TIEHM'S BUCKWHEAT

FIELD RESEARCH & PROTECTION PLAN

EM STRATEGIES
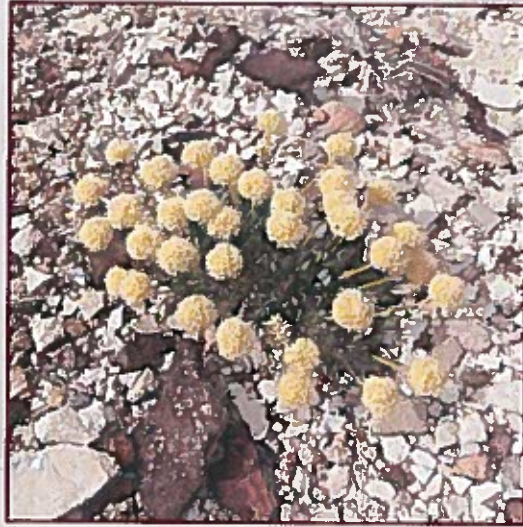
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2018-2019 FIELD RESEARCH

Summary of Results

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KNOWN DISTRIBUTION

6 SUBPOPULATIONS AND ONE OUTLIER
WITHIN 1 5 SQUARE-MILE AREA
COLLECTIVELY COVER APPROX 10 ACRES

Google Earth

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ESTIMATE OF AREA OCCUPIED

Subpopulation	Area (Acres)	
	2008 / 2010	2019
1	4.71	4.81
2	1.17	1 56
3	0 62	0 63
4	0.58	1.04
5	0.03	0 05
6 (a, b)	1 64	1.88
7	n/a	0.007
8	n/a	(1 plant)
Total	8.75	9.98

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POPULATION ESTIMATES

Subpopulation	Estimated Number of Plants		
	1994	2008 / 2010	2019
1	7,000+	15,280	9,243
2	3,000+	4,000	4,541
3	500+	4,000	1,860
4	500+	1,960	8,159
5	15	100	1994
6 (a, b)	6,000+	11,100	19,871
7	n/a	n/a	50*
8	n/a	n/a	1*
Total	17,015	36,540	43,821

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SEED BANKING

- 300 plants in subpopulations 1-7.
- 2% of the entire population.
- Collected by Comstock Seed.
- Tested for viability by the Nevada Department of Agriculture. The TZ test showed 16% viability.
- Yield approx. 9,000 seeds.
- Stored at the Rae Selling Berry Seed Bank and Conservation Program.

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GENETIC ANALYSIS

CUSHION BUCKWHEAT

SHOCKLEY'S BUCKWHEAT

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PROTECTION PLAN

Voluntary Protection Measures and Ongoing Research

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AVOIDANCE

- No disturbance to 1, 2, 3 and outlier
- Fencing and signage at 1 and 2 and outlier
- Employee and contractor training

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SALVAGE

- Project activities would remove the plants in subpopulations 4, 5, 6
- Salvage of existing plants will be conducted wherever feasible and relocated into suitable habitat.
- Suitability factors:
    - Geologic Unit
    - Proximity
    - Soil chemistry and properties
    - Elevation
    - Level of protection

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SEEDING

- Seed plots will be established in the fall of 2020.
- Plots will be in habitat outside of the Project Area or area of proposed disturbance.
- Plots monitored over a period of years.
- Success determined by germination, establishment, reproductive maturity, viable seed.
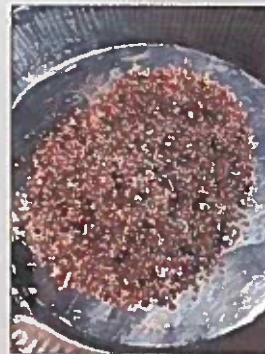
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PROPAGATION
AND
TRANSPLANTING

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PROPAGATION AND TRANSPLANTING

- Results of the trial used to develop strategies for establishing self-sustaining populations under natural conditions.
- Work performed by Dr. Beth Leger's lab at the University of Nevada, Reno
- Seed collected in 2019 germinated in greenhouse, 30% germination rate
- 900 seedlings transplanted at 3 sites outside area of disturbance in three different soil types
- Monitoring for a minimum of 20 years
- 650 seedlings alive 2 months after planting

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LOSS FROM HERBIVORY

- Coverings have been installed to protect remaining seedlings
- Demonstrates need to modify plot design to include small mammal exclosures
- Control group of seedlings remain in greenhouse

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DEMOGRAPHIC MONITORING AND POPULATION MODELING

- The purpose of this study is to evaluate the stability of the populations.
- Work will be performed by Dr. Bob Shriver at UNR.
- Monitor trends in numbers, acres inhabited, size class distribution, and cover over five years.
- Special emphasis on number of flowers, seed viability, and new germinants.

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PLANT / SOIL RELATIONSHIP

- Looking for soil preferences
- This work was started in 2020 by Dr. Leger's lab at UNR.
- Seed collected in 2019 was germinated in the greenhouse in various soil types found in the project area.
- Measuring difference in seed emergence and survival, plant biomass, and root:shoot allocation.

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POLLINATOR ASSESSMENT

- This work was started in 2020 by Dr. Beth Leger's lab at UNR.
- Purpose is to:
  - Identify pollinators.
  - Specialists or generalists?
  - Determine ability for self-pollination.

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GENETIC ANALYSIS

- The genetic make up of each subpopulation will be analyzed to determine:
  - Similarity or differences between subpopulations
  - Degree of variation within subpopulations
- Comparison to eight more species of buckwheat determined to be close phylogenetic relatives.
- Work will be performed by Dr. Paul Wolf's lab at the University of Alabama Huntsville.

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ADDITIONAL ONGOING FIELD WORK

- Seed collection and banking
- Search for new populations in habitat identified by Habitat Suitability Model and reported observations
- Climate monitoring with installation of a weather station

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