Bat Acoustic and Roost Surveys for the MSHCP Amendment

PRESENTED TO:

Clark County – Desert Conservation Program

desert conservation PROGRAM

PRESENTED BY:

Mike Swink
Biology Team Lead
mswink@swca.com

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BAT SURVEY PROJECTS FOR DCP:

2023-SWCA-2315A:

Bat [Acoustic and Roost] Surveys

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

BAT SURVEY PROJECTS FOR DCP:

2023-SWCA-2315A:

Bat [Acoustic and Roost] Surveys

2023-SWCA-2315F:

Bat Acoustic Data Analysis for the MSHCP Amendment

Pallid Bat (*Antrozous pallidus*)

BACKGROUND - BAT SURVEYS FOR MODEL REFINEMENT

Spotted Bat

- The Clark County Desert Conservation Program is currently developing a proposed amendment to the MSHCP
- To aid in this effort, habitat suitability models were developed for species included in the amendment (Nussear and Simandle 2020; Nussear 2019)
- These models will be used to identify potential areas for conservation

BACKGROUND - BAT SURVEYS FOR MODEL REFINEMENT

Spotted Bat

- Two bat species proposed under MSHCP amendment: Spotted Bat (*Euderma maculatum*, or EUDMAC) and Townsend's Big-eared Bat (*Corynorhinus townsendii*, or CORTOW)
- Initial habitat modeling for both species indicated the need for additional occurrence records to increase accuracy

PROJECT GOAL

Townsend's Big-eared Bat

Increase detections for two target bat species across Clark County to update and refine habitat suitability models

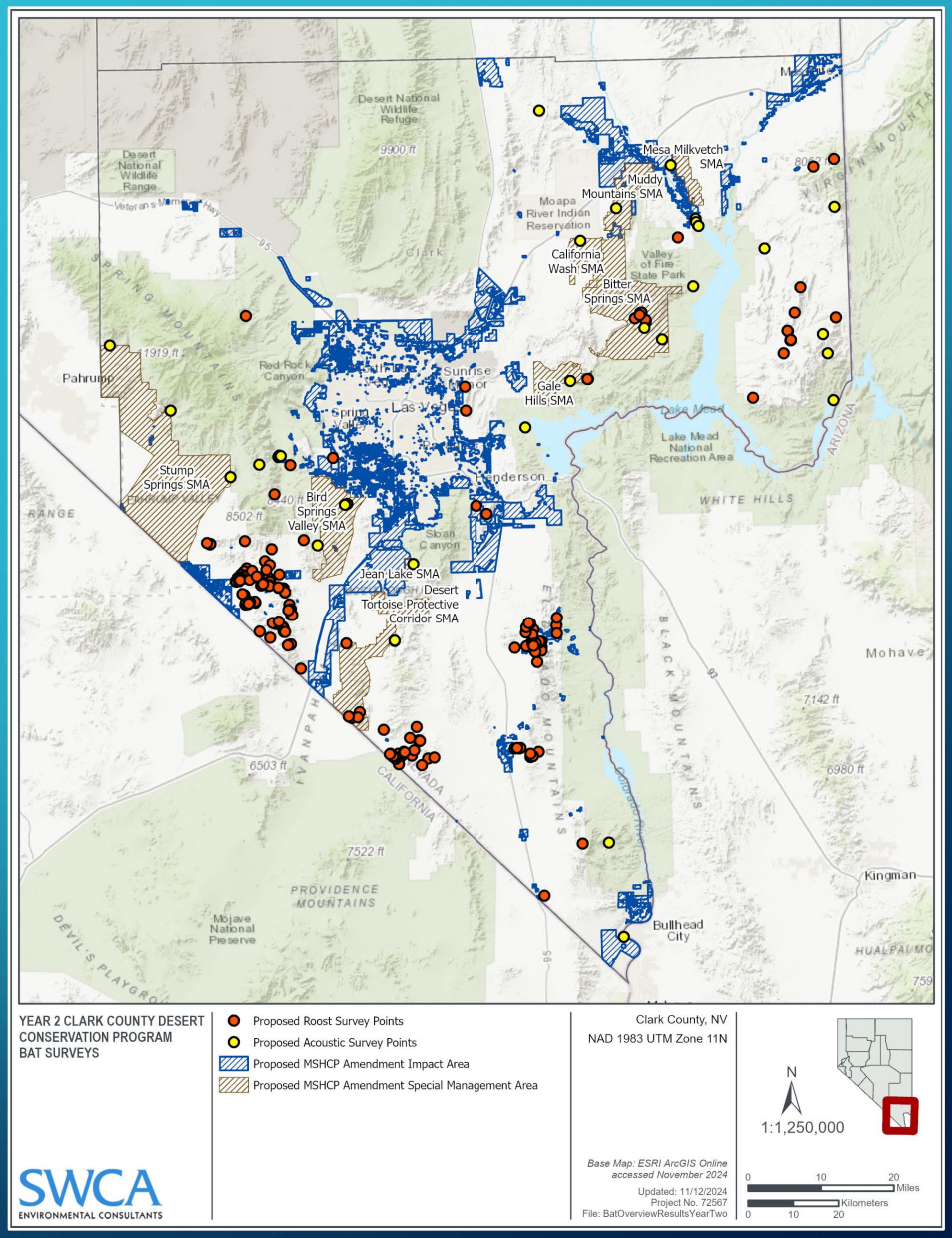
METHODS – ACOUSTIC AND ROOST SURVEYS

Year 1

- Acoustic: Jun.-Sept. 2022
- Roost: Aug. 2022, Feb. 2023

Year 2

- Roost: Aug. 2023, Feb. 2024
- Acoustic: May-Sept. 2024



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- **Roost: Aug. 2023, Feb. 2024**
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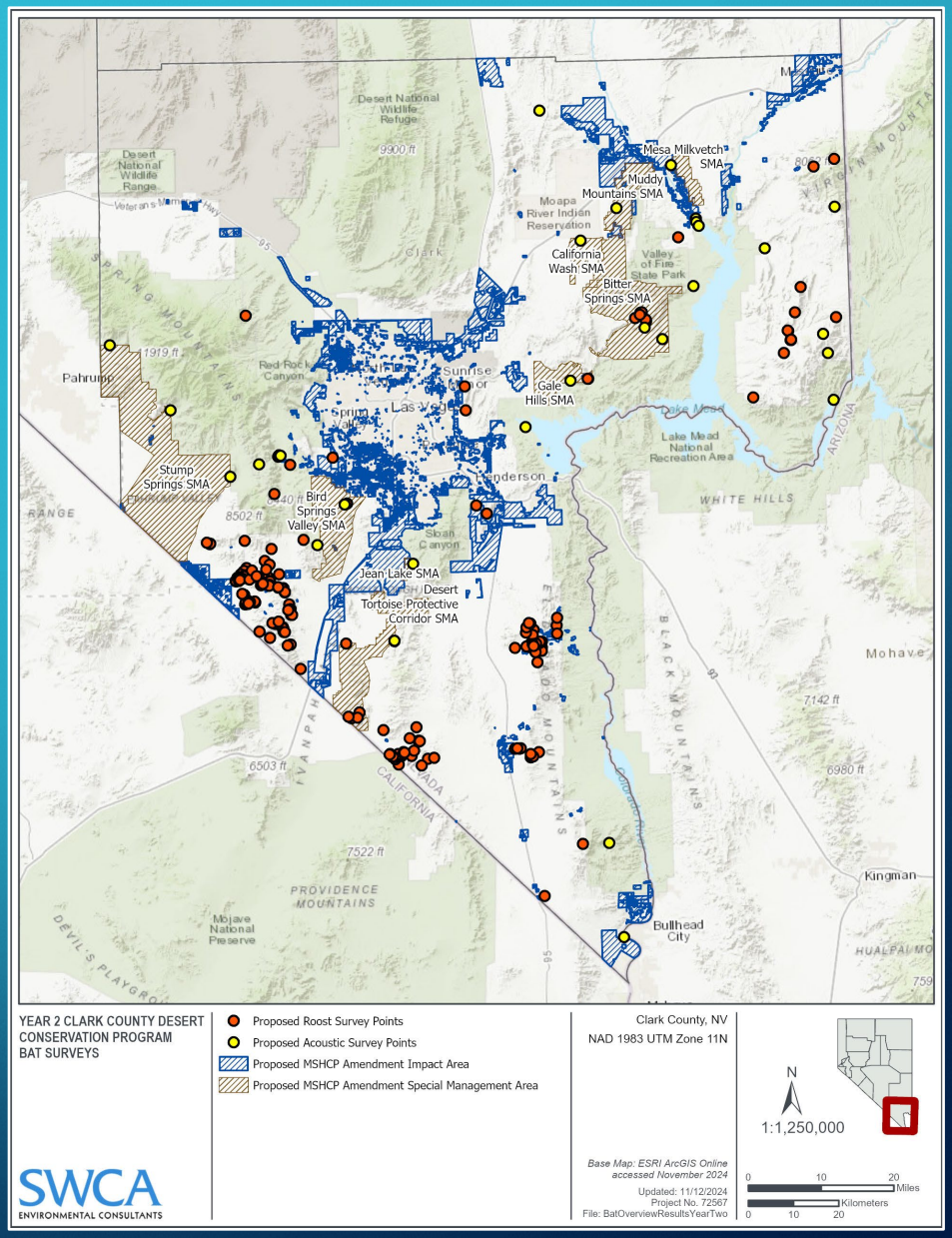
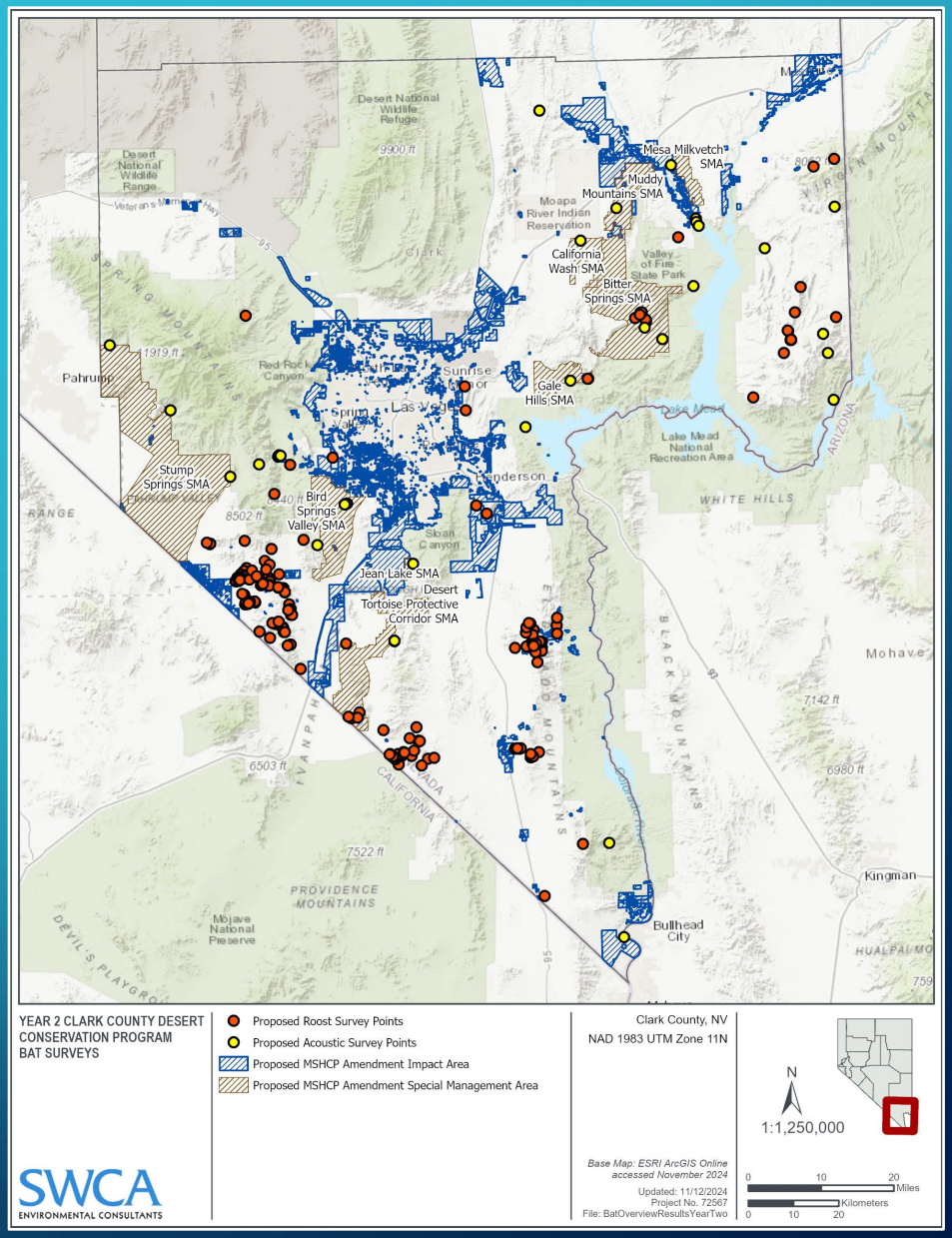


METHODS – PASSIVE ACOUSTIC SURVEYS

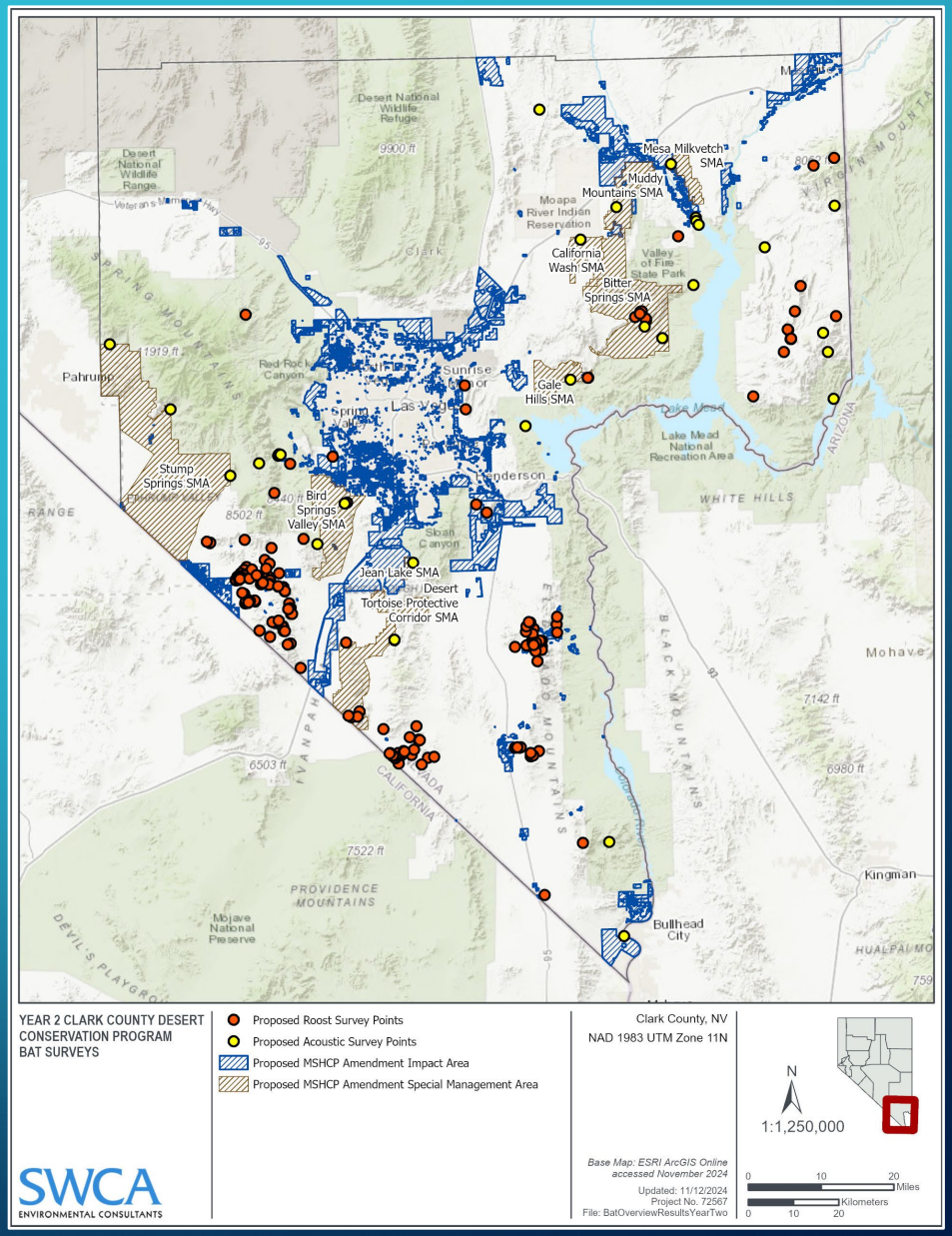
- Habitat suitability models used to select sites – preference for predicted habitat lacking detections
- 34 potential acoustic survey sites developed through desktop analysis
- Acoustic survey approach prioritized for EUDMAC detections
- Roost surveys targeted CORTOW



METHODS – PASSIVE ACOUSTIC SURVEYS

Selection of acoustic survey site locations based on several preferred criteria:

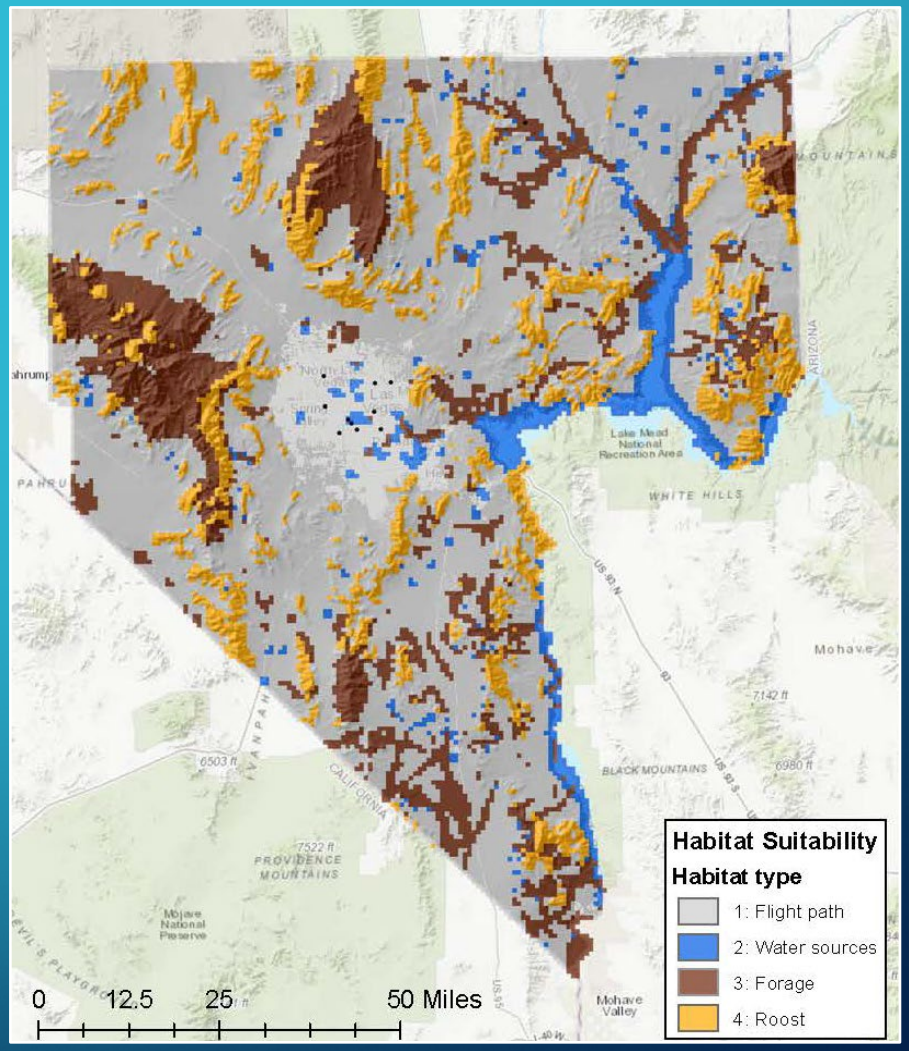
- **Within a proposed MSHCP Amendment Special Management Area**



METHODS – PASSIVE ACOUSTIC SURVEYS

Selection of acoustic survey site locations based on several preferred criteria:

- Within a proposed MSHCP Amendment Special Management Area
- **Within "foraging" habitat class for EUDMAC**

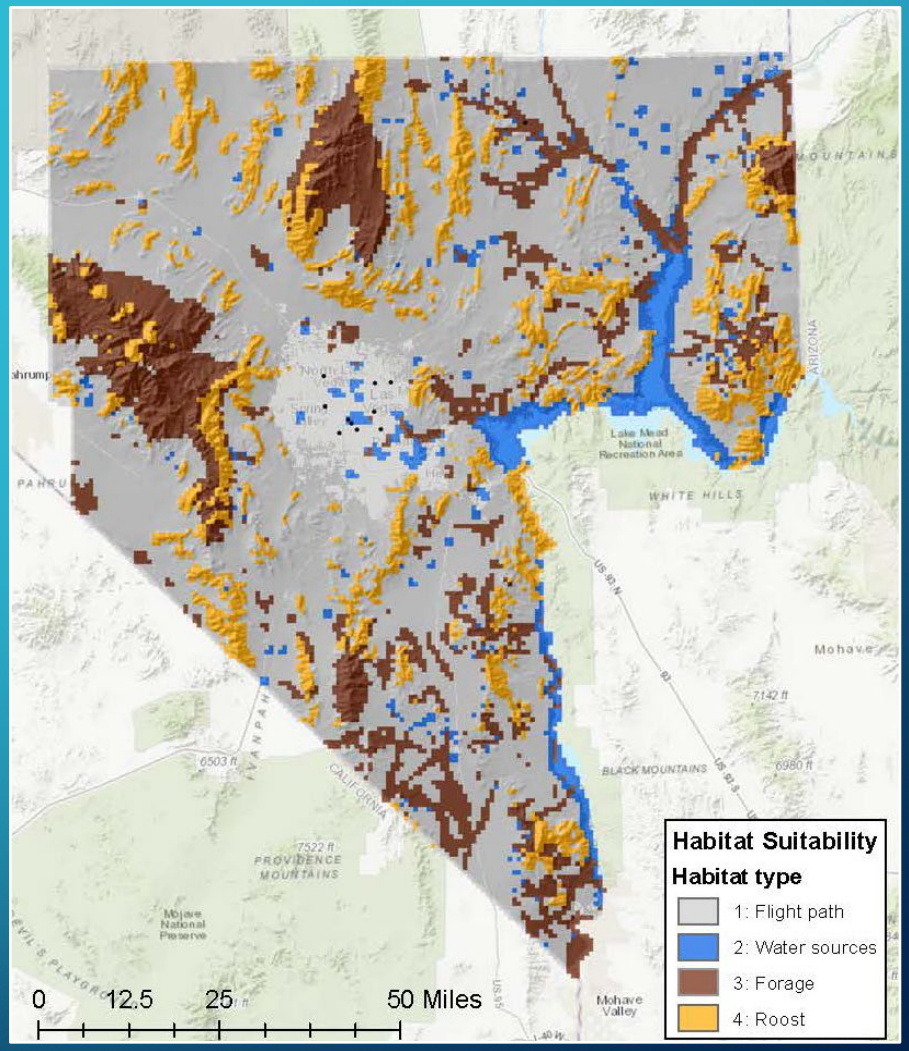


EUDMAC Habitat Suitability Model

METHODS – PASSIVE ACOUSTIC SURVEYS

Selection of acoustic survey site locations based on several preferred criteria:

- Proximity to a road navigable with a truck (≤1 mile preferred)
- On public land



EUDMAC Habitat Suitability Model

METHODS – PASSIVE ACOUSTIC SURVEYS

- 30 acoustic survey locations visited May 3 — Sept 13, 2024
- 6-11 consecutive detector-nights per location (mode = 7)

METHODS – PASSIVE ACOUSTIC SURVEYS

Equipment:

Wildlife Acoustics SM4BAT-FS Full Spectrum Detector with an omnidirectional SMM-U1 microphone attached to an aluminum pole (4-7.5 meters above ground surface)

METHODS – PASSIVE ACOUSTIC SURVEYS

Equipment:

- Detector stored in plastic dry-storage ammo box and covered with plywood to reduce internal temperatures
- Microphone cable wrapped in split wire loom to reduce damage from rodents/UV

METHODS – PASSIVE ACOUSTIC SURVEYS

Detector Audio Settings:

Parameter	Setting
Gain	0-12 dB
16k high filter	Off
Sample rate	256 khz
Min duration	1.5 ms
Max duration	50 ms
Minimum Trigger Frequency	7 khz
Trigger Level	12 db
Trigger Window	2 s
Maximum Length	15 s
Compression	none
Schedule	-30 min sunset, +30 min sunrise

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METHODS – ROOST SURVEYS

- Two roost survey periods (summer, winter) to document maternity, day and night roosting, and hibernation use
- 65 roost surveys: 33 mines surveyed in summer, 32 in winter
- Prioritized adits < 1 mile from road with extensive internal workings and no CORTOW records

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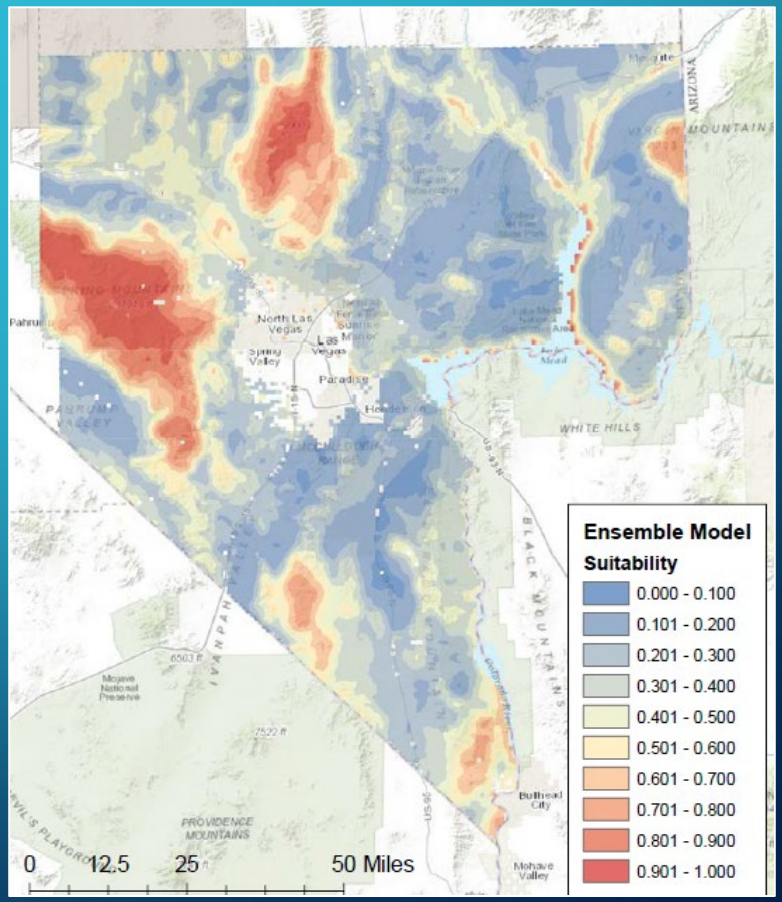

METHODS – ROOST SURVEYS

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RESULTS – ACOUSTIC AND ROOST SURVEYS

Common Name	Scientific Name	6-letter Code	Acoustic	Roost
Pallid bat	*Antrozous pallidus*	ANTPAL	X	X
Townsend's big-eared bat	*Corynorhinus townsendii*	CORTOW	X	X
Big brown bat	*Eptesicus fuscus*	EPTFUS	X	
Spotted bat	*Euderma maculatum*	EUDMAC	X	
Western bonneted bat	*Eumops perotis*	EUMPER	X	
Allen's big-eared bat	*Idionycteris phyllotis*	IDIPHY	X	
Silver-haired bat	*Lasionycteris noctivagans*	LASNOC	X	
Northern hoary bat	*Lasiurus cinereus*	LASCIN	X	
Desert red bat	*Lasiurus frantzii*	LASFRA	X	
Western yellow bat	*Lasiurus xanthinus*	LASXAN	X	
Californian leaf-nosed bat	*Macrotus californicus*	MACCAL	X	X
California myotis	*Myotis californicus*	MYOCAL	X	
Western small-footed myotis	*Myotis ciliolabrum*	MYOCIL	X	
Long-eared myotis	*Myotis evotis*	MYOEVO	X	
Fringed myotis	*Myotis thysanodes*	MYOTHY	X	
Long-legged myotis	*Myotis volans*	MYOVOL	X	
Yuma myotis	*Myotis yumanensis*	MYOYUM	X	
Pocketed free-tailed bat	*Nyctinomops femorosaccus*	NYCFEM	X	
Canyon bat	*Parastrellus hesperus*	PARHES	X	X
Brazilian free-tailed bat	*Tadarida brasiliensis*	TADBRA	X	X

- 20 bat species detected within Clark County in Years 1 and 2, including CORTOW and EUDMAC

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RESULTS – ACOUSTIC SURVEYS

Target Species	Site ID	Site Description	MSHCP Status*	Habitat Rating	No. of Files
Spotted bat (*Euderma maculatum*)	OW-04	Overton Wildlife Management Area (OWMA)	–	Foraging	21
	GB-04	Red Bluff Spring	–	Foraging	17
	BI-02	West Longwell Ridge	SMA	Roosting	11
	OW-02	OWMA	–	Foraging	11
	OW-03	OWMA	–	Foraging	9
	BI-01	Bitter Spring	SMA	Foraging	4
	MU-01	California Ridge	SMA	Flight Area	2
	BR-01	Bowman Reservoir	SMA	Water Sources	1

- 76 EUDMAC acoustic detections from eight locations

RESULTS – ACOUSTIC SURVEYS

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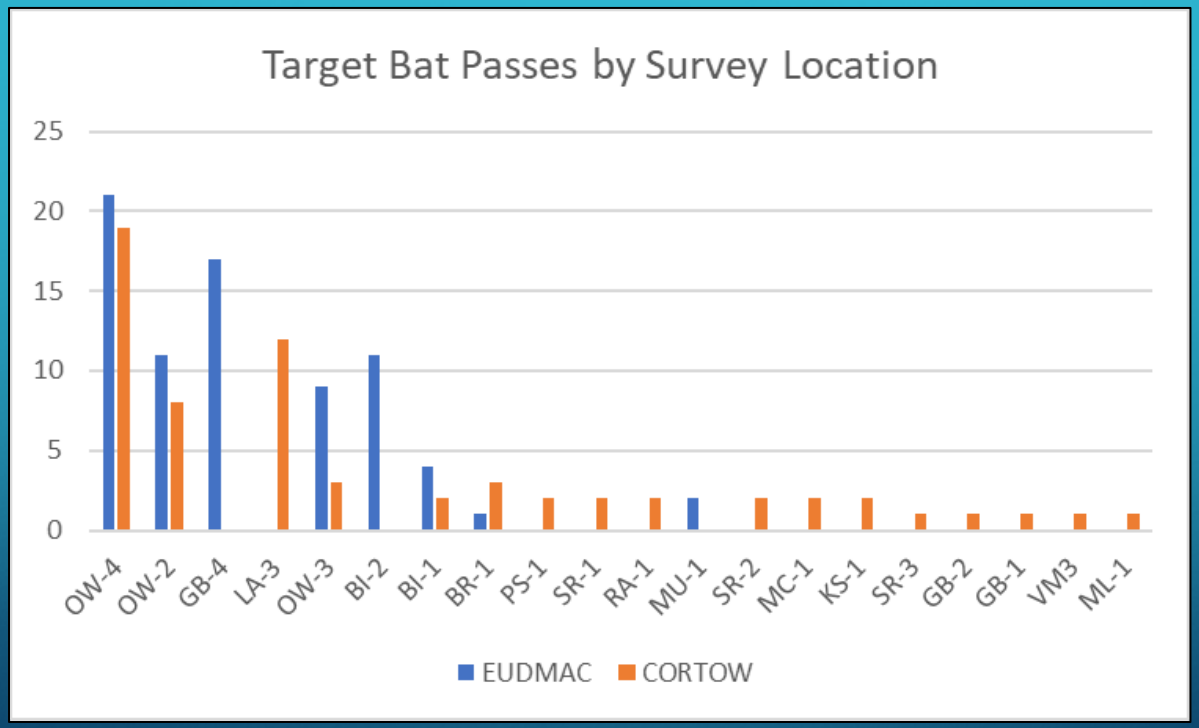
Townsend's big-eared bat (*Corynorhinus townsendii*)	OW-04	Overton Wildlife Management Area (OWMA)	–	Marginal	19
	LA-03	Laughlin, Colorado River	–	Marginal	12
	OW-02	OWMA	–	Suitable	8
	BR-01	Bowman Reservoir	SMA	Marginal	3
	OW-03	OWMA	–	Marginal	3
	BI-01	Bitter Spring	SMA	Unsuitable	2
	KS-01	Kiup Spring	SMA	Suitable	2
	MC-01	McClanahan Spring	SMA	Unsuitable	2
	PS-01	Pipe Spring	–	Suitable	2
	RA-01	Rainbow Spring	–	Suitable	2
	SR-01	Spring Mountain Ranch State Park (SMRSP)	–	Suitable	2
	SR-02	SMRSP	–	Marginal	2
	GB-01	Summit Spring	–	Unsuitable	1
	GB-02	Connoly Spring	–	Unsuitable	1
	ML-01	Mule Spring	SMA	Suitable	1
	SR-03	SMRSP	–	Marginal	1
	VM-03	Cabin Spring	–	Marginal	1

- 64 CORTOW acoustic detections from 17 locations

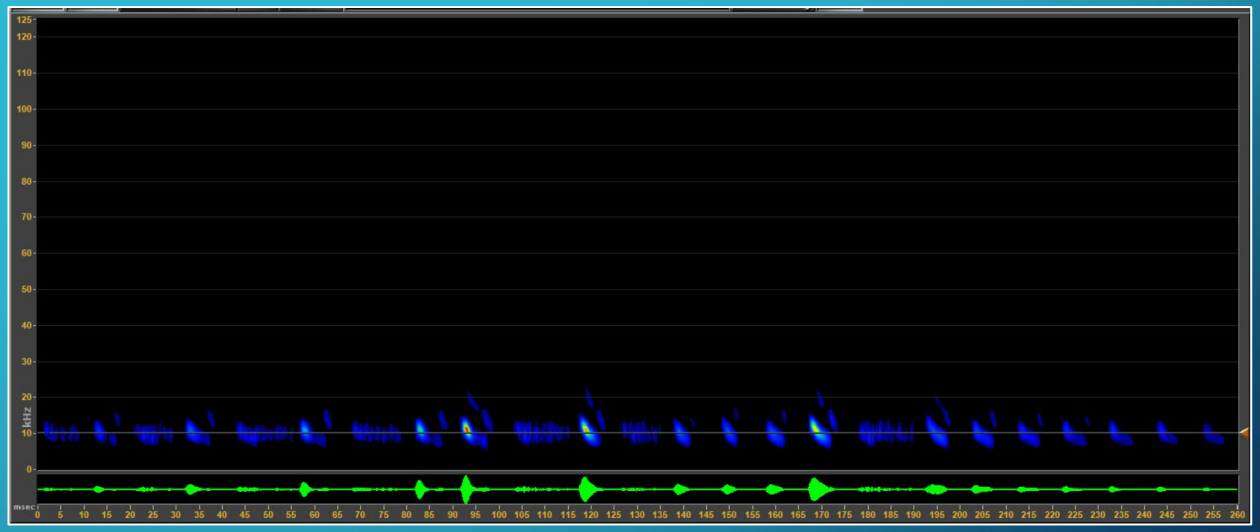
RESULTS – ACOUSTIC SURVEYS

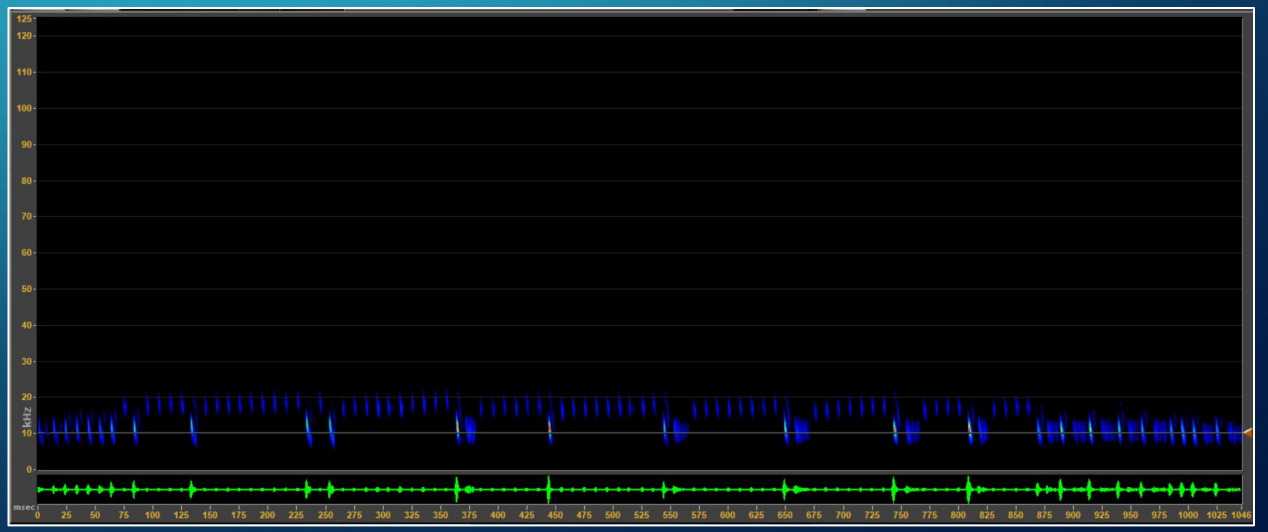


- 140 acoustic files classified and vetted to target bat species
- High activity at OWMA, GB-4, BI-2, and LA-3, relatively low activity elsewhere

EUDMAC – ACOUSTIC DETECTIONS

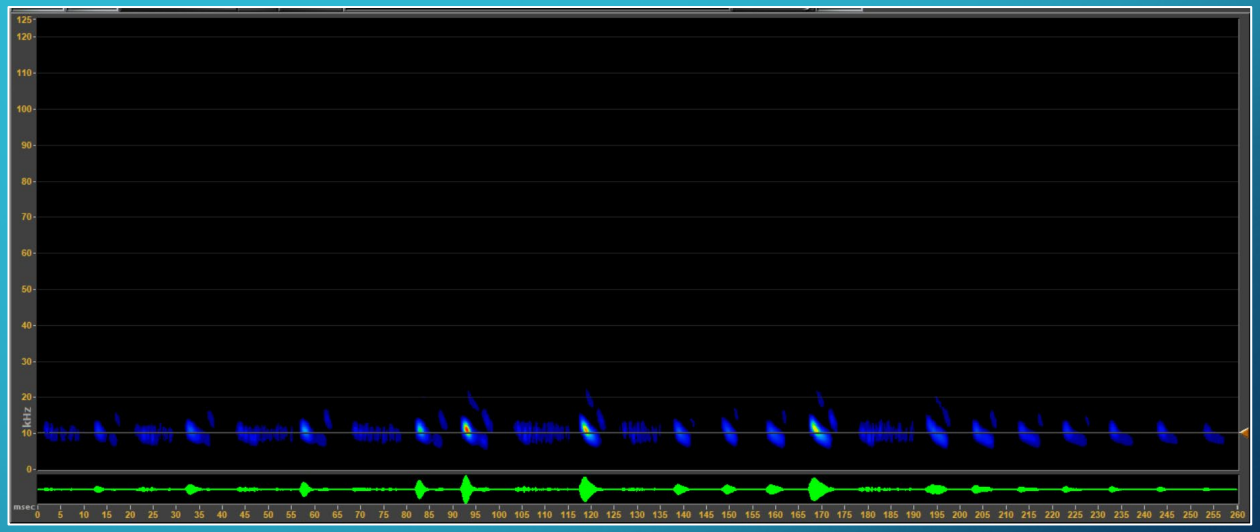
- Recorded at eight locations within warm desert riparian and bedrock cliff/outcrop habitat

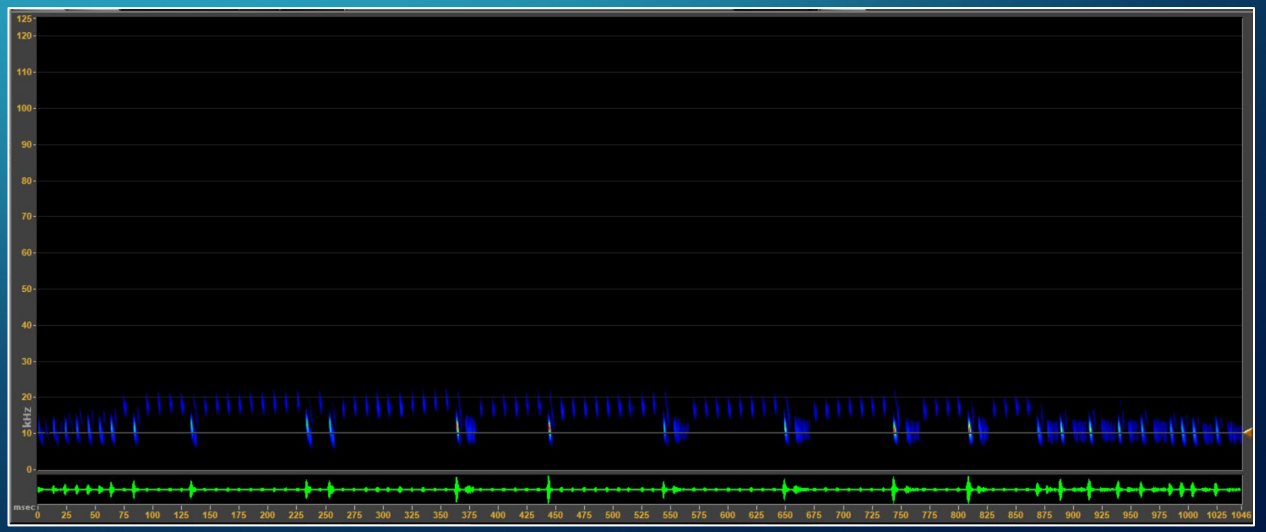




EUDMAC – ACOUSTIC DETECTIONS

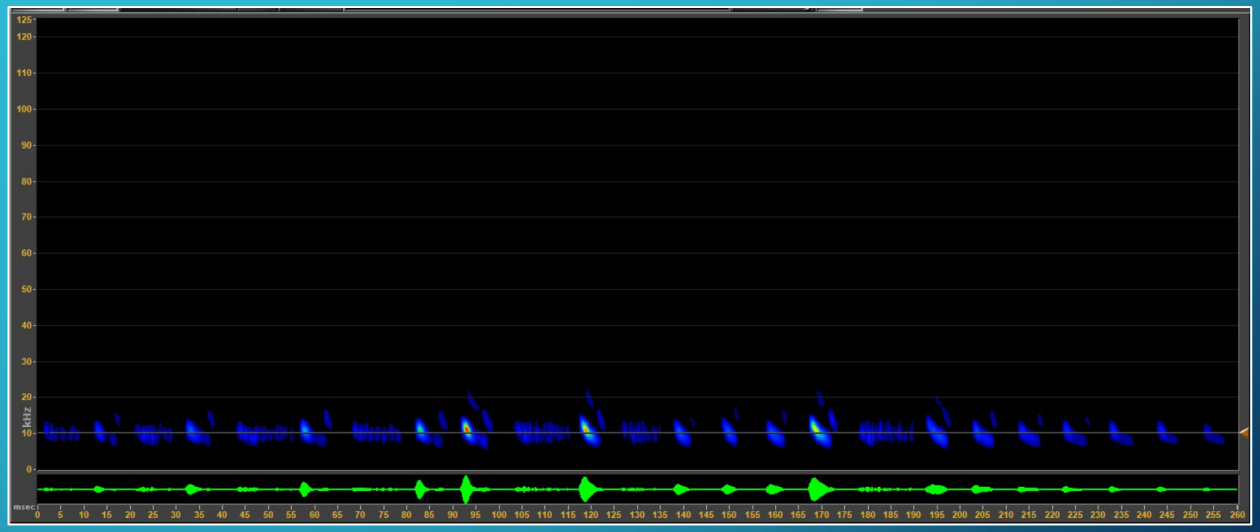
- Recorded at eight locations within warm desert riparian and bedrock cliff/outcrop habitat
- Trills recorded in several sequences suggest feeding behavior

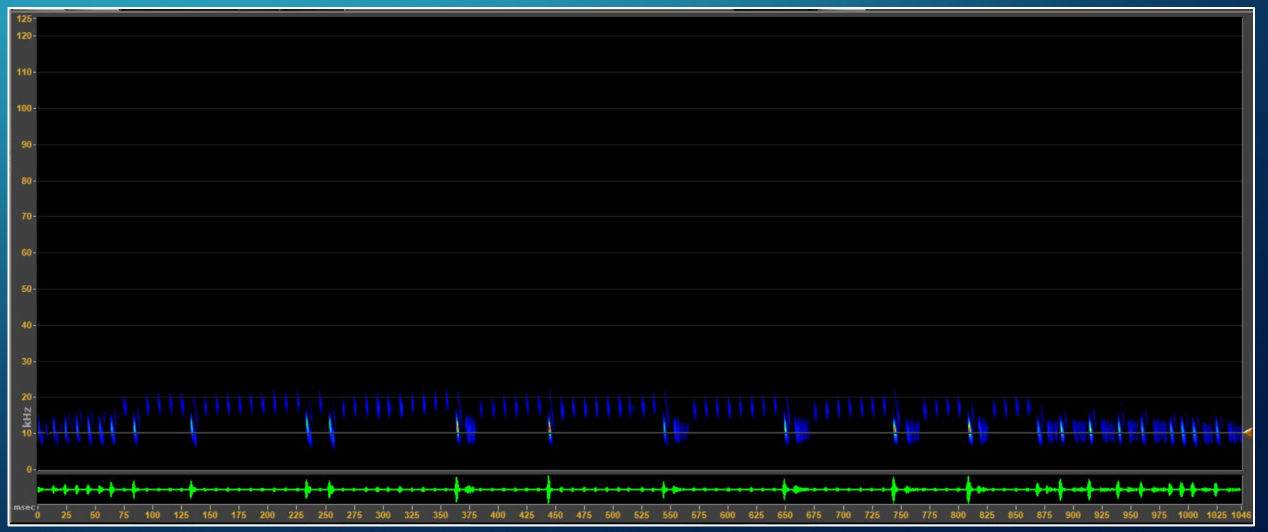




EUDMAC – ACOUSTIC DETECTIONS

- High- and fast-flying, also generally difficult to record acoustically, produces relatively lower amplitude calls



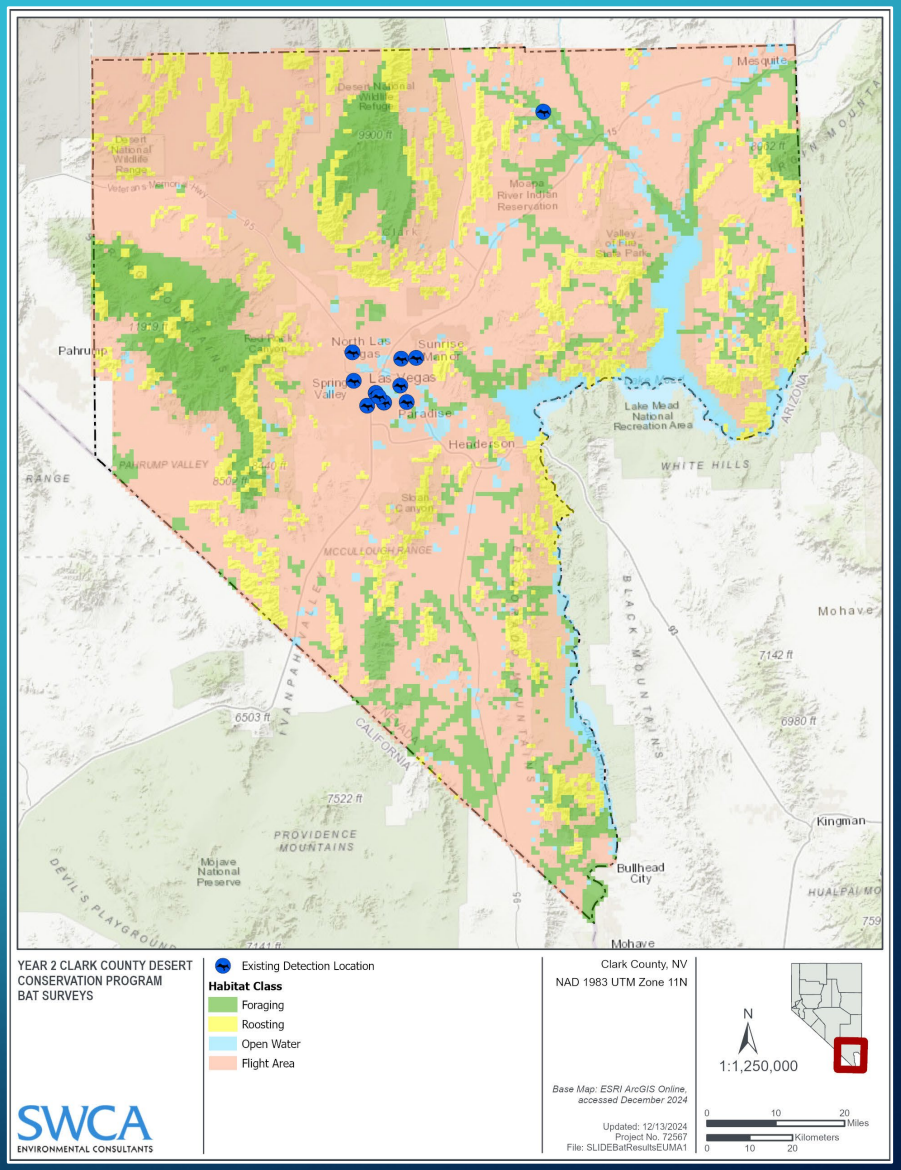


EUDMAC – ACOUSTIC DETECTIONS

- Acoustic Survey Site OW-03 located along Muddy River at the Overton Wildlife Management Area
- Interface of agriculture, desert riparian, and desert scrub

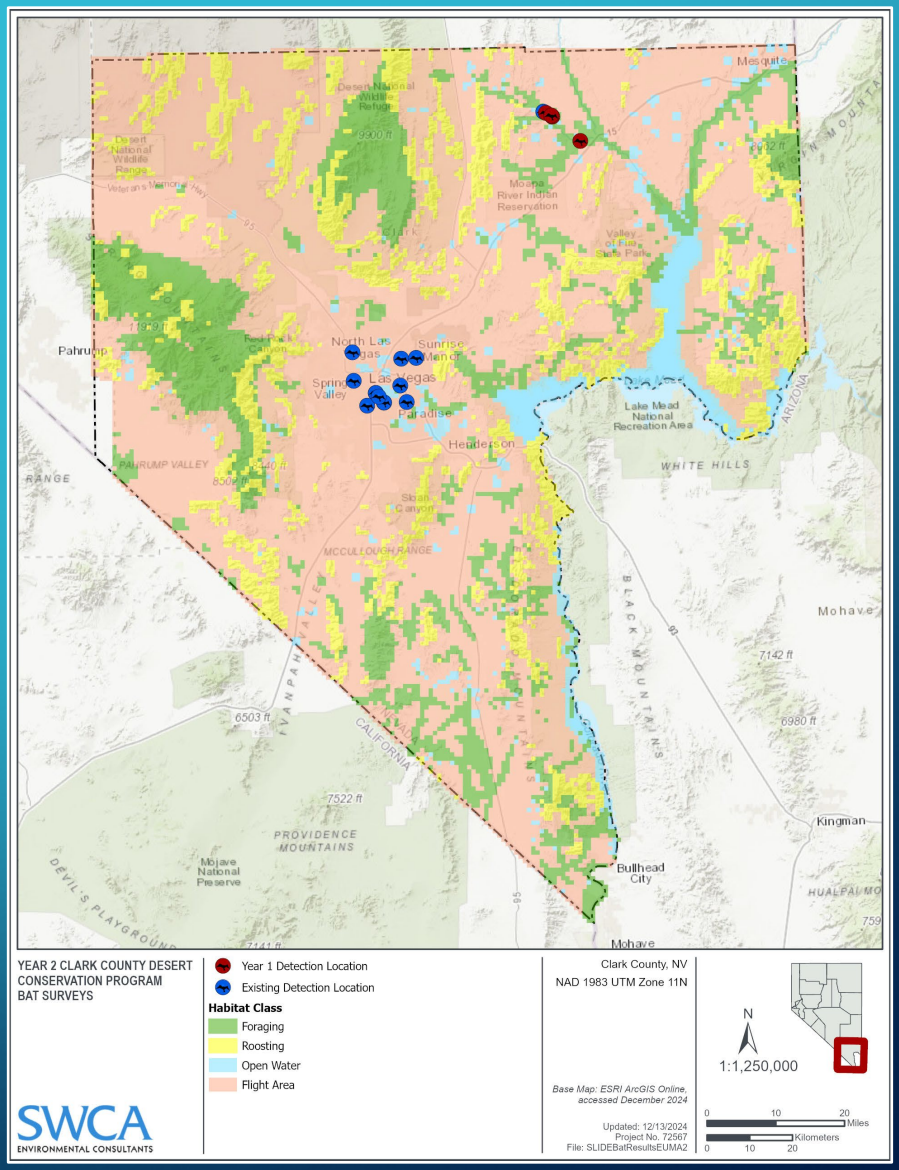
EUDMAC – ACOUSTIC DETECTIONS

- Existing desktop review (Southwest Ecology LLC 2018) resulted in 13 detection locations
- 12 within the Las Vegas Valley Metropolitan Area (Urban, Developed, High Intensity)
- Single locality record within the Warm Springs Natural Area, Muddy River headwaters (Williams et al. 2006)



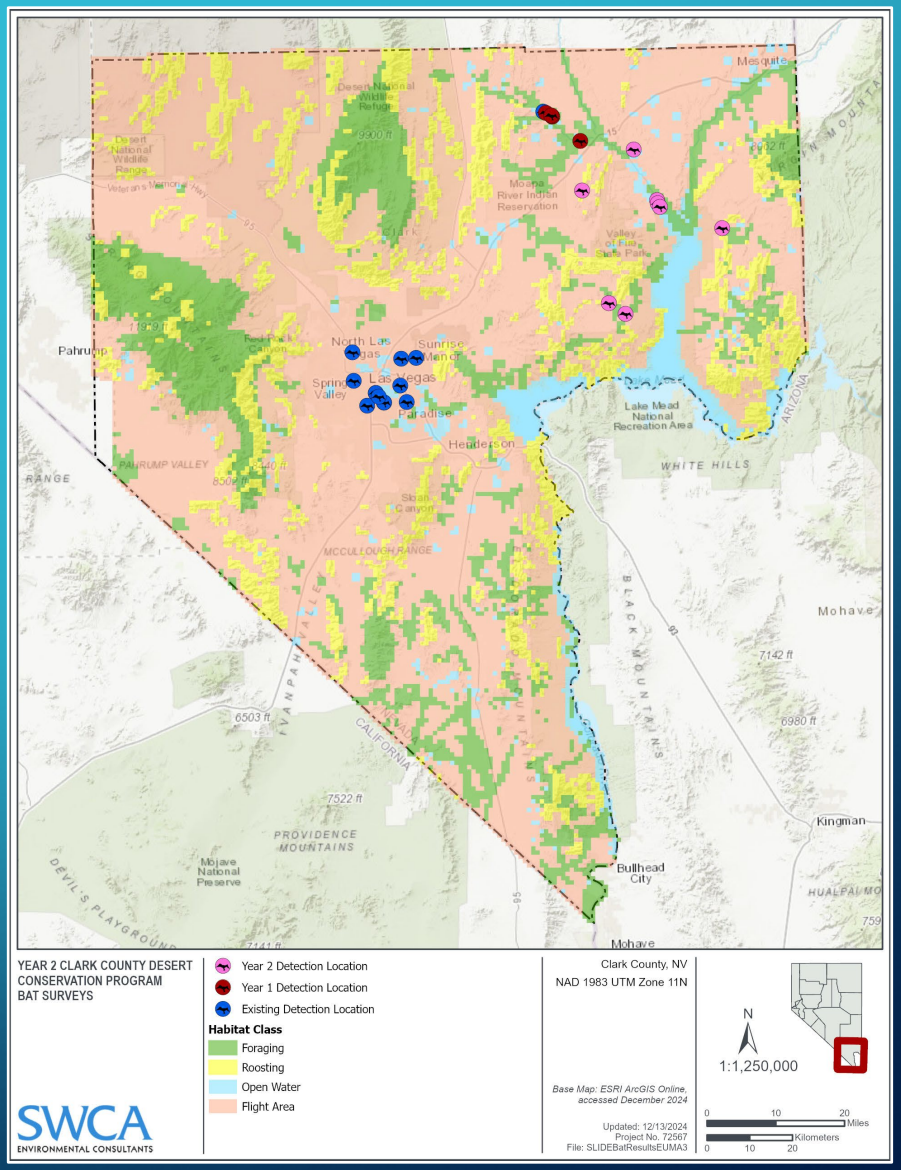
EUDMAC – ACOUSTIC DETECTIONS

- Four Year 1 detections limited to Muddy River floodplain in northwestern Clark County



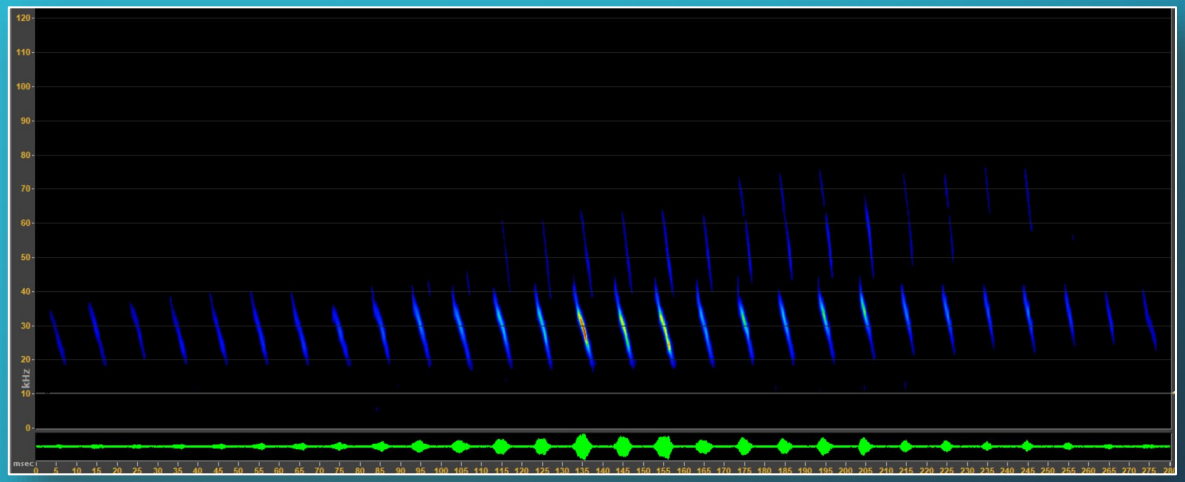
EUDMAC – ACOUSTIC DETECTIONS

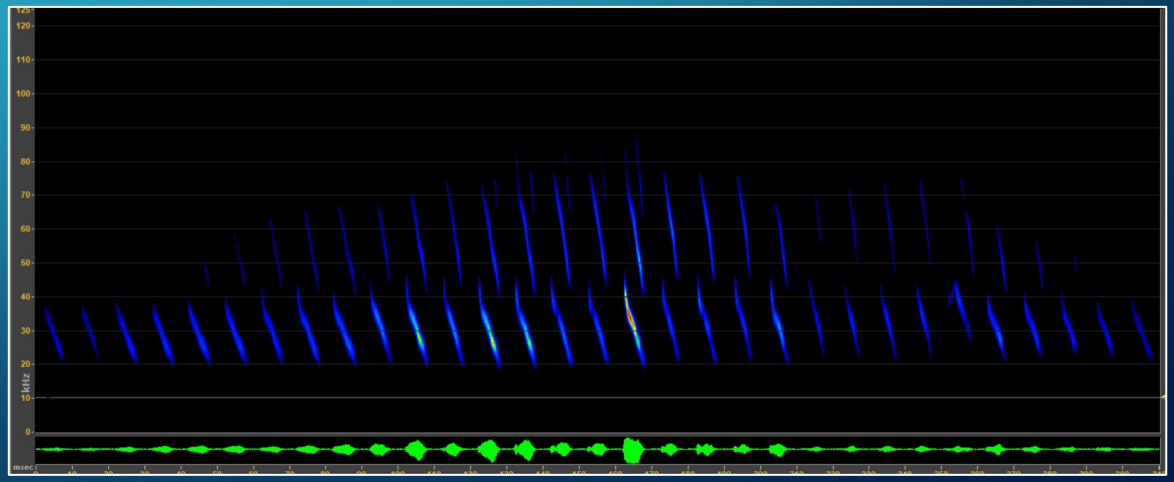
- Year 2 detections in eight new locations
- Detected within all habitat classes (foraging, roosting, flight area, open water)



CORTOW – ACOUSTIC DETECTIONS

- 64 acoustic files from 17 locations
- “Whispering Bat”
- Generally difficult to record acoustically, produces relatively lower amplitude calls
- Recorded in warm desert riparian, mixed woodland, agriculture, and montane riparian habitat





RESULTS – SUMMER ROOST SURVEYS

- 33 Summer roost surveys completed in August 2023
- CORTOW and/or their sign (guano) detected within 19 mines
- Two CORTOW maternity colonies observed
- Multiple mines exhibited CORTOW maternity use

Heavy guano deposition and prey remains covering the floor of an abandoned mine during a roost survey indicate multi-species bat (day/night roosting and maternity) use.

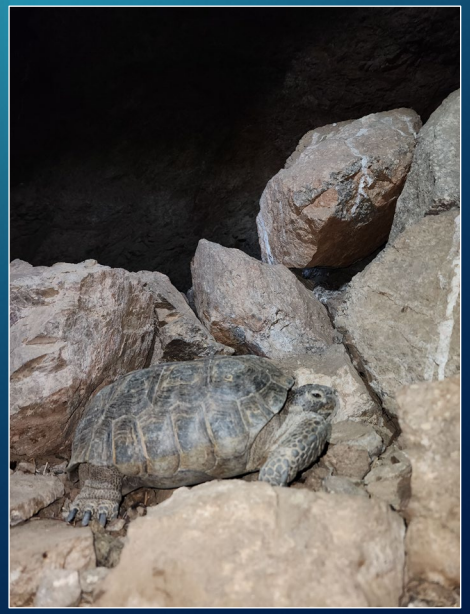
RESULTS – SUMMER ROOST SURVEYS

Incidental wildlife observed within mines included:

- Mojave desert tortoise
- Various bat species
- Speckled and Western diamondbacked rattlesnakes
- barn owl
- Say's phoebe

Speckled Rattlesnake

Pallid bats roosting in drill hole



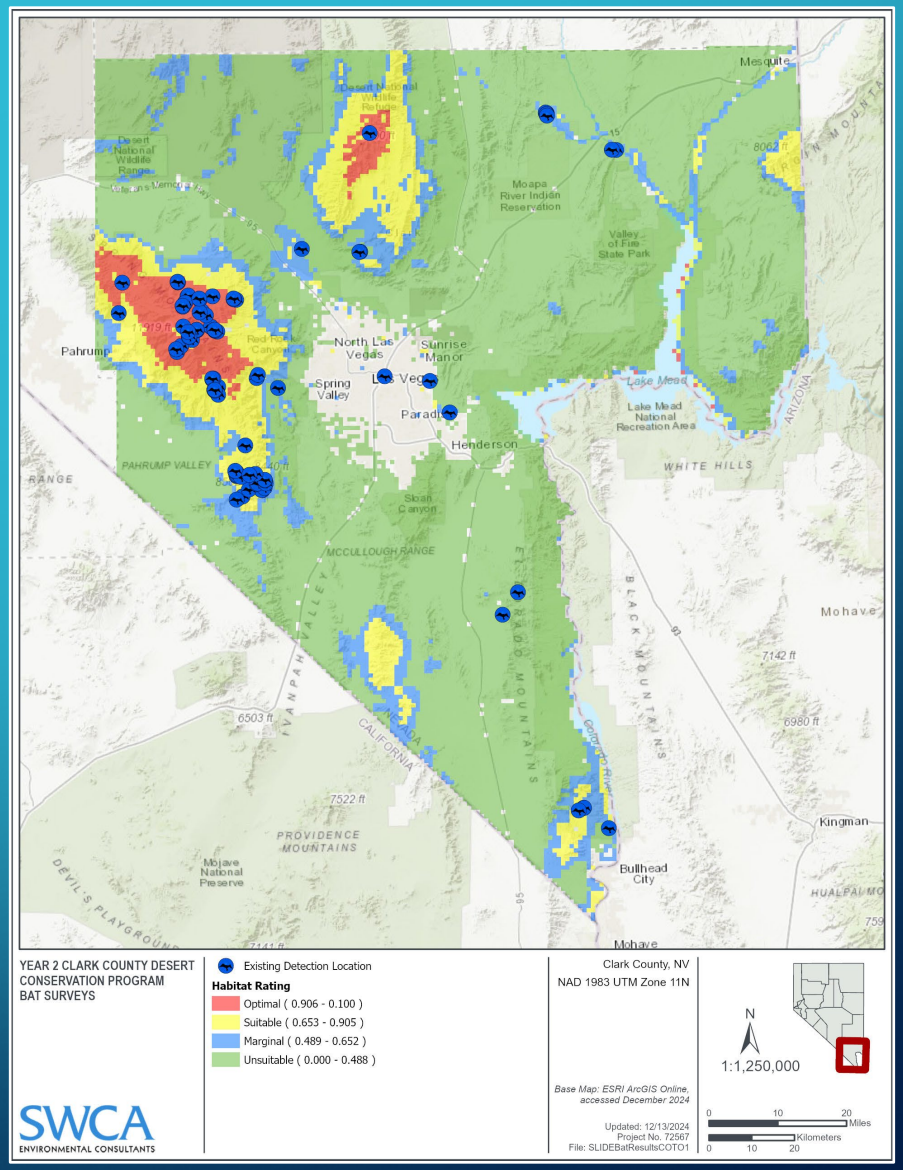
Mojave desert tortoise in mine

RESULTS – WINTER ROOST SURVEYS

- 32 Winter roost surveys completed in February 2024
- CORTOW and/or their sign detected within 15 mines (warm-season maternity, day/night roosting use)
- Several mines exhibited hibernation/torpor potential
- Two MACCAL colonies observed

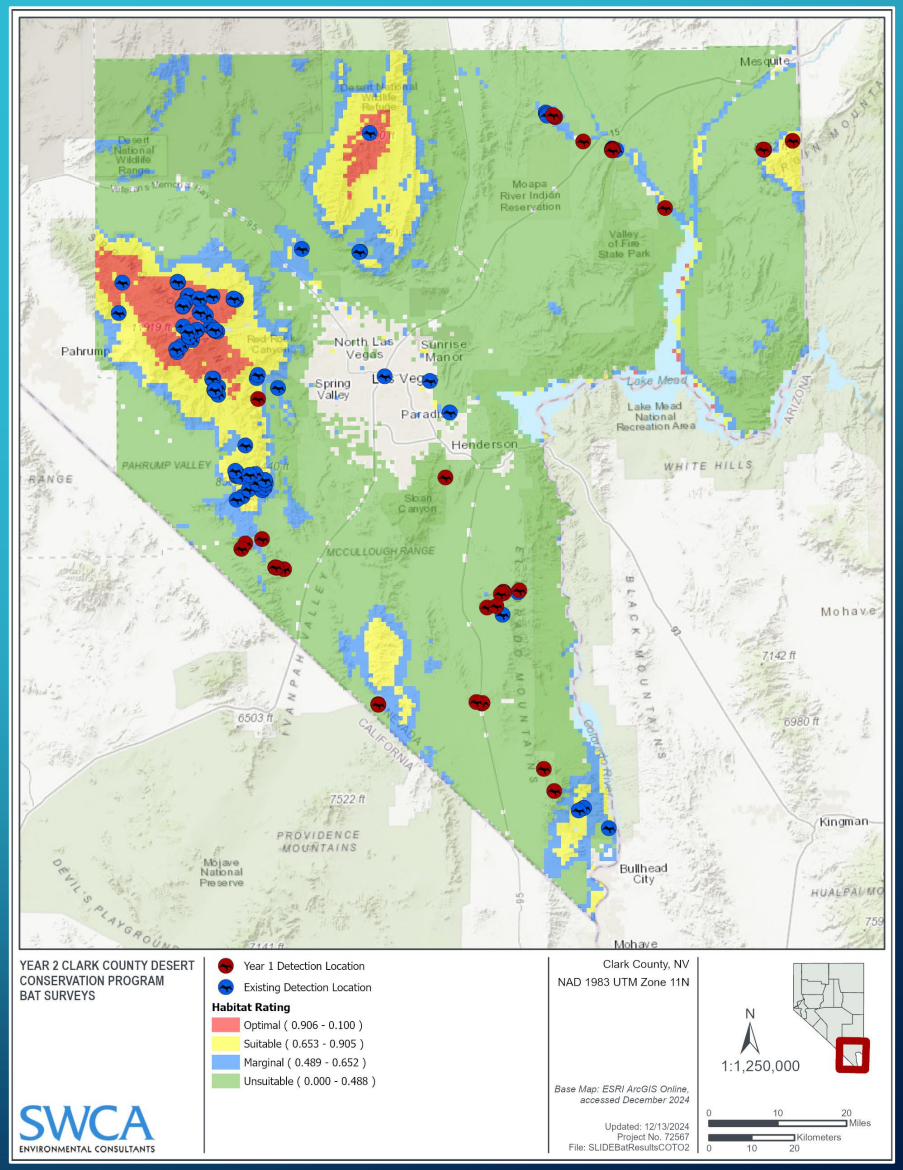
CORTOW – ROOST AND ACOUSTIC DETECTIONS

- Existing Data Review (Southwest Ecology LLC 2018) resulted in 93 locations
- Primarily located at higher elevations in the Spring Mountains and Sheep Range



CORTOW – ROOST AND ACOUSTIC DETECTIONS

- Most of the acoustic and roost survey detections (n=35) were within areas modeled as unsuitable
- Model appears to underestimate habitat within Clark County



CORTOW – ROOST AND ACOUSTIC DETECTIONS

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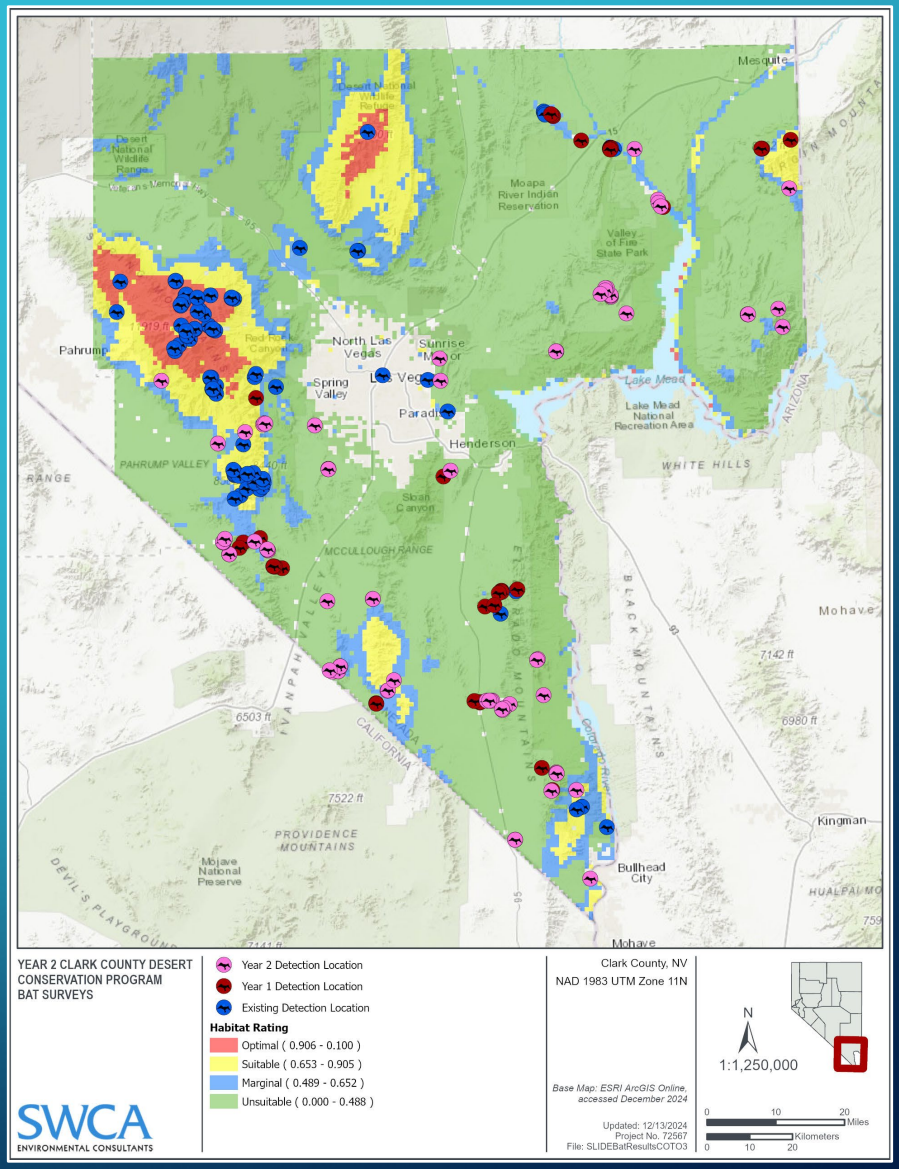
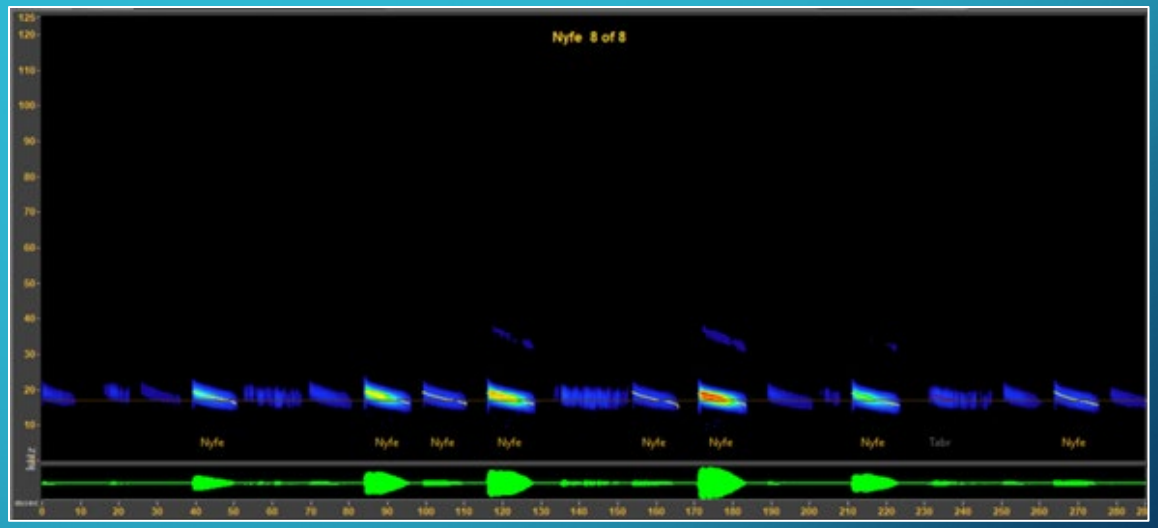
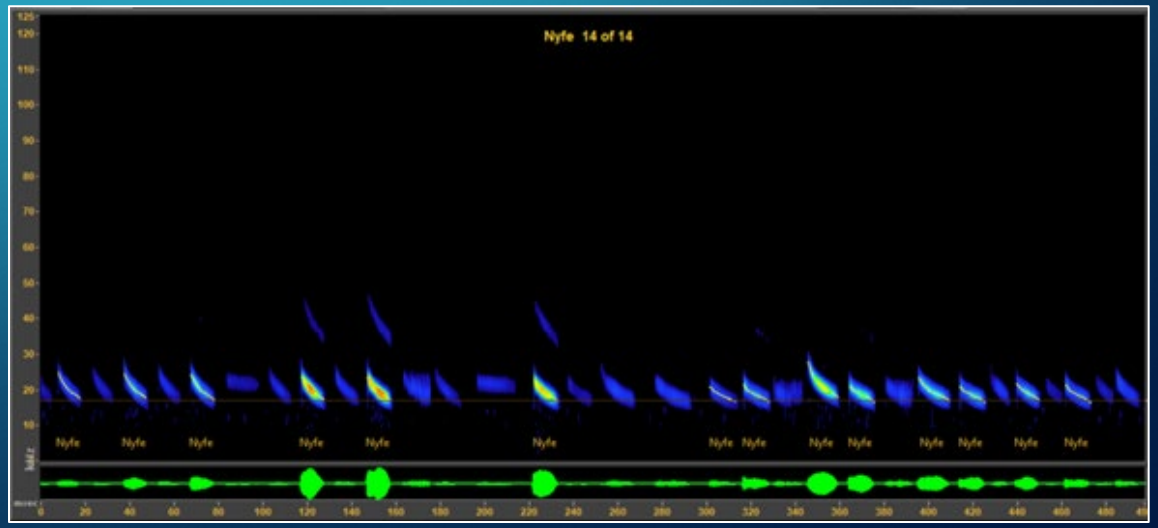


NYCFEM – ACOUSTIC DETECTIONS

Pocketed free-tailed bat (*Nyctinomops femorosaccus*)

- Acoustically detected at four locations
- Second confirmed NV record after O'Farrell (2009)
- Generally difficult to record acoustically, high- and fast-flying





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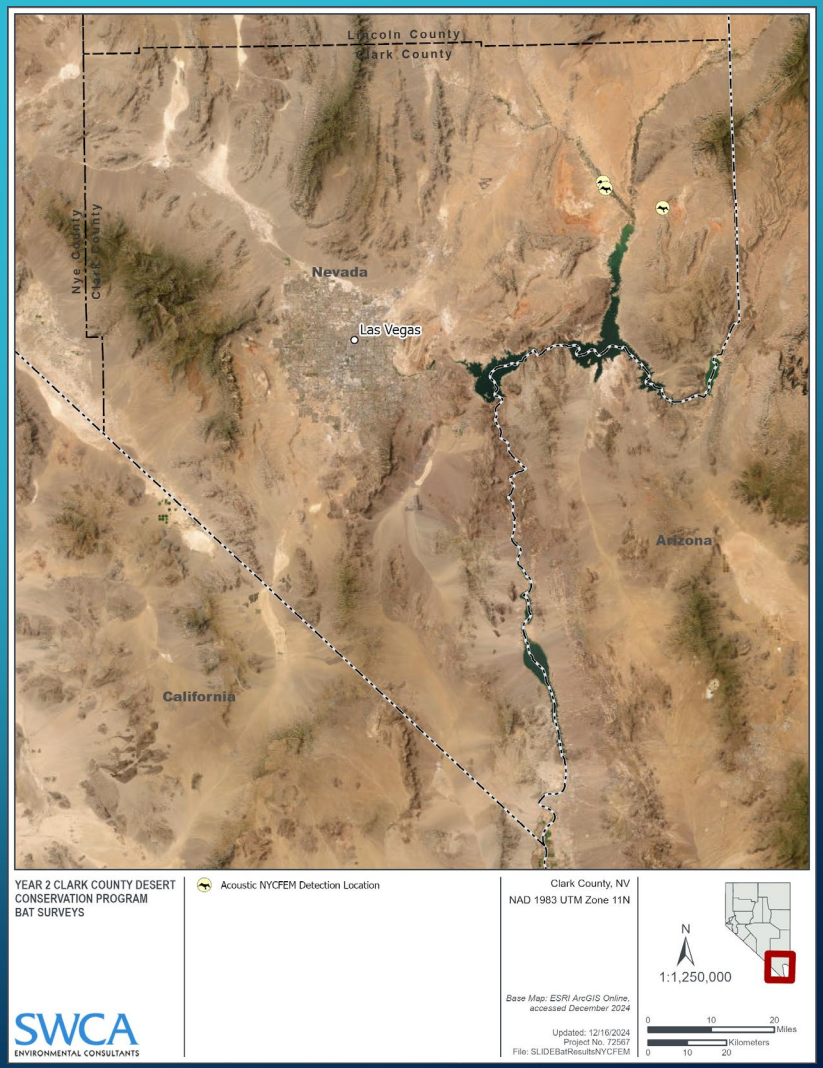

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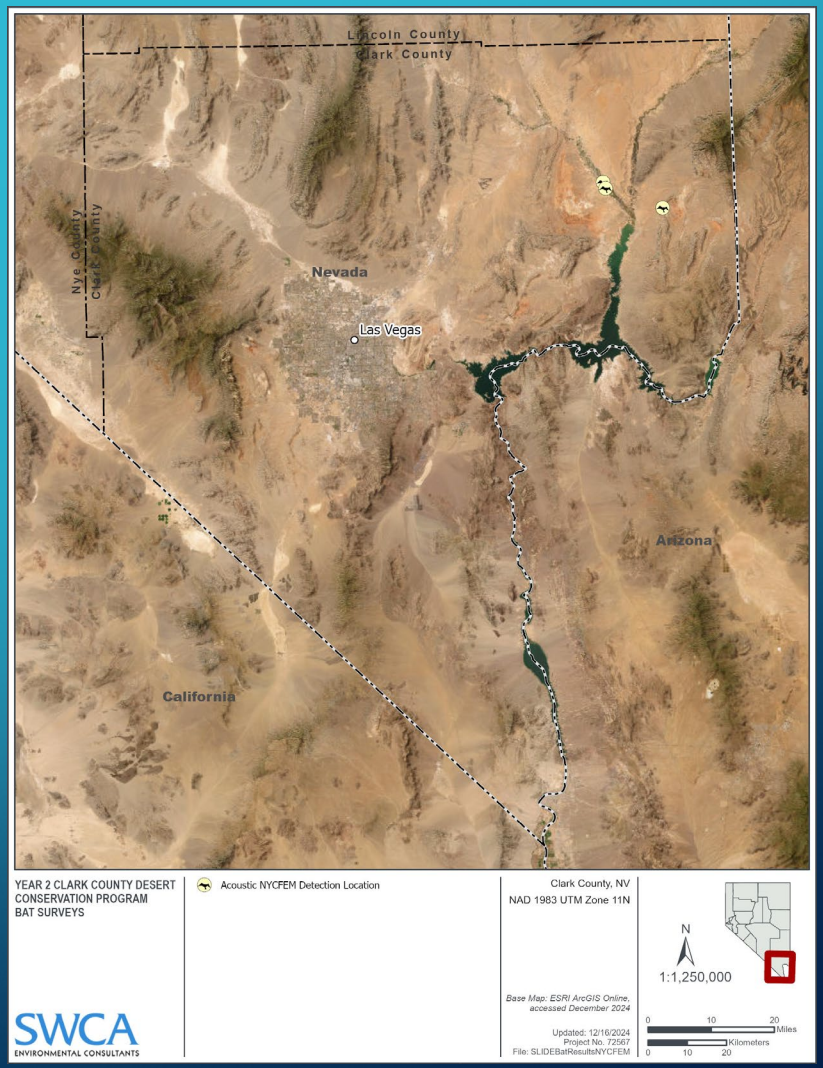
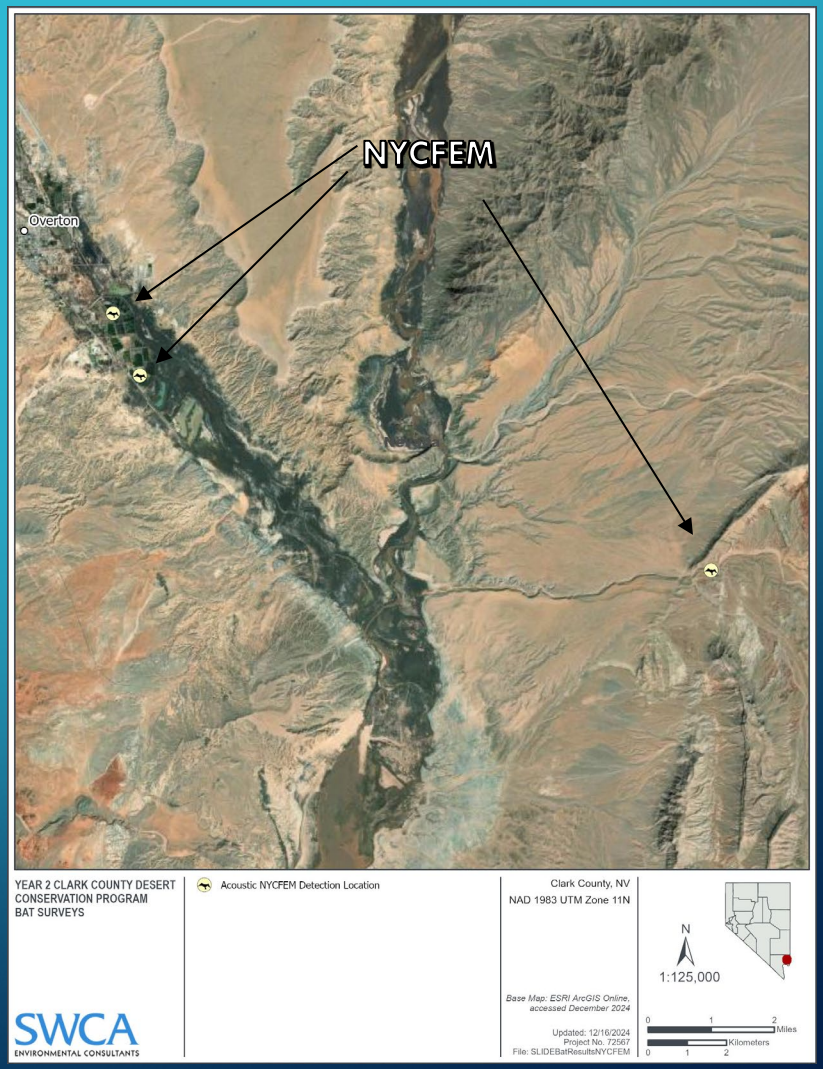
- Generally difficult to record acoustically, high- and fast-flying
- Recorded in warm desert riparian, agriculture, and bedrock/cliff/outcrop habitat



NYCFEM – ACOUSTIC DETECTIONS

Pocketed free-tailed bat
(*Nyctinomops femorosaccus*)

- Acoustically detected at four locations
- Second confirmed NV record after O'Farrell (2009)
- Generally difficult to record acoustically, high- and fast-flying
- Recorded in warm desert riparian, agriculture, and bedrock/cliff/outcrop habitat



NYCFEM – ACOUSTIC DETECTIONS

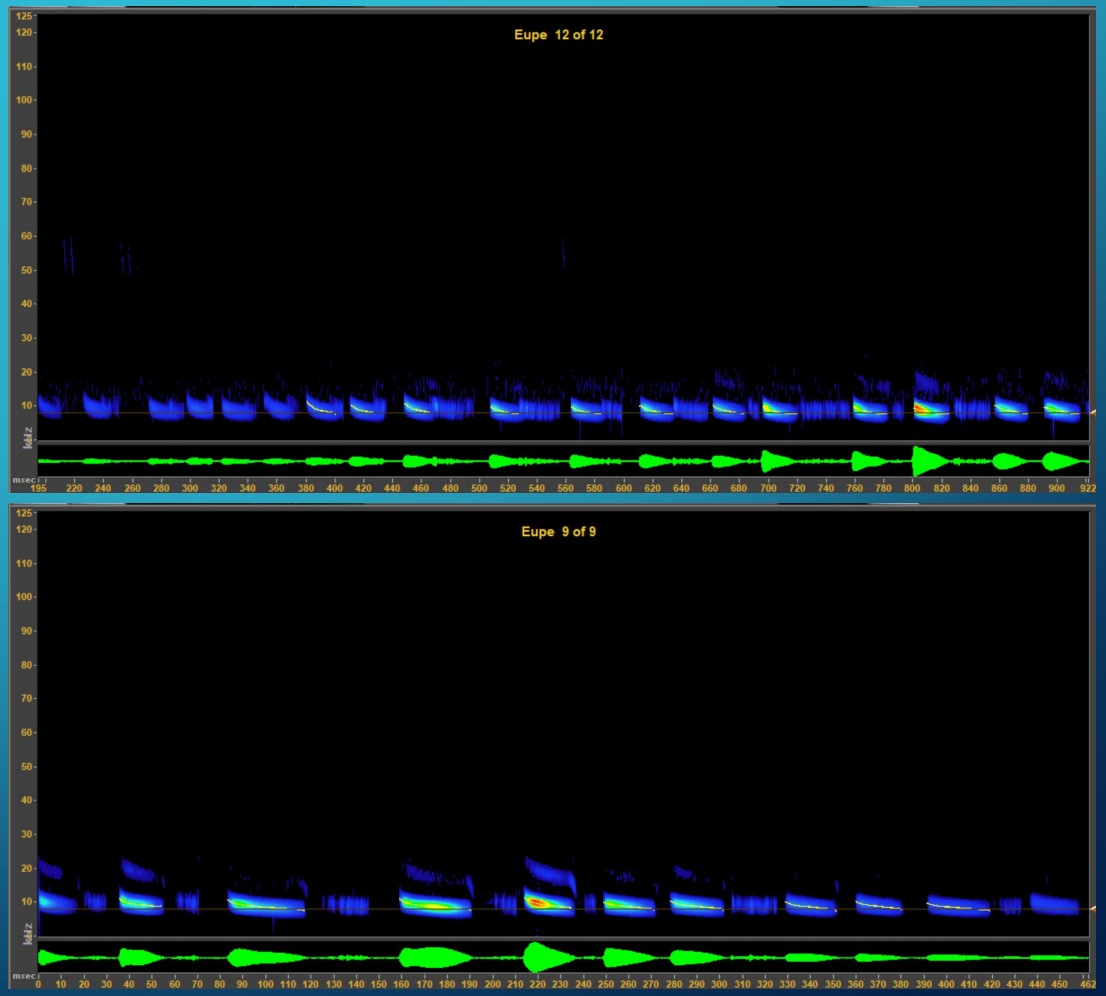
GB-4, Red Bluff Spring, Gold Butte National Monument

OW-4, Overton Wildlife Management Area

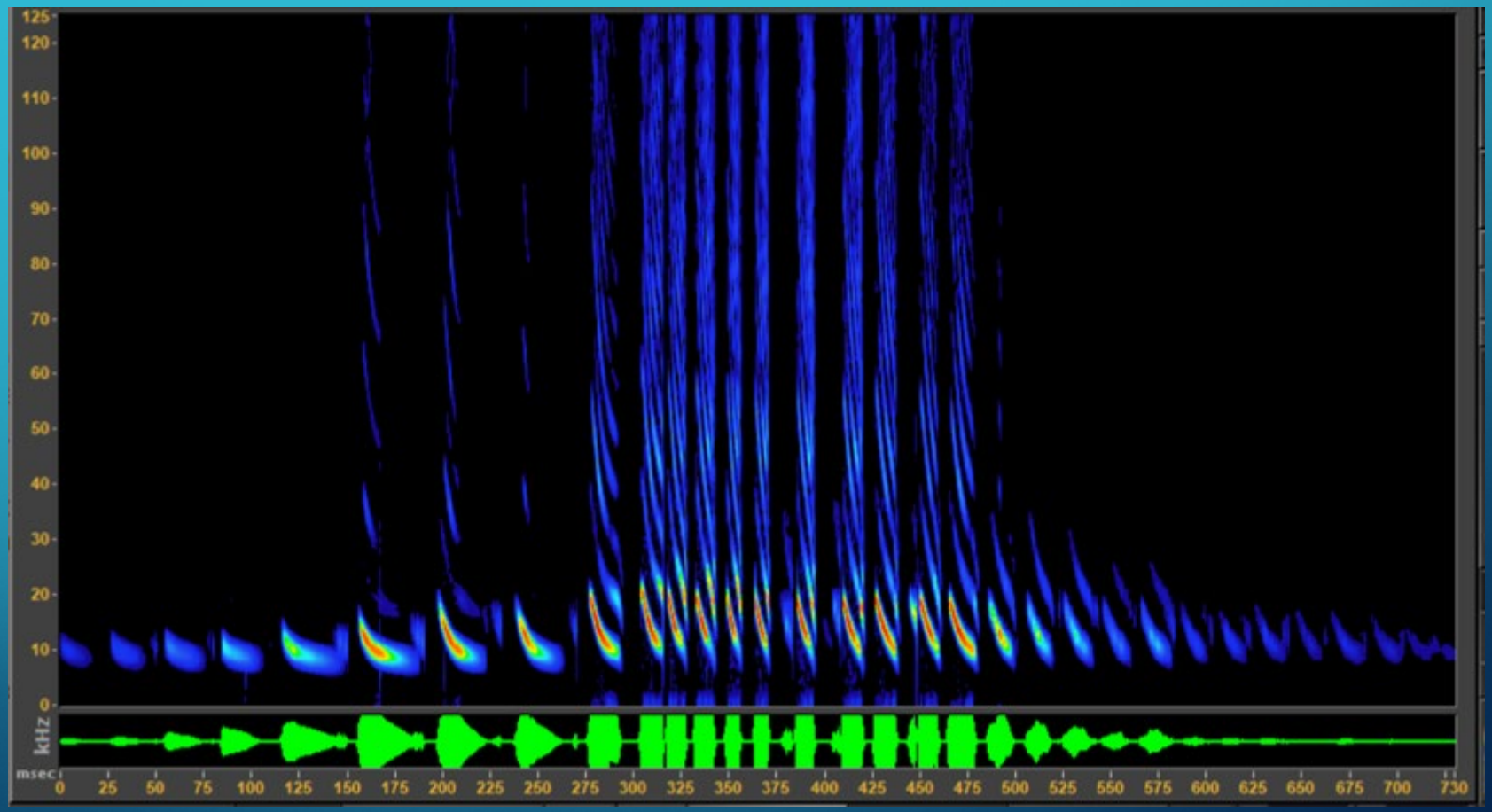
EUMPER – ACOUSTIC DETECTIONS

Greater bonneted bat
(***Eumops perotis***)

- 13 acoustic files from seven locations
- Generally difficult to record acoustically, high- and fast-flying
- Recorded in warm desert riparian, agriculture, and bedrock/cliff/outcrop habitat



EUMPER – ACOUSTIC DETECTIONS



EUMPER – ACOUSTIC DETECTIONS

LA-3, Laughlin, Colorado River

GB-3, Devil's Cove, Lake Mead National Recreation Area

GH-1, Gale Hills

CONCLUSIONS – ACOUSTIC AND ROOST SURVEYS

- Both target species were recorded acoustically in 2024
- CORTOW sign detected within 33 AMLs
- 97% of these locations within areas modeled as unsuitable habitat

Roosting habitat at roost survey location CL-1582, where signs of Townsend's big-eared bat day, night, and maternity use were detected

CONCLUSIONS – ACOUSTIC AND ROOST SURVEYS

- Year 1 and 2 acoustic and roost survey detections substantially increased spatial coverage of EUDMAC (92%) and CORTOW (91%) occurrence dataset for Clark County
- Additional detections will be input into the models to help refine predicted habitat

Roosting habitat at roost survey location CL-1582, where signs of Townsend's big-eared bat day, night, and maternity use were detected

CONCLUSIONS – BAT ACOUSTIC DATA ANALYSIS

- Year 1 and Year 2 acoustic data analysis/vetting for all bat species-completed
- 20 bat species detected acoustically (18 in 2022 and 19 in 2024)
- Detection of rare species in new areas adds to our understanding of bat species composition and distribution within Clark County

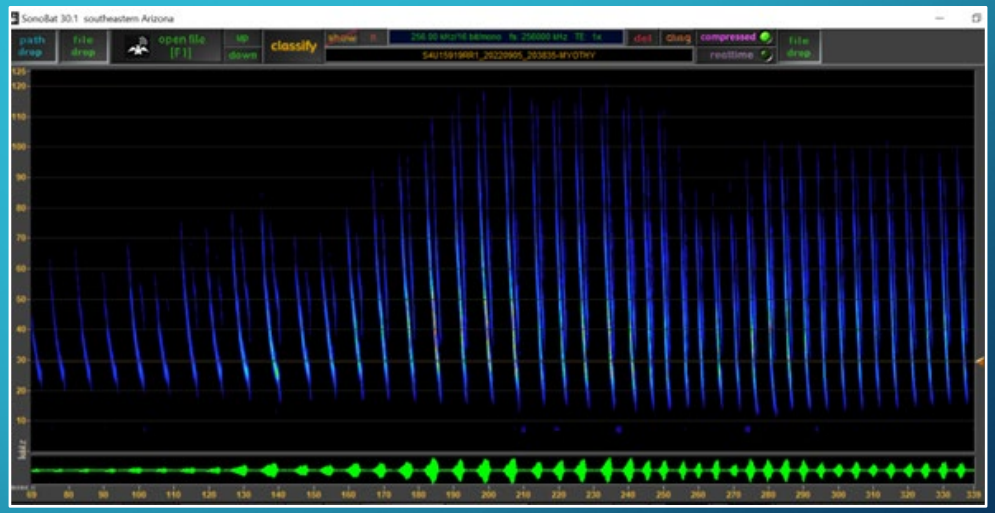


Figure A-15. Fringed myotis (*Myotis thysanodes*) call sequence, from acoustic survey location RR-1, Clark County, September 5, 2022.

ACKNOWLEDGMENTS:

- Clark County Desert Conservation Program
- Bureau of Land Management-Southern Nevada District Office
- National Park Service – Lake Mead National Recreation Area
- State of Nevada – Spring Mountain Ranch State Park
- Nevada Department of Wildlife
- Nevada Division of Minerals
- Holistic Wildlife Services, LLC
- Bat Survey Solutions, LLC

Room-and-Pillar mine complex with multi-species bat roost use