



TO: TECHNICAL ADVISORY COMMITTEE (TAC)
FROM: EXECUTIVE DIRECTOR'S OFFICE (EDO)
SUBJECT: 2024/2025 ACOUSTIC BAT SURVEYS
DATE: APRIL 17, 2025

The EDO has started proactively gathering information on bat species occurring on Program properties. We began to build capacity in this area in 2023 and 2024 to better assist the Program in meeting USFWS requirements to minimize impact on listed bat species while implementing management actions to benefit target species. Surveys at sites with suitable bat habitat will be used when future management actions may require consultation on bat species, and to help inform range maps for bat species of concern.

The EDO is requesting TAC feedback on two items:

- Does the TAC have feedback on survey sites, survey methods, level of effort, reporting of results, data sharing formats, etc.?
- What would you like to see from the EDO moving forward?

I. Background

The United States Fish and Wildlife Service (USFWS) published a final rule to reclassify the northern long-eared bat (NLEB) as endangered under the Endangered Species Act (ESA) on November 29, 2022. On September 13, 2022 the USFWS announced the proposed listing of the tricolored bat (TCB) as endangered. Since then, the USFWS has provided tools and technical assistance documents to provide guidance, facilitate ESA compliance for development projects (such as tree removal and work on culverts or bridges), as well as work proactively with partners to conserve bats within NLEB and TCB ranges ([USFWS 2025a](#), [USFWS 2025c](#)). These tools are designed to be utilized by agencies with project scopes within the consultation range for each species (**Figure 1**, [USFWS 2024b](#)). For both species the state of Nebraska is within the hibernating range where bats roost in trees during the summer occupancy period (**Figure 2**, [USFWS 2024b](#)). Riparian forest along the central Platte River within the Platte River Recovery Implementation Program's (PRRIP or Program) Associated Habitat Reach (AHR) provides suitable habitat for foraging and maternal roosting colonies from May through late July. Thus, the Program as a federally funded Recovery Program must consult with the USFWS under section 7(a)(2) of the ESA when an action, like tree removal, *may affect* a listed species. Since the listing and proposed listing of NLEB and TCB, the Program has conducted two tree removal projects (Dipple in 2023 and Lindstrom in 2024), both of which occurred in the fall outside the active, breeding period of NLEB. In both cases, the Program worked collaboratively with the USFWS Nebraska Field Office to screen the proposed projects through the NLEB Determination Key (DKey) in the USFWS's Information for Planning and Consultation (IPaC) application and provide additional information as requested by the USFWS. The result of these informal consultations in both cases was a letter of concurrence from the USFWS for the determination of both projects as "may affect, not likely



to adversely affect” NLEB. In neither instance were acoustic bat surveys required to arrive at this determination.

II. EDO Biologist Training

The purpose for conducting acoustic surveys is to determine whether NLEB and/or TCB are present or probable absent at a given site during the summer, active season. When collected by trained biologists in accordance with USFWS survey guidelines and using a USFWS approved study plan, negative survey results are valid for 5 years from their completion unless new information (e.g., other nearby surveys) suggests otherwise ([USFWS 2024a](#)). To build capacity to perform surveys that meet USFWS guidelines, the EDO sent three biologists to approved USFWS courses to be trained on acoustic monitoring and acoustic call analysis for species identification. Biologists attended one of two different training sessions that encompassed both eastern and western bat species diversity. These courses focused on field methods for proper placement and set up of acoustic monitoring equipment, including where and how to place the detectors for best performance. Additionally, the training covered data processing and workflow to use Kaleidoscope Pro and SonoBat software (USFWS approved) to clean noise from the dataset, evaluate the characteristic acoustic signatures of bat calls, and identify bat species based on calls.

III. Purpose of surveys on PRRIP properties

An initial pilot study was implemented by EDO biologists in 2024 to gain experience implementing acoustic surveys and performing data analyses to identify bat species by call signature to meet USFWS guidelines ([USFWS 2024a](#)). The area proposed for tree removal in the fall of 2024 on the Lindstrom tract in the Cottonwood Ranch complex was included in the 2024 summer pilot study to collect information on NLEB presence or probable absence prior to project implementation. No tree clearing is planned in the near future on Program properties, but continued surveys can help the Program get a jump on acquiring baseline information on bat species presence or probable absence on Program properties and their distribution within the AHR. Survey data can assist with planning projects to avoid potential impacts and inform the consultation process reducing potential delays in implementation when/if tree removal or bridge/culvert projects are necessary.

Gathering and sharing baseline information on bat species presence or probable absence in relation to the Program’s AHR also addresses the Program’s Purpose B, *“When doing so will not reduce resources available to target species, the Program will also manage Program lands to benefit non-target listed species and non-listed species of concern and to reduce the likelihood of future listing. When feasible, the Program will provide regulatory certainty with respect to those non-target, listed species.”*

IV. 2024 Acoustic Survey – Pilot Study

In 2024, three study sites were initially selected for acoustic bat monitoring within the summer active survey window between May 15th and August 15th. The tracts surveyed were McCormick, Bartels and Johns (Elm Creek complex), Belf and Volentine (Jerry Kenny Pawnee complex, hereafter Pawnee complex), and Meyers (Chapman complex) (**Figure 3**). These sites were selected



because they contain suitable roosting and foraging habitat for NLEB and are distributed across the Program's AHR. These sites are also close to off-channel sand and water plover and tern nesting sites, so EDO biologists prioritizing monitoring of plover and tern productivity could also efficiently implement bat monitoring during seasons that overlap. In late June, it was decided to also survey an area on the Lindstrom tract (Cottonwood Ranch complex) where a tree clearing project was planned for the fall of 2024 (**Figure 3**). For this purpose, we removed the detector from the Pawnee complex to be used at Lindstrom.

Each complex was split into multiple sections of <123 acres each (maximum area of individual sampling units according to USFWS survey guidelines, [USFWS 2024a](#)). Sections were evaluated to determine appropriate locations for acoustic monitoring placement (i.e., fence rows, road cuts, open fields, and water features). Because we had only a single detector to survey multiple sections for each complex, we randomized the order of appropriate survey locations within a complex to determine deployment order, making sure at least 2 locations per section were surveyed over the survey period to meet USFWS guidelines.

Equipment specifications, set up of acoustic recorders and microphones, and data collection followed USFWS survey guidelines ([USFWS 2024a](#)). Detector settings were based on the recommendations provided by the manufacturer ([Wildlife Acoustics, 2024](#)). Calls were collected as Wav audio files. To reduce the risk of recording multiple individuals within a single Wav file, the detectors recorded only 6 seconds max of each call. We used a trigger window of one second between when a call stops recording and another call may be recorded. Thus, individual Wav files or calls are not necessarily independent or from unique individuals and cannot be used to estimate abundance.

Wav files were processed to ensure audio files were high quality and met survey requirements. If any of the following weather conditions occurred at a survey site during acoustic sampling, the survey effort for that night did not count toward total effort and resulting acoustic detections were invalid:

- temperatures fall below 50°F (10°C) during the first 5 hours after sunset;
- precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently during the first 5 hours after sunset; and
- sustained wind speeds greater than 9 miles/hour (4 meters/second; 3 on Beaufort scale) for 30 minutes or more during the first 5 hours after sunset ([USFWS 2024a](#)).

Detector nights during which any or all of these conditions occurred were removed from our count of detector nights for a valid survey. For the pilot study we did analyze the Wav files collected during these conditions to get a better sense of bat diversity, but these calls do not officially count as USFWS approved survey results. Wav files were also processed to remove noise prior to species identification.

We used two automated acoustic bat identification software programs, Kaleidoscope Pro and SonoBat, both USFWS approved software, to identify bat calls to species ([USFWS 2025b](#)). Any



calls receiving an automated identification as potential NLEB or TCB were sent to a USFWS approved specialist for vetting (Brett Anderson at the Nebraska Game and Parks Commission).

Many of the sampled sections did not meet USFWS requirements for a valid survey due to weather conditions that reduced the number of detector nights below the 14-night minimum in at least two locations per <123-acre section (**Table 1**). Only three sections were completed to USFWS standards during the 2024 pilot study: 1) the Lindstrom tree clearing project area, 2) the slew at McCormick, and 3) the homestead area at Meyers. Those surveys met USFWS survey requirements in 2024 and should be valid for 5 years.

No NLEB or TCB calls were detected at any of the sampled locations in 2024. Species present at the Program complexes surveyed included big brown bat, eastern red bat, evening bat, hoary bat, and silver haired bat (**Table 2**).

V. 2025 Acoustic Survey

The 2025 survey will generally follow the same experimental design, data processing, and analyses for call identification as the 2024 pilot study, as survey guidelines are determined by a USFWS-approved protocol. The study sites proposed for acoustic bat monitoring in 2025 are shown in **Figure 4** and include:

- Cottonwood Ranch (N side of channel) and Stall tracts within the Cottonwood Ranch complex
- Valentine and Belf within the Pawnee complex
- Dipple
- Binfield within the Shoemaker Island complex

These sites were chosen to distribute bat surveys from west to east, gathering information on the distribution of bat species across the AHR. Proposed sites include riparian forest with suitable bat roosting habitat close to the river channel in areas where tree removal may occur if necessary in the future to widen unforested corridor widths for whooping crane roosting. These sites are also relatively close to plover and tern nesting sites to make set up and maintenance efficient for biologists monitoring birds and bats during the summer season. The Valentine and Belf tracts will be resurveyed in 2025 because the survey was not completed last year due to prioritization of the Lindstrom tree clearing area.

In 2024 our inability to obtain 14 detector nights in at least two locations per section under USFWS approved survey conditions was due to weather, detectors being knocked over or equipment failure, and being limited by a single detector per site. We will adjust in 2025 by setting up two detectors per <123-acre block at appropriately spaced locations to collect data in tandem to meet the minimum number of detector nights per section. We will also do more frequent maintenance checks on detectors while they are in the field and prior to moving a detector to ensure continuity of data collection. We will check daily weather conditions at each site through the season and calculate detector nights lost due to weather conditions prior to moving the detectors. Detectors will be moved only after minimum requirements for an approved USFWS survey have been met.



These changes will improve the number of valid surveys completed in a season and provide survey results that can be used in future consultations as needed.

VI. 2025 Estimated Effort

During the bat monitoring season, May 15th through August 15th, we estimate a total of 102 hours (about 26 hours dedicated to bat monitoring per biologist over the monitoring season) across the four complexes with two sections surveyed each. We estimate three hours dedicated to set up/relocation/take down of each pair of detectors per surveyed section. Assuming we can sample two sections over the course of the survey period, we estimate six hours per complex, for a total of 24 hours dedicated to equipment setup/takedown/relocation over the four complexes. To avoid losing data, we will be checking the detectors battery and SD cards weekly to ensure continuity in data collection. This includes data download, review, and checking weather compliance. We estimate about 1.5 hours per week per complex allocated to detector maintenance and data management over the 13-week survey period, for a total of 78 hours through the season.

After the season concludes, the focus will shift to data processing and analyses. Sifting noise files takes some initial processing time. We then use an automated call identification process in both Kaleidoscope Pro and SonoBat. This task takes a few minutes to set up at the beginning of each run, but will run in the background, requiring little to no attention. Time is invested in reviewing Wav files identified by the automated process as belonging to NLEB or TCB. Those files are then sent to a USFWS approved specialist for vetting. We will then summarize, write up, and present results. Based upon 2024 effort, we estimate around 50 hours post-season to perform all these tasks and compile the information gathered for four complexes with two sampled sections each to produce a written report and shared ArcGIS file for 2025.

VII. References Cited

United States Fish and Wildlife Service. 2024a. Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines. U.S. Fish and Wildlife Service, Region 3, Bloomington, MN. 95 pp. https://www.fws.gov/sites/default/files/documents/2024-10/2024_usfws_rangewide_ibat-nleb_survey_guidelines.pdf

United States Fish and Wildlife Service. 2024b. Standing Analysis and Implementation Plan – Northern Long-Eared Bat and Tricolored Bat Assisted Determination Key, version 1, August 2024. Midwest and Northeast Region, Bloomington, MN and Hadley, MA. 71 pp. https://www.fws.gov/sites/default/files/documents/2024-10/20240913_signed_final_nleb-and-tcb-rangewide-key_standing-analysis-version-1.0-1.pdf

United States Fish and Wildlife Service (USFWS). 2025a. Northern long-eared bat. Accessed April 14, 2025. <https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis>



United States Fish and Wildlife Service 2025b. Automated Acoustic Bat ID Software Programs. Accessed April 14, 2025. <https://www.fws.gov/media/automated-acoustic-bat-id-software-programs>

United States Fish and Wildlife Service (USFWS). 2025c. Tricolored bat. Accessed April 14, 2025. <https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus>

Wildlife Acoustics. 2024. Song Meter SM4BAT FS Bioacoustics Recorder User Guide. <https://www.wildlifeacoustics.com/uploads/user-guides/SM4-BAT-FS-USER-GUIDE-EN-2024-06-11.pdf>

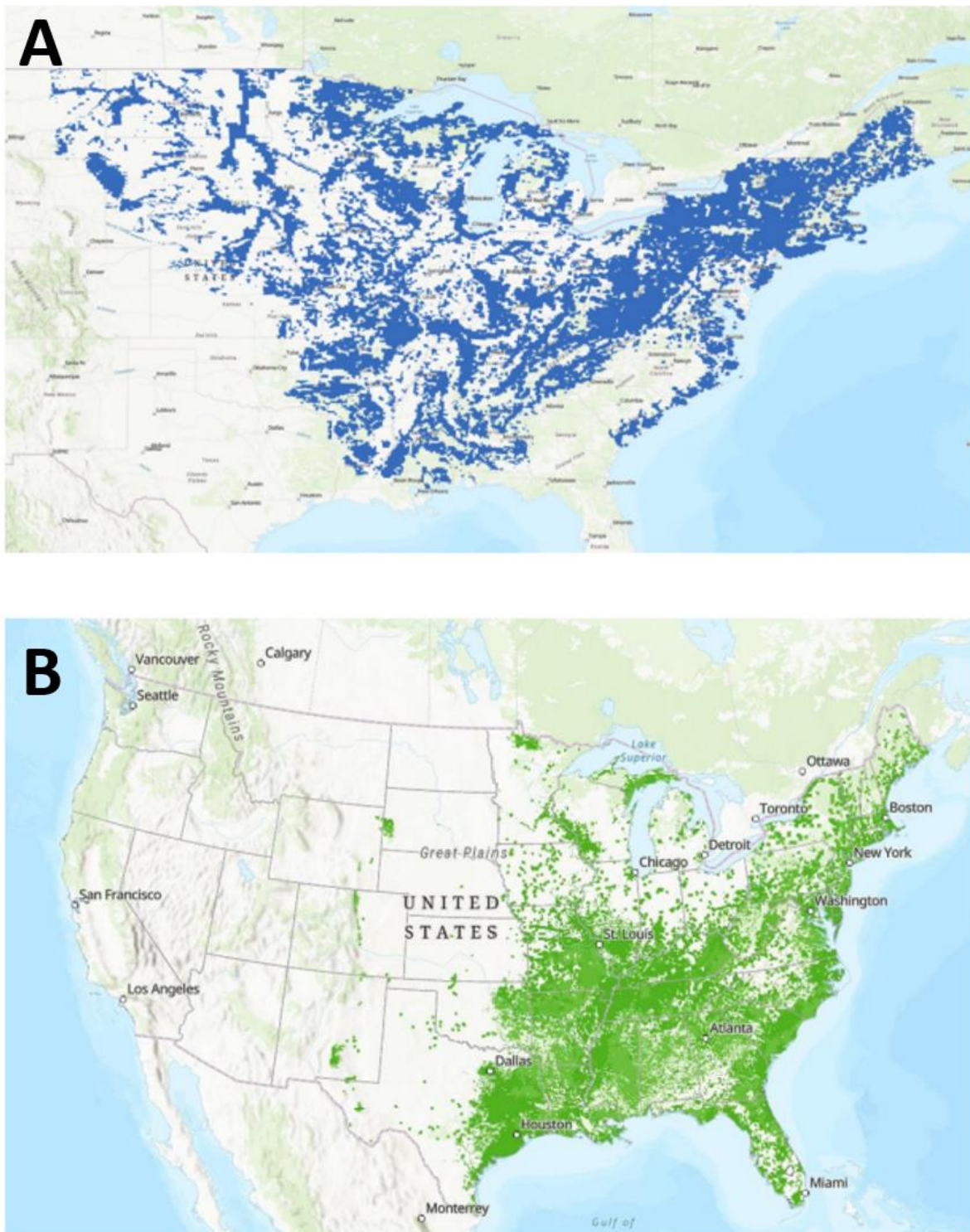


Figure 1. Consultation range for A) northern long-eared bat (blue) and B) tricolored bat (green) ([USFWS, 2024b](#)).

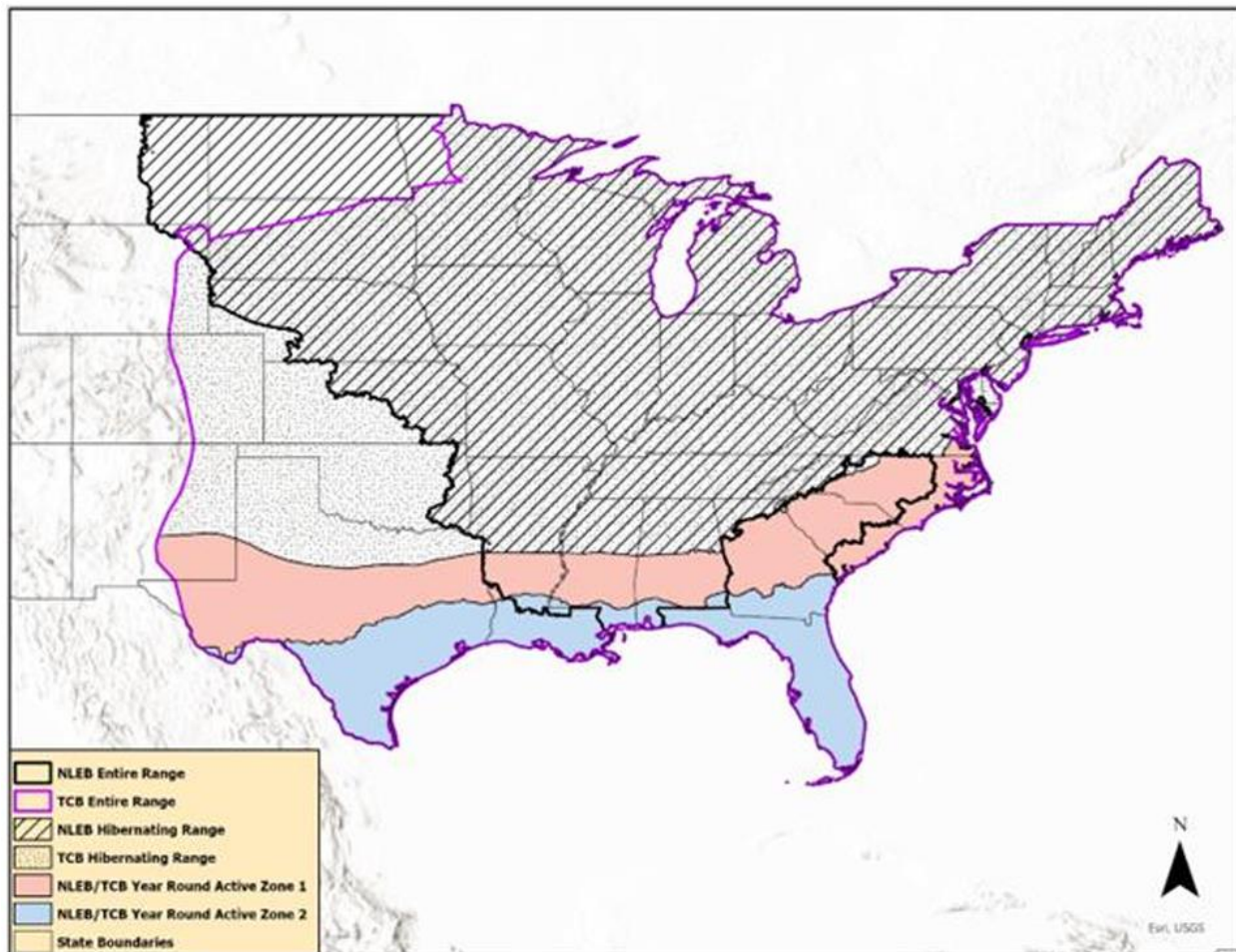


Figure 2. NLEB and TCB hibernating and year-round active ranges. ([USFWS, 2024b](#)). The Program’s AHR is within the NLEB and TCB hibernating range, where these bats roost in trees during the summer occupancy period.

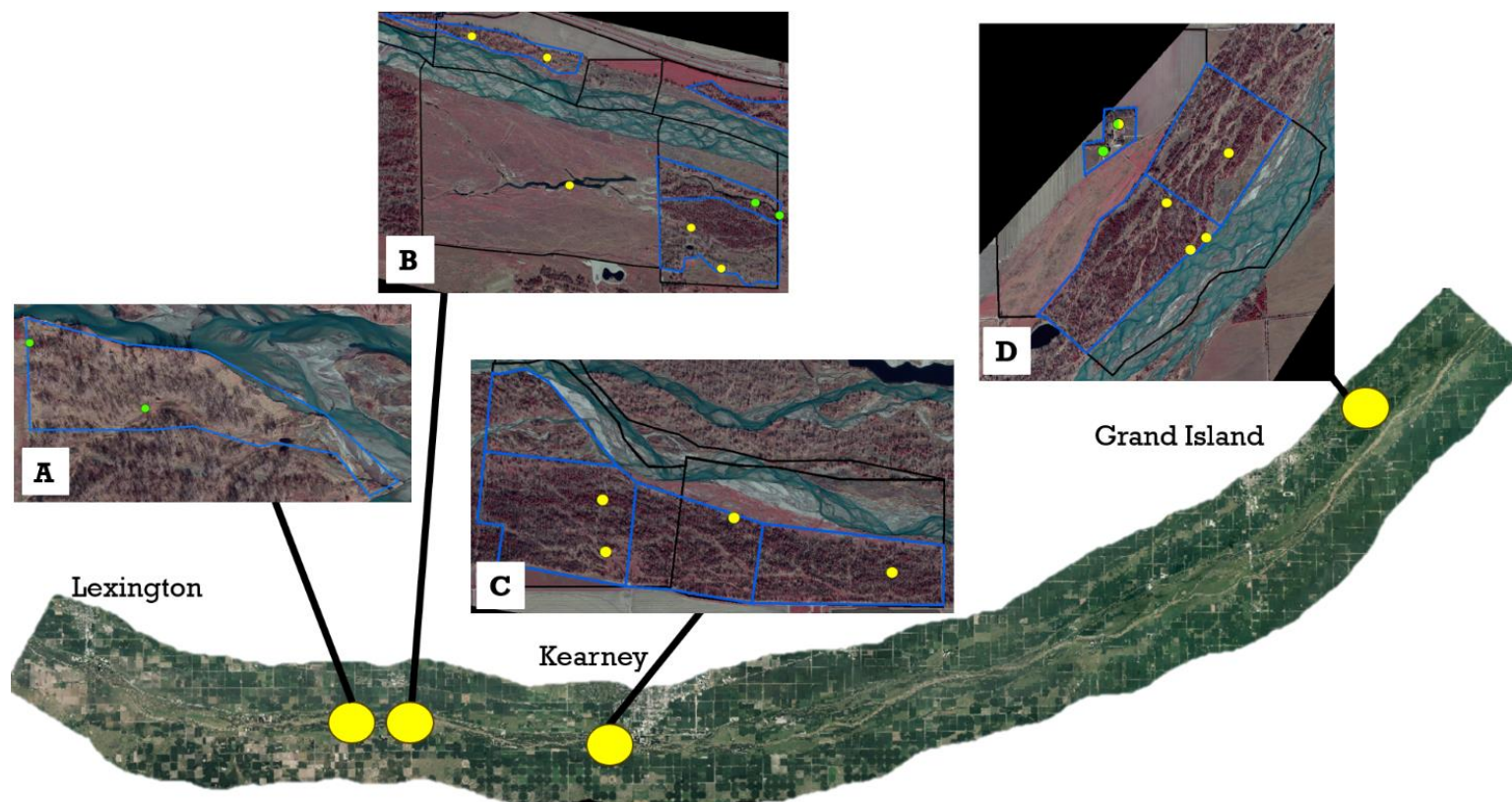


Figure 3. Program tracts and complexes surveyed in 2024 for NLEB and TCB depicting acoustic survey locations at A) Lindstrom, Cottonwood Ranch complex between Overton and Elm Creek, B) McCormick, Bartels, and Johns, Elm Creek complex between Elm Creek and Odessa, C) Belf and Volentine, Pawnee complex just south of Kearney, and D) Meyers, Chapman complex between Grand Island and Chapman. Blue lines are sections within a tract, each <123 acres. Surveyed locations that did not meet minimum survey requirements are indicated within sections with yellow dots. Green dots are surveyed locations that together met minimum requirements for survey results to be valid for that section for 5 years.

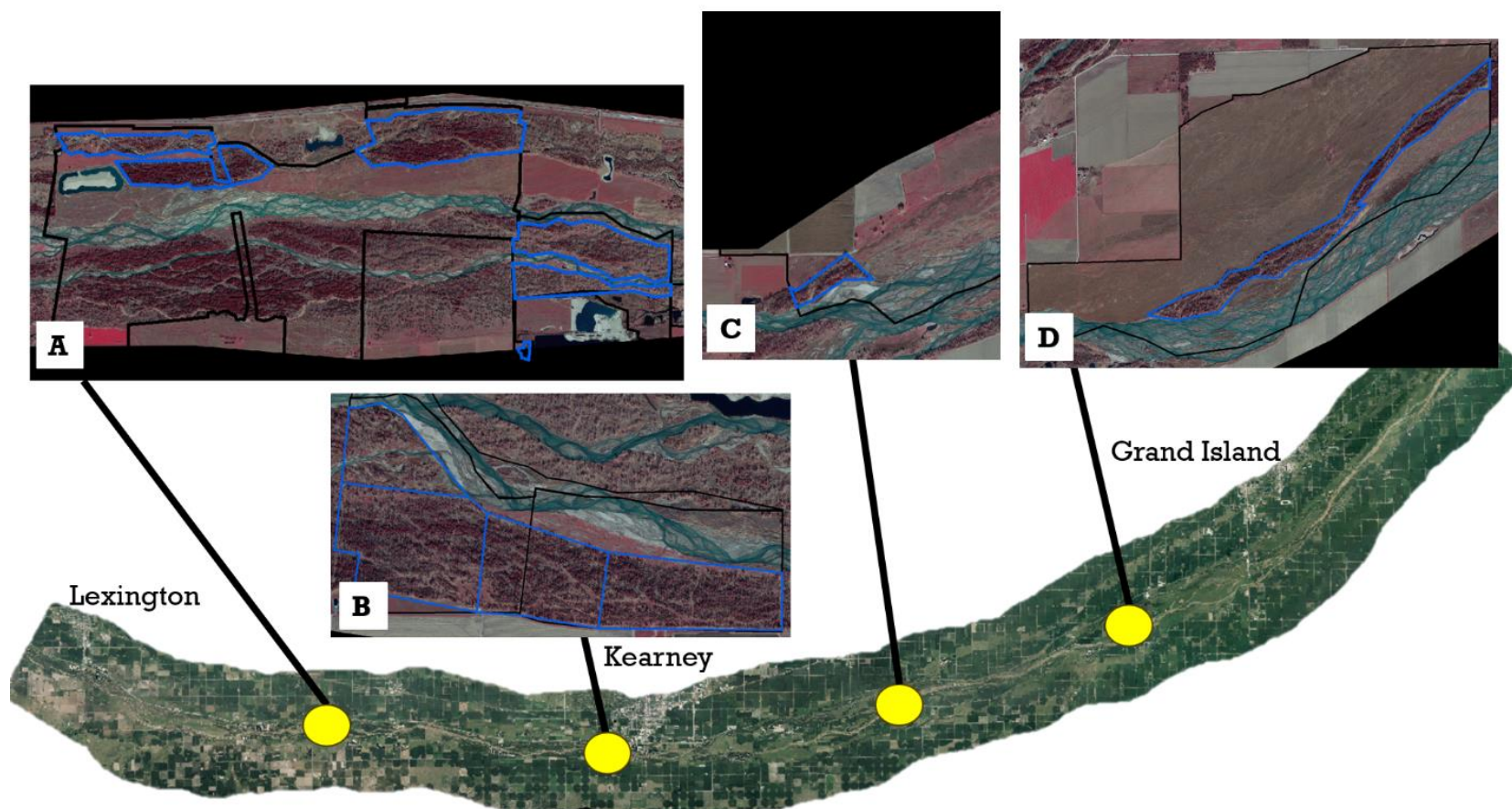


Figure 4. Program tracts and complexes proposed for survey in 2025 for NLEB and TCB at A) Cottonwood Ranch and Stall, Cottonwood Ranch complex between Overton and Elm Creek, B) Belf and Volentine, Pawnee complex just south of Kearney, C) Dipple, between Gibbon and Shelton, and D) Binfield, Shoemaker Island complex between Wood River and Alda. Blue lines are sections within a tract, each <123 acres.



Complex	Tract	Section*	Location	Date Range	Detector Nights	Nights Eliminated by Detector Failure	Nights Eliminated by Wind	Nights Eliminated by Rain	Valid Detector Nights	Notes
Cottonwood	Lindstrom	A	1	July 3-July 18	15	0	6	0	9	
Ranch	Lindstrom	A	2	July 18- Aug 1	14	0	5	0	9	
Elm Creek	Bartels	B	1	May 22- June 5	14	0	7	1	6	
	Bartels	B	2	June 5-June 19	14	3	8	2	1	Batteries failed
	McCormick	C	1	July 3-July 18	15	0	6	0	9	
	McCormick	C	2	Aug 1-Aug 15	14	0	4	1	9	
	McCormick	D	1	June 19- July 3	15	0	8	2	5	
	McCormick	D	2	July 18- Aug 1	14	2	5	0	7	Detector knocked over
	Johns	K	1	May 15th-May 22	7	0	5	1	1	
Pawnee	Belf	E	1	May 22- June 5	14	0	7	1	6	
	Belf	E	2	June 19- July 3	15	0	8	2	5	
	Volentine/Belf	F	1	June 5-June 19	14	0	8	2	4	
	Volentine	G	1	May 15th-May 22	7	0	5	1	1	
Chapman	Meyers	H	1	May 22- June 5	14	14			0	Microphone malfunctioned
	Meyers	H	1	June 5-June 19	14	0	2	7	5	
	Meyers	H	2	July 3-July 18	15	0	1	1	13	
	Meyers	I	1	June 19- July 3	15	0	2	6	7	
	Meyers	J	1	May 15th-May 22	7	0	0	4	3	
	Meyers	J	2	July 18- Aug 1	14	0	2	6	6	
	Meyers	J	3	Aug 1-Aug 15	14	14	0	0	0	SD card corrupted

*Green indicates sections where USFWS survey requirements were met and results should be valid for 5-years.

Table 1. Program complexes and tracts surveyed for NLEB and TCB in 2024. Each tract was divided into sections <123 acres. Each section was surveyed at two or three locations to achieve a minimum of 14 valid detector nights at a minimum of two locations under stipulated survey conditions. If any of the following weather conditions existed at a survey site during acoustic sampling, the survey effort for that night did not count toward the total and resulting acoustic detections were invalid: a) temperatures fall below 50°F (10°C) during the first 5 hours after sunset; (b) precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently during the first 5 hours after sunset; and (c) sustained wind speeds greater than 9 miles/hour (4 meters/second; 3 on Beaufort scale) for 30 minutes or more during the first 5 hours after sunset.



Table 2. Number of bat calls per species collected at each complex from May 15, 2024 through August 15, 2024. Detectors are set up to record 6 seconds of a detected call with a pause of 1 second before recording another call. Thus, calls are not independent and not necessarily from unique individuals. In addition, data are not adjusted for sampling effort (detector nights). Thus, call numbers are not an appropriate indicator of abundance.

Species	Elm Creek Complex	Pawnee Complex	Meyers Complex
Big Brown Bat	13,428	10,459	9,077
Eastern Red Bat	1,300	900	1,041
Evening Bat	1,918	664	606
Hoary Bat	1,910	571	653
Silver Haired Bat	254	129	142