western small-footed bat, MYEV = western long-eared bat; MYLU = little brown bat; MYSE = northern long-eared bat; MYSP = unknown Myotis species; MYTH = fringed bat, MYVO = long-legged bat; NYMA = big free-tailed bat; HF= High-Frequency Bat (≥30 kHz); LF= Low-Frequency Bat (≤30 kHz).

*Species with 0 total were classified as present by Kaleidoscope but were determined not to occur based on qualitative call review.

DISCUSSION

The goal of NABat is long-term monitoring for changes in species occupancy over a range-wide scale and not to detect small variations in overall bat activity among quadrants. Bat activity is

known to vary significantly among nights and among years (Hayes 1997, Agosta et al. 2005) and with only four to five nights sampled from an entire season, differences in activity among years may be due to sampling bias alone, even without the influence of weather, annual variation, or the timing of volant juveniles foraging on the landscape for the first time (Bishop-Boros 2014). Thus, NABat monitoring provides a snapshot of the bat species community and activity within a grid cell during the summer maternity season. NABat, and other long-term wildlife monitoring programs such as the US Geological Survey (USGS)-monitored North American Breeding Bird Survey, provide most value when examining changes in species composition or population trends overtime. There is limited inference into activity data when attempting to determine causes for differences between sampling years as environmental covariates are not collected as part of the protocol. Thus, we do not attempt to determine potential causes of activity rate differences between NABat results from 2019 and 2020, and differences in species composition should also be interpreted with caution given the study design is intended to consider these data on a long-term scale.

Spatial Variation

At NABat stations, approximately twice as many bat calls (686) were recorded at the SE station, which was located along a drift fence on public land followed by the SW station located near a stream and rocky outcrops. To improve call quality in 2020, the NABat SE station was given a Polyvinyl chloride (commonly “PVC”) tube to extend the microphone 1.0 ft (0.3 m) further from the drift fence, which may account for the increase in activity here. It is possible bats investigate novel items in their landscape more closely than those that blend in with the existing environment (Tyberac 2017).

Species Composition

Acoustically detected species diversity was greater in 2020 than 2019 for Kaleidoscope call identifications (four fewer potential species identified in 2019 than 2020). Upon qualitative review, species diversity in 2020 did not differ from Year 1. In 2020, Kaleidoscope identified calls of all 14 bat species that have the potential to occur within the Project area. Following qualitative call review, however, the same seven species identified in the Project in Year 1 were confirmed in 2020: big brown bat, eastern red bat, hoary bat, silver-haired bat, western long-eared bat, little brown bat, and fringed bat. As in Year 1, a single bat pass Kaleidoscope identified as a potential NLEB. This call was identified as an unknown 40 kHz Myotis by qualitative review. This call had a minimum slope less than 100 ops, which is not characteristic of NLEB call.

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Appendix A: Site Photos for Rail Tie Bat Acoustic Surveys

Appendix A1. Photo of the Northeastern site for North American Bat Surveys.

Appendix A2. Photo of the Northwestern site for North American Bat Surveys.

Appendix A3. Photo of the Southeastern site for North American Bat Surveys.

Appendix A4. Photo of the Southwestern site for North American Bat Surveys.