Agency/Organization: US Geological Survey

Project Name: Clark County Rare Plant Propagation Research Phase II

Project Number: 2021-USGS-2075A

Reporting Period: July 1, 2024 – September 30, 2024

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QUESTION 1: What did you accomplish during this reporting period? How did these accomplishments help you reach the goal of your project? If relevant, what indicators or benchmarks were used to determine your progress?

After re-introducing *Cylindropuntia multigeniculata* (CYMU) plants propagated from Gold Butte joint cuttings (Spring 2023 cohort planted in April 2024, M11), we revisited the plants in June and August. Plants assigned to the Frequent watering treatment received 1 gal of water during both visits, while plants assigned to the Infrequent watering treatment received 1 gal of water during the August visit only. In October, we will be outplanting the CYMU propagated from cuttings collected in October 2023 (Fall 2023 cohort).

We collected seed from 45 bagged *Eriogonum viscidulum* (ERVI) individuals at the Middle Muddy River population in late June and July 2024 (M14). We after-ripened seeds in the USGS shade house under prevailing summer temperatures, cleaned the seeds and conducted germination trials, and delivered these seeds to the County in August (D13).

We completed all greenhouse watering phases on ERVI seedbank soils originally collected from the Middle Muddy River population in late September 2023 (M15). One definite and two potential ERVI germinants emerged during the grow-out of these seedbank samples but failed to thrive before transplanting. Although seedbank samples were collected near existing plants in Fall 2023, the low density of emerging ERVI seeds in the soil seedbank was consistent with our findings during Phase I of this project.

Because no ERVI seedlings were successfully transplanted and grown out from surface soils we collected during Fall 2023, we subsequently sieved the samples to retrieve any remaining viable (dormant) seeds that did not respond to our emergence treatments. We found seven empty ERVI seed coats by sieving the samples, but no remaining filled seeds. Because these seeds had already germinated, we could not use them to grow plants in the greenhouse for seed harvest (D14).

We collected mature *Astragalus geyeri* var. *triquetrus* (ASGET) fruits from the Mud Lake, Mormon Mesa, and Sandy Cove populations in late May 2024. We then sorted the seeds in the USGS laboratory and tested viability to fulfill conservation collections for the County (D12).

We are continuing with propagation efforts for seeds of *Arctomecon californica* (ARCA) we received from Kelsey Graham (USDA), with germination associated with ongoing temperature trials and gibberellic acid treatment. Simultaneously, we are preparing additional ARCA seeds collected in 2023 by Kelsey Graham (USDA) for a second round of germination based on the most successful treatment combinations from our initial trials.

In the USGS greenhouse, the PEAL cuttings collected by our subcontractor (Utah State University graduate student) in late March 2024 at three of the four populations in Clark County (Ivanpah, Hidden Valley, and Jean) were potted in May and June as they developed roots. All cuttings continue to be cared for at the USGS greenhouse.

Dr. Lesley DeFalco presented project progress at the annual Multiple Species Habitat Conservation Plan Progress Report Symposium in August 2024, completing Milestone 13.

These Milestones are instrumental in field and greenhouse work and developing our final deliverables for this project.

QUESTION 2: What, if any, problems were encountered? Briefly describe those problems and the manner in which they were dealt.
Estimating the number of filled seeds per fruit and fruits per individual plant is difficult when weather, microsite fertility and maternal investment can affect reproductive output from year to year. While cleaning and counting the ERVI seed collected at Middle Muddy River and the ASGET seed collected at Mormon Mesa, we determined we had seeds in excess of our collection permits. In coordination with BLM, and because of our detailed spatial information, we were able to return a proportion of the filled seed from 9 of the most prolific ERVI and 20 of the most prolific ASGET to the exact locations that seeds would have dispersed from had they not been collected. By doing so, we remain compliant on permits for both species' seed collections.

QUESTION 3: What, if any, proposed activities were not completed? Briefly describe those activities, the reasons they were not completed and your plans for carrying them out.
None.

QUESTION 4: What is the calculated percent of work completed?
We are approximately 20% toward project completion.

QUESTION 5: Do you foresee any upcoming problems with future project activities? If so, how do you propose to overcome those problems?
Because no ERVI seedlings were successfully transplanted and grown out from surface soils we collected during Fall 2023, and we found no remaining viable seeds in these samples, we are unable to harvest seeds from plants emerging from seedbank grown in the greenhouse (D14). To overcome the absence of seed for conservation collection, we propose to deliver an Excel workbook documenting all species that emerged and their counts from this habitat collection. This aspatial data includes details of the greenhouse emergence trial and the composition of the seed bank at this site (i.e., native, nonnative and ERVI species; seedling counts; timing of emergence associated with watering and chemical treatments), which can be compared against seed bank composition at other sites.

QUESTION 6: Is there anything else you want to tell the DCP about this project?
We have nothing additional to note concerning this project.

QUESTION 7: What was produced during the reporting period?
During the reporting period, we produced Seed Available for ASGET from first year irrigated habitat (ASGETirr1) (D12), Seed Available for ERVI from field collections (ERVI2024) (D13), and this Quarterly Progress Report (D15).