Topock Project Executive Abstract

Document Title: *Final Topock Compressor Station Summer 2019 Roosting Bat Surveys Report* Submitting Agency: BLM, USFWS, DTSC, and CDFW Final Document? X Yes __ No	Date of Document: October 28, 2020 Who Created this Document?: (i.e. PG&E, DTSC, DOI, Other) –PG&E
Priority Status: __ HIGH _X_ MED __ LOW	Is this time critical? X Yes __ No
Type of Document: __ Draft X Report __ Letter __ Memo __ Other / Explain:	Action Required: X Information Only __ Review and Input __ Other / Explain:
What does this information pertain to? __ What does this information pertain to? __ Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA)/Preliminary Assessment (PA) __ RCRA Facility Investigation (RFI)/Remedial Investigation (RI) (including Risk Assessment) __ Corrective Measures Study (CMS)/Feasibility Study (FS) __ Corrective Measures Implementation (CMI)/Remedial Action X_ California Environmental Quality Act (CEQA)/Environmental Impact Report (EIR) __ Interim Measures X_ Other / Explain: SEIR Mitigation Measure BIO-2f	Is this a Regulatory Requirement? X Yes __ No If no, why is the document needed?
What is the consequence of NOT doing this item? What is the consequence of DOING this item? Non-compliance with Mitigation Measure BIO-2f in the SEIR (DTSC, December 2017).	Other Justification/s: __ Permit __ Other / Explain:

Brief Summary of attached document:

This final report presents the results of summer maternity season surveys for roosting bats, including maternity colonies. The summer surveys included mist netting and radio tracking, visual surveys of known roosts, and acoustic monitoring for at least three consecutive nights in known roost areas, as well as the large tamarisk grove (Sacramento Wash) in Arizona where western bats were expected. The acoustic monitoring surveys detected two special-status foliage-roosting species, the western red bat and western yellow bat, and one non-special-status foliage-roosting species, the hoary bat, in the Sacramento Wash tamarisk grove. The western red bats could potentially raise young in the large tamarisk grove in Arizona. Hoary bats are not expected to raise young in the region. Western yellow bat prefers to roost in palm fronds and are expected to roost in the numerous palms adjacent to resort sites along the Colorado River and not known to roost in the tamarisk. HTH confirmed seven roosts (Roosts 3 through 8, and 10) and found one new roost (Roost 11) during the summer 2019 surveys. Two Roosts (1 and 2) were thought to be temporary roosts that may only be used for short periods of the year. Overall results suggest that implementation of the Proposed Protective Measures for Roosting Bats (HTH, 2016) are effective because bat populations roosting on the Project site are stable or are increasing in numbers.

Written by: PG&E

Recommendations:

Continue to develop information on bat populations and potential maternity roosting sites by ongoing, periodic bat surveys.

How is this information related to the Final Remedy or Regulatory Requirements?

This report satisfies SEIR Mitigation Measure BIO-2f (DTSC, Dec 2017) that was prepared for the Final Groundwater Remedy.

Other requirements of this information?

None.

H. T. HARVEY & ASSOCIATES
Ecological Consultants

Topock Compressor Station
Summer 2019 Roosting Bat Surveys
Report
Final

Project #3740-03

Prepared for:

Pacific Gas and Electric Company

Prepared by:

H. T. Harvey & Associates

December 2019 (Revised October 2020)

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Table of Contents

Figures

Tables

Appendix

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Section 1. Introduction

Pacific Gas and Electric Company's (PG&E's) Topock Compressor Station is a natural gas compressor facility located south of Needles, California (Figure 1) near the Interstate 40 crossing of the Colorado River. PG&E has implemented the Topock Compressor Groundwater Remediation Project (Project) to address chromium groundwater contamination at the station (hereafter referred to as the Project site). This report provides the results of summer 2019 roosting bat surveys that were conducted as a Project monitoring requirement.

Previous surveys for bats at the Project site were conducted by Dr. Patricia Brown and Dr. William Rainey during winter 2014–2015 (Brown 2015) and spring 2015 (Brown and Rainey 2015) and in 2015 and 2016 by H. T. Harvey & Associates (HTH) bat biologists Dr. Dave Johnston, Kim Briones, Gabe Reyes, and Meredith Jantzen (HTH 2015, 2016). The Brown (2015) and Brown and Rainey (2015) surveys detected four California Species of Special Concern—Townsend's big-eared bat (*Corynorhinus townsendii*), pallid bat (*Antrozous pallidus*), cave myotis (*Myotis velifer*), and California mastiff bat (*Eumops perotis*)—that could potentially establish maternity roosts on the Project site. The HTH (2015, 2016) surveys focused on locating roosts of these special-status species and other species of bats occurring on or in the Project vicinity; these surveys detected 10 roosts composed of Yuma myotis (*Myotis yumanensis*), pallid bats, or an unidentified species of bat.

After the 2015 and 2016 bat surveys were conducted, H. T. Harvey & Associates developed a Project Protective Measures for Roosting Bats plan (HTH 2016) to conserve maternity colonies of bats, which was incorporated into the Project's Mitigation, Monitoring and Reporting Program document. This document includes the following conditions and rationale for conducting bat surveys as a part of the required monitoring.

> *"Because roosting bats, including maternity colonies, switch roosts especially on a season-by-season basis, roost locations shall be identified by a qualified biologist specializing in bats at least once each for the spring and summer periods of the maternity season once every 3 years. Additionally, because western red bats could potentially breed in the large tamarisk groves located in Arizona, acoustic surveys for a minimum of three consecutive nights during fair weather (above 50 degrees Fahrenheit, no rain or high winds) during the summer maternity season shall occur once every 3 years. If western red bats are recorded acoustically, an attempt to locate active roost sites shall occur to establish appropriate buffer zones around each roost."*

Therefore as a part of the Protective Measures for Roosting Bats Monitoring and Reporting Program and as requested by PG&E and Jacobs, H. T. Harvey & Associates conducted focused bat surveys to identify the locations of maternity roosts of special-status bats and other bat species on the Project site in the summer of 2019. The primary purpose of the summer 2019 roosting bat surveys was to obtain up-to-date information on roost populations to help determine if the Project Protective Measures being implemented were effective and to document if any of the maternity roost had switched locations on the Project site. H. T. Harvey & Associates ecologists conducted mist-netting, radio-tracking, visual surveys, and short-term acoustic monitoring in areas supporting roosting habitat. This report summarizes the methods and results of our roosting bat surveys and includes a discussion of our findings.

N:\Projects3700\3740-01\03\Report\Fig 1 Vic Map.mxd

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Figure 1. Vicinity Map

Topock Compressor Station Proposed Bat Mitigation Measures (3740-03)

December 2019

Section 2. Methods

2.1 Mist-Netting and Radio-tracking

During the maternity season (March 15 through August 31), females of some bat species group in a single roost or cluster of associated roosts to form larger maternity colonies, where they raise their young. These colonies often represent significant populations on a local or regional scale, and some species are particularly susceptible to disturbance while raising their young. To document the locations of maternity roosts on the Project site, we conducted mist-net surveys with the intention of catching lactating females and tracking them back to their maternity colonies. Although our primary aim was to locate maternity roosts for species of special concern (Townsend's big-eared bat, pallid bat, western red bat, cave bat, and California leaf-nosed bat), we also assessed the species, sex, and reproductive status of other bats on the Project site.

We conducted mist-netting during the evenings of June 25 and 26, 2019. We placed mist nets that ranged from 6 to 30 meters wide and from 2.6 to 9.1 meters tall across natural flyways within Middle Bat Cave Wash (Figure 2). Because the walls of the wash funnel bats down to a narrow flyway, this is the most effective location on the Project site to capture bats. Open areas such as the river bank below the railroad bridge crossing over the Colorado River lack similar features to constrain the movement of the bats into smaller spaces, and therefore would be more difficult locations to attempt to capture bats. The 30-meter-wide by 9.1-meter-tall net was operated with a pulley system (Johnston 2001). When mist-netting in the evening, we opened nets at approximately 8:00 p.m. and closed them at approximately 11:00 p.m. After nets were opened, we checked them at intervals of 15 minutes or less. We placed each captured bat in a paper bag, processed it on site, and released it unharmed after data collection. For each individual, we assessed and recorded species, age (adult or subadult), forearm length (in millimeters), mass (in grams), and reproductive status (lactating, postlactating, testes descended, or non-reproductive).

To radio-track bats, we carefully clipped the fur in the interscapular region of the bat's back and attached Holohil BD-2 radio transmitters (Holohil Systems, Ltd., Carp, Ontario, Canada) using eyelash glue. Each radio tag accounted for less than 5% of an individual's weight. After the radio tag was securely attached, we released the bat. The day after capture, we went to the site of release and checked for a signal using radio receivers (R-1000, Communication Specialists, Orange, California), and three-element and five-element Yagi antennas. If we could not detect a signal, we drove or walked to opportunistic areas of high elevation within a 5-mile radius and attempted to locate the signal. After locating the signal, we attempted to locate the roost by systematically determining the direction in which the signal was strongest and following it in that direction.

N:\Projects3700\3740-01\03\Report\Fig 3 Mist nets and Acoustic Surveys and Roosts.mxd

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Figure 2. Locations of Acoustic Surveys and Mist Nets
December 2019

2.2 Visual Surveys of Roost Habitat

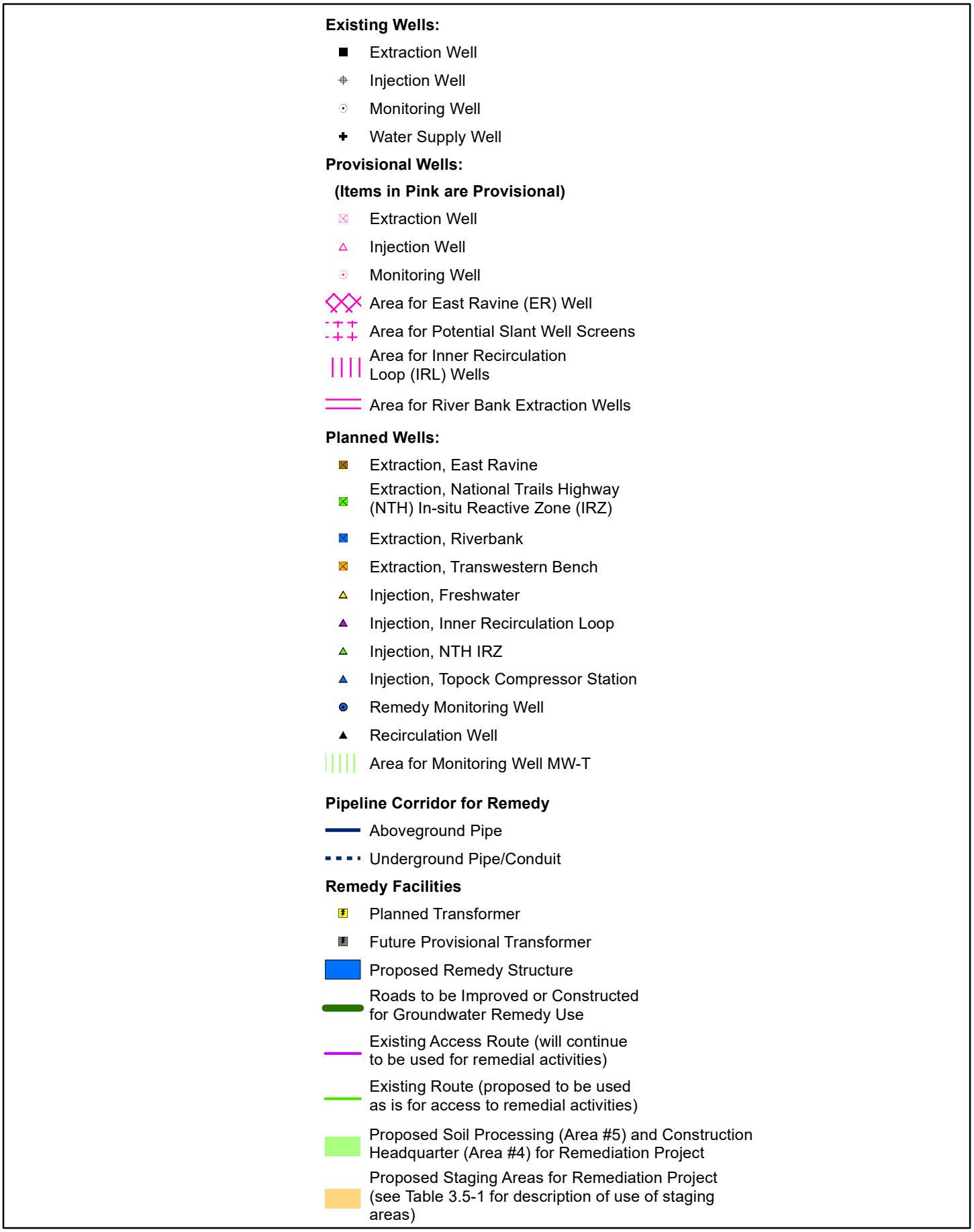
To confirm the presence of previously located bat roosts on the Project site, we revisited previously observed roost sites and new sites with suitable habitat that were included in the updated footprint of the Project site (Figures 3a, 3b). We therefore conducted visual observations from approximately half an hour before sunset to an hour after sunset. At each location, we watched for emerging bats and kept a tally of how many bats flew out from an emergence spot and how many bats flew back into the same roost opening. To arrive at an approximate total number of bats for each roost, we subtracted the number of bats flying into the roost from the number of bats recorded flying out of the roost. For bridges, we used several observers to cover the multiple areas of potential roosting habitat.

2.3 Acoustic Monitoring and Analysis

Bats use echolocation calls to detect prey and obstacles as they navigate across landscapes. Although a given species may demonstrate some degree of plasticity in its calls, acoustic parameters, such as call shape, duration, and minimum frequencies, may be used to identify species (Fenton et al. 1995). Therefore, acoustic surveys can be used to help determine many species of bats (Parsons et al. 2000). Two primary technologies exist for recording and analyzing bat calls: zero-crossing and full spectrum. The technology for viewing zero-crossing recordings is well developed; it is easy to quickly view and place species labels on thousands of calls at a time. However, full-spectrum technology provides more detail about specific call characteristics, which can sometimes be critical for distinguishing species with similar call parameters (Fenton 2000). Therefore, to assess bat activity in different areas of the Project site, we used Song Meters (Song Meter SM4 BAT recorders) (Wildlife Acoustics, Concord, Massachusetts, United States), which record compressed files that can be converted to either zero-crossing or full-spectrum files.

To determine which bat species were present on the Project site, we deployed six Song Meters on the site from June 24 through June 27, 2019. We programmed the Song Meters according to the default settings provided in the instruction manual, and we manually set the Universal Transverse Mercator coordinates for each detector. We then scheduled the units to record from sunset to sunrise. We attached microphones to microphone cables and secured them approximately 5 to 10 feet off the ground to telescoping poles positioned at a slight angle. We deployed Song Meters throughout the site, with four units in the tamarisk grove in the eastern portion of the Project site, near the western railroad bridge, and at the south end of Bat Cave wash where we have previously detected activity.

We conducted acoustic monitoring at six sites that had been previously monitored during summer 2015 and spring 2016 (Figure 2). The previously monitored sites included three sites along the Sacramento Wash tamarisk grove in Arizona; one site near the western railroad bridge along National Trails Highway, and the middle portion of Bat Cave Wash at the southern Project boundary. For the 2019 summer surveys, we did not use several locations for bat detectors in Bat Cave Wash, in the tamarisk grove west of Park Moabi Road, or below



N:\Projects3700\3740-01\03\Report\Fig 2a Site Plan Legend.mxd

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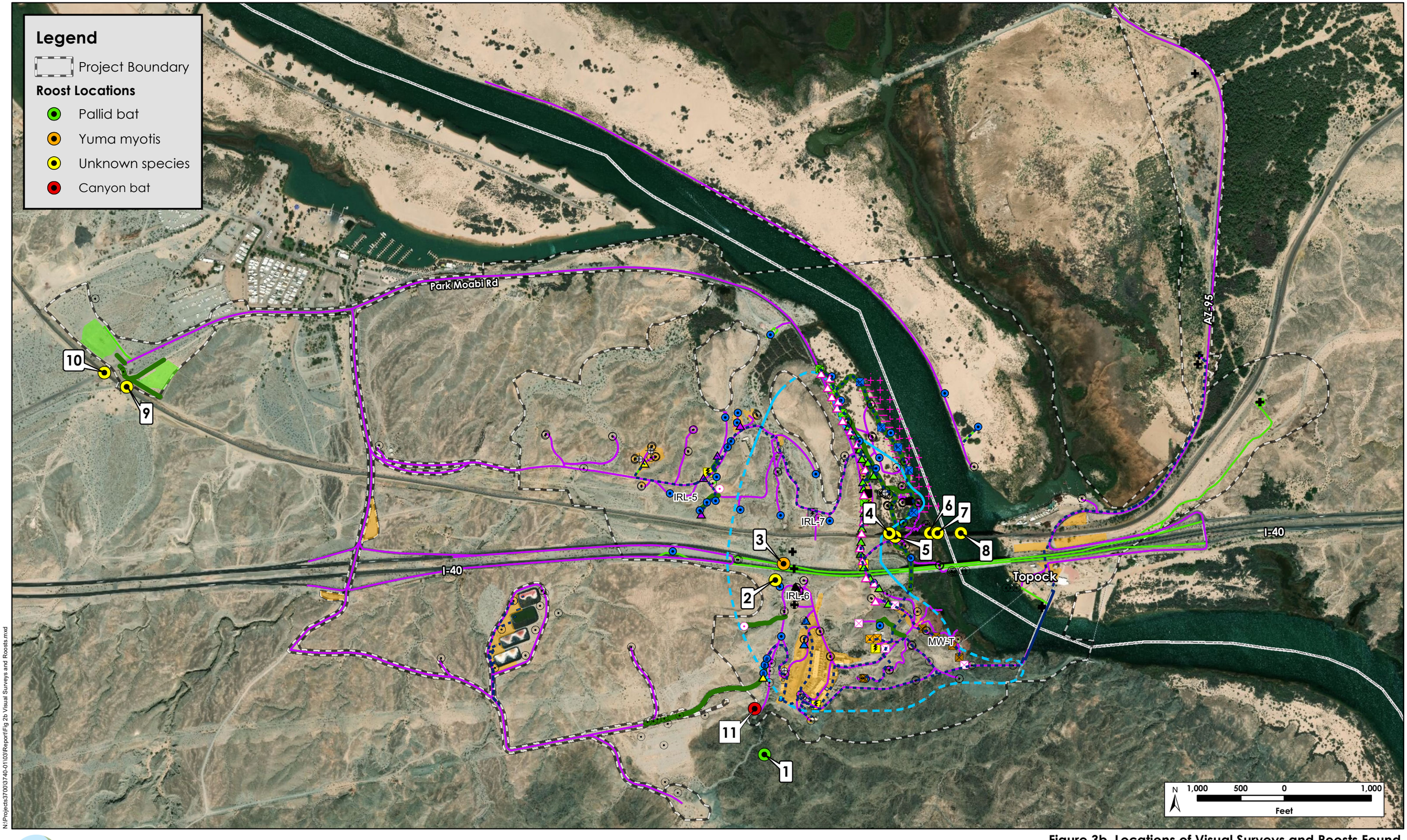
Figure 3a. Site Plan Legend

Topock Compressor Station Proposed Bat Mitigation Measures (3740-03)

December 2019



N:\Projects3700\3740-01\03\Report\Fig 2b Visual Surveys and Roosts.mxd

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Figure 3b. Locations of Visual Surveys and Roosts Found
Topock Compressor Station Proposed Bat Mitigation Measures (3740-03)
December 2019

the railroad bridge across the Colorado River as we had in 2015; instead, we focused acoustic monitoring efforts in the following three locations: near the western railroad bridge to help determine species at a known roost, at one location in the middle section of Bat Cave wash where proposed groundwater facilities and construction activities will occur, and at four locations along the Sacramento Wash to assess western red bat (*Lasiurus blossevillii*) activity to focus on a potential bat habitat area where future provisional fresh water supply pipelines could be constructed. For previous bat surveys we systematically set out bat detectors below the Colorado River railroad bridge crossing; however, many bats trolling for insects along the river banks that are not associated with roosting in this railroad bridge were also recorded by our recorders. Because it is not possible to separate bats that are from the bridge and those that are simply foraging in the area, acoustic data from the river banks below this bridge are limited in value.

We analyzed all Song Meter data as .wav files in Sonobat (Szewczak 2015). Whenever possible, we identified bats to species based on the acoustic parameters of shape, minimum frequency, duration, and/or critical frequency. Of the species that occur in the region, several have call characteristics that often overlap with those of other local species (Szewczak and Weller 2011). Therefore, some bat calls were identified to a phonic group rather than to a species (e.g., 50-kilohertz [kHz] group for California myotis [*Myotis californicus*]/Yuma myotis). Calls that we could not identify to species or group were classified as unknown and not considered further. Calls that don't have enough data to present a clear call structure or are not detailed enough to discriminate to species or group should not be used. Using poor quality recordings of bats can lead to errors in the dataset.

Although bat calls cannot be used to identify individuals, the number of calls is commonly used as an index of overall activity at a site (Kunz et al. 1996). We quantified bat activity separately for each species classification by presence/absence within 1-minute periods per night. This method provides more accurate assessments of bat activity than traditional methods of counting individual passes (Miller 2001). We then examined the data for temporal patterns to determine whether there was evidence of an emergence event (e.g., a high number of calls from one species recorded around sunset).

Section 3. Results

3.1 Mist-Netting and Radio-tracking

We conducted two nights of mist-netting, both occurring in the southern portion of Bat Cave Wash. In total, we captured six bats representing three species (Table 1 and Appendix A).

Table 1. Number of Bats Captured by Date, Site, and Species

Date	Site	Big Brown Bat	Canyon Bat	California Myotis	Yuma Myotis
June 25, 2019	Bat Cave Wash	0	1	2	1
June 26, 2019	Bat Cave Wash	1	1	0	0

On June 25 we captured a canyon bat near a new maternity roost we discovered at a rock grotto and about a hundred feet downstream we caught two California myotis and a Yuma myotis (Figure 3b). On June 26 we caught a big brown bat and a Yuma myotis in the 30-foot by 100-foot macronet. This was the first big brown bat caught on the Project site. In order to help determine that there were no big brown bat colonies on the Project site, we attached a radio-transmitter on the bat with the hopes of determining where this species was roosting. We were unfortunately unable to find the signal either that same evening or at any time the next day suggesting this bat did not roost on or in the vicinity of the Project site. In addition to Table 1 above, Appendix A provides specific data for each individual caught.

3.2 Visual Surveys of Roosts

We confirmed seven roosts (Roosts 3, 4, 5, 6, 7, 8, and 10) and found a new roost (Roost 11) during this June 2019 survey through visual observations (Figure 3b). Roost 9[1] habitat was eliminated because the few Yuma myotis that were day roosting between sheets of steel at Roost 9 were excluded after the maternity season in 2016. Bats were not observed exiting Roost 1 where we had located a pallid bat roost through radio telemetry during the summer 2015 bat surveys. Nonetheless, this off-site roost is likely used by significant portions of a maternity colony intermittently through parts of the maternity season and should be treated as a maternity roost. We also did not observe any bats emerging from Roost 2. Approximately five bats emerged from this location on the western bluff of southern Bat Cave Wash observed during the summer 2015 visual surveys, but

[1] The Bat Protective Measures Letter Report (H. T. Harvey & Associates 2016) noted the presence of a small number of unidentified Myotis (based on the guano and the habitat, presumably California or Yuma myotis) and proposed bat exclusion and filling voids with expanding foam. With adequate roosting habitat in the nearby BNSF railroad bridge, the culvert roost was deemed not to be needed for bats. Railroad traffic generates low frequency sounds that bats are insensitive to, and these bridges have been found to be compatible with bat roosts without causing measurable stress to bats (Allen et al. 2011). The bat exclusion occurred on October 26, 2016, well before the start of construction activities in this area in January 2018. The Roost 9 habitat was eliminated because of its proximity to the Construction Headquarters access roadway that prevented implementation of bat roost avoidance buffers for construction activities as described in the 2016 Bat Protective Measures Letter Report. The noise generated by the braking of large trucks and the operation of other anticipated equipment produces high frequency noises which are expected to disturb roosting bats. This small roost occurred within the designated buffer zone for roosting bats; therefore, bats were excluded during the non-maternity season to prevent the loss of bats due to construction disturbance during the maternity season.

none were detected this year. However, this small area of burrows on the steep sides of the Bat Cave Wash may represent a seasonal or intermittent roost; therefore, we believe that this location should be treated as a roost site unless otherwise indicated through specific preconstruction surveys conducted no more than 3 days before construction activities begin. This area comprises eroding gravel bluffs with scattered burrows or cavities. These roost types typically provide habitat for individual canyon bats or pallid bats, but do not provide habitat for maternity colonies (Unpublished data, D. Johnston). We reconfirmed Roost 3 of Yuma myotis in the four culverts under Interstate 40 at the northern end of Bat Cave Wash (Figure 3b). Whereas during the 2016 surveys these Yuma myotis were concentrated in a vertical tube in the easternmost culvert, in 2019 we observed the colony of about 20 bats scattered among the four separate culverts. A total of 106 bats were observed emerging from five locations (Roosts 4, 5, 6, 7, and 8) in the railroad bridge over the Colorado River (Figure 3b) during our June 27, 2019 survey. Most of the bridge-roosting bats were observed emerging from the bridge on the California side in a similar distribution as observed in 2015 and 2016. Roost 11 is a newly discovered roost of 5 canyon bats occurring at a grotto along Bat Cave Wash just inside the Project site boundary (Figure 3b). At the railroad crossing over National Trails Highway (Roost 10), we counted 367 bats.

3.3 Acoustic Monitoring

In total, we conducted short-term acoustic surveys at six locations on the Project site, which covered a variety of potential foliage roosting habitat and crevice- or cavity-roosting habitats. Over the course of the survey period, we recorded and analyzed 5,029 acoustic call files and detected 3,923 minutes of bat activity from ten distinct species of bats: pallid bat, Townsend's big-eared bat, western red bat, big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), western yellow bat (*Lasiurus xanthinus*), small-footed myotis (*Myotis ciliolabrum*), Cave myotis, canyon bat (*Parastrellus hesperus*), Mexican free-tailed bat (*Tadarida brasiliensis mexicana*), and two other species that we grouped into one category, California myotis/Yuma myotis, totaling twelve species (Table 2).

Table 2. Total Number of Call Minutes Detected for Ten Bat Species and the California Myotis/Yuma Myotis Phonic Group at the Topock Compressor Station

Species	Topock 1†	Topock 2†	Topock 6†	Topock 9†	Middle Bat Cave Wash	Western Rail-road	Total Call Minutes
Western red bat*	2	3	1	3	9	7	25
Western yellow bat*	3	2	0	0	0	0	5
Pallid bat*	22	124	8	26	10	0	190
Cave bat*	8	10	5	0	0	0	23
Townsend's big-eared bat*	0	5	1	1	1	1	9
Canyon bat	136	184	208	706	232	76	1542
Hoary bat	0	1	2	2	2	0	7
Mexican free-tailed bat	37	62	78	37	12	5	231
Big brown bat	13	24	8	79	1	0	125
Small-footed myotis	3	3	3	16	1	0	26
California myotis/Yuma myotis	193	263	183	487	306	308	1740
All Species	**417**	**681**	**497**	**1,357**	**574**	**397**	**3923**

†Tamarisk grove detectors
*California Species of Special Concern

Based on captures of both species on site, California myotis and Yuma myotis both occur on the site but we were not able to reliably discern between the two species. Of the total number of recorded call files, we also detected call files from three phonic groups in the 25, 30, and 40 kilohertz (kHz) range and social calls, but we did not quantify minutes of activity for these call files because we could not identify calls to species due to poor call quality. Our results are organized into the two available bat roosting habitat types on the Project site.

3.3.1 Foliage Roosting Habitat

We detected nine call minutes for the western red bat, five call minutes for the western yellow bat, and five call minutes for the hoary bat combined for the four detectors among the tamarisk trees along the Sacramento Wash. We also detected activity of a number of crevice-roosting species in the wash including 1,126 minutes of activity from California myotis/Yuma myotis, and 1,234 call minutes of activity from canyon bats. Additionally, a small number of call minutes of the Townsend's big-eared bats were also detected among these tamarisk trees.

3.3.2 Crevice- and Cavity-Roosting Habitat

Middle Section of Bat Cave Wash: We recorded ten call minutes of activity for the pallid bat and one call minute for the Townsend's big-eared bat; however, a majority of bat activity in the wash was attributed to California myotis/Yuma myotis and canyon bats, comprising 306 and 232 call minutes, respectively. A small amount of western red bat and hoary bat activity was also recorded. Other species recorded in small numbers include Mexican free-tailed bats, small-footed myotis, and big brown bats.

Western Railroad Bridge: We recorded 308 call minutes of activity, in addition to a number of call files containing social calls, of the California myotis/Yuma myotis phonic group, with a high proportion of these calls likely belonging to Yuma myotis. Canyon bats accounted for the second highest detections at this site with 76 call minutes of activity. Fewer than 13 call minutes of activity combined for the western red bat, Townsend's big-eared bat, and Mexican free-tailed bat were recorded at this site.

Section 4. Discussion and Conclusions

We detected two special-status foliage-roosting species, the western red bat and western yellow bat, and one non-special-status foliage-roosting species, the hoary bat, in the Sacramento Wash tamarisk grove on the eastern portion of the Project site. We did not detect any of these species during the 2015 summer acoustic surveys, but in spring of 2016 we detected a few western red bats. Because of the timing of the two surveys, we suggested in our 2016 report that perhaps the western red bats migrate through the Project site during spring and do not occur there in the summer. However, the recent survey results suggest that three species of foliage roosting bats occur during summer months and that western red bats and yellow bats could potentially raise young on or in the vicinity of the Project site. Hoary bats are not expected to raise young in the region.

Although closely associated with mature cottonwood (*Populus fremontii*) and sycamore trees (*Platanus occidentalis*), western red bats have been documented roosting in nonnative trees, such as tamarisk, particularly in larger stands (Pierson et al. 2004). The tamarisk grove on the eastern portion of the Project site supports dense areas of foliage, providing potential roosting habitat for this species. Western yellow bats primarily roost in the dry palm fronds of native California fan palms (*Washingtonia filifera*) but are increasingly occupying nonnative Washington fan palms (*Washingtonia robusta*). They have also been detected roosting in sycamore trees (Brown 2006); however, to our knowledge, they are not known to roost in tamarisk. While western yellow bats may commute and forage on the site, they are not expected to roost in this habitat type. There are numerous fan palms in the adjacent resort sites along the Colorado River, and we would expect these yellow bats to be roosting in this preferred habitat. The hoary bat, a widespread and common foliage-roosting species, may occasionally roost in the tamarisk groves found on the California and Arizona sides of the Project. Despite the high amount of activity from California myotis/Yuma myotis and canyon bats, there is no crevice-roosting habitat in this portion of the Project site, and these detections likely represent foraging and/or commuting individuals. Similarly, although Townsend's big-eared bats were detected in the tamarisk grove, this species is not expected to roost on the Project site.

Compared with 2015 and 2016 surveys, we detected the same crevice-roosting species in Bat Cave Wash in 2019 with the exception of our visual emergence survey for Roost 2. Because we detected high to moderately high activity levels of California myotis/Yuma myotis and canyon bat, which suggests that day roosts of these species are present in Bat Cave Wash, we don't think the absence of five bats from the Roost 2 site is.an indication that the population of roosting bats in the wash has changed. The gravel substrate could have eroded since the 2016 surveys to the point that this specific bluff no longer provided good habitat, forcing these roosting bats to move to another location within the Bat Cave Wash area or somewhere else. Our summer 2019 bat surveys were completed in the month of June before the MW-11D construction activities were conducted in July of the same summer, suggesting that disturbance was not a reason bats were not detected at Roost 2. Although a number of other crevice-roosting species, including pallid bats, were detected during the acoustic surveys, there were no patterns in the data to suggest that any day roosts of these species were nearby. The single Townsend's big-eared bat detected likely represents a commuting or foraging bat, but as noted in previous

reports, we do not expect that this species roosts anywhere on the Project site. Despite our detections of western red bat and hoary bat, no suitable foliage-roosting habitat for females raising young is present in Bat Cave Wash. There is a patch of mostly tamarisk trees at the terminus of the wash just before it enters the Colorado River and immediately west of National Trails Highway where marginal roosting habitat exists, but we do not expect western red bat to raise young or regularly roost anywhere in the wash due to the lack of appropriate habitat, specifically dense overhanging foliage from large trees.. Other species detected in small numbers, including Mexican free-tailed bats, small-footed myotis, and big brown bats, likely roost in the area.

Based on the activity levels and social calls that we detected at the western railroad bridge, this bridge continues to be occupied by day-roosting Yuma myotis and California myotis, but canyon bats do not roost in bridges and were likely commuting under the bridge and headed toward the Colorado River. Likewise, the bridge does not support suitable roost habitat for western red bats and Townsend's big-eared bats and these species were likely commuting through the area. Although we detected small numbers of Mexican free-tailed bats, this species also likely roosts in this bridge in small numbers. With the exception of the Townsend's big-eared bat, the same species were found to occupy this portion of the Project site as were identified in the spring and summer surveys in 2015 and 2016.

We confirmed seven roosts (Roosts 3–8, and 10) and found a new roost (Roost 11) during the June 2019 surveys of the Project site. Roosts 1 and 2 are likely temporary roosts and may only occur for short periods of the year. For Roost 3 we counted 28 Yuma myotis, approximately the same number of roosting Yuma myotis as counted in 2016, although in 2019 the colony was not bunched up in one culvert location as previously observed; instead, the colony was distributed among all four culverts, which suggests that some dispersal is occurring. This pattern also suggests the females raised young much earlier in the year and pups had already begun to disperse.

For Roosts 4–8 from five locations in the railroad bridge crossing the Colorado River, we counted 106 bats emerging (Figure 3b) during our June 27, 2019 survey. This is a nearly three-fold increase from the 36 bats observed in 2016. The 2019 survey results suggest that these bats were not disturbed by construction activities occurring below the bridge and in adjacent areas. Roost 10, which includes several clusters of bats at the railroad crossing over National Trails Highway, increased from 75 in 2016 to 367 bats in 2019, almost five times the number of bats observed in 2016.

Based on the results of the 2015 and 2016 bat surveys, H. T. Harvey & Associates developed a Protective Measures for Roosting Bats plan that included specific buffer zones for maternity colonies of bats. Buffer zone distances between operating equipment and active roosts were determined primarily by modelling the attenuation of high frequency noises generated by specific pieces of equipment that could be operated during the maternity season (H. T. Harvey & Associates 2016). Other aspects of the plan included shielding of nighttime lights if they were used. Since buffer zones had been implemented for the remediation project, the bats roosting in Roosts 4–8 and Roost 10 have increased substantially in number. Roost 3 appears stable, Roosts 4–8 increased collectively by five-fold, and Roost 10 increased in number by three-fold. Therefore, we conclude

that the implemented Protective Measures for Roosting Bats have been successful, and that the populations of bats roosting on the Project site are stable or are increasing in numbers. That said, additional spring 2020 surveys are not likely needed; however, we believe that generally, spring and summer surveys should be conducted to accurately assess these populations of bats.

Section 5. References

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Appendix A. Bat Capture Data

Date	Site	Species	Latitude	Longitude	Forearm (mm)	Sex	Age	Reproductive Status
7/25/2019	Bat Cave Wash	Canyon bat	34.712449°-	-114.495699°-	28.8	Male	Sub-Adult	Non- reproductive
7/25/2019	Bat Cave Wash	California myotis	34.712498°	-114.495702°	31.6	Female	Sub-Adult	Non- reproductive
7/25/2019	Bat Cave Wash	Yuma myotis	34.712449°-	-114.495699°-	34.1	Female	Sub-Adult	Non- reproductive
7/26/2019	Bat Cave Wash	Canyon bat	34.712956°	-114.495148°	27.9	Male	Sub-Adult	Non- reproductive
7/26/2019	Bat Cave Wash	Big brown bat	34.712956°	-114.495148°	45.2	Male	Sub-Adult	Post-lactating Non- reproductive