BAT CONSERVATION INTERNATIONAL

Final Report: Coronado National Forest Abandoned Mine Bat Surveys

January 22nd- 25th, February 5th - 9th 2024

Supplemental Project Agreement: 23-CS-11031600-337

The crew was greeted by a beautiful, early morning fog during the hike out to the last feature for the project.
BCI Photo by Corrie Harrison

Submitted April 02, 2024

Contents

Acknowledgements 3
Overview 3
Conservation Impact 4
Section 1: Survey Methods 12
Section 2: Survey Results 13
Contact 32
Appendix 1: Selected Photos 33
Appendix 2: Bat Habitat Assessments 39
Appendix 3: Closure Recommendations 43
Appendix 4: Exclusion Guidance 46

Acknowledgements

BCI wishes to thank Mark Schwab, Regional Abandoned Mines Program Lead, USFS Region 3, for initiating the project, providing the scope of work and site inventory descriptions, providing on-site navigation, and serving in the surface safety role during field work. Additional thanks to Abby Watson and Robin Bruno (Forest Geologists), and Bree Dean (NEPA Specialist) with the USFS, for joining the crew in the field.

All surveys were conducted by BCI Subterranean Team staff: Jackson Bain, Harrison Tamayo, Corrie Harrison, Myriam Bishop, and Logan Miller. This report was authored by Corrie Harrison, with survey protocol content and report design by Shawn Thomas. Geospatial products were created by Priyesh Patel.

Overview

BAT SURVEYS:
This biological survey project assessed abandoned mine land (AML) features in southern Arizona managed by the Nogales Ranger District, USFS. The AML features surveyed are located in the San Luis Mountains, south of Arivaca, AZ. All sites were surveyed by Bat Conservation International (BCI) staff following standardized protocols and safety procedures for providing subterranean biological data and closure recommendations. Surveys focused on documenting bat and other wildlife use of each feature. The field project resulted in bat surveys being conducted on 64 distinct features, comprising 72 openings to the surface (Table 1, Figures 1-3). Bat habitat assessments and closure recommendations are provided for all features. Selected photos appear in Appendix 1.

GUANO ANALYSIS:
Guano was collected from three features (CN-15, CN-18 and CN-65). Pooled guano samples are collected to determine species identification when bats are not present or cannot be confidently identified. Guano samples are preserved in RNA later and submitted to the Bat Ecology & Genetics Lab (Species From Feces) at Northern Arizona University for DNA analysis to determine species composition. Detected species are listed in decreasing number of reads (highest to lowest proportion of sample).

Conservation Impact

BCI's Subterranean Team works to protect subterranean bats and their habitat. Through our survey efforts, we assess subterranean features and identify sites that serve as critical habitat for bats and other wildlife, or as sources of water for wildlife. Bats are strongly associated with caves (and abandoned mines), and while not all bats use caves, a significant proportion of bat species are known to use caves during part of their life cycle (e.g., maternity roosting, hibernation, night roosting, fall swarming). Subterranean bats serve as important contributors to nutrient-poor cave ecosystems by providing nutrients (through guano deposition) that may provide the foundation for complex biological communities of microbes, fungi, and invertebrates. Since all bats forage above ground, subterranean bats also serve critical roles in terrestrial ecosystems, where they contribute ecological services such as pollination and insect population control. Given the importance of subterranean bats to both surface and subsurface ecosystems, and because many bat species rely on caves and abandoned mines for survival, identification of subterranean habitat is necessary for implementing conservation. Our survey results directly inform recommendations for long-term protection of subterranean habitat.

The conservation impact of this project is the recommendation to protect 21 subterranean features, which collectively represent an estimated 10,400 ft^2 of subterranean habitat.

Table 1. Summary of bat survey results and closure recommendations.

Feature[1]	Closure Rec.[2]	Live Bats[3]	Other Bat Sign	Guano Analysis[4]	Roost Function	Bat Habitat
CN-02	DCAT	0	none	n/a	none	Poor
CN-03	LAI	0	none	n/a	n/a	None
CN-04	LAI or DCAT	0	none	n/a	none	Poor
CN-05	DCAT	0	none	n/a	none	Poor
CN-06	DCWS	0	splatter, insect parts	n/a	day roost, night roost	Marginal
CN-07	LAI or DCAT	0	none	n/a	none	None
CN-08	LAI or DCAT	0	none	n/a	n/a	None
CN-09	DCAT or LAI	0	none	n/a	none	Poor
CN-10	LAI or DCAT	0	none	n/a	n/a	None
CN-11	DCAT or LAI	0	none	n/a	none	None
CN-12	LAI	0	none	n/a	none	None
CN-13	LAI or DCWS	0	guano, insect parts	n/a	night roost	Marginal
CN-13b	LAI or DCWS					
CN-14	LAI or BCAT	0	guano, insect parts	n/a	day roost, night roost	Moderate
CN-15	BCAT	0	guano, insect parts, splatter, roost stain	failed analysis	day roost, night roost	Good
CN-16	BCAT	1 CHME?	guano, insect parts, roost stain	n/a	day roost, night roost	Moderate
CN-16b	BCAT					
CN-16c	BCAT					
CN-17	DCWS	0	none	n/a	none	Marginal
CN-17b	DCWS					
CN-18	BCCS	1 EPFU	guano, insect parts, roost stain	MACA & MYVE	night roost, warm season colony	Excellent
CN-19	LAI or BCAT	0	guano, insect parts	n/a	day roost, night roost	Moderate
CN-20	DCAT	0	none	n/a	none	Poor
CN-22	BCAT	0	guano, insect parts	n/a	day roost, night roost	Moderate
CN-23	LAI or DCAT	0	none	n/a	none	None
CN-24	LAI or DCAT	0	none	n/a	none	None
CN-25	LAI or DCAT	0	guano	n/a	day roost	Marginal
CN-26	DCAT	0	none	n/a	none	Poor

Feature[1]	Closure Rec.[2]	Live Bats[3]	Other Bat Sign	Guano Analysis[4]	Roost Function	Bat Habitat
CN-27	DCAT	0	none	n/a	none	Poor
CN-28	LAI	0	none	n/a	n/a	None
CN-29	LAI or BCAT	0	guano, splatter, insect parts	n/a	day roost, night roost	Good
CN-30	DCAT	0	none	n/a	none	Poor
CN-30b	DCAT					
CN-31	LAI	0	none	n/a	none	None
CN-32	DCAT	0	none	n/a	none	Poor
CN-33	LAI	0	none	n/a	n/a	None
CN-34	LAI	0	none	n/a	n/a	None
CN-35	DCAT	0	none	n/a	none	Poor
CN-36	DCAT					
CN-37	DCWS	0	guano, insect parts	n/a	day roost, night roost	Marginal
CN-38	LAI	0	none	n/a	none	None
CN-39	BCAT	0	unknown	n/a	unknown	Unknown
CN-40	DCAT	0	unknown	n/a	unknown	Unknown
CN-41	LAI or OWC	0	guano, insect parts	n/a	night roost	Marginal
CN-43	DCAT	0	none	n/a	none	Poor
CN-44	DCAT	0	none	n/a	none	Poor
CN-45	DCWS	0	none	n/a	none	Marginal
CN-46	LAI or DCAT	0	guano	n/a	day roost	Marginal
CN-47	DCAT	0	none	n/a	none	Poor
CN-48	BCCS	1 COTO	guano, insect parts	n/a	night roost, warm season colony	Good
CN-49	LAI	0	none	n/a	none	None
CN-50	LAI or DCAT	0	none	n/a	none	Poor
CN-51	DCAT	0	none	n/a	none	Poor
CN-52	LAI or BCAT	0	guano, insect parts	n/a	day roost, night roost	Good
CN-53	LAI or DCAT	0	none	n/a	none	Poor
CN-54	DCAT	0	none	n/a	none	Poor

Feature[1]	Closure Rec.[2]	Live Bats[3]	Other Bat Sign	Guano Analysis[4]	Roost Function	Bat Habitat
CN-55	LAI	0	none	n/a	n/a	None
CN-56	BCAT	0	guano, insect parts	n/a	day roost, night roost	Moderate
CN-57	DCAT	0	none	n/a	none	Poor
CN-58	LAI or BCAT	0	guano, insect parts	n/a	day roost, night roost	Moderate
CN-59	DCWS	0	none	n/a	none	Marginal
CN-59b	DCWS					
CN-59c	DCWS					
CN-59d	DCWS					
CN-60	BCAT	0	guano, insect parts	n/a	night roost	Moderate
CN-61	DCWS	0	none	n/a	unknown	Unknown
CN-62	LAI or DCWS	0	guano	n/a	day roost	Marginal
CN-62b	LAI or DCWS	0	guano, insect parts	n/a	night roost	Marginal
CN-63	LAI	0	none	n/a	none	None
CN-64	BCAT	0	guano, insect parts	n/a	night roost	Marginal
CN-65	BCCS	0	guano, insect parts, roost stain	MYVE	night roost, warm season colony	Excellent
CN-66	BCAT	0	guano, insect parts	n/a	night roost	Moderate

n/a – not applicable

[1]Feature: A distinct feature may consist of a single opening, multiple openings interconnected via underground workings, or closely related surface workings. In the "Feature" column, distinct features are separated by solid lines, and associated openings of a feature are separated by dashed lines. A feature contains shared biological and habitat characteristics and is therefore described by a single survey, whereas closure recommendations are unique to each opening.

[2]Closure recommendations:

Wildlife-compatible Closures
BCAT – bat-compatible closure, any time
BCCS – bat-compatible closure, cold season
BCWS – bat-compatible closure, warm season
OWC – other wildlife-compatible closure

Destructive Closures
DCAT – destructive closure, any time
DCWS – destructive closure, warm season

No Action
LAI – leave as is

[3]Bat species codes:

COTO – Townsend's big-eared bat (Corynorhinus townsendii)
EPFU – big brown bat (*Eptesicus fuscus*)
CHME – Mexican long-tongued bat (*Choeronycteris mexicana)*
MACA – California leaf-nosed bat (*Macrotus californicus)*
MYVE – Cave myotis (*Myotis velifer)*

[4] Guano analysis: Pooled guano samples are collected to determine species identification when bats are not present or cannot be confidently identified. Guano samples are preserved in RNAlater and submitted to the Bat Ecology & Genetics Lab (Species From Feces) at Northern Arizona University for DNA analysis to determine species composition. Detected species are listed in decreasing number of reads (highest to lowest proportion of sample).

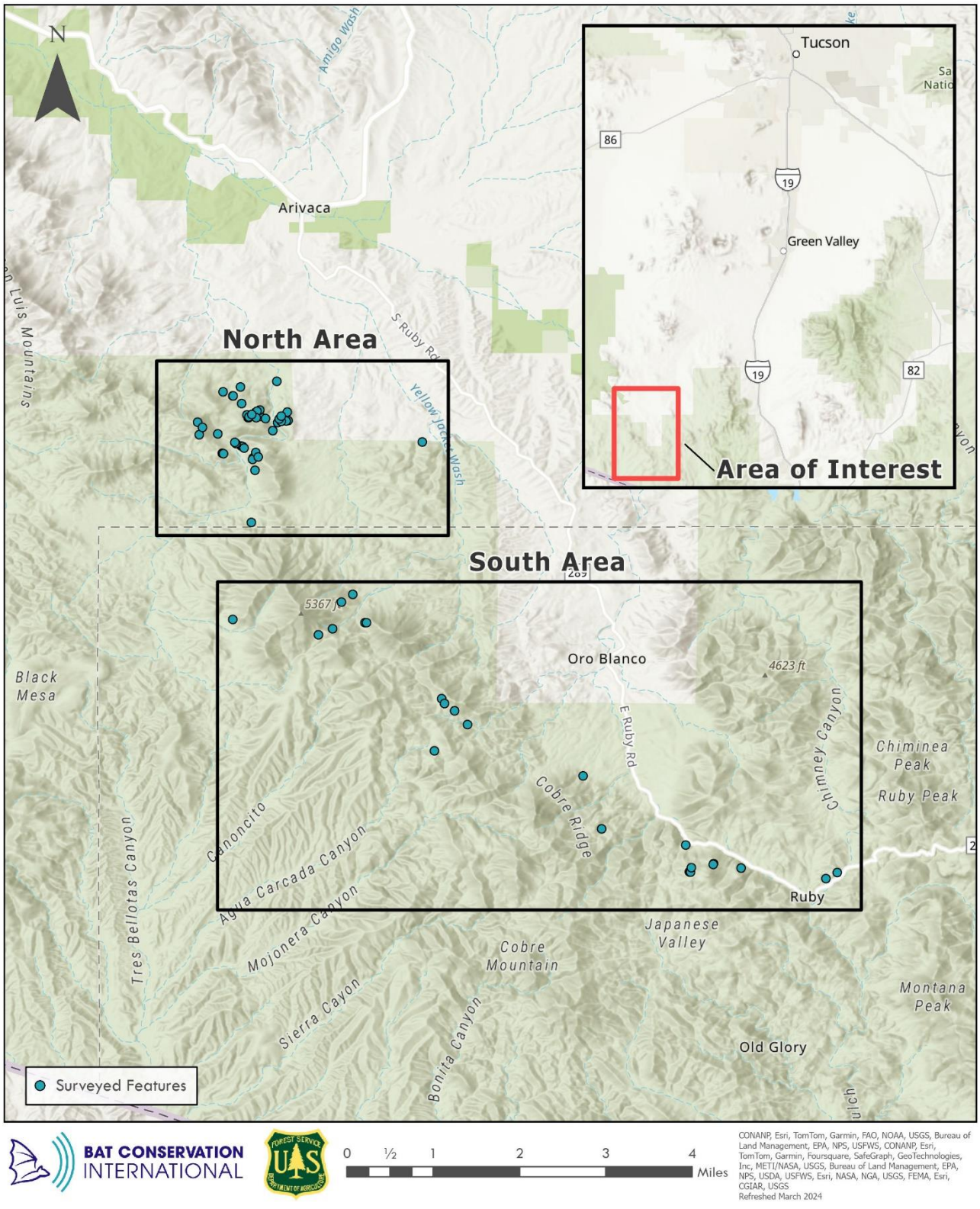

Figure 1: Overview Map of Project Area and Features Surveyed

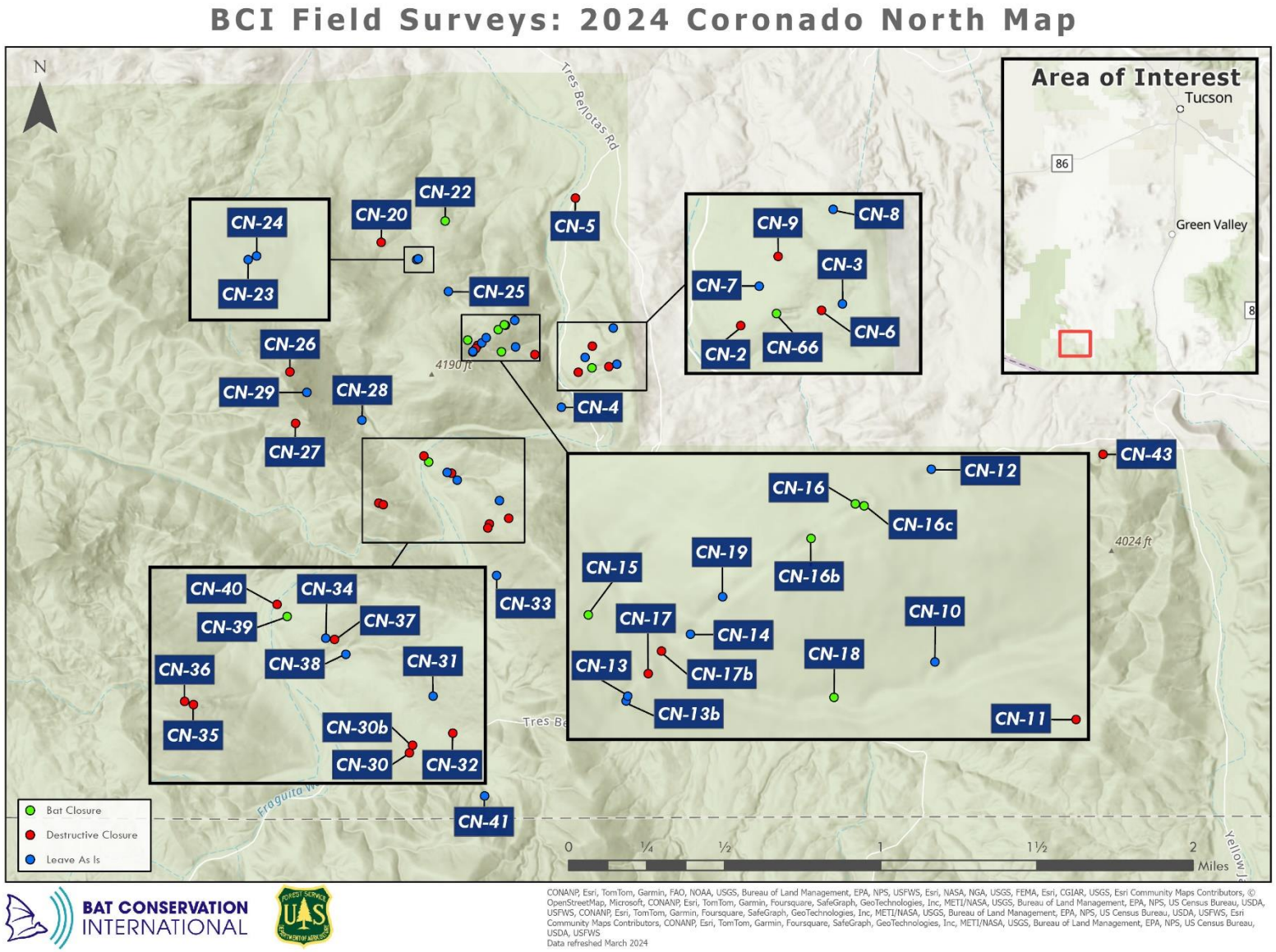

Figure 2: North Area Map

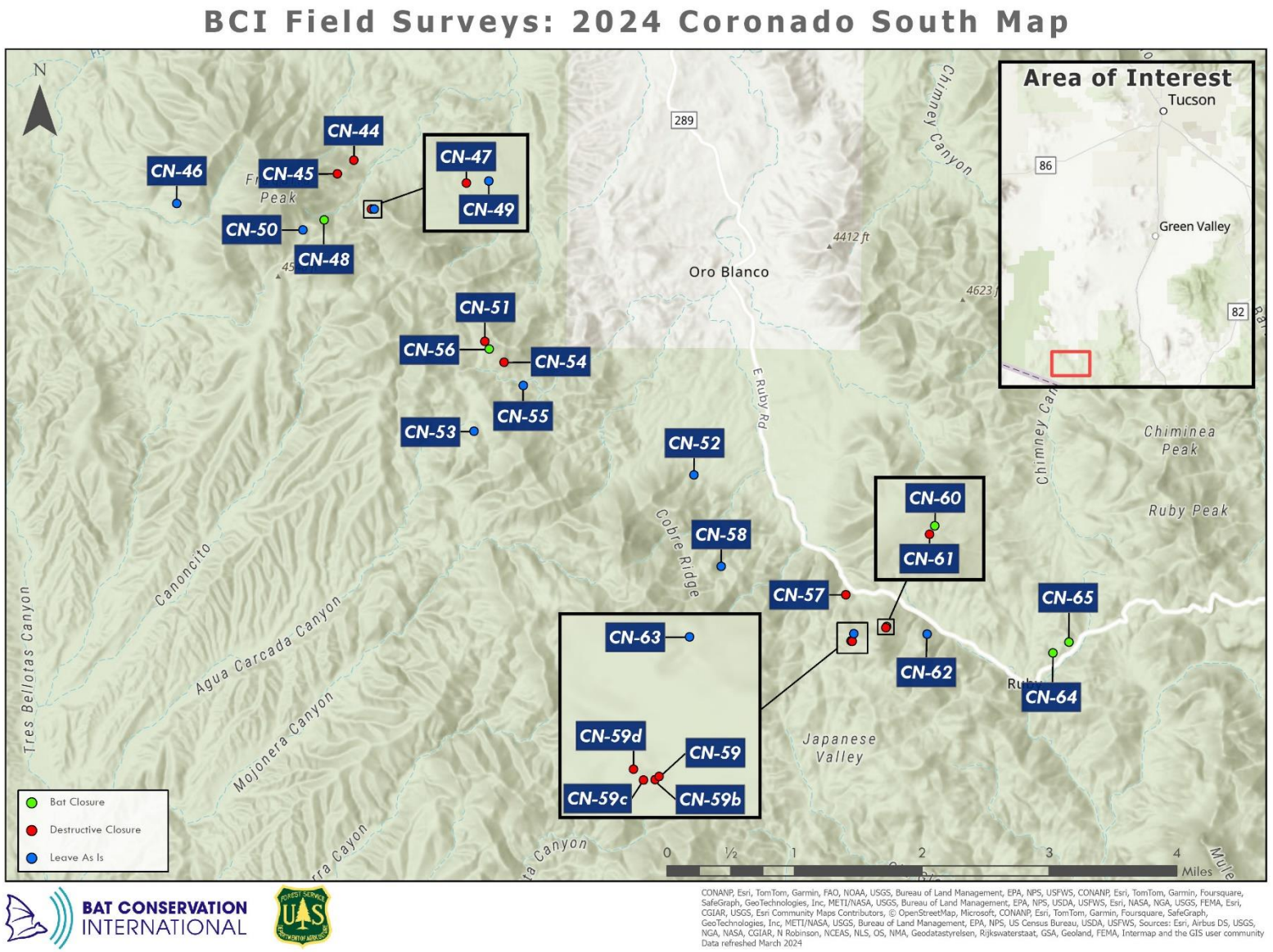

Figure 3: South Area Map

Section 1: Survey Methods

BIOLOGICAL SURVEYS:
Biological data is collected via internal surveys after abandoned mine land (AML) features are assessed and determined to be safe to enter. Internal surveys are the most efficient and effective means of assessing habitat quality and wildlife use. Surveys are focused on subterranean habitat, with a primary emphasis on bat use. Surveys attempt to identify bat species present, document other bat sign (e.g., guano, insect parts, roost staining), and determine roost function of the site. Additionally, surveys document other wildlife use of features, evident by live animals, scat, nests, etc. All bat and other wildlife observations inform habitat assessments and closure recommendations.

BAT HABITAT ASSESSMENT SUMMARY:
Bat habitat assessments are determined based on observed bats and bat sign, along with physical characteristics of the site such as complexity and extensiveness of workings, portal size and obstructions, ceiling textures that bats select for, hydrological activity (such as seasonal flooding) that may preclude bat use, and any additional observations that may influence bat use of the site. A bat habitat assessment is applied to each distinct AML feature, which may include multiple openings.

- None
- Poor
- Marginal
- Moderate
- Good
- Excellent
- Unknown

See Appendix 2 for descriptions of bat habitat assessment classifications.

CLOSURE RECOMMENDATIONS:
Closure recommendations generally fall into bat-compatible or destructive closure categories and include a seasonal component that recommends the closure to occur either during the warm season, cold season, or at any time. A closure recommendation is provided for each individual opening of an AML feature and is selected from the following options:

- BCAT: Bat-compatible Closure, Any Time
- BCCS: Bat-compatible Closure, Cold Season
- BCWS: Bat-compatible Closure, Warm Season
- OWC: Other Wildlife-compatible Closure
- DCAT: Destructive Closure, Any Time
- DCWS: Destructive Closure, Warm Season
- LAI: Leave As Is
- CM: Closure Modification
- AC: Airflow Closure

See Appendix 3 for descriptions of closure recommendation classifications and Appendix 4 for guidance on conducting exclusion prior to closure.

Section 2: Survey Results

AML FEATURE DESCRIPTIONS:

Unless otherwise noted, all features are driven in moderate- to good-quality rock (qualitative safety assessment), contain good air*, and exhibit minimal signs of post-mining human disturbance. All feature locations are listed as latitude and longitude (decimal degrees) in the WGS84 datum.

* Good air is defined as no alarm sounding on the Altair 4x Multi-gas Detector carried during all surveys. The detector measures four gases (oxygen, carbon monoxide, hydrogen sulfide, methane) and alarms for gas levels that fall outside of safe thresholds.

Feature: CN-02
Location: 31.538835, -111.336744
Date: January 24, 2024
Observations: This feature is a shaft with a collar that is 6'Wx7'L and has an approximate depth of 10'. The feature was completely flooded when the survey was conducted, so the true depth is unknown.
Bat Habitat: Poor
Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-03
Location: 31.539162, -111.334952
Date: January 24, 2024
Observations: This feature is a trench that is 8'Wx6'Hx14'L. The trench was filled with water when the survey was conducted. This feature provides no roosting habitat for bats and contains no dark zone.
Bat Habitat: None
Closure Recommendation: Leave As Is (LAI)
This feature presents no obvious hazards greater than those inherent to the landscape. The trench holds water during certain times of the year and LAI would enable wildlife to continue to utilize the site as a water source.

Feature: CN-04
Location: 31.537462, -111.337520
Date: January 25, 2024
Observations: This feature is a shallow shaft that is 7'Wx10'L and is 9' deep. This feature contains no subterranean habitat and no dark zone.
Bat Habitat: Poor
Closure Recommendation: Leave As Is (LAI)
Alternative Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-05
Location: 31.545715, -111.336866
Date: January 24, 2024
Observations: This feature is a well that is 4'Wx4'L and goes down 19'. It has a 6' long culvert for the collar that is set into cement for support. Below the culvert, the rest of the well wall is solid rock and contains water at the bottom. The subterranean workings are minimal. A snake shed was seen where the culvert intersects the bedrock layer. This feature creates a pitfall hazard for people as well as wildlife.
Bat Habitat: Poor
Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-06
Location: 31.539068, -111.335317
Date: January 24, 2024
Observations: This feature is an adit that has a 4'Wx6'H portal opening and is 28' long, ending in solid rock. Historical items included a single piece of timber. Bat sign documented was splatter on the wall and moth wings. This feature is used very lightly as a day and a night roost. The adit contains a very limited dark zone. Other wildlife seen was woodrat scat and midden.
Bat Habitat: Marginal
Closure Recommendation: Destructive Closure, Warm Season (DCWS)
Follow exclusion protocols in BCI's "Managing Abandoned Mines for Bats." See Appendix 4.

Feature: CN-07
Location: 31.53943050, -111.33641859
Date: January 24, 2024
Observations: This feature is a shallow shaft that has a 5'Wx10'L collar and was flooded during the time of the survey
Bat Habitat: None
Closure Recommendation: Leave As Is (LAI)
This feature retains water, and LAI would allow wildlife to continue to utilize the feature as a guzzler.
Alternative Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-08
Location: 31.540582, -111.335112
Date: January 24, 2024
Observations: This feature is a prospect cut on a hillside. A small trench leads to a 6' high wall. This feature contains no subterranean habitat.
Bat Habitat: None
Closure Recommendation: Leave As Is (LAI)
This feature presents no obvious hazards greater than those inherent to the landscape.
Alternative Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-09
Location: 31.539875, -111.336083
Date: February 7, 2024
Observations: This feature has a 60' long trench that varies from 6'-20' deep, leading to an 8' long adit.
Bat Habitat: Poor
Closure Recommendation: Destructive Closure, Any Time (DCAT)
Alternative Closure Recommendation: Leave As Is (LAI)

Feature: CN-10
Location: 31.539845, -111.339655
Date: February 8, 2024
Observations: This feature is a 7'Wx10'Hx25'L trench and contains no subterranean workings.
Bat Habitat: None
Closure Recommendation: Leave As Is (LAI)
This feature is remotely located and presents no obvious hazards greater than those inherent to the landscape. Fencing and signage could be added to minimize safety concerns.
Alternative Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-11
Location: 31.539534, -111.338754
Date: January 24, 2024
Observations: This feature is a shaft with a 6'Wx5'L collar. The shaft is completely flooded up to the last 3' from the surface and contains no subterranean workings. The water is at least 16' deep.
Bat Habitat: None
Closure Recommendation: Destructive Closure, Any Time (DCAT)
Alternative Closure Recommendation: Leave As Is (LAI)

Feature: CN-12
Location: 31.540894, -111.339677
Date: January 24, 2024
Observations: This feature has self-remediated and contains no subterranean workings.
Bat Habitat: None
Closure Recommendation: Leave As Is (LAI)

Feature: CN-13 / CN-13b
Location: 31.539660, -111.341617
Date: January 24, 2024
Observations: This feature is a trench that is 4'Wx20'Hx60'L and is subdivided by a 20'L tunnel. The face of the trench ends in collapse. The tunnel feature contained four guano pellets and a pair of moth wings indicating a minor night roost. Other wildlife sign included woodrat scat.
Bat Habitat: Marginal
Closure Recommendation:
CN-13: Leave As Is (LAI)
CN-13b: Leave As Is (LAI)
Alternative Closure Recommendation:
CN-13: Destructive Closure, Warm Season (DCWS)
CN-13b: Destructive Closure, Warm Season (DCWS)
Follow exclusion protocols in BCI's "Managing Abandoned Mines for Bats." See Appendix 4.

Feature: CN-14
Location: 31.539997, -111.341217
Date: February 8, 2024
Observations: This feature is an adit with a 6'Wx10'H portal opening that quickly narrows down to a 4'Wx2'H constriction, then opens into standing height. The adit is driven into solid rock and has 235' of horizontal workings before ending in collapse. This feature also contains two stopes, located towards the portal and the face of the mine, that extend upwards and are 33' and 12' in length, respectively. Nails, drill holes, and a few 8' long pieces of lumber were seen throughout the feature. Scattered guano, beetle/cricket parts, and moth wings were primarily found within the first 100' of the adit. Guano was also seen at the face of the mine near the collapse. Insect parts and light guano scatter indicate feature is utilized as a night and a day roost. Other wildlife signs observed were javelina remains, lots of javelina scat, small carnivore scat, woodrat scat, and ringtail scat. Live wildlife in mine includes spiders and flies.
Bat Habitat: Moderate
Closure Recommendation: Leave As Is (LAI)
This feature presents no obvious structural concerns or internal physical hazards. LAI would provide the least impact to wildlife utilizing this feature and preserve habitat for larger wildlife that would otherwise be excluded by standard bat gates. Maintenance on current fencing and signage could help to minimize safety concerns.
Alternative Closure Recommendation: Bat-compatible Closure, Any Time (BCAT)
A removable bar and a gate with 6" bar spacing is recommended for this feature.

Feature: CN-15
Location: 31.540103, -111.341870
Date: January 24, 2024
Observations: This feature has a 50' long trench that leads to an adit with a 4'Wx6'H portal opening and extends back 112'. There was standing water ranging from 6" – 2' deep that was present throughout the feature. Bat sign includes light scatter, splatter, moth wings, beetle/cricket parts, and roost staining. This indicates the feature is utilized as a night roost and a day roost. Guano and splatter were observed on the ribs and the back of the mine. Insect parts were seen floating in the water. Bat use is likely more significant than what was observed, but the flooded adit could be preventing sign building up from year to year.
Bat Habitat: Good
Guano Analysis: A guano sample collected for species identification was preserved in RNA later and submitted to the Bat Ecology & Genetics Lab at Northern Arizona University for DNA analysis to determine species composition. For indeterminate reasons, the Lab was unable to sequence the guano sampled at this site.
Closure Recommendation: Bat-compatible Closure, Any Time (BCAT)
A removable bar and a gate with 6" bar spacing is recommended for this feature.

Feature: CN-16 / CN-16b / CN-16c
Location: 31.54070643, -111.34016247 (CN-16)
31.54051735, -111.3404471 (CN-16b)
31.5406963, -111.3401064 (CN-16c)
Date: January 24, 2024
Observations: This feature is a singular stope approximately 6'Wx40'Hx100'L and is accessed by three openings. CN-16b is an adit that is located at the southwestern end of the feature and serves as the most accessible entrance. This portal entrance is situated in a trench and accesses the upper portion of the feature. The adit continues to the main stope, which then opens to the surface by CN-16. Past the main stope on the same trajectory is the shaft feature CN-16c. The bottom of the shaft was not accessible to survey and contained three unsurveyed drifts. Historical stulls, timbers, wire, rusty containers, and modern trash were observed throughout the feature. Bat sign includes light guano scatter, moth wings, beetle/cricket parts, and roost staining. A live bat was observed but could not be positively identified; it was suspected to be a Mexican long-tongued bat (*Choeronycteris mexicana)*. Other wildlife sign includes an owl nest and guano, dead jackrabbit, snake shed, and mesocarnivore and large carnivore scat.
Bat Habitat: Moderate
Closure Recommendation:
CN-16: Bat-compatible Closure, Any Time (BCAT)
CN-16b: Bat-compatible Closure, Any Time (BCAT)
CN-16c: Bat-compatible Closure, Any Time (BCAT)
A bat gate with 6" bar spacing is recommended for all entrances. For portal CN-16b, a removable bar is recommended to allow for future access.

Feature: CN-17 / CN 17b
Location: 31.539782, -111.341487 (CN-17)
31.53990471, -111.3414021 (CN-17b)
Date: January 24, 2024
Observations: This feature is a shaft that has a 4'Wx23'L collar and descends 26' where it intersects a horizontal crosscut. One drift extends to the southwest and is 63' in length. The other drift extends to the northeast 33' to CN-17b entrance, which is too small to enter. The feature is flooded up to 3' deep, except for a small landing where the shaft enters the crosscut. No bat sign was seen but it should be noted that the water could obscure/degrade any guano or insect parts. Other wildlife sign noted was woodrat scat and cocoons.
Bat Habitat: Marginal
Closure Recommendation:
CN-17: Destructive Closure, Warm Season (DCWS)
CN-17b: Destructive Closure, Warm Season (DCWS)
Follow exclusion protocols in BCI's "Managing Abandoned Mines for Bats." See Appendix 4.

Feature: CN-18
Location: 31.53965291, -111.34029851
Date: February 8, 2024
Observations: This feature is an adit with a 5'Wx8'H portal and extends back 222', ending in solid rock. 70' from the portal is a 5'Hx5'L underhand stope. Both modern human disturbance and cultural artifacts were found within this mine. Modern disturbance included plastic bottles, a shoe, food packages, and an aluminum mineral survey tag. Cultural artifacts seen included miner graffiti, plywood, rusty food cans, and glass shards. Lots of bat sign was seen throughout the feature. This included heavy scatter of guano, piles of guano (some a few inches tall), insect parts, roost staining, and one live big brown bat (*Eptesicus fuscus*). This bat sign, along with temperatures ranging from 72°F-77°F, indicates this feature is utilized by a warm season colony. Insect parts, which included moth wings and beetle/cricket parts, also points towards this feature being used as a night roost.
Bat Habitat: Excellent
Guano Analysis: A guano sample collected for species identification was preserved in RNA later and submitted to the Bat Ecology & Genetics Lab at Northern Arizona University for DNA analysis to determine species composition. The guano sampled identified two species to be present at this site: California leaf-nosed bat (MACA) and cave myotis (MYVE).
Closure Recommendation: Bat-compatible Closure, Cold Season (BCCS)
A removable bar and a gate with 6" bar spacing is recommended for this feature.

Feature: CN-19
Location: 31.540200, -111.341012
Date: February 8, 2024
Observations: This feature is an adit with a portal opening 8'Wx3'H and extends back 17', ending in solid rock. Bat sign was comprised of light and heavy guano scatter, moth wings, and beetle/cricket parts. This sign indicates the feature is used as a day and a night roost. Other wildlife sign includes bird feathers, eggshells, woodrat scat, and small mammal scat.
Bat Habitat: Moderate
Closure Recommendation: Leave As Is (LAI)
This feature is remotely located and presents no obvious structural concerns or internal physical hazards. LAI would provide the least impact to wildlife using this feature. Fencing and signage could be added to minimize safety concerns.
Alternative Closure Recommendation: Bat-compatible Closure, Any Time (BCAT)
A removable bar and a gate with 6" bar spacing is recommended for this feature.

Feature: CN-20
Location: 31.543965, -111.345862
Date: January 24, 2024
Observations: This feature is a shaft with a 7'Wx9'L collar and has an approximate depth of 13'. There is no dark zone, and the shaft is flooded 9' from the surface.
Bat Habitat: Poor
Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-22
Location: 31.544803, -111.342910
Date: February 8, 2024
Observations: This feature is an adit with a 3'Wx3'H portal opening. Right after the entrance, the adit slopes down for 6' at a 20° angle and then levels off. The feature continues for 58' and ends in solid rock. Most of the feature contains 2' of standing water. Very light guano scatter was seen throughout the feature, with one concentrated area of heavy scatter at the face of the mine. A few moth wings were located near the heavy guano scatter, and beetle parts were seen sparsely throughout the feature. This sign indicates the feature is utilized as a day and a night roost. Other wildlife sign included mud wasp nests, woodrat scat and nest, and small mammal scat.
Bat Habitat: Moderate
Closure Recommendation: Bat-compatible Closure, Any Time (BCAT)
A culvert closure is recommended to prevent rock debris from further constricting the portal entrance. A removable bar and a gate with 6" bar spacing is also recommended for this feature.

Feature: CN-23
Location: 31.543283, -111.344233
Date: January 24, 2024
Observations: This feature is a shaft with a 19'Lx7'W collar and is 8' deep. The shaft was completely flooded to the surface and had a thin layer of duckweed across the top.
Bat Habitat: None
Closure Recommendation: Leave As Is (LAI)
This feature is a half mile from any publicly accessible roads and is stable with little risk of collapse. LAI would preserve this feature as a water source for animals.
Alternative Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-24
Location: 31.543312, -111.344150
Date: January 24, 2024
Observations: This feature is a prospect shaft with a 6'Wx9'L collar and is 6' deep. The feature is completely flooded and has a small amount of duckweed on the surface.
Bat Habitat: None
Closure Recommendation: Leave As Is (LAI)
This feature is a half mile from any publicly accessible roads and is stable with little risk of collapse. LAI would preserve this feature as a water source for animals.
Alternative Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-25
Location: 31.542033, -111.342761
Date: February 8, 2024
Observations: This feature is an adit with a 4'Wx6'H portal opening. It extends 35' before ending in solid rock. This feature contained standing water that was 2' deep. Bat sign consists of light guano scatter which indicates the feature is primarily used as a day roost. Other wildlife sign includes javelina scat, woodrat scat, and a paper wasp nest.
Bat Habitat: Marginal
Closure Recommendation: Leave As Is (LAI)
This feature is a half mile from any publicly accessible roads and is stable with little risk of collapse. LAI would preserve this feature as a water source for animals.
Alternative Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-26
Location: 31.538861, -111.350095
Date: January 25, 2024
Observations: This feature is a shaft with a 9'Wx8'L collar and is 11' deep. The shaft contains no dark zone.
Bat Habitat: Poor
Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-27
Location: 31.536827, -111.349837
Date: January 25, 2024
Observations: This feature is a shaft with a 7'Wx9'L collar and extends 25' down where it becomes flooded with water. Water is an unknown depth. This shaft contains no dark zone.
Bat Habitat: Poor
Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-28
Location: 31.536946, -111.346758
Date: January 25, 2024
Observations: This feature has been naturally remediated; there is no portal opening and no subterranean workings.
Bat Habitat: None
Closure Recommendation: Leave As Is
This feature has self-remediated and needs no further work.

Feature: CN-29
Location: 31.538046, -111.349320
Date: January 25, 2024
Observations: This feature is an adit with a 3'Wx3'H portal entrance that opens into standing height once inside. The adit is driven back 94' into solid rock. Cultural sign seen within feature includes an aluminum metal tag with flagging. Bat sign documented was splatter, light guano scatter, moth wings, and beetle/cricket parts. These items indicate that the feature is utilized as a day and a night roost. The guano varied in size, which points towards the roost being used by multiple species. Other mammal sign noted was lots of javelina scat, a large mammal spine, medium mammal scat, spider webs, woodrat scat, and a mouse nest.
Bat Habitat: Good
Closure Recommendation: Leave As Is (LAI)
This feature presents no obvious structural concerns or internal physical hazards. LAI would provide the least impact to wildlife using this feature and preserve habitat for larger wildlife that would otherwise be excluded by standard bat gates. Fencing and signage could be added to minimize safety concerns.
Alternative Closure Recommendation: Bat-compatible Closure, Any Time (BCAT)
A removable bar and a gate with 6" bar spacing is recommended for this feature.

Feature: CN-30 / CN-30b
Location: 31.532696, -111.340936 (CN-30)
31.53284773, -111.3408595 (CN-30b)
Date: January 25, 2024
Observations: This feature is a collapsed shaft that is divided by a narrow 1'W archway, forming two collars. CN-30 collar is 8'Wx10'L and extends down 14'. The shaft contains no dark zone and holds water at the bottom. A cable and a few timbers were seen within the shaft. The archway could be utilized by bats as a night roost, but no bat sign was found underneath it. Other wildlife sign documented was woodrat scat, dead insects, and a spider egg case.
Bat Habitat: Poor
Closure Recommendation:
CN-30: Destructive Closure, Any Time (DCAT)
CN-30b: Destructive Closure, Any Time (DCAT)

Feature: CN-31
Location: 31.533783, -111.340400
Date: February 7, 2024
Observations: This feature has a 10'Wx15'Lx5'H trench that leads to a completely collapsed adit. Lots of loose, clay-like material comprises the majority of the collapse, along with some small rocks and tree roots. A small, wooden sign that says, "keep out" and a glass jar were found within the trench. There are no accessible subterranean workings at this site.
Bat Habitat: None
Closure Recommendation: Leave As Is (LAI)
The adit has self-remediated, and the trench feature poses no danger that is not already inherent on the landscape.

Feature: CN-32
Location: 31.533078, -111.339959
Date: January 25, 2024
Observations: This feature is a shaft that has a 4'Wx25'L collar and has an unknown depth due to the shaft being flooded at the time of the survey. A few pieces of lumber was documented around the collar, and a deer skeleton was seen floating on the surface of the water.
Bat Habitat: Poor
Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-33
Location: 31.530819, -111.340519
Date: January 25, 2024
Observations: This site contains a series of collapsed workings that extend straight uphill for about 100'. There is no subterranean habitat present. Various scattered timbers and lumber were seen.
Bat Habitat: None
Closure Recommendation: Leave As Is (LAI)

Feature: CN-34
Location: 31.534885, -111.342805
Date: January 25, 2024
Observations: This feature is a 20'Wx30'Lx6'H prospect pit. The prospect pit contained standing water about 2' deep. Floating timbers and vegetation were seen submerged in the water.
Bat Habitat: None
Closure Recommendation: Leave As Is (LAI)

Feature: CN-35 / CN-36
Location: 31.533620, -111.345773 (CN-35)
31.533681, -111.345972 (CN-36)
Date: February 7, 2024
Observations: This is a trench feature that is 3'W, ranges from 4-8'H and is 75'L. Halfway through the trench is a 10'L land bridge connecting CN-35 to CN-36. Cultural items seen at the site were nails, an aluminum metal tag, a rusty can, and a Styrofoam cup. Other wildlife sign was a mud wasp nest.
Bat Habitat: Poor
Closure Recommendation:
CN-35: Destructive Closure, Any Time (DCAT)
CN-36: Destructive Closure, Any Time (DCAT)

Feature: CN-37
Location: 31.534860, -111.342611
Date: February 7, 2024
Observations: This feature is an adit with a small 3'Wx2'H portal opening. The adit declines down 8' at 30° and then hits a pool of water 1' deep and 7' in length. The adit then continues up at a slight incline and ends in solid rock. Cultural items seen were an aluminum metal tag and a screwdriver. Bat sign documented was moth wings and a few guano pieces on wall. The bat sign was not very significant, and the feature is probably lightly used as a night and a day roost.
Bat Habitat: Marginal
Closure Recommendation: Destructive Closure, Warm Season (DCWS)
Follow exclusion protocols in BCI's "Managing Abandoned Mines for Bats." See Appendix 4.

Feature: CN-38
Location: 31.534578, -111.342357
Date: February 7, 2024
Observations: This feature has completely collapsed, and the original entrance could not be found.
Bat Habitat: None
Closure Recommendation: Leave As Is (LAI)
Feature has self-remediated and needs no further work.

Feature: CN-39
Location: 31.535300, -111.343667
Date: February 7, 2024
Observations: This feature is an adit that has a 5'Wx3'H portal opening and is greater than 100' in length. The feature is driven downhill, following the ore body with stopes on either side. After 60' from the portal, a drift branches sharply to the left, towards a possible collapsed entrance. The main drift continues, and there could be a possible additional drift to the right. While conducting the survey, a noise (similar to a rock falling) was heard from the drift to the left. The surveyor came back out to the entrance after hearing the noise, and the rest of the survey was subsequently called off due to safety. A couple of historical items were seen within the area that was surveyed, including an aluminum mineral survey tag and some corrugated metal. This adit sees significant human use from people migrating through the area. The floor near the entrance and 60' back was completely covered in various items that included large black bags, jugs, bottles, clothing, food packaging, canned food, camouflage backpacks, and blankets. No bat sign was observed within the section of the mine that was surveyed, but the amount of trash on the floor could easily obscure any sign that was present. Other wildlife sign documented include a dead skunk, skunk scat, a snake skeleton, and woodrat scat. The mine also smelled heavily of a skunk.
Bat Habitat: Unknown
Closure Recommendation: Bat-compatible Closure, Any Time (BCAT)
A bat gate with 6" spacing and a removable bar is recommended to allow for future entry/monitoring at this feature. Since this site sees significant human use, placing the gate further back into the feature is also recommended in order to provide enough shade and shelter from the elements.

Feature: CN-40
Location: 31.535533, -111.343900
Date: February 7, 2024
Observations: This feature has a 5'Wx5'L portal opening and was completely flooded at the time of the survey.
Bat Habitat: Unknown
Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-41
Location: 31.522126, -111.341083
Date: February 7, 2024
Observations: This feature is an adit that has a 4'Wx3'H portal opening. Past the portal opening 20', there is a 10' stope on the left and a 20' drift to the right (which circles back to the main adit). Off the 20' drift is a 2'Wx2'Hx10'L stope. The feature continued to be driven down at a 35° angle for 90' before leveling out to even ground. The adit continues another 20' before constricting down to a 2'Wx1'H squeeze. Just past the squeeze the adit opens to standing height and continues another 20' before ending in solid rock. The feature gets very warm (71°F) and humid (73 RH) closer to the face of the mine. Historical sign seen were lumbers, nails, a metal hook on the ribs of the mine, wooden steps, two food cans, an old metal pipe, and some metal railing sticking out from adjacent collapsed portal. The only modern human disturbance documented was an older Budweiser can at the face of the mine. Bat sign was very sparse and was only found within 30' of portal. It consisted of a few pieces of guano and moth wings, indicating the feature is used as a night roost. Other wildlife sign includes a live gray fox observed from the portal, fox scat, javelina scat and skull, small mammal bones, and spider webs.
Bat Habitat: Marginal
Closure Recommendation: Leave As Is (LAI)
LAI would provide the least impact to wildlife using this feature and preserve habitat for larger wildlife that would otherwise be excluded by standard bat gates or destructive closure. Fencing and signage could be added to minimize safety concerns.
Alternative Closure Recommendation: Other Wildlife-compatible Closure (OWC)
A small "mammal door" is recommended to allow continued access for gray foxes to use this feature as a den. Closure should occur outside their denning period, between July-December. A gate with a removable bar and 6" bar spacing is recommended for this feature.

Feature: CN-43
Location: 31.535598, -111.312435
Date: February 7, 2024
Observations: This feature is a short, 6'L prospect with a 5'Wx5'H portal opening. It contains about 4" of seasonal standing water. This feature contains no true dark zone. No bat sign was seen during the survey. Other wildlife sign includes woodrat scat, remnants of bird nest, and spider webs.
Bat Habitat: Poor
Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-44
Location: 31.510072, -111.324098
Date: January 25, 2024
Observations: This feature is a shaft with an 8'Wx10'L collar and has an unknown depth. The shaft is flooded about 6' from the surface. It contains no subterranean workings and has no dark zone.
Bat Habitat: Poor
Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-45
Location: 31.508752, -111.325983
Date: January 25, 2024
Observations: This feature is a collapsed shaft with a 15'Wx25'L collar and is 15' deep. The collapse makes it possible to walk into the feature without any rigging. It contains a lateral drift at the base that is 18' long and ends in solid rock. At the end of the drift is a pool of water about 2' deep. No bat sign was seen; however, seasonal flooding could obscure any sign from building up. Other wildlife sign includes woodrat scat, mouse scat and a nest.
Bat Habitat: Marginal
Closure Recommendation: Destructive Closure, Warm Season (DCWS)
Follow exclusion protocols in BCI's "Managing Abandoned Mines for Bats." See Appendix 4.

Feature: CN-46
Location: 31.505861, -111.344234
Date: February 7, 2024
Observations: This feature is an adit that has a 5'Wx5'H portal opening and extends back 16', ending in solid rock. Historical sign seen includes rusty cans, small timbers, and two nails on ribs. Modern human disturbance included trash bags, empty bottles, cans, jugs, and a USB charger battery pack. The only bat sign seen was light guano scatter, indicating that this feature is utilized as a minor day roost. The adit contains only a twilight zone and never gets fully dark. Other mammal sign seen was woodrat and small mammal scat.
Bat Habitat: Marginal
Closure Recommendation: Leave As Is (LAI)
This feature is remotely located and presents no obvious structural concerns or internal physical hazards. Signage could be added to minimize safety concerns.
Alternative Closure Recommendation: Destructive Closure, Any Time (DCAT)
If a destructive closure is the chosen closure method, it's worth noting that this feature is adjacent to two other significant shaft features (>50' deep) that have never received a biological survey. If future surveys are conducted on the other shafts, all features could be closed at the same time (if needed).

Feature: CN-47
Location: 31.505313, -111.322097
Date: January 23, 2024
Observations: This feature is a shaft with a 6'Wx8'L collar and is 13' in depth. The bottom of the shaft is sumped, with a lateral drift that extends 10' and ends in solid rock. The only historical items noted were timbers. No bat sign was seen, and the feature contains a limited dark zone. The only other wildlife seen was woodrat scat.
Bat Habitat: Poor
Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-48
Location: 31.504272, -111.327495
Date: February 8, 2024
Observations: This feature has a 20'L trench that leads to a 10'L archway. Just past the archway is an adit with a 7'Wx8'H portal opening. At the portal opening is a 5'Wx'5Lx8'H underhand stope. The feature continues past the stope for another 65', ending in solid rock. Historical items seen were black plastic piping and pieces of lumber and timber. A live Townsend's big-eared bat was seen hibernating underneath the archway. Other bat sign seen was heavy guano scatter, moth wings, and beetle/cricket parts. Heavy guano scatter indicates warm season use, while the insect parts show that this feature is also utilized as a night roost.
Bat Habitat: Good
Closure Recommendation: Bat-compatible Closure, Cold Season (BCCS)
A bat gate with 6" bar spacing is recommended for this feature as well as a visual inspection underneath trench feature to make sure there are no hibernating bats.

Feature: CN-49
Location: 31.505335, -111.321819
Date: January 23, 2024
Observations: This feature is a prospect trench that is 4'Wx5'Hx20'L. The end of the trench contains an adit that extends back 2'. This feature contains no subterranean habitat.
Bat Habitat: None
Closure Recommendation: Leave As Is (LAI)

Feature: CN-50
Location: 31.503307, -111.329880
Date: February 8, 2024
Observations: This feature is a short 4'Wx2'Hx5'L prospect adit that has been flooded. Water could be obscuring a small portal opening. The feature contains no subterranean workings and no dark zone. Historical items seen outside of the feature include a shovel head. Modern human items documented were camouflage gear, plastic bottles, and food packaging.
Bat Habitat: Poor
Closure Recommendation: Leave As Is (LAI)
This feature is remotely located and presents no obvious structural concerns or internal physical hazards. Signage could be added to minimize safety concerns.
Alternative Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-51
Location: 31.492550, -111.309238
Date: January 23, 2024
Observations: This feature is a shallow shaft with a 9'Wx13'L collar and extends down 10'. The bottom of the shaft is filled with 3' of water. This feature contains no subterranean workings or dark zone.
Bat Habitat: Poor
Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-52
Location: 31.479615, -111.285508
Date: February 6, 2024
Observations: This feature is an adit with a 3'Wx5'H portal opening. The adit extends back 15' and ends in solid rock. Bat sign seen includes heavy guano scatter, moth wings, and beetle/cricket parts. This sign indicates that the feature is utilized as a night and a day roost. Woodrat scat was also seen outside of the feature.
Bat Habitat: Good
Closure Recommendation: Leave As Is (LAI)
This feature presents no obvious structural concerns or internal physical hazards. LAI would provide the least impact to wildlife using this feature and preserve habitat for larger wildlife that would otherwise be excluded by a bat gate.
Alternative Closure Recommendation: Bat-compatible Closure, Any Time (BCAT)
A removable bar and a gate with 6" bar spacing is recommended for this feature.

Feature: CN-53
Location: 31.483852, -111.310470
Date: February 8, 2024
Observations: This feature is an adit with a 5'Wx5'H portal opening and extends back 10', ending in solid rock. A lot of human trash was seen within the feature. This included trash bags, food containers, food packaging, a Camelbak pack, a backpack, plastic bottles, clothing, and bailing twine. Wildlife sign seen was bird guano, woodrat scat, a mud wasp nest, and some kind of chrysalis.
Bat Habitat: Poor
Closure Recommendation: Leave As Is (LAI)
This feature is remotely located and presents no obvious structural concerns or internal physical hazards.
Alternative Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-54
Location: 31.490534, -111.307046
Date: January 23, 2024
Observations: This feature is an adit with a 4'Wx6'H portal opening and extends back 22'. The face of the adit contains a pool of water. This feature declines at a moderate grade and dimensions narrow as it descends. The only wildlife sign seen was bird feathers.
Bat Habitat: Poor
Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-55
Location: 31.488253, -111.304884
Date: February 8, 2024
Observations: This feature is a prospect pit that is 15'Wx3'Hx10'L. The pit was filled with water at the time of the survey.
Bat Habitat: None
Closure Recommendation: Leave As Is (LAI)
LAI would help to preserve water retention on the landscape, and wildlife could continue to utilize the feature as a water source.

Feature: CN-56
Location: 31.491788, -111.308736
Date: January 23, 2024
Observations: This feature is a shaft with a 5'Wx8'L collar opening and is 54' deep with water at the bottom. The shaft is driven down at a 75°-85° angle. A 13' lateral drift extends off the main shaft 40' from the collar. A second, 17' lateral drift also extends off the shaft. Both drifts end in solid rock. Historical sign documented were timbers and a ladder. Bat sign includes light guano scatter, beetle/cricket parts, and moth wings, indicating this feature is used as a night and a day roost. The 17' lateral drift contained the area where the bat sign was located. Other wildlife sign seen included an owl pellet, bird guano, a rodent skull, spiders, and spider webs.
Bat Habitat: Moderate
Closure Recommendation: Bat-compatible Closure, Any Time (BCAT)
A removable bar and a gate with 6" bar spacing is recommended for this feature.

Feature: CN-57
Location: 31.468028, -111.268292
Date: January 23, 2024
Observations: This feature is a prospect shaft that is 6'Wx10'Lx8'H. The feature contains no dark zone.
Bat Habitat: Poor
Closure Recommendation: Destructive Closure, Any Time (DCAT)

Feature: CN-58
Location: 31.470763, -111.282426
Date: February 6, 2024
Observations: This feature is an adit with a 4'Wx3'H portal opening. The adit opens into standing height, extends straight back 80', and then ends in solid rock. Historical artifacts include an aluminum mineral sampling tag with flagging, a glass bottle, and drill holes. Bat sign documented was light guano scatter, moth wings, and beetle/cricket parts. A handful of guano pieces and insect parts were seen at the face of the mine, indicating this feature is lightly used as a night roost. Other wildlife sign seen was javelina scat and prints, a javelina jawbone, mouse scat, feathers, and bird guano. The javelina use of this feature was very high and that (along with seasonal water) could possibly obscure other bat sign within feature.
Bat Habitat: Moderate
Closure Recommendation: Leave As Is (LAI)
This feature presents no obvious structural concerns or internal physical hazards. LAI would provide the least impact to wildlife using this feature and preserve habitat for large wildlife that would otherwise be excluded by standard bat gates or destructive closure.
Alternative Closure Recommendation: Bat-compatible Closure, Any Time (BCAT)
A removable bar and a gate with 6" bar spacing is recommended for this feature.

Feature: CN-59 / CN-59b / CN-59c / CN59d
Location: 31.46354291, -111.26752941 (CN-59)
31.46352503, -111.2675525 (CN-59b)
31.46352432, -111.2676213 (CN-59c)
31.46357774, -111.2676815 (CN-59d)
Date: January 23, 2024
Observations: This feature is an adit/shaft complex. CN-59d was the access point to the mine workings and sits at the end of a 16' long trench. The workings extend east underneath CN-59c (a large skylight that is 10' deep) and end at CN-59b and CN-59. This feature is very open and exposed, making the subterranean climate similar to the ambient air, and no true dark zone exists. The historical artifacts of this site contain a stacked rock wall near the entrance of CN-59d. There was also lots of trash from people migrating through. This included plastic bottles, medicine, food wrappers, clothing, blankets, and a propane can. No bat sign was seen within feature. A live horned lizard was also seen in the feature.
Bat Habitat: Marginal
Closure Recommendation:
CN-59: Destructive Closure, Warm Season (DCWS)
CN-59b: Destructive Closure, Warm Season (DCWS)
CN-59c: Destructive Closure, Warm Season (DCWS)
CN-59d: Destructive Closure, Warm Season (DCWS)
Follow exclusion protocols in BCI's "Managing Abandoned Mines for Bats." See Appendix 4.

Feature: CN-60
Location: 31.464962, -111.263643
Date: February 6, 2024
Observations: This feature is an adit with a 4'Wx4'H portal opening. The adit is driven straight for 27' and ends in solid rock. Bat sign for this feature includes light guano scatter, beetle/cricket parts, and moth wings, which indicates use as a night roost. Seasonal standing water could obscure any other sign within the adit. A mud wasp nest, dragonfly wings, rodent scat and nest, a kissing bug, spider webs, and red insect larvae were also observed in this feature.
Bat Habitat: Moderate
Closure Recommendation: Bat-compatible Closure, Any Time (BCAT)
Removal of vegetation in front of portal would help to open up the fly way for bats. A removable bar and a gate with 6" bar spacing is also recommended for this feature.

Feature: CN-61
Location: 31.464842, -111.263734
Date: February 6, 2024
Observations: This feature has a 6'Wx14'L collar and has an unknown depth. The feature was completely flooded at the time of the survey. Rails and other metal material are submerged in the feature. Since the feature is completely flooded, it could indicate that the workings are not very extensive. Lots of trash from migrating people was seen around the collar. These items include blankets, plastic bottles, razors, wall adapter, hats, clothes, slippers, and backpacks.
Bat Habitat: Unknown
Closure Recommendation: Destructive Closure, Warm Season (DCWS)
Follow exclusion protocols in BCI's "Managing Abandoned Mines for Bats." See Appendix 4.

Feature: CN-62
Location: 31.46421256, -111.25906535
Date: February 6, 2024
Observations: This feature contains 15’ of a previously collapsed adit that leads to two separate portals (CN-62 and CN-62B) that do not intersect underground. The portal on the right is CN-62; it has a 5’Wx5’H portal opening and extends back 26’ feet, ending in solid rock. An underhand stope 10’ from the portal is about 10’ deep. The bottom of the stope contains 2’ of pooled water. An aluminum mineral sampling tag is nailed above the portal. This feature contains light guano scatter, which indicates bats use it as a day roost. Guano was seen before the stope, and the feature contains no true dark zone. A bird wing (possibly a crow) was seen at the face of the mine. Woodrat scat and small mammal scat were also observed.
Bat Habitat: Marginal
Closure Recommendation: Leave As Is (LAI)
This feature is remotely located and presents no obvious structural concerns or internal physical hazards. Leaving this feature open is recommended to provide the least impact to wildlife using this feature.
Alternative Closure Recommendation: Destructive Closure, Warm Season (DCWS)
Follow exclusion protocols in BCI’s “Managing Abandoned Mines for Bats.” See Appendix 4.

Feature: CN-62b
Location: 31.46421337, -111.2590675
Date: February 6, 2024
Observations: This feature is a shallow adit and is adjacent to CN-62. The adit has a portal opening 5’Wx3’H and extends back 10’, ending in solid rock. Moth wings, beetle/cricket parts, and light guano scatter were seen within the feature. Other wildlife sign documented was bird guano and woodrat scat.
Bat Habitat: Marginal
Closure Recommendation: Leave As Is (LAI)
This feature is remotely located and presents no obvious structural concerns or internal physical hazards. Leaving this feature open is recommended to provide the least impact to wildlife using this feature.
Alternative Closure Recommendation: Destructive Closure, Warm Season (DCWS)
Follow exclusion protocols in BCI’s “Managing Abandoned Mines for Bats.” See Appendix 4.

Feature: CN-63
Location: 31.464247, -111.267349
Date: January 23, 2024
Observations: This feature is a collapsed shaft; it contains no subterranean habitat and no dark zone.
Bat Habitat: None
Closure Recommendation: Leave As Is (LAI)
This feature has self-remediated.

Feature: CN-64
Location: 31.462414, -111.244786
Date: February 8, 2024
Observations: This feature is an adit with a 5'Wx3'H portal opening. The adit is driven straight for 34' and ends in solid rock. Two historical nails were seen within the feature. Lots of trash from migrating people was also present and included blankets, water bottles, plastic bags, and food packaging. Bat sign seen in the feature was light guano scatter, possible splatter, beetle/cricket parts, and moth wings. Guano and insect parts were seen near the entrance, indicating that this feature is primarily used as a night roost. Other wildlife sing includes heavy woodrat scat, javelina scat, a mouse nest, a cocoon, spider webs, and small mammal scat (possibly ringtail).
Bat Habitat: Marginal
Closure Recommendation: Bat-compatible Closure, Any Time (BCAT)

Feature: CN-65
Location: 31.463454, -111.242929
Date: February 8, 2024
Observations: This feature is an adit that has a 3'Wx4'H portal opening. The feature declines 8' before leveling out to flat ground. It extends another 21' and has an 8' stope to the left and a 4' stope to the right. Significant bat use was seen within this feature. Heavy guano scatter, piles of guano, roost staining, moth wings, and beetle/cricket parts were seen throughout the feature. Insect parts were prevalent throughout the flyway and near the face of the mine. Heavy guano scatter and piles were seen in between the two stopes. All these signs indicate this feature gets used as a warm season colony, day roost, and a night roost.
Bat Habitat: Excellent
Guano Analysis: A guano sample collected for species identification was preserved in RNA later and submitted to the Bat Ecology & Genetics Lab at Northern Arizona University for DNA analysis to determine species composition. The guano sampled identified cave myotis (MYVE) to be present at this site.
Closure Recommendation: Bat-compatible Closure, Cold Season (BCCS)

Feature: CN-66
Location: 31.53901699, -111.33611453
Date: January 25, 2024
Observations: This feature is a shaft that is located on the western side of a long trench. This shaft has a 9'Wx10'H collar and descends 23'. A crosscut at the bottom of the shaft follows the trajectory of the trench. The crosscut extends to the east 15' and ends in collapse. The western portion of the crosscut extends 30' and ends in solid rock. The only historical sign seen within the feature were timbers. This shaft sees low levels of bat use. The sign documented was light guano scatter and beetle/cricket parts, indicating a night roost. Other wildlife sign included a barn owl nest with eggs, a dead barn owl, and owl pellets.
Bat Habitat: Moderate
Closure Recommendation: Bat-compatible Closure, Any Time (BCAT)

Contact

For questions on the content of this report, or for more information on bats and subterranean habitat, please contact Bat Conservation International's Subterranean Team:

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BCI's Habitat Protection & Restoration Program (HP&R) works to identify, protect, restore, and conserve the above and below ground habitats that are vital to bat populations around the world. To learn more about our capabilities and partnership opportunities, please contact:

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To learn more about BCI's mission to end bat extinctions worldwide, and how you can help, please visit our website:

www.batcon.org

Appendix 1: Selected Photos

The full set of photos from all features was provided in digital form with this report.

CN-15: Jackson Bain taking a guano sample while trying to avoid flooding his boots with water.
BCI Photo by Harrison Tamayo

CN-16: Possible Mexican long-tongued bat hangs from the ceiling.
BCI Photo by Jackson Bain

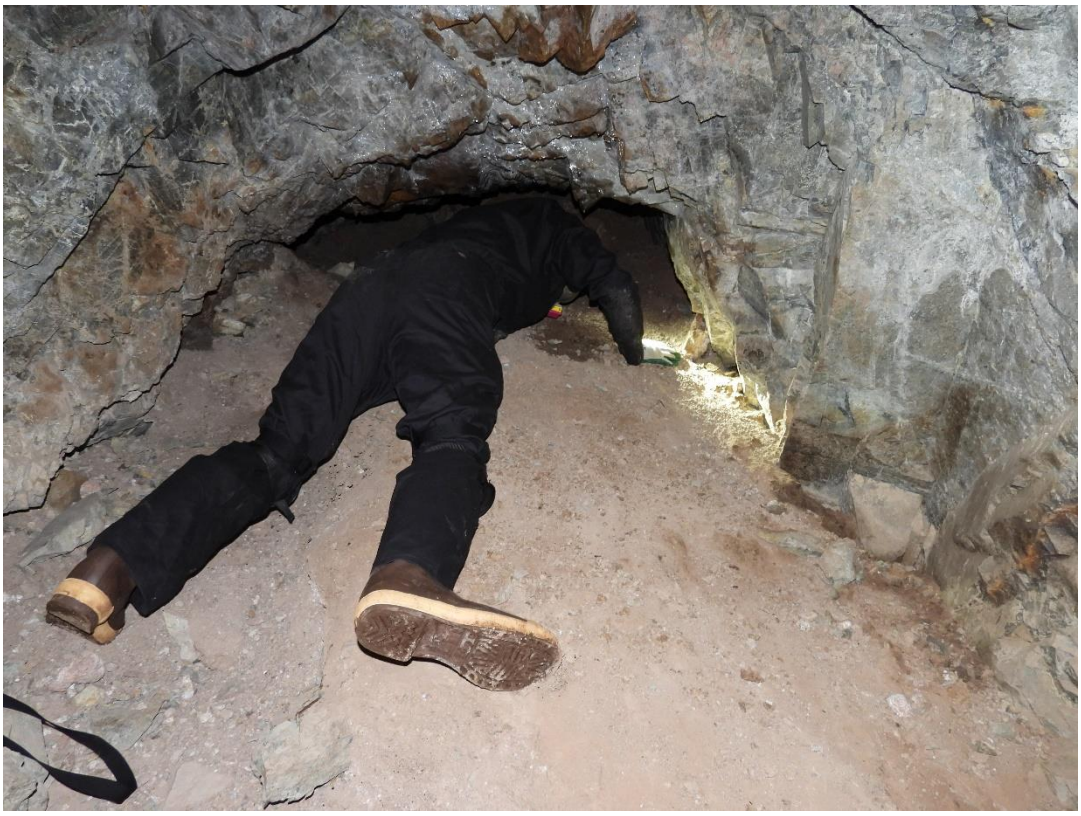
CN-18: A big brown bat catching up on sleep while day roosting.
BCI Photo by Myriam Bishop

CN-48: A Townsend's big-eared bat hibernating underneath an archway.
BCI Photo by Logan Miller

CN-65: Corrie Harrison diligently collects guano from a pile.
BCI Photo by Logan Miller

CN-14: Myriam Bishop shows off a javelina skull found in the mine.
BCI Photo by Logan Miller

CN-66: Jackson Bain prepares to make the descent into the shaft.
BCI Photo by Harrison Tamayo



CN-58: Logan Miller conducting a thorough internal survey of the mine.
BCI Photo by Corrie Harrison

CN-39: Discarded trash and other items from people migrating through the area.
BCI Photo by Myriam Bishop

CN-18: Heavy guano scatter seen covering the ground.
BCI Photo by Logan Miller

CN-14: Myriam Bishop inspects an overhand stope for any bats that could be hanging overhead.
BCI photo by Logan Miller

Appendix 2: Bat Habitat Assessments

Bat habitat is assessed for each feature surveyed and describes the value of that feature for bat use. Determining bat habitat is the primary objective of surveys conducted by the BCI Subterranean Program. Survey of a feature results in seven possible bat habitat classifications: excellent, good, moderate, marginal, poor, no habitat, or unknown. Each of these classifications are described below.

Excellent Bat Habitat

Description
Excellent bat habitat is very rare amongst features surveyed. For a feature to be assessed as having excellent habitat, significant bat use, usually by colonies, must be documented. Typically, this occurs when a large single species roost (>20 bats) is identified using the feature for warm season aggregation, usually in conjunction with substantial guano piles. Bats present in lower numbers but representing multi-species use of three or more species also warrants an assessment of excellent habitat. Bats need not be present to identify excellent habitat, as obvious bat sign such as large guano piles, heavily scattered guano along flyways, and roost staining on ceilings are indicators of significant bat use. Major winter use by bats cannot be confirmed during warm season surveys, though features that exhibit cold temperatures, airflow, and a high diversity of microclimates and roosting habitat can be identified as sites with good potential for serving as hibernacula. Features offering excellent bat habitat usually exhibit striking internal complexity, with extensive workings and possibly multiple levels. Due to the extensiveness of underground workings, these features nearly always offer high quality rock habitat. Exceptions, however, include small features used as maternity sites. Feature stability should be good, with little concern for future collapse that could result in loss of the roost.

Closure Recommendation
Features with excellent bat habitat should nearly always be recommended for protection (exceptions include imminent collapse or other major safety hazards). To minimize disturbance while bats are using the feature for a critical life cycle phase, bat-friendly closures should occur during the opposite season of primary use. For example, closure of a feature that hosts a maternity colony should occur during the cold season, and closure of a feature that serves as a hibernaculum should occur during the warm season. For features with multiple entrances, closures should protect all openings that are either used for bat access or necessary to preserve airflow patterns.

Good Bat Habitat

Description
Good bat habitat is represented by features that contain clear signs of persistent bat use but do not exhibit the striking evidence of significant use by bat colonies. These features often support use by one or two species of bats that use the site as a day roost or night roost. Bat sign such as guano, either scattered or in small piles, and insect parts are common in these features. The internal workings usually exhibit moderate complexity, with rock habitat quality that meets the specific needs of day or night roosting bats, such as domes, drill holes, and/or a heavily featured back. Feature stability should be good, with little concern for future collapse that could result in loss of the roost.

Closure Recommendation
Features with good bat habitat should nearly always be recommended for protection (exceptions include imminent collapse or other major safety hazards). Bat-friendly closures can usually occur at any time of the year, as bat use of these sites is persistent but dispersed and does not represent significant use for warm season maternity colony aggregation or cold season hibernation. For features with multiple entrances, closures should protect all openings that are either used for bat access or necessary to preserve airflow patterns.

Moderate Bat Habitat

Description
Moderate bat habitat generally refers to features that exhibit some signs of minor bat use or have potential for bat use due to the level of complexity and/or stable microclimate offered within. Moderate habitat features are often occupied by one or two bats, possibly on a seasonal nature, but will not display any signs of significant bat use. Guano, if present, will be lightly scattered, or in no more than a few very small piles representative of solitary bats of a single species. Insect parts may also be present, indicating night roosting. Bat sign may also be completely absent from these features at the time of survey, either due to extremely limited bat use, suspected winter use that cannot be detected during a warm season survey, or feature conditions such as flooding that may cover or destroy evidence of bat use. Complexity of the feature will range from simple, if combined with other signs of bat use, to moderately complex. Feature stability should be relatively stable, and rock habitat quality should offer some level of suitable roosting surface.

Closure Recommendation
Features with moderate bat habitat fall into the "grey area" where bat use is not necessarily prominent enough to immediately warrant a protective closure, yet the possibility for increased future bat use exists. Generally, a bat-friendly closure should be recommended for features with moderate habitat in order to maintain a conservative approach to habitat protection. Furthermore, the context of the feature relative to the surrounding landscape may elevate its importance if few other suitable habitat options are available. Scenarios that may call for destructive closure recommendations on features that meet the criteria for moderate habitat include unstable internal conditions that suggest future collapse/destruction of the feature or areas in which the feature is eclipsed by numerous other features with superior habitat. If a destructive closure is recommended, it must be accompanied by bat exclusion prior to closure.

Marginal Bat Habitat

Description
Features designated marginal bat habitat generally lack bats and bat sign. Less commonly, these features may exhibit signs of very minor, infrequent use. A single bat may be present, but there may be no accompanying signs that would allow detection if the bat was absent. Guano and insect parts, if present, will be very sparsely scattered and require diligence for detection. Complexity of the feature will always be simple, with no substantial workings; however, these features are usually extensive enough to include a dark zone, and the entire feature is not visible from the portal or collar. Marginal features are often short, simple adits or blind and bald shafts. Feature stability can be stable, but often poor rock conditions contribute to marginal habitat. Rock habitat quality will generally be poor to fair, with less than ideal roosting surfaces.

Closure Recommendation
Features with marginal bat habitat are almost invariably recommended for destructive closure due to these features lacking bat sign and/or containing unstable conditions that threaten collapse. Given the possibility for bats to be present in these features, exclusion is required prior to closures occurring in the warm season when bats are active. In rare circumstances, a protective closure may be warranted to allow for the possibility of future bat use, especially if the feature represents one of the only subterranean habitat options in the area.

Poor Bat Habitat

Description
Features classified as poor bat habitat tend to be very small prospects that exhibit no signs of bat use. While these features offer some level of subterranean habitat, the workings are so limited as to offer no true dark zone and no area of stable subterranean microclimate. Usually, the entire feature will be visible from the portal or collar. These features are so small that structural stability is often quite good, but they may also be in a state of collapse. Rock habitat quality can range the entire spectrum, but this assessment is largely irrelevant in such small features that offer little physical area from which bats can select roosting spots that have a stable microclimate.

Closure Recommendation
Features with poor bat habitat are recommended for destructive closure. Due to the lack of bat sign or potential for future bat use, a "DCAT" recommendation is usually warranted on these features.

No Bat Habitat

Description
Assessing a feature as containing no bat habitat means no subterranean habitat is available. No underground workings are present at all, and the feature would present no option for bats to roost in subterranean environments. This scenario occurs for features that are totally collapsed, prospect scrapes, entirely and permanently flooded, or some other similar circumstance. This assessment is also appropriate for portals that are almost entirely sloughed closed and/or overgrown with vegetation such that bats would be unable to access the workings.

Closure Recommendation
With no subterranean component and thus no bat habitat, a "DCAT" recommendation is always warranted. For some features, though, especially those that contain no inherent hazard, a "Leave As Is" recommendation may be most appropriate. This recommendation is most applicable to prospect scrapes and pits that contain no headwall and may be largely overgrown.

Unknown Bat Habitat

Description
If an internal survey cannot be conducted, and underground workings are likely to exist based on observations from the surface, then bat habitat cannot be assessed. This usually occurs when the feature is not accessible due to safety concerns (e.g., wildlife hazards, rock or timber hazards) at the portal or collar. Often, looking into the feature from outside confirms that underground workings are present, though inaccessible. An unknown bat habitat assessment may also be appropriate for some partial internal surveys, when a survey is terminated underground due to safety concerns. In these instances, though, if extensive workings and/or bats and bat sign are observed prior to terminating the survey, then a higher bat habitat classification and feature protection are warranted.

Closure Recommendation
Closures of features with unknown bat habitat should follow conservative recommendations to minimize the possibility of destroying potentially important bat roosts. When possible, bat-friendly closures should be recommended for these features. In cases where destructive closures are more appropriate (e.g., collapse of feature is imminent), exclusion is required prior to closures occurring in the warm season when bats are active.

Appendix 3: Closure Recommendations

Closure recommendations are assigned to each opening of a distinct feature surveyed and prescribe the appropriate remediation strategy for the site. Bat use, other wildlife use, feature stability, and overall nature of the workings are considered when determining the closure recommendations. Survey of a feature usually results in recommendation of a bat-compatible closure or destructive closure for each opening, with a seasonal component to advise suitable timing of the closure. In some cases, openings may warrant other wildlife-friendly closures or recommendation of no action (leave as is). Each of these classifications are described below.

Bat-compatible Closures

Bat-compatible closures are recommended for openings to features that contain bats / bat sign and/or exhibit characteristics that indicate high potential for bat use. These features warrant protective closures to maintain the bat habitat within and allow for continued bat use. Bat-compatible closures include a variety of methods that fall on a spectrum of high to low compatibility. No closure method is perfect for all bat species, but generally, gates designed to comply with bat-compatible specifications are preferred to 1) minimize the potential of disrupting current use patterns and 2) promote long-term access for bats and other wildlife. For openings that are unstable or present access challenges, construction of a standard bat gate may not be possible. In these instances, use of alternative methods such as culverts or cable nets may be the most feasible method; while these closure types are not ideal for bats and other wildlife, they may still facilitate moderate levels of access and habitat use and therefore present a suitable alternative to total habitat loss.

Three seasonal designations are used to recommend appropriate timing of bat-compatible closures:

- BCAT (Bat-compatible Closure, Any Time): "Any time" bat closures are recommended for openings to features in which overall bat use is relatively minor or not confined to any single season.

- BCCS (Bat-compatible Closure, Cold Season): Cold season bat closures are recommended for openings to features that display significant warm season use, typically by a maternity colony of bats. Closure is recommended to occur during the cold season to avoid disturbance of bat colonies, which could potentially lead to abandonment of the site.

- BCWS (Bat-compatible Closure, Warm Season): Warm season bat closures are recommended for openings to features that are documented as hibernacula or exhibit characteristics that indicate high potential for significant cold season use by hibernating bats. Closure is recommended to occur during the warm season to avoid disturbance of hibernating bats, which could potentially lead to bats arousing and burning critical energy reserves.

Airflow Closures

Airflow closures may be recommended for secondary openings to features with multiple openings that access habitat warranting protection. Independent, secondary openings often contribute to the microclimate and habitat suitability of the underground workings via air exchange but may not serve as important access points for wildlife. In these cases, it is appropriate to close these secondary openings in a way to maintain air exchange without preserving access to wildlife.

Other Wildlife-compatible Closures

Protection may also be recommended for openings to features that display significant use by wildlife other than, or in addition to, bats. These closure recommendations are relatively rare, and closure methods are dependent on type of wildlife use. Protection of features may be warranted for use by wildlife including, but not limited to, birds (e.g., owls, vultures), mammals (e.g., cats, foxes, porcupines, ringtails), and reptiles/amphibians (e.g., salamanders).

Closure Modifications

Closure modifications are recommended for existing closures such as bat gates or backfills that do not adequately protect or maintain habitat provided by the feature. In these cases, a modification to the existing closure is recommended to improve wildlife access to habitat assessed at the time of survey. Closure modifications are recommended to provide access to previously inaccessible habitat or to facilitate increased use of existing habitat. Seasonality is also considered in closure modification recommendations to advise suitable timing of the modification.

Destructive Closures

Destructive closures are recommended for openings to features that either offer no bat habitat, contain no evidence of bat use, or exhibit only minor, insignificant bat use. In some cases, destructive closures may also be recommended for secondary openings to features that are protected through bat-compatible closure of primary openings used for wildlife access. Two destructive closure designations are used to recommend appropriate measures based on possible bat use:

- DCAT (Destructive Closure, Any Time): These openings access features that exhibit no signs of bat use or potential for bats to be present and can be destructively closed without conducting exclusion, during any season. This recommendation may also be applied to secondary openings to features protected for wildlife habitat, provided that these openings do not serve any critical function in maintaining wildlife access or suitable habitat conditions.

- DCWS (Destructive Closure, Warm Season): These openings access features that either exhibit signs of minor, insignificant bat use or have the potential for bats to be present

during destructive closure. In some cases, other wildlife such as birds may be present, and these animals should also be excluded; alternatively, closure with bat exclusion may be timed for after the nesting season when birds are no longer using the feature. Using appropriate exclusion techniques on the features prior to closure is critical. Exclusion needs to be done during the warm season when bats are active and will be able to escape. See Appendix 4 and refer to "Managing Abandoned Mines for Bats," published by Bat Conservation International, for guidance on exclusion techniques.

Leave As Is (No Action)

"Leave As Is" (LAI) treatments are recommended on a limited basis for subterranean features that present no inherent safety concerns (e.g., vertical drops, loose overhead rock), contain little to no sign of modern human visitation, and/or are so remotely located and difficult to access that they do not present a viable threat to human health and safety. Features that are appropriate for this recommendation include minor prospects and relatively short adits that meet the above criteria. Additionally, features with no subterranean component (e.g., prospect scrapes/trenches, self-remediated adits, small subsidence pits in unconsolidated sediment) are often suitable for LAI recommendations. Features that present a fall hazard (e.g., shafts) should never receive a LAI recommendation.

Wildlife use is another consideration for some Leave As Is recommendations. For features with habitat unique to the landscape and with demonstrated use by wildlife that would be precluded by standard bat-compatible closures, LAI is the only option for preserving the habitat for those animals. Examples from past SubT surveys include black bear, javelina, and turkey vulture habitat (this consideration does not apply to domesticated animals like sheep and cattle). In these cases, however, consideration is still given to any objective hazards presented by the feature, along with access and signs of human visitation.

Communication from partners may also inform Leave As Is recommendations. Partners occasionally indicate they have no intention of closing a particular feature. Conversely, some partners are adamant that every feature must be physically addressed with a hard closure. While partner perspectives are important in making closure recommendations, they are not the sole consideration. Land management is dynamic and evolves over time with funding and staffing changes. Thus, our recommendations remain rooted in the primary factors we use to inform the appropriate closure type (e.g., wildlife use, safety, access, human visitation).

Our deliverables include primary closure recommendations that are derived from our standard decision-making process. When recommending LAI for subterranean features, an alternative recommendation (bat-compatible or destructive) will also be included. For non-subterranean features, LAI can serve as the sole closure recommendation. Based on partner communication, LAI can also be indicated as a primary or alternative recommendation, if appropriate.

For a typical AML project, LAI recommendations will constitute a minor proportion of overall closure recommendations.

Appendix 4: Exclusion Guidance

Exclusion Guidance as Excerpted from BCI's "Managing Abandoned Mines for Bats"

Timing of Exclusions

The exact timing of exclusions and site closures is best determined locally, given the variability in types of use by different species. As a general rule, bats must be active for exclusions to be effective, so all exclusions should be conducted outside of hibernation season. In general:

- The best time to implement exclusions and portal closures is during late summer or early fall, after cessation of maternity activities and before the onset of hibernation.

- Early-fall closures will best ensure a window for bats to find alternate hibernacula and will give females a full spring season to locate alternate maternity sites.

Exclusions for Destructive Closures

Regardless of the reason for a destructive closure of known or potential bat roosts, steps must be taken to ensure significant bat colonies are not destroyed as a direct result of closure activities. Managers should include adequate exclusions as a routine part of mine reclamation programs to minimize the risk of entombing bats in closed workings. Further, closures should be conducted immediately following exclusion to limit the chance of bats becoming reestablished in the mine. In general, these two guidelines can help determine whether exclusions should be conducted and how intense the exclusion effort should be.

Exclusions Not Required: Exclusions are generally not required if a mine does not offer potential bat habitat, as mutually agreed upon by all partners involved in the mine closure project.

Standard Exclusions: In general, exclusions are recommended at all mines that represent habitat for bats. Given the ephemeral and episodic use of some roosts, it is prudent to err on the side of caution and conduct standard exclusions efforts, especially if significant time has elapsed since biological assessments were conducted.

The use of one-inch mesh material (e.g., chicken wire, polypropylene or similar material) is most often used to exclude bats from a mine. Lighter-weight material may be used for remote mines that require physically transporting the material over long distances or rough terrain. Although this material is very effective for excluding bats, it may also entangle bats and other wildlife. Managers may need to develop a plan to periodically check exclusion materials at sites with large bat colonies or high use by other wildlife to prevent loss of entangled bats, amphibians, reptiles or birds.

Exclusion materials should be maintained for at least three nights prior to portal closure at mines that provide habitat and where little or no bat use has been detected. Simultaneously

covering all external openings with exclusion materials and leaving it in place for at least one week is an effective method for excluding most bat species from roosts. Difficulties in navigating through exclusion materials should cause bats to seek alternate roosts rather than continuing to access the mine through the wire.

For most species, simply spreading exclusion materials across portals will be sufficient to allow bats to exit a mine while effectively discouraging their return. However, not all bats in all roosts across all landscapes will respond in an identical manner. As a general rule, smaller colonies in areas where roosts are abundant tend to quickly abandon roosts after exclusion materials are installed. For example, exclusion materials left in place for three to five nights will usually cause small colonies of Townsend's big-eared bat roosting in small mines in Nevada to abandon the roosts.