UNLV | School of LIFE SCIENCES

Reevaluating Desert Upland Habitat Restoration Sites

Clark County Desert Conservation Program

Project Number: 2017-UNLV-1760C

University of Nevada Las Vegas

PI, Dr. Scott Abella

2024 08 19

Lindsay Chiquoine, Research Associate,
lindsay.chiquoine@unlv.edu

Shelley Porter, Research Assistant,
shelley.porter@unlv.edu

Scott Abella, Associate Professor,
scott.abella@unlv.edu

Habitat Restoration Goals

- Ameliorate degradation
- Improve ecological functions
- Reintroduce lost species, increase biodiversity
- Create structural habitat for wildlife, including pollinators
- Reestablish habitat connectivity
- Maintain or improve air quality, reduce dust which can be a human health hazard

Yet, uncertainties

- Optimal restoration techniques
- Cost-effective treatments
- Long-term effectiveness, contemporary climate conditions

Habitat restoration practices in the Mojave Desert

Desert Plants
Volume 38, Number 2
May 2023
BOYCE THOMPSON ARBORETUM

Techniques for Restoring Damaged Mojave and Western Sonoran Habitats, Including Those for Threatened Desert Tortoises and Joshua Trees

Scott R. Abella
University of Nevada Las Vegas,
School of Life Sciences
4505 S. Maryland Parkway
Las Vegas, Nevada 89154-4004

Kristin H. Berry
U.S. Geological Survey,
Western Ecological Research Center
3621 Pinot Grigio Drive
Reno, Nevada 89509

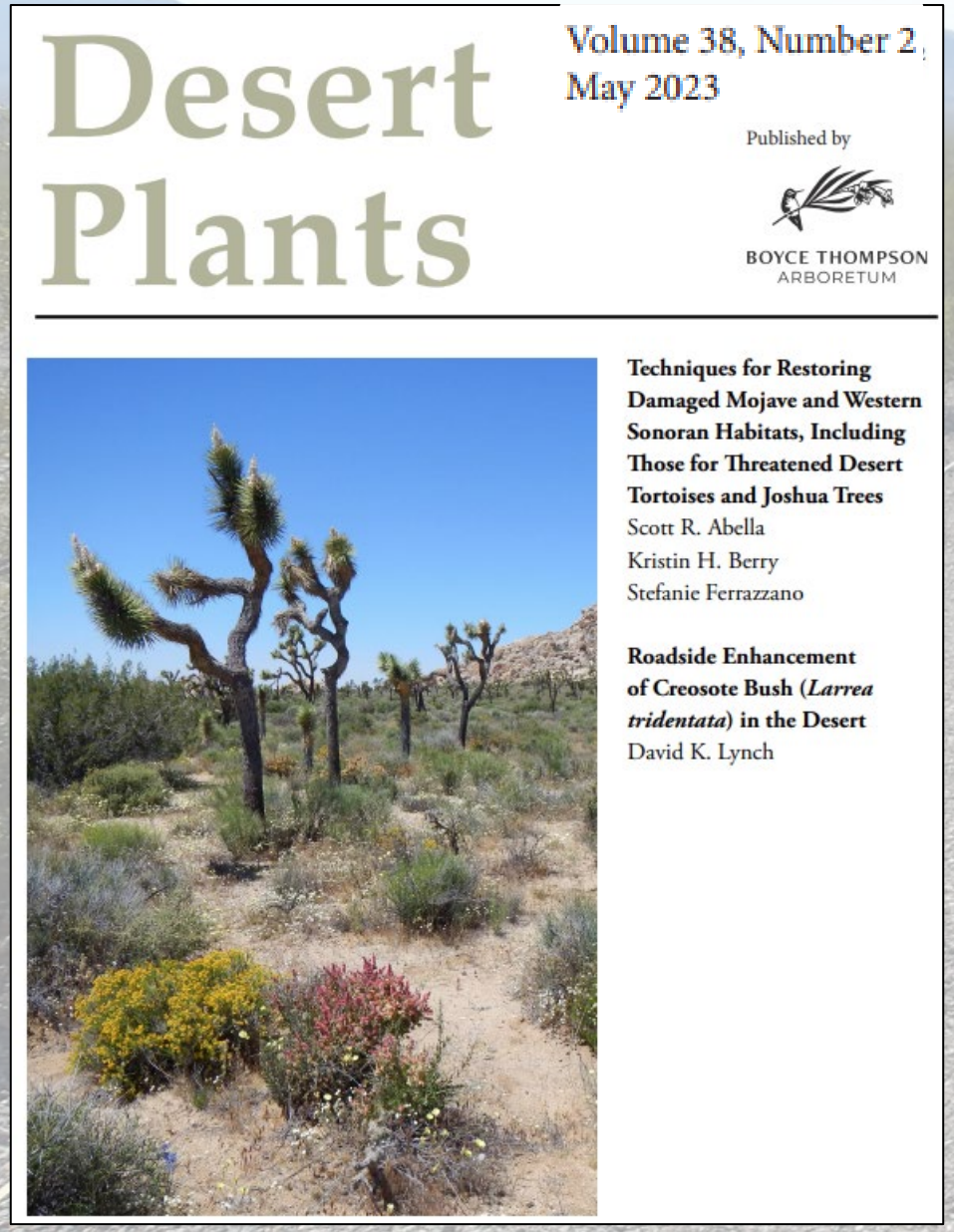
Natural Resource Conservation LLC
1400 Colorado Street
Boulder City, Nevada 89005
Author for correspondence:
scott.abella@unlv.edu

Stefanie Ferrazzano
Clark County Department of Environment and Sustainability, Desert Conservation Program
4701 W. Russell Road, Suite 200
Las Vegas, Nevada 89118

Sixteen studies - outplanting nursery-grown native perennials

Only one study assessed outplant survival after four years

A Clark County Desert Conservation Program-sponsored synthesis



Habitat restoration practices in the Mojave Desert

- What is the long-term survival of planted individuals and the long-term effects on plant communities?
- Do restoration activities result in self-sustaining populations that reproduce naturally?
- Does planting provide floral resources to pollinators, or facilitate other native plant species?
- How can incorporating innovative techniques that include bet-hedging approaches improve outcomes?

Project Aim

To determine the long-term condition of restoration treatments that used a variety of approaches applied to a diversity of sites in southern Nevada desert upland ecosystems

Project Objectives

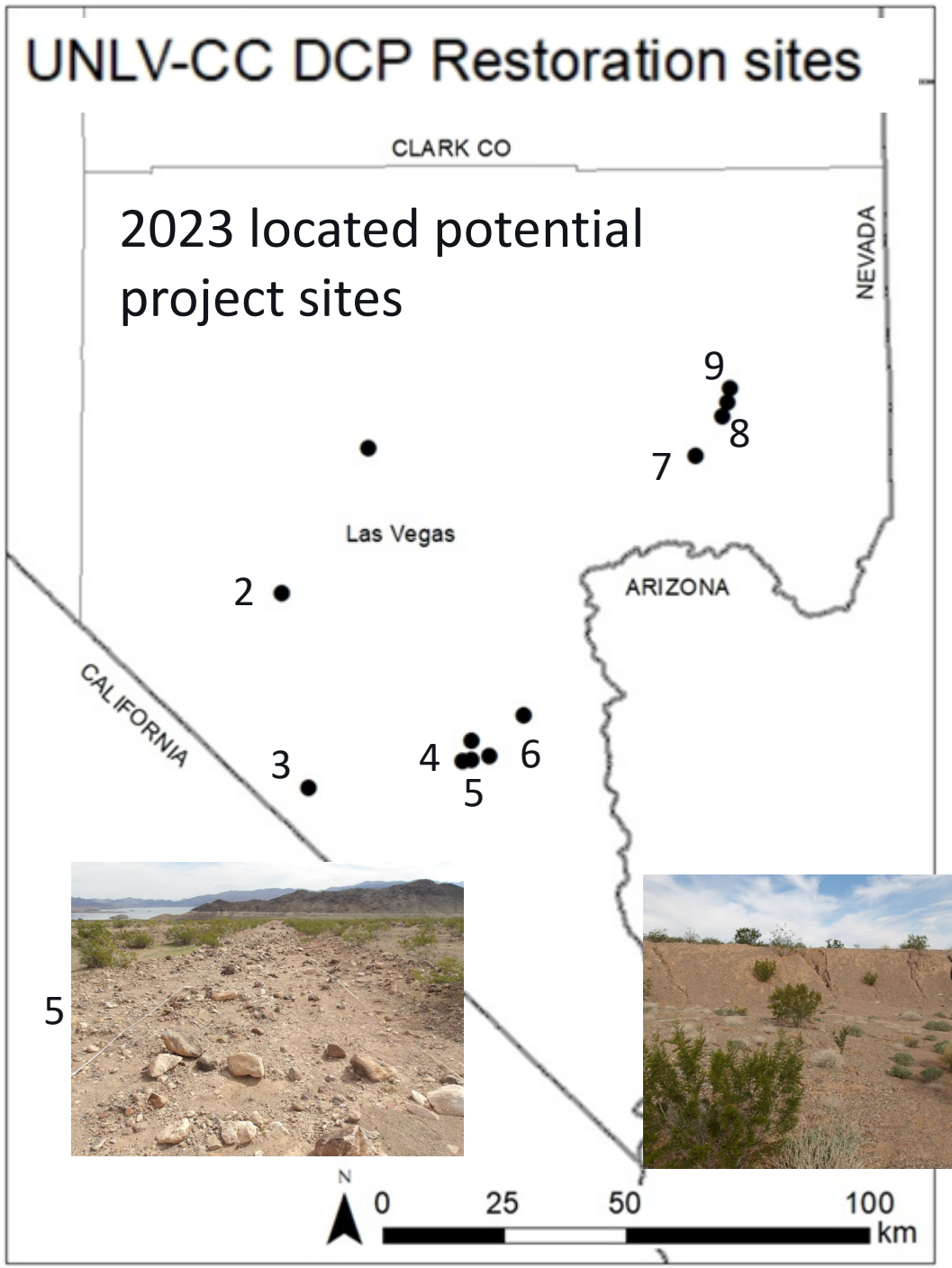
1. Determine habitat conditions of restoration sites established 10+ years ago and more recently.
2. Compare the effectiveness of a variety of restoration approaches: soil amendments, abiotic treatments, seeding, outplanting.
3. Model the cost-effectiveness and benefits of the different approaches.

1

2

3

4


UNLV-CC DCP Restoration sites
CLARK CO
2023 located potential project sites
NEVADA
ARIZONA
CALIFORNIA
Las Vegas
9
8
7
2
3
4
5
6
N
0
25
50
100
km

5

6

7

8

9

Restoration type	Number of sites	Treatment age range
Revegetation (seeding and planting)	13	2-26 yrs
Geomorphic site restoration (decompaction, recontouring, imprinting)	7	2-22 yrs
Soil amendment (topsoil salvage, vertical and horizontal mulch, rocks, artificial varnish)	9	2-26 yrs
Site protection (fencing, road closure)	8	2-22 yrs

2024 Activities

- Conduct rapid assessments: key habitat quality measures
  - 362 observation units
- Where applicable, replicate original methods (case studies)
- Include undisturbed reference/unrestored control for habitat comparisons

- **Supplemental data sets:** Climate/weather station data; soil survey information
- **Planned analyses:** outplanting survival (survival analyses, where applicable), univariate and multivariate community analyses, univariate and multivariate analyses to compare treatment effects

Road Realignment & Planting, 2008

Plant & topsoil salvage

Road realignment, re-contouring

Topsoil reapplication, planting

Monitoring: 2016, 2017, 2019, 2020, 2024

2008

2009

2010

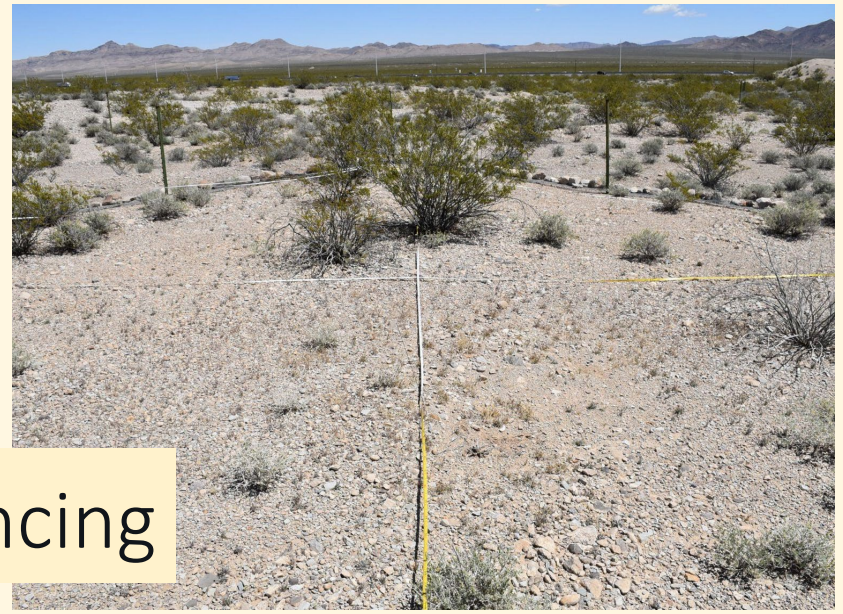
2016

Post-fire Seeding, 2007

Abiotic

Vertical mulch

Protection



Fencing

Surface manipulation

Artificial desert varnish

Soil remediation via ripping, 2002

Ripping Treatment

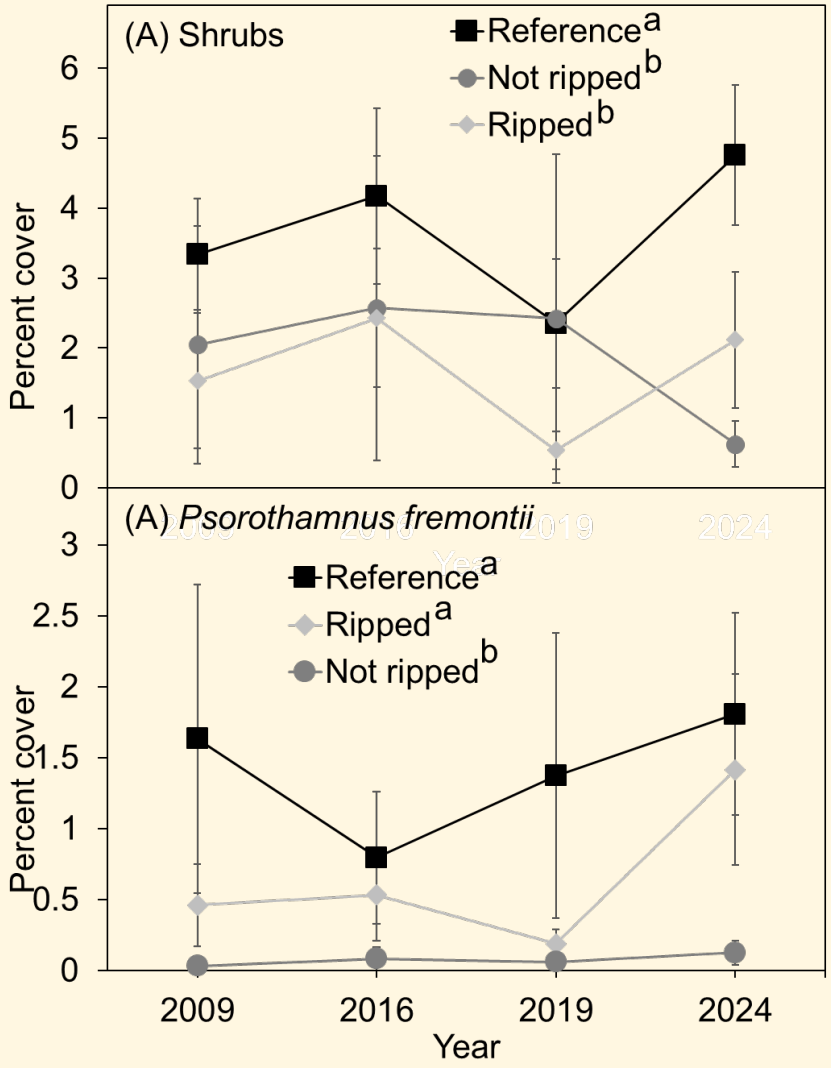
Control

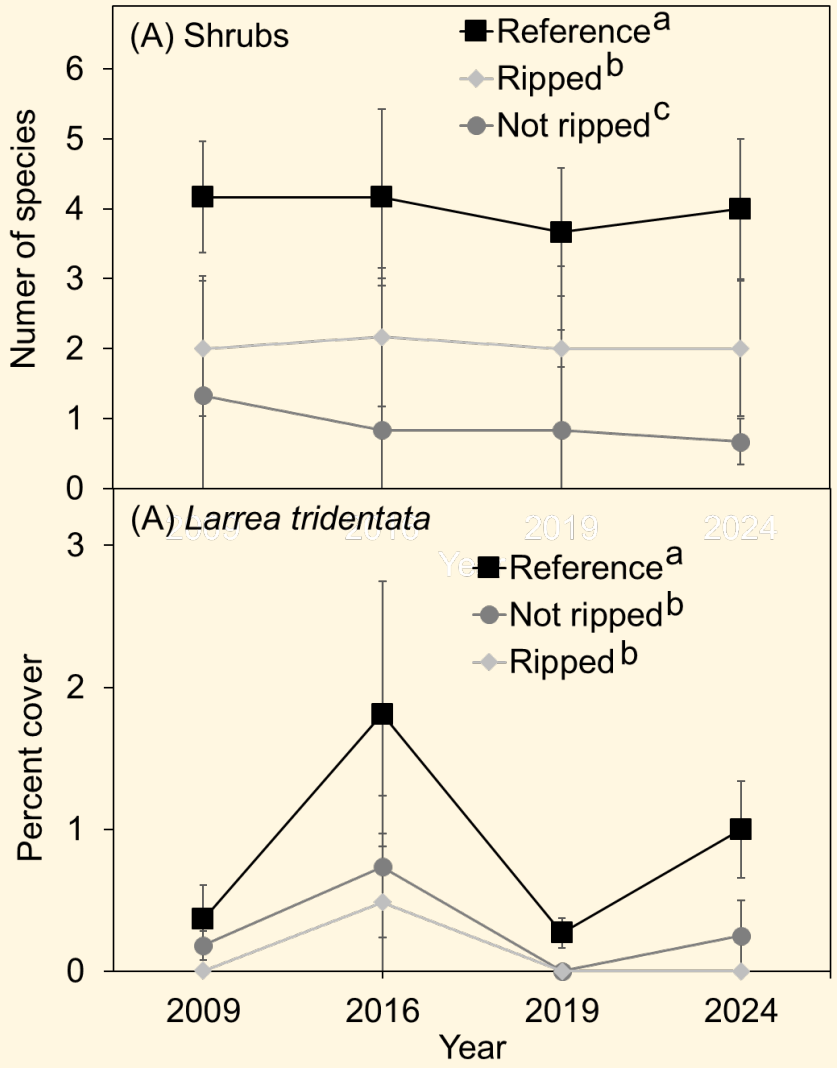
Reference

Arctomecon californica and Anulocaulis leiosolenus habitat

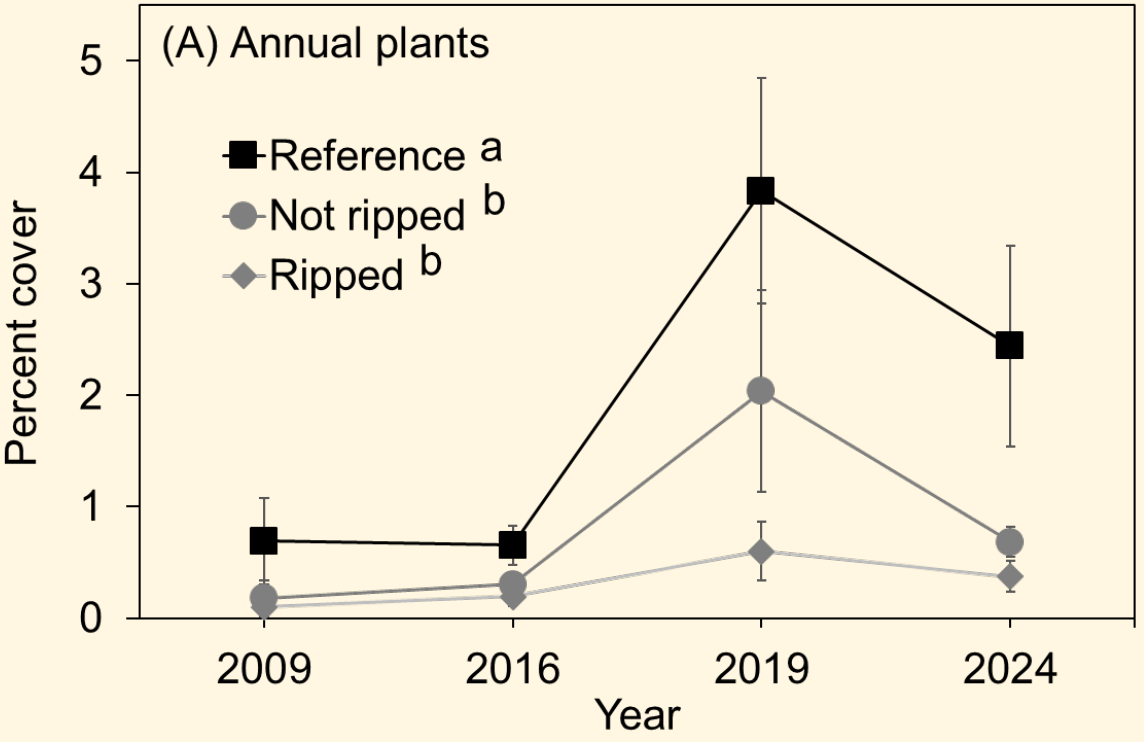
Soil remediation via ripping, 2002

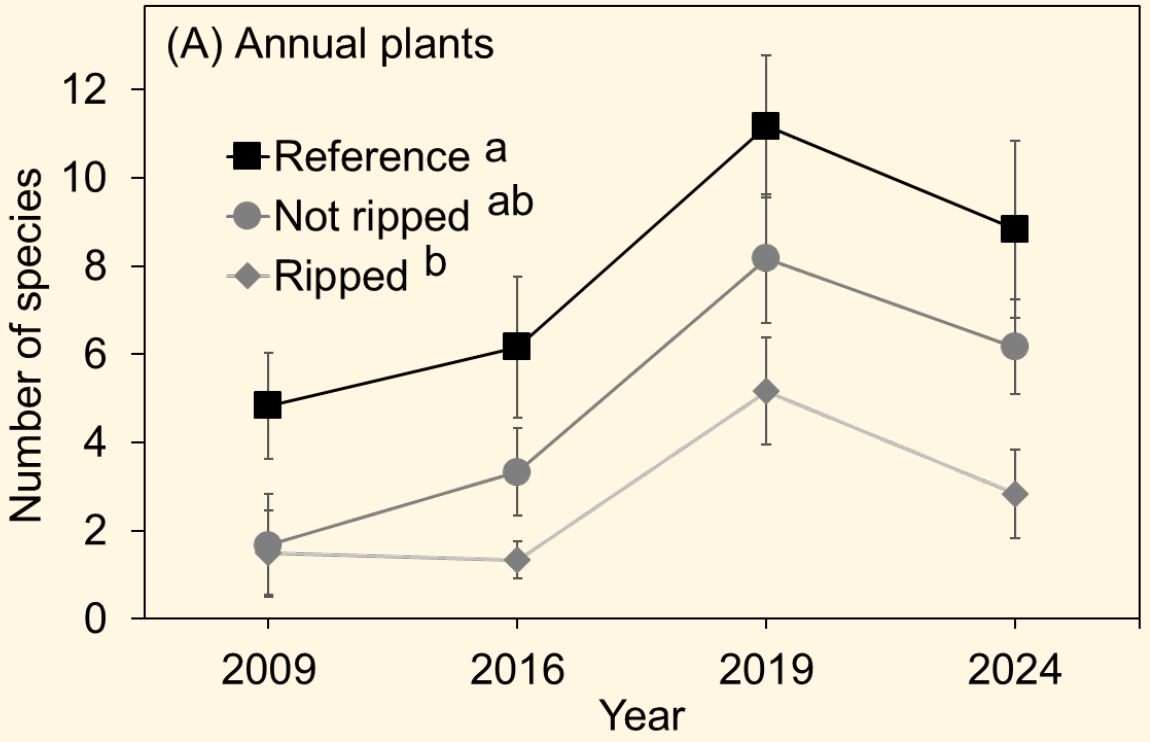
- Woody shrub cover and richness still short
- Shrub-specific results: dominant species *P. fremontii* increased to similar cover as reference
- Other shrubs like *L. tridentata* did not differ between treatment types
- Possible impacts to shrubs by droughty conditions





Soil remediation via ripping, 2002





- Ripped and not ripped: generally not different in annual cover or richness
- Could suggest soil conditions not yet at levels like references
- Recovering biocrust not developed; shrubs may not produce nurse/fertile island-effects

Acknowledgements

Thank you to the many agency personnel and agencies who have granted permits for past monitoring at field sites.

We thank the following for providing information for new sites:

- Stephanie Ferrazzano, DCP
- Carrie Norman, NPS
- Kelly Wallace, NPS
- Erin Eichenberg, NPS

desert conservation PROGRAM

This work is supported by the Clark County Desert Conservation Program Project No. 2017-UNLV-1760C

Questions?


Abella Conservation Ecology Lab
Restoration Ecology and Applied Conservation Science Research
https://abellaappliedecologylab.wordpress.com/