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Rare Plant Propagation Research
(2021-USGS-2075A)





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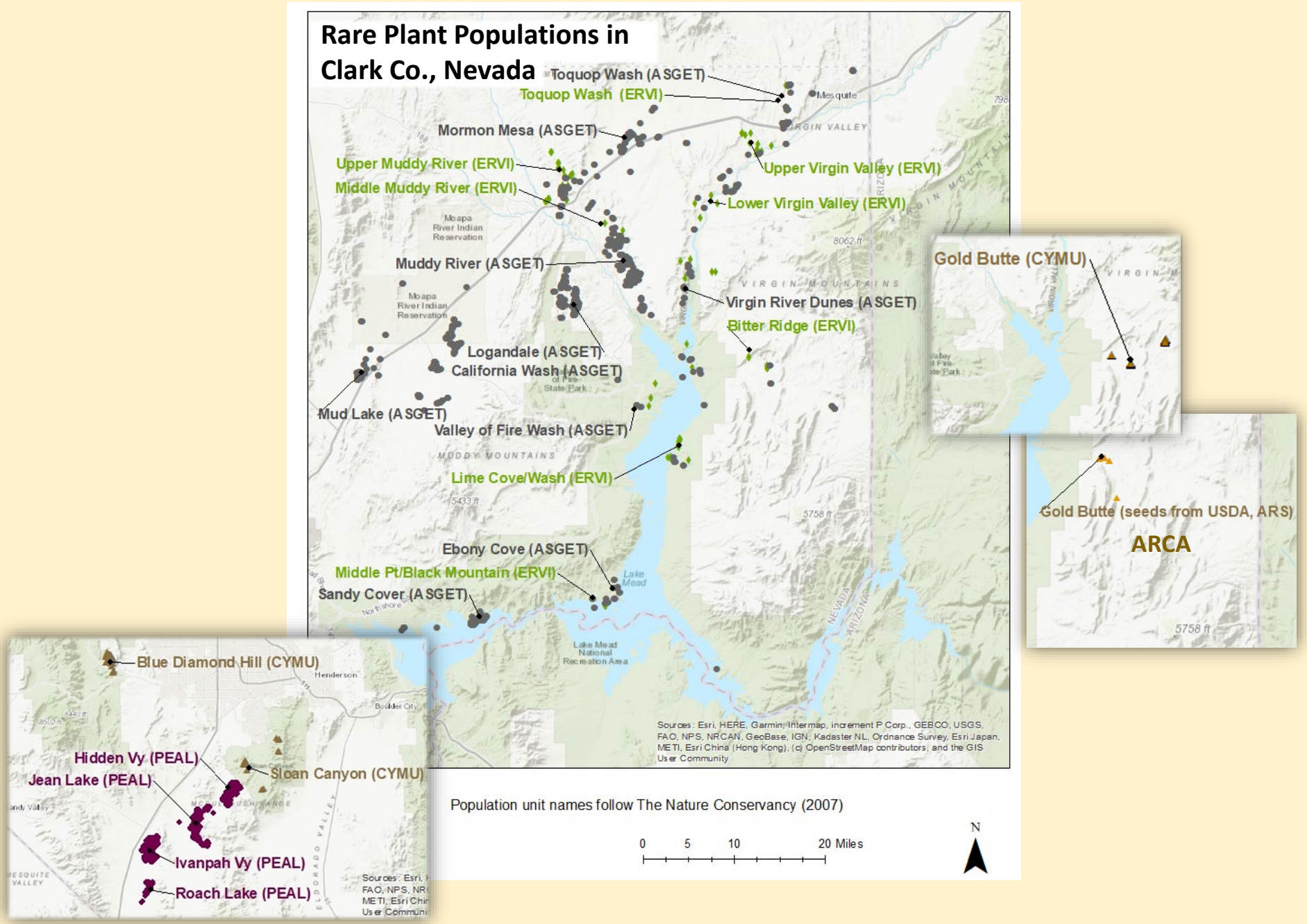
Clark County DCP Symposium, August 18, 2025


Rare Plant Populations in Clark Co., Nevada
Toquop Wash (ASGET)
Toquop Wash (ERVI)
Mormon Mesa (ASGET)
Upper Muddy River (ERVI)
Middle Muddy River (ERVI)
Muddy River (ASGET)
Logandale (ASGET)
California Wash (ASGET)
Mud Lake (ASGET)
Valley of Fire Wash (ASGET)
Lime Cove/Wash (ERVI)
Ebony Cove (ASGET)
Middle Pt/Black Mountain (ERVI)
Sandy Cover (ASGET)
Upper Virgin Valley (ERVI)
Lower Virgin Valley (ERVI)
Virgin River Dunes (ASGET)
Bitter Ridge (ERVI)
Gold Butte (CYMU)
Gold Butte (seeds from USDA, ARS)
ARCA
Blue Diamond Hill (CYMU)
Hidden Vy (PEAL)
Jean Lake (PEAL)
Sloan Canyon (CYMU)
Ivanpah Vy (PEAL)
Roach Lake (PEAL)
Mesquite
Henderson
Boulder City
Moapa River Indian Reservation
Valley of Fire State Park
Lake Mead
Lake Mead National Recreation Area
VIRGIN MOUNTAINS
MUDDY MOUNTAINS
VIRGIN VALLEY
NEVADA
ARIZONA
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
Population unit names follow The Nature Conservancy (2007)
0 5 10 20 Miles
N

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Sticky Buckwheat

(Eriogonum viscidulum)

Background

- Plant occurrence and abundance vary among populations and across years
- Seed collections increase capacity to adapt to future conditions (Center for Plant Conservation)

Approach

- Ensure genetic diversity is maintained by creating seed collections for conservation and research
    - Harvest seeds directly from plants growing in habitat (CPC guidelines)
    - Grow seed-bearing plants from soils collected from habitat (= soil seed bank)

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Photos: Lesley DeFalco, USGS, Alex Stosich, USU

Sticky Buckwheat

Collections from Habitat

"3,000 seeds/population from 50 matrilines collected in multiple years"

Status	Year	Population	# Matrilines	Total # Seeds	% Viability	Est # Viable Seeds
	2025	Toquop Wash	4	76	--	--
✓	2024	Middle Muddy River	45	3,002*	93.3	2,801
✓	2023	Upper Virgin Valley	42	3,204	98.7	3,162
	2023	Toquop Wash	18	8,550	98.7	8,439
	2023	Upper Muddy River	33	1,385	100.0	1,385
				* Additional seeds returned to habitat in 2024		

- No plants emerged at Upper Muddy River in 2025 (dry La Niña conditions)
- Four matrilines were added to conservation collection for Toquop Wash
- One more year (2026) to round out conservation collections

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Photos: Sara Scoles-Sciulla, USGS, Alex Stosich, USU

Sticky Buckwheat

Propagation from Soil Seed Bank

- Three sticky buckwheat seedlings emerged and died
- Despite prior success for this species (2019-USGS-1990A), seed bank grow-out for a second year of trial has not had similar result

Photos: Lesley DeFalco, USGS

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Three-corner Milkvetch

(Astragalus geyeri var. triquetrus)

Background

- Plants were scarce during 2020 – 2023 surveys (2017-IRONWOOD-1755A)
- No seeds were found in soil samples during 2020 – 2021 (2019-USGS-1990A)

Approach

- Create seed collections for conservation and research

  - Harvest seeds from plants in habitat (Irrigation)
    - Mud Lake, Mormon Mesa (2023/24)
    - Muddy River, California Wash (2025/26)*
  - Grow seed-bearing plants from soil seed bank
    - Mud Lake, Mormon Mesa

Photos: Lesley DeFalco, USGS

*Amendment request granted for extension

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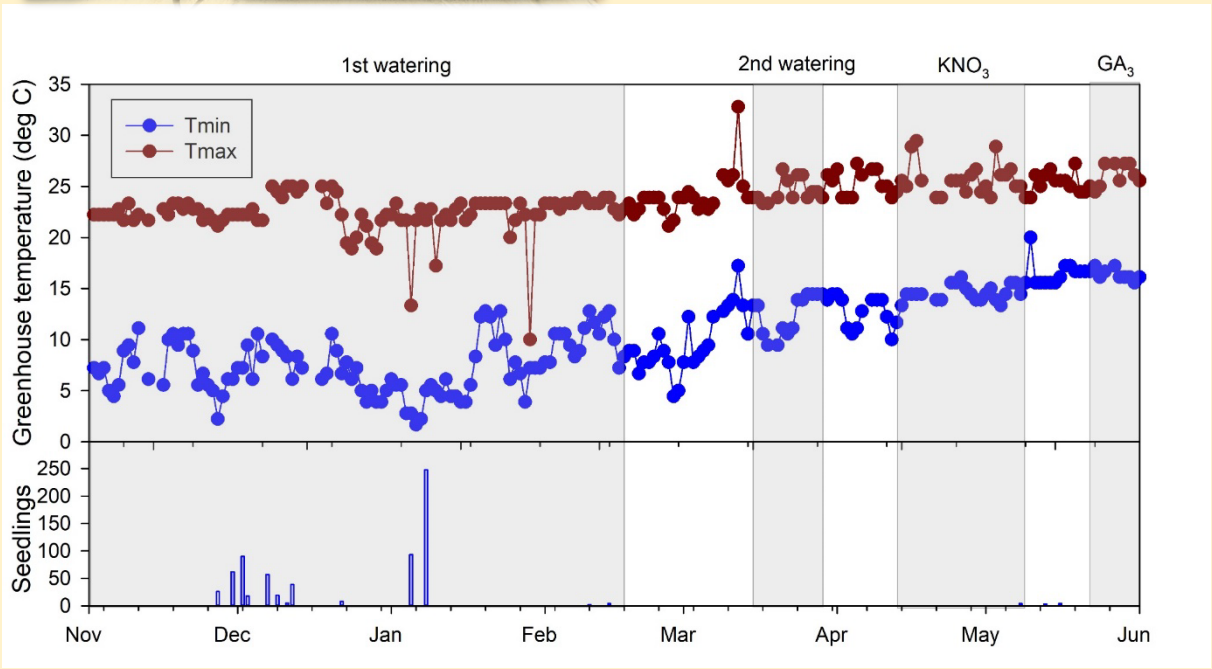
Three-corner Milkvetch

Propagation from Soil Seed Bank

- Mud Lake and Mormon Mesa (n=20 adults)
- Four watering–drying cycles in semi-controlled greenhouse
- 861 milkvetch seedlings emerged (1st watering cycle)



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Photos: Lesley DeFalco, USGS

Three-corner Milkvetch

Propagation from Soil Seed Bank

Site	Freq of adults	# Seedlings	#Transplanted	# Survived
Mormon Mesa	14/20	861	399	146
Mud Lake	0/20	--	--	--

- 36.5% transplant survival; most fruits with filled seeds
- Limited seed crop at Mud Lake (small plant size)

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Photos: Lesley DeFalco, USGS

Blue Diamond Cholla

(*Opuntia multigeniculata*)

Background

- Seed production is variable, but plants successfully propagated from joints (Scoles-Sciulla et al. 2023)

- Plants propagated from joint cuttings can help preserve genetic diversity

Approach

- Identify best practices for reintroducing joint-propagated plants into habitat
  - Season of planting (Spring vs. Fall)
  - Nurse plant association (Canopy vs. Open)
  - Supplemental watering (Frequent vs. Infrequent)
  - Herbivore protection (Cage vs Uncaged)

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Photos: Sara Scoles-Sciulla & Lesley DeFalco, USGS

Blue Diamond Cholla
Re-introduction into Habitat

- Season of collection/planting: Spring 2023/2024; Fall 2023/2024
- Nurse plant: Outplant 1-year old plants beneath canopy or open
- Supplemental watering: 3.8 L @ 2, 4, 6 months (Freq) or @ 4 mo (Infreq)
- All caged


April 2024 outplanting


Thamnosma montanum
nurse plant


Open

Photos: Sara Scoles-Sciulla, USGS

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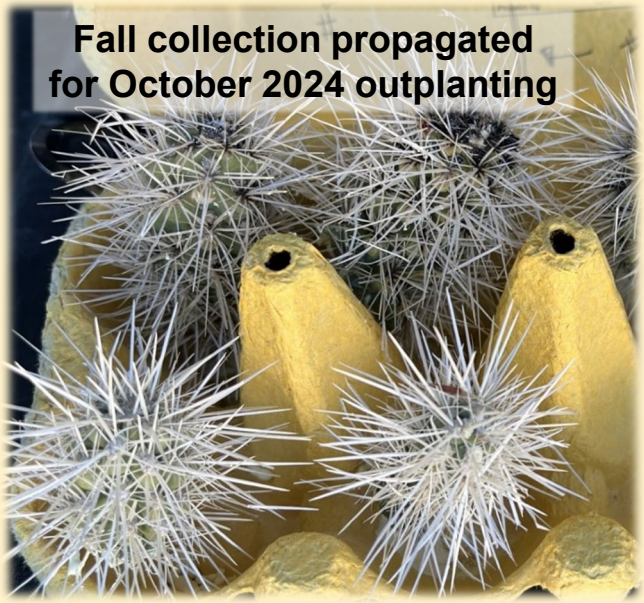
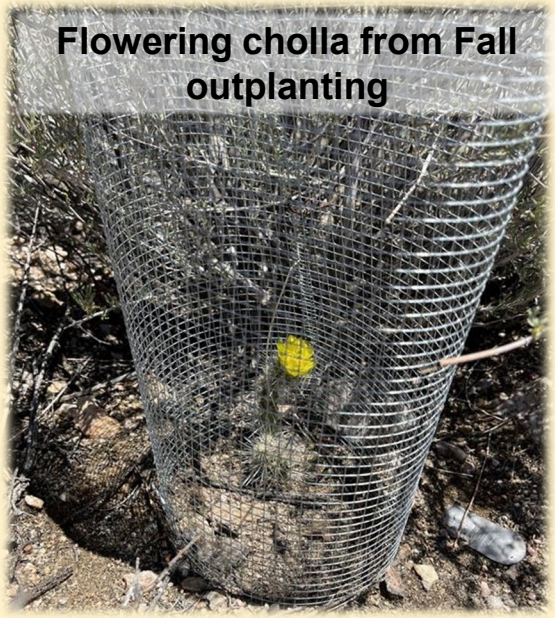
Blue Diamond Cholla
Re-introduction into Habitat





- Improved survival for Fall (100%) outplants: greater than Spring outplant survival at 2 months (85%)
- Buried cages (6” depth) deterred persistent herbivores

- Final assessment in Fall 2025: Blue Diamond outplanting in 2026 based on best practices

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Photos: Sara Scoles-Sciulla, USGS

Photo: Todd Esque, USGS

Las Vegas Bearpoppy

(*Arctomecon californica*)

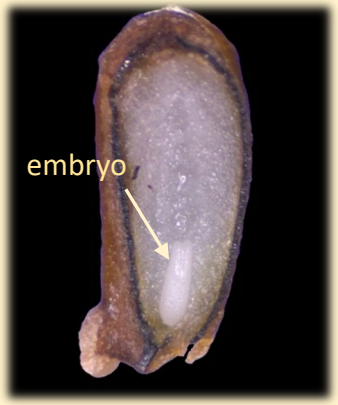

Photo: Mikaela Gaskill & Bryce Usiak, USGS

Background

- Dormancy-breaking treatments have yielded low germination success (Meikle et al. 2006, Pereira et al. 2021, de Queiroz & Meyer 2023)

- Morphophysiological seed dormancy may impede propagation efforts

Approach

- Grow embryo and trigger germination in lab trials (after-ripening + cold stratification)
- Propagate plants from these germinated seeds (2 steps)

- Propagate plants from soil seed bank

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Las Vegas Bearpoppy

Propagation from Germinated Seeds: Step 1

Thanks again to Kelsey Graham, USDA/ARS, for sharing bearpoppy seeds!

- 3 soil types in small pots: sand, native soil-perlite mix, and nursery soil mix
- > 2,500 germinated seeds transferred to pots (Feb – Aug)

Photos: Mikaela Gaskill & Lesley DeFalco, USGS

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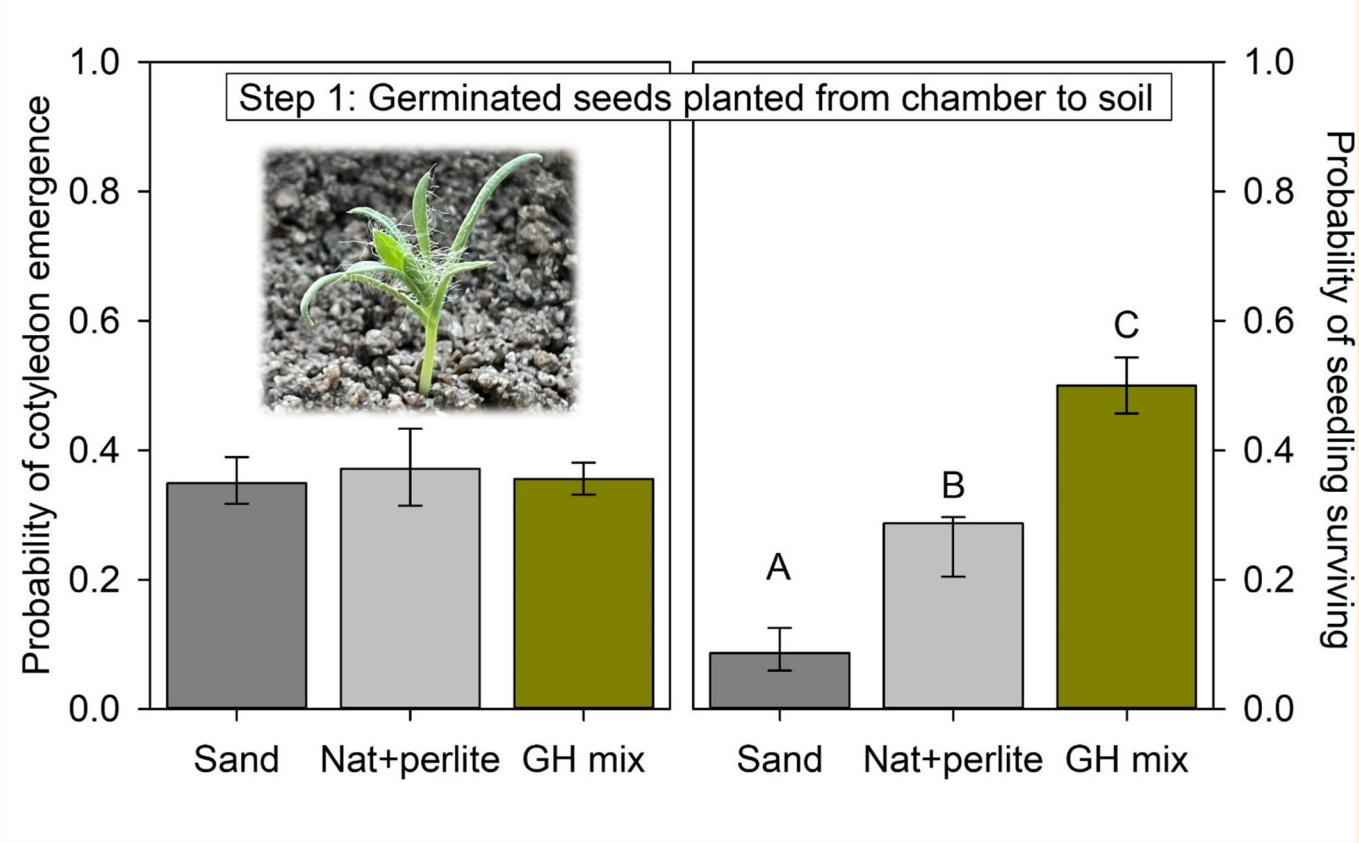
Las Vegas Bearpoppy

Propagation from Germinated Seeds: Step 1



- Seedlings emerged equally among soil types, but seedling survival greatest in greenhouse soil mix

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Photo: Lesley DeFalco, USGS

Las Vegas Bearpoppy

Propagation from Germination Seeds: Step 2

- 3 soil types in large pots: native, gypsum, and greenhouse
- On-going monitoring of growth and survival (Jan 2026)

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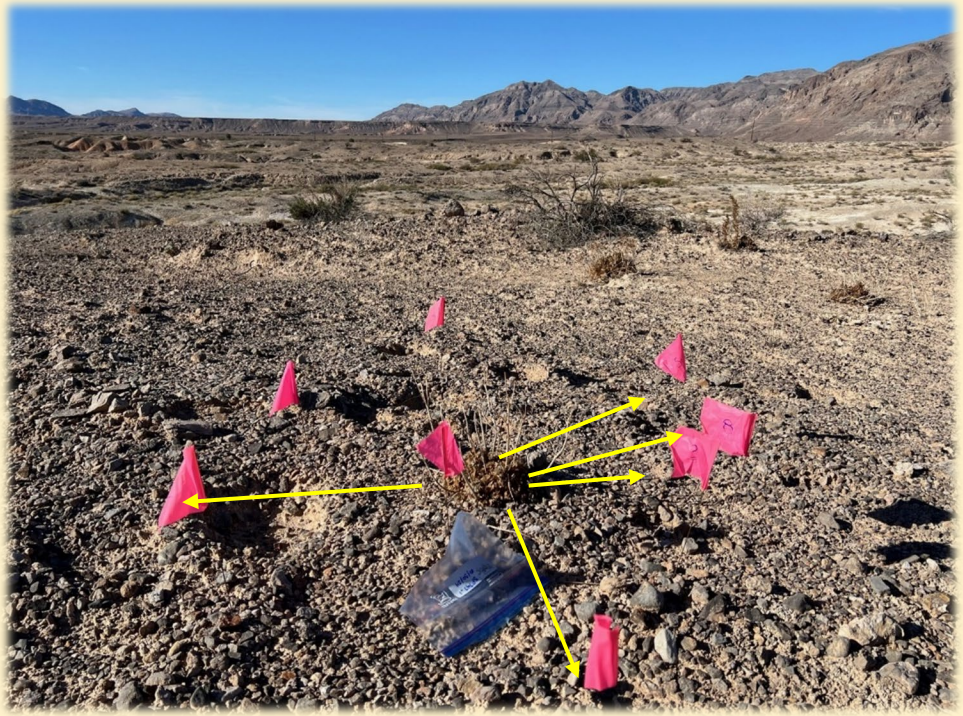
Las Vegas Bearpoppy

Propagation from Soil Seed Bank



- Bitterspring Valley and Red Bluff Spring North populations
- Soils collected around dormant adult plants (n = 20 plants per pop)
- Grow-out in greenhouse using seedling emergence method

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Photos: Seneca Randolph, Lesley DeFalco, USGS

Las Vegas Bearpoppy

Propagation from Soil Seed Bank

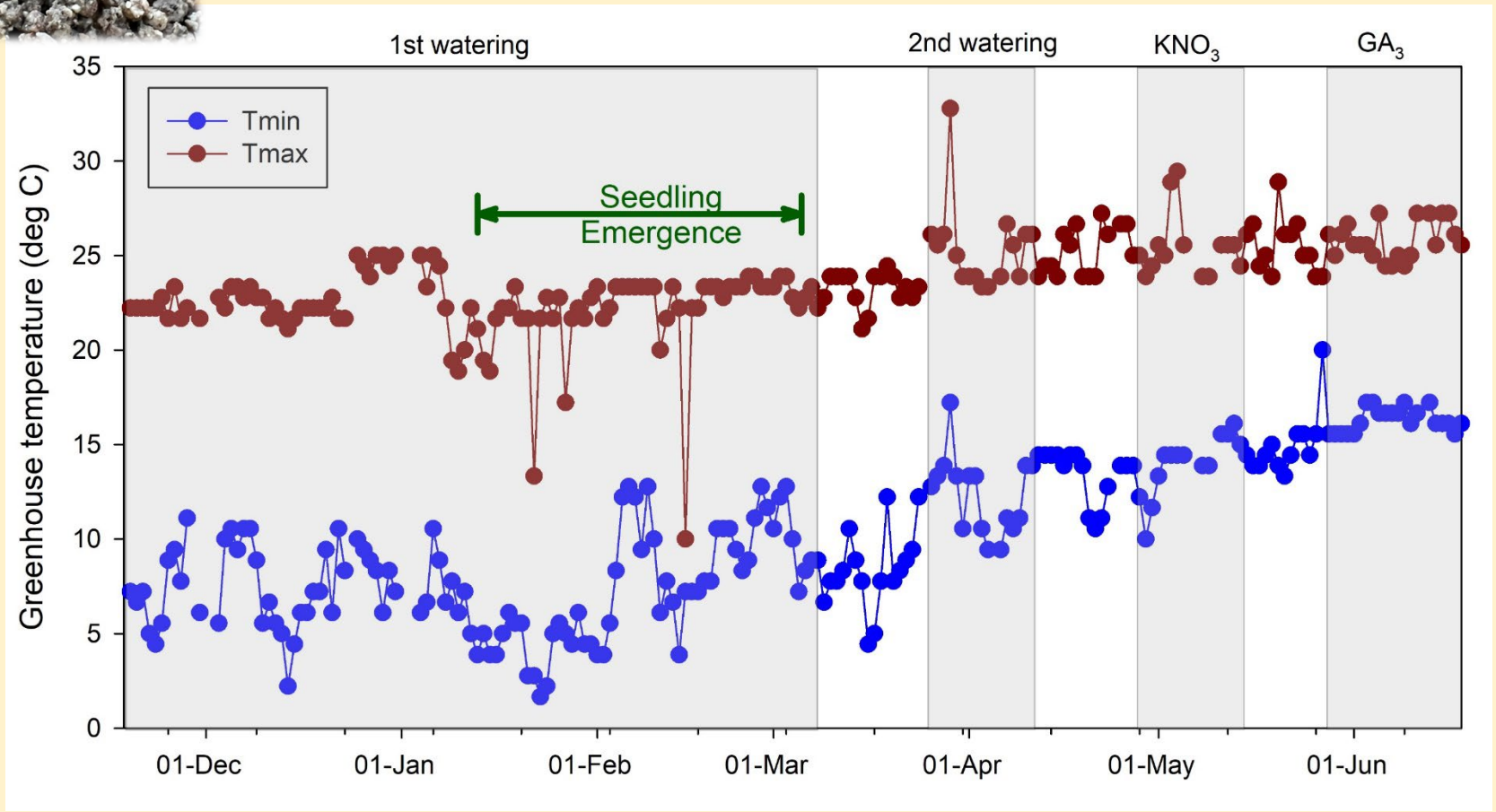

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Photo: Lesley DeFalco, USGS

Las Vegas Bearpoppy

Propagation from Soil Seed Bank

Site	Freq of adults	# Seedlings emerged	#Transplanted	# Surviving
Bittersprings Valley	6/20	10	6	2
Red Bluff Springs North	9/20	32	30	10

- Transfer directly into tall pots (30% transplant survival)
- Flowering in one transplant < 1 year old

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Photos: Lesley DeFalco, USGS

White-margined Penstemon

(*Penstemon albomarginatus*)

Background

- Clark County subpopulations are vulnerable to development and changing climate (Miller 2021)
- Propagation from cuttings may preserve genetic diversity when seed collections are unavailable
- Reintroduction into protected habitats may be necessary

Approach (Stosich 2025 thesis, Utah State Univ)

- Evaluate how to produce robust stock from stem cuttings (Large, pre-reproductive terminal cuttings, 2023/24)
- Evaluate how to reintroduce propagated plants into protected habitats (Affinity for open microsites, 2024)

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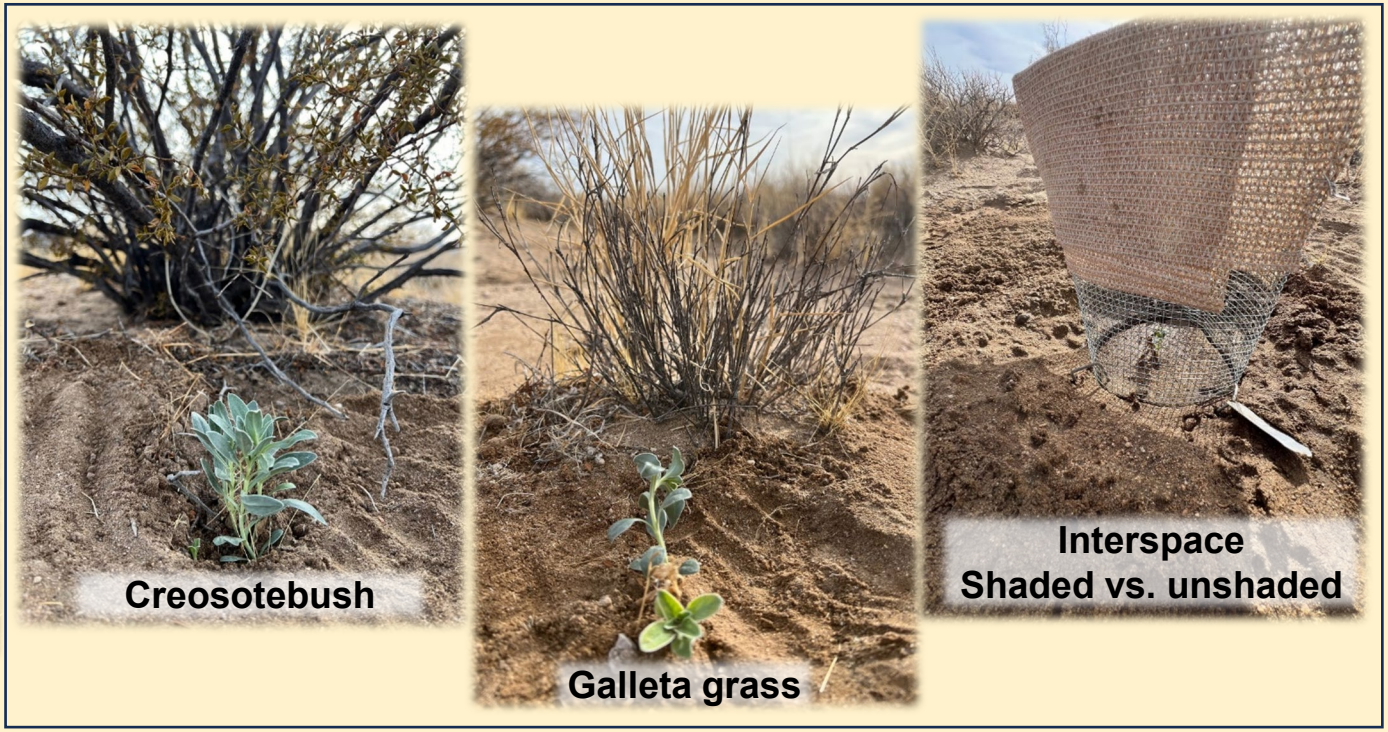
Photos: Alex Stosich, USU

White-margined Penstemon

Re-introduction into Habitat



- Outplanted 90 penstemon plants in January 2025 at USGS common garden to evaluate microsites
- High survival after 1-month after outplanting (≥ 78%)
- On-going monitoring for survival and growth for 1 year (Spring 2026)

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Photos: Lesley DeFalco, USGS

Questions?

Thank you for support, assistance and insights…

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