JOSHUA TREE NATIONAL PARK

Bat Monitoring Project

Final Report- Not Intended for Distribution

Submitted to MacTec

**MINE SITE DESCRIPTIONS:**

***SNOW CLOUD MINE COMPLEX JOTR S -109 (OP1;OP4)***

The Snow Cloud Mine consists of a 200 foot deep, steeply declined drift (identified as 0P 1), that provides access to 3 discrete working levels. The uppermost level intersects the decline at the 75 foot level and continues 125 feet to the surface where it opens as an adit (identified as OP 4). A short crosscut , 70 feet in from the OP 4 portal, accesses an ore-pass that undercuts an overhand stope. The primary decline continues to a second working level (130 feet below the OP 1 portal) that includes exploratory crosscuts driven 60 feet south and 15 feet north from the main decline. The decline continues below this level to a total depth of 200 feet where it opens into 200 feet of additional drifts and crosscuts. Carbide smoke writings dated 1952 indicate relatively recent activity in this mine.

We observed fair amounts of guano broadcast throughout this mine with preliminary indicators suggesting deposition by at least 3 species. Upon our arrival at this mine, we conducted preliminary evaluations of the site to determine the types of available roosting habitat included in the site. Additionally we collected guano samples, developed a thermal profile, video-recorded the site interior, and deployed drop-cloths throughout the mine.

We revisited the Snow Cloud mine complex in March 2011. OP 1, OP 4, and OP3 had been gated with angle iron gates. Internal resurveys revealed some guano accumulation on the Guano Accumulation Devices (GAD) (better known as plastic sheeting), indicating activity since our Sept 2010 original visit. The amount of new guano acquisition on the GAD was consistent with low levels of activity of the complex. No bats were observed during our March cold weather survey. Temperatures of the mine varied from 10.5C 3 meters inside OP 4 to 21.5C at the bottom of OP1, the deep decline.

We visited Snow Cloud for our final survey on 13 August 2011. Entry through the portal at OP-4 was blocked by a rattlesnake sitting on a shelf at eye level right at the gate. In essence it was impossible to open the gate with the snake in that location. Because I was in a National Park with Park service employees, I decided to not attempt to move the snake. Entry through the other portals is unsafe due to portal conditions and or debris stacked in the openings. There are 2 small openings , one of which could provide entrance, that have not been gated or closed off. The park service is apparently aware of those and have plans to close them.

No bats were observed due to lack of entry to the interior workings of the mine. Previous surveys have convinced us that this mine gets limited, but consistent use throughout the year, mainly as a night roost and feeding post. Gating of this mine does not seem to have affected that usage.

Vital Survey Data:

**JOTR S-109 OP1, OP3, OP4**

* **18 March 2011, 08:30 – 11:45 PDT**
* No Bats were observed. Guano judged to be from 3 different species was observed.
* There appeared to be no areas of the mine that had large accumulations of guano. The guano we did find indicate that there is light use of the mine throughout various places. Essentially it appears to be small individual roost sites scattered throughout the mine.
* Population size is unknown. The amount of Guano indicates light use by small numbers of bats.
* Most likely a day roost and night roost.
* **13 August 2011. 11:05 – 13:30 PDT**
* Entry blocked by rattlesnake on entry gate
* 2 openings not closed off - human hazard

***LUCKY TURKEY MINE COMPLEX JTOR- 053 – (OP 1; OP 3)***

The Lucky Turkey Mine is a complex consisting of a 225 foot adit (OP 3), that intersects a 45 foot deep vertical shaft (OP 1) at the end of the adit. We observed evidence of seasonal water flow in the mine as flow through the shaft and into the adit during periods of runoff.

We noted several guano accumulations below overhand stopes and other undulations in the back. We also observed substantial amounts of insect parts scattered throughout the mine. Upon our arrival at this mine, we conducted preliminary evaluations of the site to determine the types of available roosting habitat included in the site. Additionally we collected guano samples, developed a thermal profile, video-recorded the site interior, and deployed drop-cloths throughout the mine.

* We revisited the Lucky Turkey mine complex in March 2011. We quantified the amount of guano deposited in key areas since October, and reset the GAD’s over the areas that had accumulated large piles of guano discovered on our original visit. Those tarps showed small amounts of accumulation over that time frame. The guano we did find seems to indicate that from Oct – March there is light use of the mine throughout various places. Essentially it appears to be small individual roost sites scattered throughout the mine. Given the large piles in October and the light use indicated since then, we speculate that this may be used as a night roost, with the probability of it being used as a maternity roost.
* Temperature throughout the mine was consistent with it varying only from 19.8 C to 21.0 C. airflow down the shaft and out the adit was observed.
* Lucky Turkey was revisited in August of 2011. Large amounts of guano were observed on the tarps, and a population of 25 – 30 bats were present in the mine. Unfortunately, as we approached their roost sites, they flew, and I was not able to get a positive identification, but it appeared to be Macrotus californicus. This would be consistent with previous findings that this site is a maternity colony for this species. During this time we also encountered a rattlesnake in the mine, about 2/3rds of the way in. this prevented our going to the end of the mine, but we were able to see all of the mine. Clearly the addition of the cupola, as well as the gate, have not caused abandonment of this mine by bats. Lucky Turkey is an important resource for bats of JOTR, being used as not only a night and day roost, but also functioning as a maternity roost.

Vital Survey Data:

**JOTR S-053 OP1, OP3**

* **18 March 2011, 13:45 – 18:00 PDT**
* No Bats were observed. Guano judged to be from 3 different species was observed. The guano appeared to be consistent in size, shape, color, and texture with known samples from a Myotis species, as well as Macrotus californicus (California Leaf-nosed bat) and Corynorhinus townsendii, (Townsends Big-eared Bat).
* Guano deposits and insect parts indicated light use throughout the mine essentially at every overhand stope.
* Population size is unknown. The amount of guano indicates light use by small numbers of bats during the October – March time frame.
* Most likely a night roost, also possibly a maternity site, we will probably be able to determine that on our warm weather visit.
* **12 August 2011, 13:00 – 17:15 PDT**
* Population of 25 – 30 bats were observed roosting and flying in the mine
* Heavy guano deposits under the roost sites
* Confirmed as maternity roost, most likely species is Macrotus californicus

***OLD SWEDE MINE COMPLEX JOTR –S-070- (OP 1; OP 2; OP 3)***

The Old Swede Mine is a complex of 3 discrete adits within a relatively small area. OP 1 is 225 feet long, with seasonal water flowing into the mine. The mine is very warm and humid with a southern exposure of the opening.

 OP 2 is 115 feet long, with a short blind offshoot to the left at the 40 foot mark. That may have functioned as a powder room, or simply storage. The portal of OP 2 has a west northwest exposure. It is a warm mine, but cooler, drier and less humid than OP3.

 OP 3 has an easterly exposure, and is a warm mine, although it is the coolest and driest of the 3 adits. It is a 2 level mine, with the lower level being 160 feet long. The upper level is accessed by climbing up about 12 feet, at the 40 foot mark of the mine. The upper level is also connected by a stope/shaft about 15 feet down to the bottom level at the 95 foot mark. The upper level continues past this shaft another 15 feet. The lower level continues another 65 feet past the shaft connecting it with the upper level.

The mines have previously been identified as roosts for California Leaf-nosed bats.

 Upon our arrival at the mines construction crews were already installing bat gates over mine portals. The operation of welders and generators by these crews produced internal mine environments that were not safe for us to enter. Therefore we were could not conduct complete internal surveys of these mines. We did observe 4 California leaf-nosed bats roosting in OP1, and several more unidentified species of bats flying around outside the openings of all 3 mines on our original visit.

We were able to map the mines and do complete surveys on our second visit in March 2011. Plastic was laid in each of the adits to allow for quantifying of post gate installation and continued seasonal use.

On our final visit in August we were able to access all of OP 1 and OP3, but we stopped from a complete survey of OP2 by a rattlesnake blocking access. We were however able to see all of that mine.

Old Swede complex is an excellent example of why it is essential to manage for bats at a landscape level. While none of the 3 mines gets heavy continuous use throughout the year, each is utilized in different ways at different times by the bat population. Closing off any of the 3 mines would most likely have resulted in a disruption of the population, and a reduction , as an important temporal resource would have been eliminated. In this case it appears as if OP 1 functions as a maternity roost for Macrotus californicus, and OP2 and OP 3 are used seasonally as day and night roost sites, probably differentiated by the different aspects, which result in different temperature and humidity profiles between the 2 mines across the year.

**JOTR S-070 OP1, OP2, OP3**

**19 March 2011 08:15 – 12:45 PDT**

* Macrotus californicus: 1 roosting in OP1 1 mummified body in OP1, 1 roosting in OP2.
* Op1 roost site was at the end of the mine – 225 feet from drip line.
* Small population
* Day and night roosting sites

**12 August 2011 7:00 – 10:45 PDT**

* Macrotus californicus: 2 roosting in OP1 1
* Large amount of fresh guano and heavy ammonia smell at the roost site
* Day and night roosting sites OP2, & OP3
* Population size unknown

***NEW EL DORADO MINE COMPLEX JTOR 074 – (OP 1; OP 2; OP 4; OP 5)***

New El Dorado Mine Complex includes ore processing facilities and underground mining operations within the same landscape footprint. The site includes the remains of water tanks, cement settling ponds, buildings and building platforms. Red tailing indicate possible arsenic contamination. Our field crew met with some confusion regarding the total number of mine openings associated with this complex and which features were numbered. In response to this we simply surveyed all of the openings that we found in this area and collected associated coordinates.

Mines identified as OP 1 and OP 2 are vertical shafts that have eroded into funnel-shaped pits that connect through a 10 foot long drift. Both shafts also had drifts driven towards the south, but these have been blocked muck that has sloughed into the shafts.

The New Eldorado Mine OP 5 was identified by Kristen, a park biologist, as an opening not on the inventory list. The opening accesses a 25 foot deep shaft. A drift driven from the sump appears to have once trended towards OP 1 and OP 2, however muck has run into the shaft and the drift is now completely plugged with this muck and is no longer accessible.

What we identified as The New Eldorado Mine OP 3, a 30 foot long adit at the bottom of the arroyo (identified as The New Eldorado Mine OP 4 on prioritized list). We noted abundant Pallid Bat (Antrozous pallidus) guano throughout this mine, and culled arthropod appendages scattered throughout the mine indicate that this mine is a routinely used night roost for this species. Additionally the mine contained one pallid bat using it as a day roost site. Upon our arrival at this mine, we conducted preliminary evaluations of the site to determine the types of available roosting habitat included in the site. Additionally we collected guano samples, developed a thermal profile, video-recorded the site interior, and deployed drop-cloths throughout the mine.

We revisited the New El Dorado complex in august of 2011, after OP1, 2, and 5 were foamed closed. OP3 showed continued light use as a night roost. I am very concerned about the state of the foam closures, with OP5 showing exposed foam, but appearing to be intact. However OP 2 showed cracking around the edges of the foam plug, caused by water erosion into the pit, working its way through the soil and into the mine below the closure. Even more precarious however was OP 1, where the erosion had opened holes between the foam and the sides of the pit, large enough for easy access not only by bats and other wildlife, but also by humans. Essentially erosion had eaten away most of the contact zone between the foam and the soil, so that the 40 foot in diameter foam plug was held in place by 2 contact points, with large hollow space underneath. Kristen a Park Biologist was made aware of this danger. Pictures are in the photo folders.

**JOTR S-074 OP1, OP2, OP4, OP5**

**17 March, 2011 14:30 – 18:25 PDT**

* No bats were observed, however guano deposited on the plastic sheeting was consistent with Antrozous pallidus was found.
* The bat observed in September was roosting 10 meters into the mine.
* Population size unknown, but probably small.
* Probably used as a Day Roost and night roost site.

**13 August 2011 7:15 – 11:30 PDT**

* No bats were observed, however guano deposited on the plastic sheeting was consistent with Antrozous pallidus was found.
* Population size unknown, but probably small.
* Probably used as a Day Roost and night roost site throughout the year.

***CONTACT MINE COMPLEX JOTR S-011 (OP1;OP2: OP3)***

The Contact Mine consists of the main shaft (OP 3), which was open on the date of our survey, but was considered far too dangerous for us to access. Therefore, the extent and condition of this mine interior remains unknown. The remaining openings in this complex (OP 1; OP 2) access the remains of stope systems driven from what is now an open trench, but was once most likely a subterranean crosscut that was later exposed. All of these openings were either dropped into and surveyed, or could be completely surveyed from the surface. Because they were of limited length and showed no sign of bat use no monitoring protocols were initiated at these sites.

The Contact Mine Complex, JOTR -011, OP1, OP3, OP4, OP5 was identified by park personnel as having been closed since our original September 2010 visit, with no entrance point for internal surveys. OP1,3,&5 were closed by Cupola, while OP4 was foamed and backfilled. This precluded March2011 surveys to determine bat usage of the internal mine.

***STANDARD MINE COMPLEX JTOR S-62 (OP 3; OP 4; OP 5; OP 6; OP 7)***

The Standard Mine is a large complex mine that straddles the Joshua Tree National Park boundary. The mine gets significant human visitation, and appears to still be prospected as we observed 20 bags of cement and other signs of mining at the site. The coordinates we were provided by the NPS did not match with field locations so we collected new locations and tried to match points based on descriptions provided by NPS personnel. Standard Mine OP 7 accesses a shaft that as been sunk to a total depth of 50 feet. An intermediate level explores an upper level ore-body and connects with sump-level workings through a winze.

Standard Mine openings OP 3, OP 4, and OP 5 all access the main haulage level of the Standard Mine while OP 4 is an open stope to the surface. The upper-most levels of the Standard Mine open to the surface through an adit (OP 6 and through a stoped out incline (OP 5). In all this mine included over 600feet of total workings broadcast over 3 discrete levels.

We observed a light scattering of guano throughout both mines (OP 7; and the OP 3 complex). Upon our arrival at this mine, we conducted preliminary evaluations of the site to determine the types of available roosting habitat included in the site. Additionally we collected guano samples, developed a thermal profile, video-recorded the site interior, and deployed drop-cloths throughout the mine.

The Standard Mine Complex was removed from our internal survey list by JOTR Park Personel, apparently because of issues with the current claimant and boundary location disputes. This resulted in no March or August 2011 surveys of this complex.