

LOGAN WASH MINE ANNUAL REPORT

Mine Permit No. M-1977-424
Anniversary Date: March 28, 2023

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Annual Report
March 28th, 2022 – March 27th, 2023
Permit No. M-1977-424

1.0 Introduction

This annual report has been prepared in accordance with regulations of the State of Colorado Division of Reclamation, Mining and Safety (DRMS) and the regulations promulgated by the Colorado Mined Land Reclamation Board. The information presented in this report pertains to the period March 28, 2022 to March 27, 2023 (reporting period). Projected reclamation activities for the following year are also presented.

The Logan Wash Mine, located approximately 12 miles northeast of De Beque, Colorado, is managed by Glenn Springs Holdings, Inc. (GSHI) for Occidental Oil Shale, Inc. (OOSI). The main mine portals are located in Section 25, Township 7 South, Range 97 West. A general site location map for the Logan Wash Mine is presented in Figure 1.

This annual report summarizes the reclamation status of the Logan Wash Mine. The Logan Wash Mine is currently under closure and reclamation status. During the reporting period reclamation and maintenance work was conducted on the OOSI property. GSHI anticipates reclamation maintenance activities to continue in 2022, focusing on maintenance and operation of mine water discharge and the associated Evaporation Pond.

In 2006, at the request of DRMS, OOSI prepared and submitted Amendment No. 1: Retort Water Pipeline and Evaporation Pond. Although these structures were constructed in 1984 after receiving permits from the U.S. Bureau of Land Management (BLM) and Garfield County, for unknown reasons the structures were not incorporated into the existing mine permit.

The remainder of this annual report is organized as follows:

- Section 2: Disturbed Acreage Status
- Section 3: Monitoring Activities in 2022
- Section 4: Reclamation Activities in 2022
- Section 5: Maintenance Activities in 2022
- Section 6: Anticipated Reclamation in the Year 2023
- Section 7: Anticipated Disturbance in the Year 2023
- Section 8: Threatened Species Designation

Please refer to Figure 1, the Logan Wash Mine Location Map, Figure 2, Logan Wash Mine Facilities, and Figure 3, the Logan Wash Mine Monitoring Wells for features discussed in this report. This report also refers to Exhibit E, the original Reclamation Plan, and Exhibit F, the Reclamation Map. Please see Exhibit E in the permit document files; a copy of Exhibit F is attached. In the report text, all acreage amounts have been rounded to the nearest tenth of an acre. The interpreted total disturbed acreage, estimated acres reclaimed, acres released, and acres under reclamation may not sum perfectly, due to different interpretations of actual disturbed areas, measurement methods that have evolved over the years, and numeric rounding.

2.0 Disturbed Acreage Status

During the reporting period no additional acreage was disturbed. According to Exhibit E of the Reclamation Plan (1981) for Logan Wash Mine, 134.7 acres were approved for disturbance within the permit area with an actual disturbance of 113.6 acres. Over the years, this acreage has been revised to account for subsequent new disturbance and incorporation of the Evaporation Pond (Amendment No. 1) into the permit. Table 1.0 shows a summary of the original designated reclamation areas and their reclamation status based on historical reclamation reporting.

However, during preparations to submit a reclamation release in 2022, WWL learned from DRMS that the permitted acreage shown in their records indicated a total of 108.55 acres, and that it was preferable to examine what acreage would remain after the forthcoming reclamation release request of August 2022. The balance in acreage would therefore be acreage previously released and acreage likely to be released in the new request. A subsequent DRMS site inspection on October 12, 2022, resulted in the release of all lands requested, an estimated 21.65 acres and an estimated 26.0 acres remaining as unreclaimed. Areas released in 2022 include Areas 1, 2, 4, 10, 13, and the Soil Barrow Area.

Figures 4A and 4B illustrate the current reclamation status of disturbed areas and roads. The reclamation status of previously disturbed areas is discussed below.

2.1 Mine Areas

Other than roads and the Evaporation Pond and associated retort pipeline, the Lower Bench is the only remaining mine area (Area 1) that is not reclaimed. This area consists of 2.1 acres and is currently being used as mine access to monitor hydrological stations and general revegetation progress at other parts of the mine property, including Parachute beardtongue (Parachute Penstemon or *Penstemon debilis*) surveys. However, over the last decade or so, the Lower Bench has naturally revegetated and a large portion (except the Lower Bench Vault and weather station) may qualify for reclamation release.

2.2 Roads

2.2.1 Area 18: Logan Wash Access Road

Disturbed acreage associated with the Logan Wash Road or the “tramroad” was originally shown in the mine permit to be 53.4 acres. This road extends from its intersection with Road 45 up Logan Wash to and beyond the mine property. BLM records indicate that the original Logan Wash Road right-of-way (COC-223027) was 58.6 acres and includes all of the Upper Access Road up to the BLM-OOSI property boundary near the intersection of the Upper and Lower Bench Roads. However, the OOSI reclamation plan included the Upper Access Road in Area 13, Miscellaneous Access Roads.

Logan Wash Road is commonly used for access to BLM and private lands and during reclamation release discussions in 2022, Logan Wash Road was formally removed from the Logan Wash Mine Reclamation Plan with DRMS’s approval.

A number of road turn-outs or cut and fill areas were constructed along Logan Wash Road under the mine permit. These areas are shown as “B1 through B-10” in Table 1. All of the “B” reclamation areas were released of reclamation responsibility by DMRS in October 2022.

2.1.2 Area 13: Miscellaneous Access Roads

Documentation that defines the locations of the Miscellaneous Access Roads (Area 13) in detail in the original reclamation plan is limited (see Table 2). Based on field observations, a number of older roads have been reclaimed and are no longer used. These roads are located on the slope above the Upper Bench and on the slope between the Upper Access Road and the Lower Access Road (see Figure 4A). These roads were released from reclamation responsibility as a result of previous requests, some as early as 1986.

The remaining roads that may have been included in Area 13 are: 1) Upper Access Road, 4.8 acres; 2) Lower Access Road, 1.8 acres; 3) Upper Bench Road, 1.4 acres; 4) Lower Bench Road, 1.5 acres; and 5) Evaporation Pond Road, 1.3 acres. The lower portion of the Lower Access Road (approximately 1.36 acres) was associated with the Heater/Treater reclamation area (Table 2). The Upper Bench Road was released from reclamation in October 2022. All other miscellaneous roads mentioned remain in an unreclaimed state as they are used for ongoing monitoring operations. Table 2 lists the various Miscellaneous Access Roads identified in the early Reclamation Plans.

2.3 Structures

2.3.1 Vaults, Pipelines, and Evaporation Pond

Structures that remain at the mine site include two vault structures, one on the Lower Bench and one on the Research Mine Bench, one sealed ventilation shaft, and one capped and vented ventilation shaft. Pipelines include 1) the retort water pipeline which conveys retort mine water from the sealed L-1 portal at the mine site to the Evaporation Pond; 2) the Logan Wash Mine mine water drainage pipeline (LW-001) which extends from the sealed L1 portal to the Lower Bench Vault and then to an infiltration gallery on the Lower Bench; and 3) the Research Mine mine water drainage pipeline (LW-002) which extends from the sealed Research Mine portal through the Research Mine Vault to the Lower Bench Vault and on to Lower Bench discharge point. See Figure 2 for the locations of these structures. The retort water (LW-Retort) and mine water (LW-001) are sampled for water quality at the Lower Bench Vault on a semi-annual basis.

Two other vaults are located at the Evaporation Pond. One vault forms a concrete spillway from the Settling Pond to the Evaporation Pond, and the other vault was used as a leak detection monitoring structure, as is located on the west side of the Evaporation Pond.

All vaults are administered as confined space concrete structures with surface access-ways constructed just above grade. Depending on the final mine closure method, these structures may remain as permanent structures on the mine site to manage and monitor mine water drainage.

The retort water pipeline was constructed with manhole clean-outs approximately every 2,500 to 3,000 feet. Two manholes, the Upper Manhole and Lower Manhole (also confined spaces), are accessed periodically to measure retort water discharge rates. The Upper Manhole is located in the vicinity of the former Heater Treater (Area 15), in the upper part of Logan Wash near the confluence with Dry Gulch. The Lower Manhole is located immediately north of the Evaporation Pond, approximately 40 feet from the pond gate. Other manholes exist on the retort water pipeline

that are buried by shallow road fill, colluvium, and vegetative litter, and have not been accessed in recent years.

2.3.2 Monitoring Wells

Monitoring wells associated with the Logan Wash Mine were constructed within and outside of the immediate mine area. Past reconnaissance has been conducted to locate and confirm the existence of these well sites. Eight wells were located and identified within the mine area and within Logan Wash. Several other wells were located at some distance from the mine (see Figure 3 and Table 3). Of the 8 identified wells in the mine area, two wells, Well LWCW-1A and Well LW-22A, have been sampled for water quality on a semi-annual basis. Well LW-22A, located on private land some distance downgradient of the mine, was dropped from the sampling program in 2020. Well LWCW-1A will remain in place as a monitoring well until final permit closure. The landowner has been contacted to inquire as to whether they may be interested in taking over ownership of the well; they have yet to respond to this inquiry.

Wells LW-108, LW-112, and LW-242 were abandoned in 2005 in accordance with Colorado Division of Water Resources rules. The other 3 wells, LW-32, LW-45, and LW-116, remain in place but will be scheduled for abandonment in the future. Casing access and downhole conditions are unknown for wells LW-32, LW-45, and LW-116. Reconnaissance to date has not revealed any other monitoring wells within the permit area and the Logan Wash drainage.

Reconnaissance for wells located outside the permitted area in distant drainages was conducted in past reporting periods. Wells LW-102 and LW-243 were located in Smith Gulch, Well LW-103 was located in Kelly Gulch, and Well LW-104 was located in Riley Gulch. Wells LW-121, LW-46, LW-47, LW-47A, and LW-106 were not located after a thorough search and are assumed to be abandoned. Wells LW-102, LW-104 and LW-243 were abandoned in 2007. Table 3 shows the status of well abandonment as of this reporting period.

2.4 Status Summary

2.4.1 Areas Released of Warranty

Reclamation areas released from warranty by DRMS prior to 2022 include: Areas 5, 7, 21, and 22, and areas A5, A7, A21, A22, B1, B4, B6, B9, B10, and B11. In October 2022, Areas 1, 2, 4, 10, 13, all B Road Areas, and the Soil Barrow Area were released from reclamation responsibility by DRMS. Table 4 shows the areas requested for release of reclamation warranty in 2022. According to the DRMS acreage release letter of October 31, 2022, a total of approximately 82.55 acres have been released of warranty for the mine permit.

2.4.2 Areas Under Reclamation

Areas that began 2022 under reclamation (revegetation in progress) included Areas 1, 2, 3, 4, 10, the 0.7-acre Soil Barrow Area, parts of Area 13, and road Areas B2, B3, B7 and B8. Areas 1 through 4 include the Upper and Lower Mine Dumps (face areas), Upper Mine Bench, Lower Mine Bench, and the Research Mine Bench and Dump, respectively. Area 10 is the former Helo Pad. Area 13 is Miscellaneous Access Roads.

As a result of the recent reclamation release on October 31, 2022, all of the above-mentioned areas were released of reclamation warranty.

2.4.3 Areas Not Under Reclamation

Areas not under reclamation include all areas shown in Table 5. These areas are currently being used for mine monitoring purposes and are not under reclamation at this time. These areas consist of the Lower Bench, the Lower Bench Road, the Upper Access Road, the Lower Access Road, the Evaporation Pond Access Road, and the Evaporation Pond and Pipeline (Area 23, 14.9 acres). Area 11, the Guard Gate, and Area 18, Logan Wash Road will not be reclaimed as they are no longer included in Reclamation Plan.

2.4.4 Areas to Be Requested for Release

No areas are expected to be requested for reclamation release of warranty in 2023.

Table 6 summarizes reclamation status at Logan Wash Mine.

3.0 Monitoring Activities in 2022

Monitoring activities at the Logan Wash Mine during the reporting period consisted of periodic monitoring of mine water discharge and related sampling activities. These activities included:

- 1) Monthly monitoring (when safe access is available)
 - a. Discharge measurement of the mine water at LW-001 (former Colorado Discharge Permit System [CDPS] Outfall 001) at the Lower Bench
 - b. Discharge measurement of the mine retort water at the Upper and Lower Manhole locations
 - c. Measurement of the manometer installed in the Research Mine Vault (LW-002)
 - d. Precipitation at the Lower Bench and at the Evaporation Pond;
 - e. Salinity of the Evaporation Pond and Settling Pond
 - f. Water level measurements of leak detection sumps at the Evaporation Pond and Settling Pond
- 2) Semi-annual water quality sampling
 - a. Mine-water discharge at the Lower Bench Vault (LW-001)
 - b. Retort-water discharge at the Lower Bench Vault (LW-Retort), the Lower Manhole (LW-LM); and at the Evaporation Pond
 - c. Groundwater at well LWCW-1A

Monitoring of mine discharge waters, the Research Mine manometer, and the Evaporation Pond salinity and leak detection system is done on a monthly frequency except during access restrictions, mostly during the winter months. As mentioned, water quality sampling is done on a semi-annual basis in May and October. A summary of monitoring events for the reporting period are shown in Table 7.

3.1 CDPS (NPDES) Permit Termination

The former CDPS permit for Logan Wash Mine (permit no. CO0048816) that permitted two outfalls, Outfall 001 (Logan Wash Mine, main lower portal [L1 Portal] discharge) and Outfall 002 (Research Mine discharge), was terminated on July 1, 2014. Any mine discharge from the

former Outfalls 001 and 002 is being infiltrated into the Lower Mine Bench. For more information regarding the Research Mine portal closure and management of the Research Mine drainage see TR No. 4 and TR No. 6, which present revisions to Exhibit E, the Reclamation Plan for Logan Wash Mine.

3.2 Mine-Water and Retort-Water Discharge

Long-term monitoring of retort water and mine water discharge is necessary to assess mine drainage behavior from the mine. The trend in discharge rates combined with water quality have implications for the future fate of the mine drainage water. Discharge measurements of mine water (LW-001) and retort water (LW-Retort) are conducted on a monthly basis as access allows. Continuous flow (meter) monitoring of LW-001 water came online in August 2011 as part of a requirement of the former CDPS permit. These data were collected by OOSI to assess and evaluate mine closure effectiveness, to support operation and maintenance of the Evaporation Pond and future water management options, and to meet state requirements.

During the summer of 2020, the LW-001 flow meter flow measurements recorded on the data logger experienced periods of false readings not representative of readings indicated on the flow meter display. The data logger was removed and tests were run on the flow meter and converter. These tests were not conclusive and further testing must be conducted. The flow meter will be restored to normal operating conditions as soon as practicable. In the meantime, flow measurements will be recorded monthly from the flow meter display.

Retort water discharge is measured manually at the Upper Manhole and Lower Manhole locations. Table 7 is a summary of monitoring events conducted at the mine in 2022, and Figure 5 shows the results for the LW-001 flow meter and the measured discharge for retort water at the Upper Manhole. The figure shows that the LW-001 discharge has decreased since 2011 appears to have stabilized at a flow rate of approximately 0.6 gallons per minute (gpm).

3.3 Water Quality Monitoring

Water quality monitoring continued at the mine site on a semi-annual schedule. Sampling usually occurs in May and October. As mentioned in the above section, knowledge of the water quality of mine drainage waters and its potential change over time is needed to assess the long-term fate of this water and final mine closure options.

OOSI considers evaporation as the preferred method of treatment for the retort water for the long-term. A new liner was installed in the Evaporation Pond in 2018. Hydrologic biannual sampling at the mine currently includes sites: 1) mine water (LW-001), 2) retort mine water (LW-Retort), 3) groundwater at the point of compliance well (LWCW-1A), 4) retort water at the Lower Manhole (LW-LM), and 5) LW-Pond (Evaporation Pond water). Sampling of LW-001 and LW-Retort is conducted at the Lower Bench Vault. Well LWCA-1A, is a compliance well located in Dry Gulch below the toe of the Lower Mine Dump. The LW-LM location is located just upstream of the Settling Pond. Under stipulations for the Evaporation Pond BLM right-of-way, water quality sampling of the Evaporation Pond (sample ID LW-Pond) was added to the semi-annual sampling schedule in 2019. In addition, water quality field parameters are measured at the Evaporation Pond during most monthly mine monitoring visits.

In 2020, monitoring locations Big Seep, an upgradient location, and well LW-22, a downgradient location, were dropped from the sampling program. These sites have provided adequate baseline data and are not critically needed at this time.

In 2022, biannual water quality sampling was conducted at all five locations mentioned above.

Locations sampled during the 2022 semi-annual sampling events are shown in Figure 6. Analytical data for these samples are shown in Tables 8 through 10.

3.4 Research Mine Manometer Monitoring

The manometer installed in the Research Mine Vault is monitored and recorded on a monthly basis as access conditions allow. During snowmelt periods, monitoring of the manometer may occur on a more frequent basis, or until the peak runoff season begins to subside. If manometer measurements were to indicate a high level (≥ 36 inches) for more than a week's time, the water in the mine can be released and allowed to infiltrate at the Lower Bench. All manometer readings recorded in 2022 indicated no ponded water in the mine at the measurement point (see Table 7).

3.5 Evaporation Pond Leak Detection System

Monitoring of the Evaporation Pond Leak Detection Systems is conducted as part of monthly monitoring events as access conditions allow. The historic Evaporation Pond Leak Detection Vault was constructed as part of the original Evaporation Pond system in 1984. A new liner system was installed in 2018 on top of the old liner. Two Evaporation Pond Leak Detection Sumps were constructed for the new overlying pond liner, one on the west side and the other on the east side of the pond. One leak detection sump was also constructed during relining of the Settling Pond. Each detection sump was constructed by installing a PVC monitoring pipe from the top edge of pond liner down the pond slope and in between the new secondary and primary liner. The PVC pipe allows for monitoring of the presence of collected pond water that may have leaked through the primary liner.

Monitoring of the Evaporation Pond Leak Detection Vault is conducted by visual observations. The continuous measurement of water pressure (depth) in the vault sump using an installed pressure transducer was discontinued after the new pond liner was installed in 2018. Field observations showed that the vault was dry throughout 2022. A metal cap was placed over the concrete collar of the vault in 2020; this likely contributed to the vault showing dry conditions throughout the year, as the cap prevents leakage into the vault from precipitation events.

No water was detected in the Evaporation Pond sumps during 2022. However, water was first detected in the Settling Pond Sump in September, 2021. In November, the Settling Pond sump water was pumped (17.5 gallons) and discharged back into the Settling Pond. An additional 4.5 gallons was pumped in December of 2021. In January and March 2022, the sump was dry. Approximately 5-inches of water was detected in August. Since August, the detection probe pipe has de-coupled and is not working properly. This will be replaced or repaired early in 2023. It is also worth noting that this sump detection pipe cover is missing which may allow precipitation to enter and may contribute to an indication of liquid in the sump.

3.6 Climatic Data

Climatic data are monitored on the Lower Bench through the use of an Onset U30-NRC weather station. Temperature and precipitation are also monitored at the Lower Bench and Evaporation Pond using Novalynx Corporation Model 260-2101SK-P rain gauges. When deployed, these instruments operate continuously but must be accessed for data downloads. The rain gauges are not equipped with wind screens. Each gauge measures precipitation with an automated logger that

is downloaded several times a year. During winter months, the rain gauges may be temporarily removed from service.

Precipitation data collected in 2022 showed a total precipitation of 12.47 and 3.52 inches, for the Lower Bench and Evaporation Pond, respectively (see Figure 7). The NWS Cooperative Network Altenburn, CO station (Coop # 050214, elevation 5,690 feet AMSL), located 13.3 miles northwest of the mine, recorded total precipitation of 16.67 inches for the year of 2022. The annual average precipitation for this station is 16.26 inches (WRCC, 2022).

4.0 Reclamation Activities in 2022

Monitoring activities described in Section 3 are considered activities that contribute to successful overall mine reclamation. Other reclamation activities conducted at the Logan Wash Mine in 2022 are discussed in the following sections.

4.1 Revegetation Maintenance

Areas seeded during past revegetation work are self-sustaining. Unfortunately, despite installed fencing, cattle accessed the mine area a number of times in 2019 and seriously damaged reclamation grasses on the Upper Mine Bench and Road and the Lower Mine Bench and Road. This vegetation recovered sufficiently to meet reclamation release requirements in areas released from warranty in October, 2022. Some hand seeding may be implemented to maintain the desired vegetation cover and diversity.

Areas within the designated Evaporation Pond area were disturbed during pond relining construction in 2018 (see Section 5.2). These areas were seeded with a native seed mix and biodegradable erosion blankets were placed on the steeper, more vulnerable slopes. Good germination and growth of grasses was evident in the spring of 2020 and has continued to improve in these areas. The steeper slopes have remained stable.

4.2 Well Abandonment

No monitoring wells were abandoned during the reporting period.

5.0 Maintenance Activities in 2022

Maintenance activities included periodic inspections of mine roads, benches, portals, high walls, mine water drainage systems associated with the retorts and general mine workings, as well as the inspection of Evaporation Pond facilities including the pond's liner, security fencing, operation, and leak detection systems. Maintenance activities conducted at the mine and Evaporation Pond are summarized in the following sections.

5.1 Mine Maintenance

During the reporting period, inspections of the Logan Wash Mine site occurred primarily on a monthly basis depending on site access conditions. Inspections focused on mine roads, headwalls, portal closures, bench surfaces, dump faces, road conditions, and constructed stormwater drainage and rip-rap channels. Maintenance of mine roads including the Evaporation Pond Road,

Lower Access Road, Upper Access Road, Lower Bench Road, and Logan Wash Road are done on an as-needed basis to mitigate stormwater impacts to the road surface. Mine water discharge rates and Evaporation Pond water levels were periodically monitored and recorded (Section 3.2). No other mine maintenance was required during the reporting period.

5.2 Evaporation Pond Maintenance

Maintenance of the Settling Pond and Evaporation Pond include inspection of: 1) discharge rates to the ponds from the mine retort water plumbing system; 2) pond liner, 3) egress ladder integrity, 4) leak detection systems; 5) wildlife security fence; and 6) stormwater drainage ditches and access road conditions.

Figures 8 and 9 show the liner design and layout and as-built features of the Evaporation Pond, respectively.

6.0 Anticipated Reclamation in the Year 2023

Because the fate of retort water discharge is currently being assessed under Amendment No. 1, OOSI does not anticipate revegetation or reclamation of any unreclaimed roads or disturbed surface areas at the mine site in 2023.

Saplings that were planted on the mine dump faces will be assessed for overall health and mortality. No mechanical irrigation of these saplings is anticipated. Roads not reclaimed will be maintained. Transplanting of *P. debilis* will be conducted if deemed necessary for plants located on the Lower Bench Road; plants will be moved to the fill slope area adjacent to the road (see Section 8.0).

Evaporation Pond maintenance will include access road and stormwater control maintenance, weed and brush control, leak detection sump pump maintenance, liner repair, and other maintenance as needed.

7.0 Anticipated Disturbance in the Year 2023

No new disturbance is anticipated to occur in 2023 and 2024 within the mine permit area associated with OOSI mine permit activities. Minor ground disturbance may occur on the Lower Bench Road during transplanting of *P. debilis* species, if needed (see Section 8.0). Maintenance of mine roads and stormwater control features will be conducted as necessary.

8.0 Threatened Species Designation

On July 27, 2011, the U.S. Department of Interior, Fish and Wildlife Service (USFW), listed the plant *Penstemon debilis* (Parachute beardtongue or *P. debilis*) as “threatened” status under the Endangered Species Act of 1973 (Act). The critical habitat for the plant is in Garfield County and the Logan Wash Mine site falls within this critical habitat. Numerous *P. debilis* plants have been observed growing within and along the flanks of the Upper Access Road from the Research Mine portal area to the north on the Upper Mine Bench Road and Lower Mine Bench Road. An Article of Designation (AOD) was signed by Colorado Parks and Wildlife (CPW), OOSI, and Oxy WTP

in early 2015 and finalized on February 3, 2015. The AOD allows for OOSI to mitigate impact to *P. debilis* habitat while conducting reclamation obligations under the DRMS mine permit.

A site plant survey conducted by BLM, USFWS, CPW (Colorado Natural Areas Program [CNAP]), and WWL in September, 2014 resulted in a number of *P. debilis* locations being mapped on both OOSI and BLM lands from the Research Mine to the Lower Bench (Figure 10). On March 25, 2015, 39 *P. debilis* plants were transplanted from the Lower Bench Road to the nearby road cut slope that is undisturbed by vehicle/equipment traffic (Figure 11). The transplanted *P. debilis* have been monitored for production and mortality on an annual basis, providing safe access was achievable and snow cover negligible. Results from monitoring of the transplanted *P. debilis* indicate a current mortality rate of approximately 64 percent. The table below shows the mortality rate for each year since transplanting in 2015. No mortality rate was measured in 2021, but casual observations indicate that overall plant numbers have decreased, both in the transplanted plants and new volunteer plants in the area on and immediately adjacent to the Lower Bench Access Road.

Year	New Mortality (Calendar Year)	Mortality (2015 to Date)
2015	15%	15%
2016	10%	26%
2017	7%	33%
2018	Insufficient Data to Determine	33%
2019	15%	46%
2020	16%	38%
2021	---	---
2022	2.5%	64%

On June 28, 2022, three state personnel along with WWL Staff Scientist, Charles Jones and Principal Hydrogeologist, Bruce Smith, visited Logan Wash Mine to conduct quantitative monitoring on a population of *P. debilis* near the Lower Bench Road. Attendees included the following: Jill Handwerk, Delia Malone, Savanna Smith, all with the Colorado Natural Heritage Program (CNHP), and Jake Gottschalk of the U.S. Fish and Wildlife Service.

REFERENCES

WRCC, 2022. Western Region Climate Center website: <<https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?co0214>>