



Monitoring Threecorner Milkvetch
(*Astragalus geyeri* var. *triquetrus*) and
Sticky Buckwheat (*Eriogonum viscidulum*)
in Clark County

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Bureau of Reclamation

**In cooperation with the
Clark County MSHCP
National Park Service
And
UNLV Public Lands Institute**

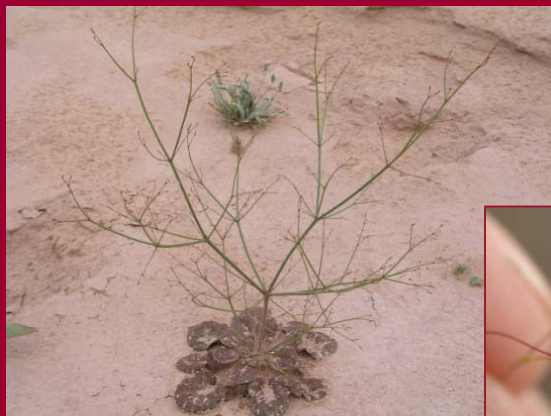


Presentation Outline

- Species status
- Project Goals
- Project Objectives
- Project Approach and Methodology
- Preliminary Results
- Adaptive Management/Recommendations
- Future work

Species Status

- Fully protected in the state of Nevada
- Bureau of Land Management and Nevada Natural Heritage Program sensitive species
- Clark County MSHCP covered species — provided funding for this project
- MSCP Covered species — provided funding for this project



Sticky buckwheat



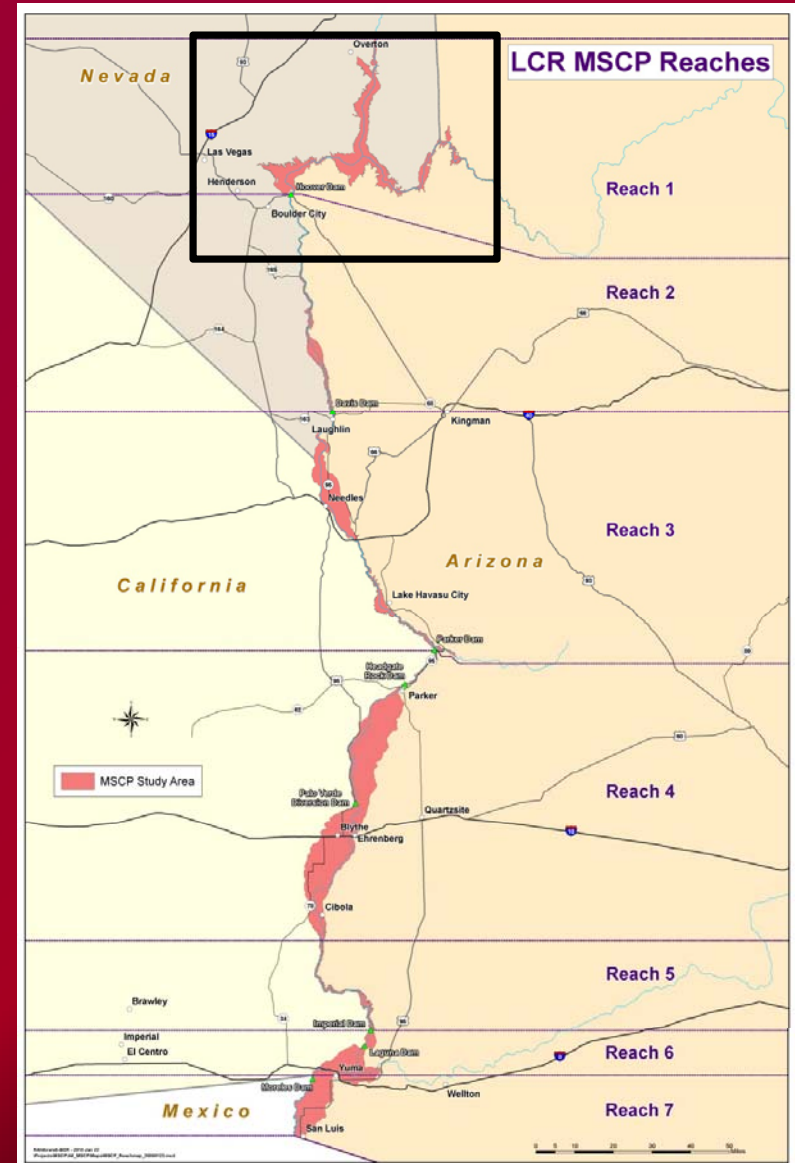
Threecorner milkvetch

MSCP Conservation Measures

Threecorner Milkvetch and Sticky Buckwheat

5.7.26 (&27).2 – Provide funding to support existing sticky buckwheat and threecorner milkvetch conservation programs

5.7.26.3 – Implementation of these measures will help ensure that the existing abundance of the species in and adjacent to the LCR MSCP planning area is maintained or increased



Project Goals

- Design and implement monitoring protocols for two rare plant species
- Assess the status of selected populations of threecorner milkvetch and sticky buckwheat
- Gain a greater understanding of the important abiotic factors that influence population condition

Project Objectives

- Maintain the current density of target species over the next 10 years (within 30% of the baseline measurement calculated from a year of average to above average rainfall).
 - Frequency, density, spatial distribution, cover
- Correlate the abiotic factors with the density of target species over the next 10 years.
 - Rainfall, temp, relative humidity, soil chemistry
- Detect changes in species richness and cover of native and non-native plant species over the next 10 years (measured in average to above average rainfall years).
 - Frequency, species richness, cover

Management Response

- If change is $> 30\%$, we will attempt to determine the cause.
 1. *Stochastic event* – such as change in climate or soil chemistry- No management action has been determined
 2. *Threat induced event* – abate threats such as, invasive species, OHV access, trespass (cattle/burros) using adaptive management techniques

Threecorner milkvetch (*Astragalus geyeri* var. *triquetrus*)

Habitat

- Aeolian or fluvial deposits from Muddy Creek Formation (Tertiary aged sedimentary rock)

Species Description

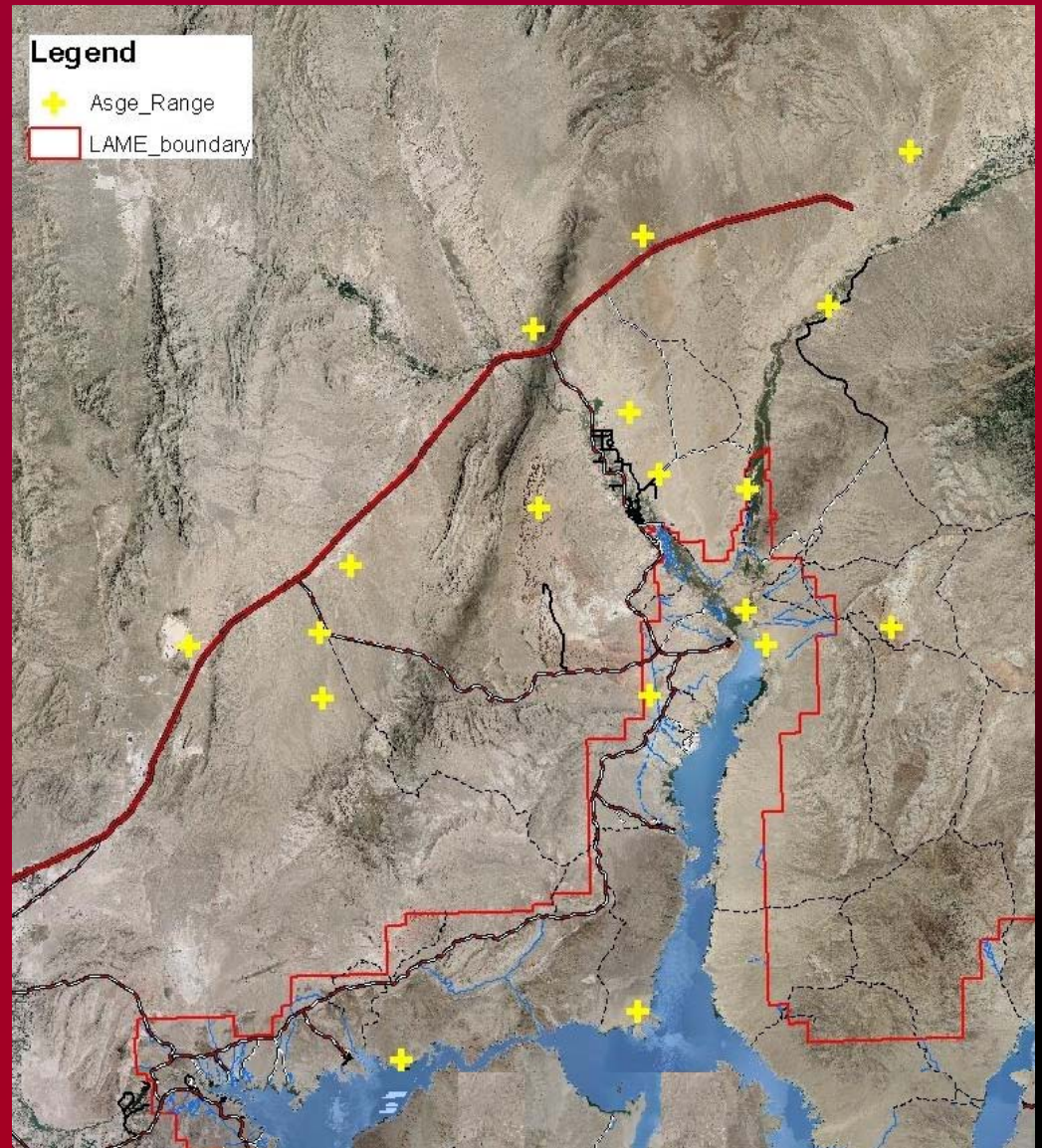
- Winter annual in the Fabaceae (legume) family
- Moisture and temperature important – wet winter for germination event
- Small white flowers – reproductive strategy unknown – may self-pollinate
- Three sided, sharply angled fruit
- Most likely wind dispersed seed pods



Threecorner milkvetch Distribution

Northeastern Mojave Desert

- Northern extent – Sand Hollow Wash (Mohave Co., AZ.)
- Southern extent – Sandy Cove (Clark Co., NV.)



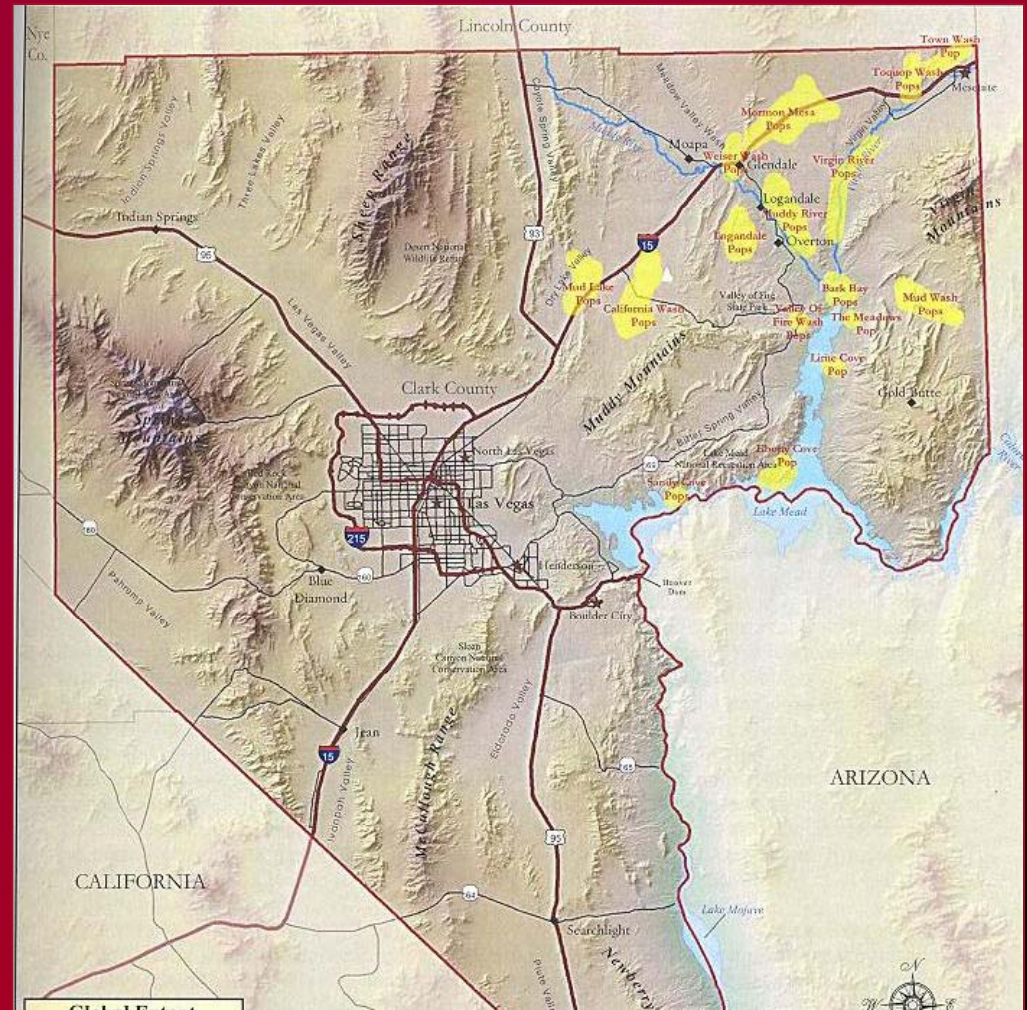
Threats

- Urban development and sprawl
- Energy development
- Invasive plant species
- Utility corridor development and maintenance
- Federal land disposal
- Livestock grazing/management
- Sand and gravel mining
- OHV use



Project Approach

- We planned on re-surveying all known populations to determine which would be suitable for monitoring
- Suitable site = accessibility, size of population, and whether populations could be relocated at historical sites
- Only 1 site in 2008 and 3 sites in 2009; more expected to be added after historical surveys are complete

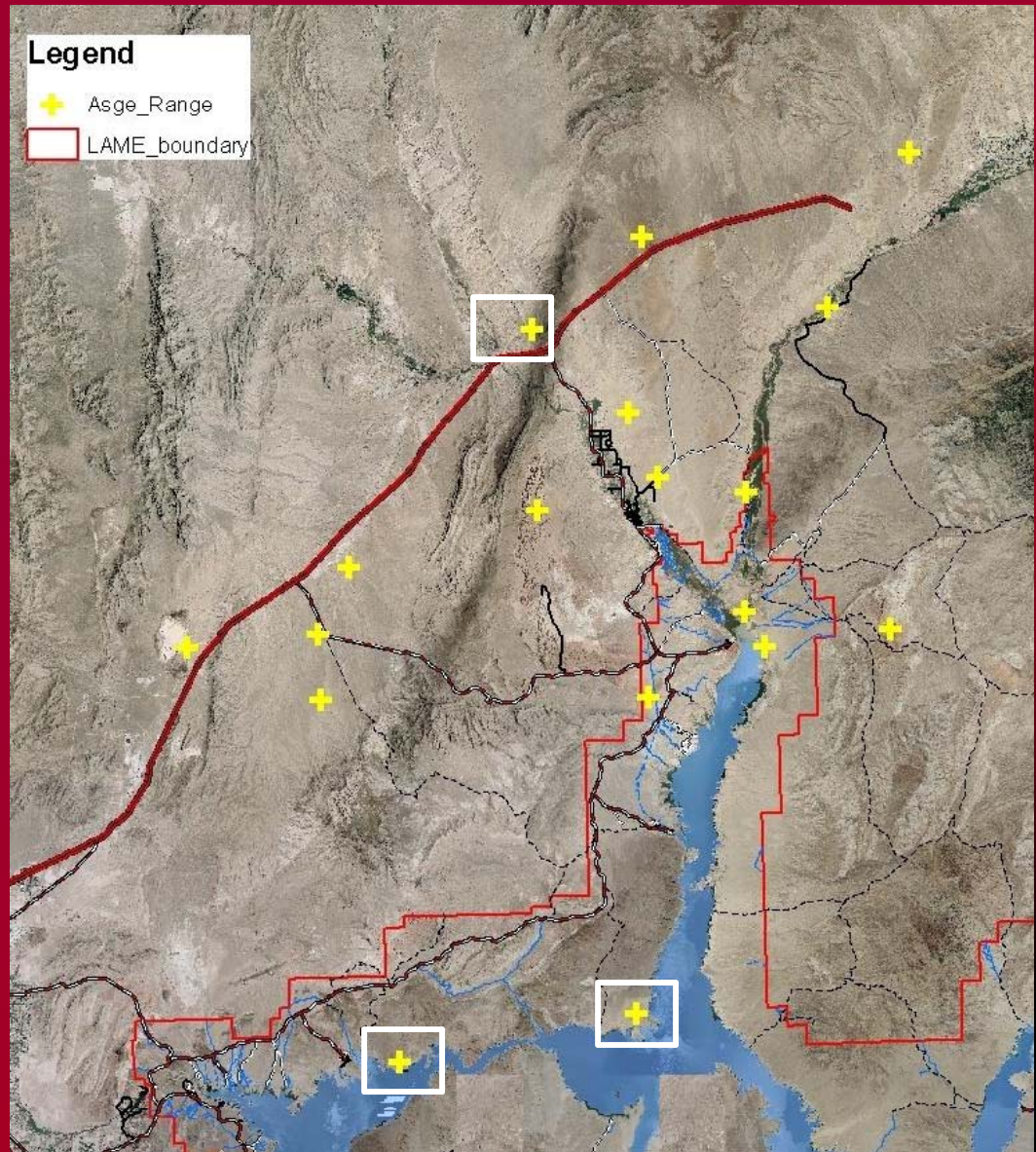


A conservation management strategy for nine low elevation rare plants – The Nature Conservancy

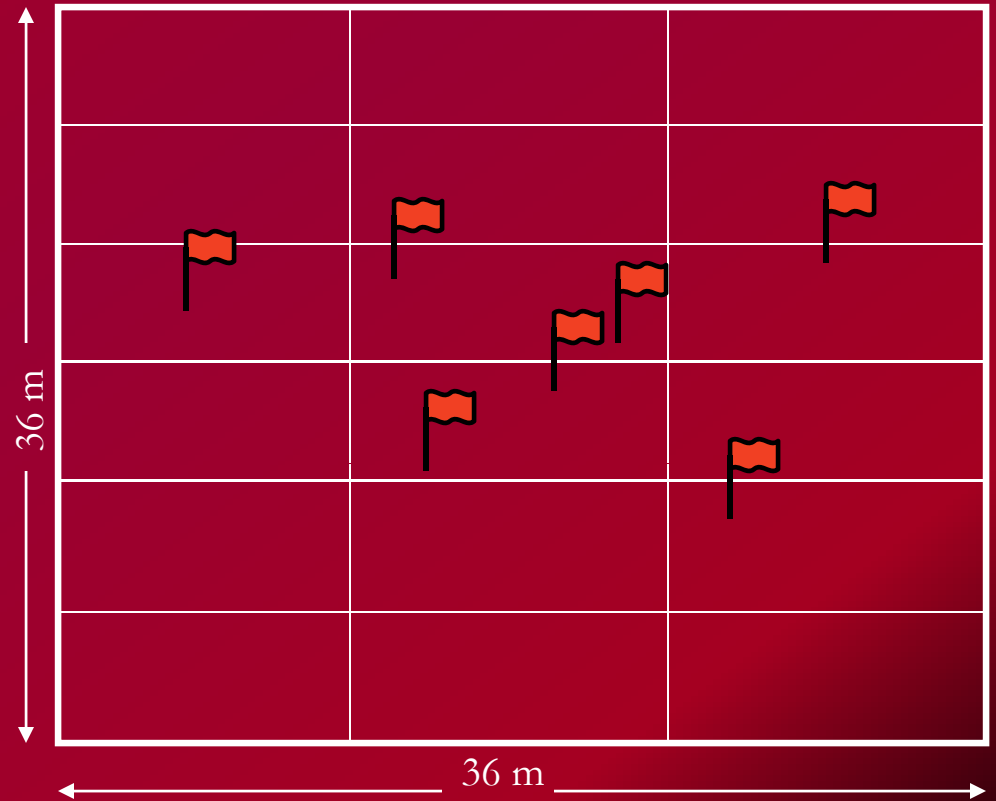
Threecorner milkvetch Project Sites



- Sandy Cove
- Ebony Cove
- Wieser Wash



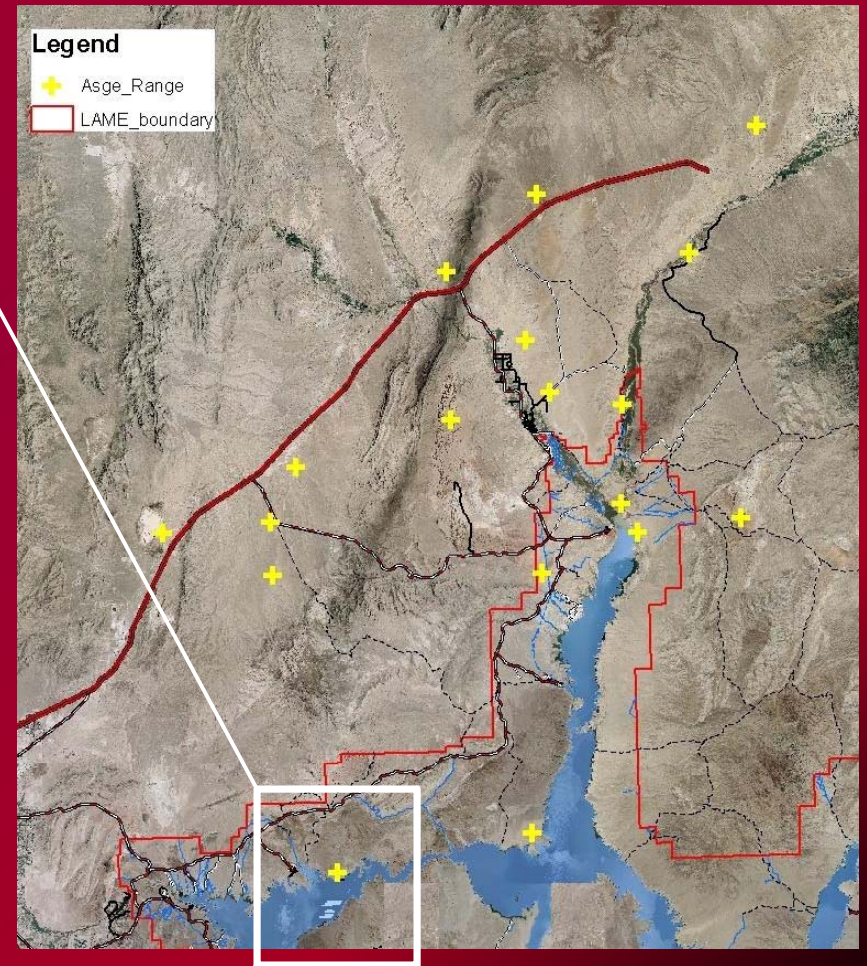
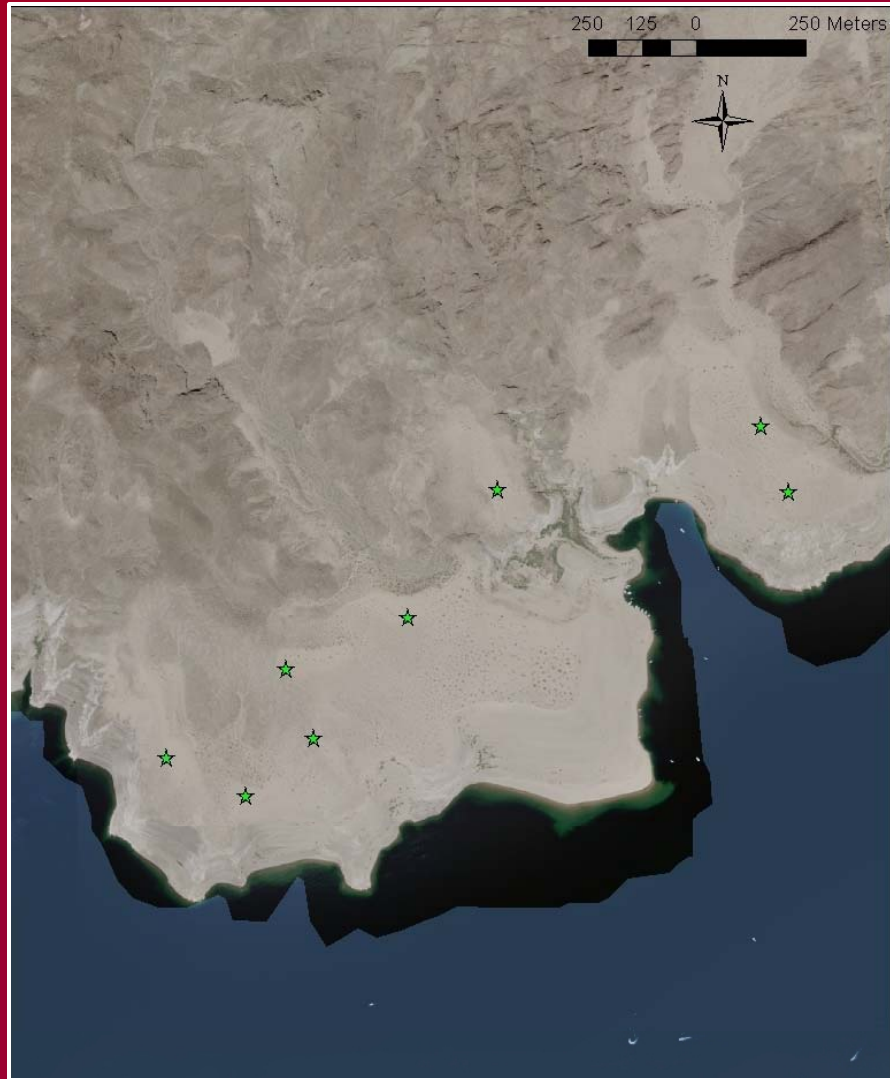
Project Methods



Grid-cell method

- Pilot year study
- 36 x 36m grids (8 grids at SC; 2 at other sites)
- 18 (6x12m) quadrats per grid

Sandy Cove



Field Mapping

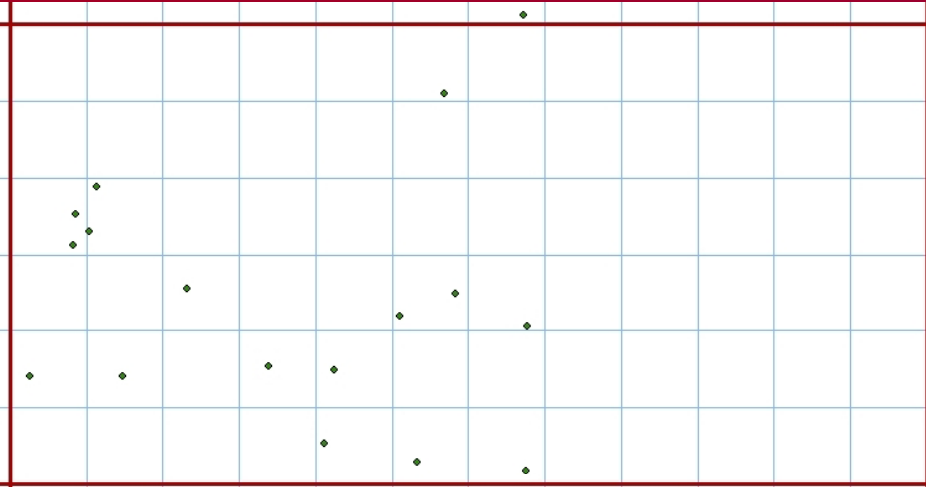
- Individual GPS coordinates were not recorded for each individual rare plant
- Individuals were recorded by marking plants on a field map of each grid showing spatial arrangement within each quadrat.
- The field maps were digitized in the office using Arcmap.

Threecorner milkvetch quad map

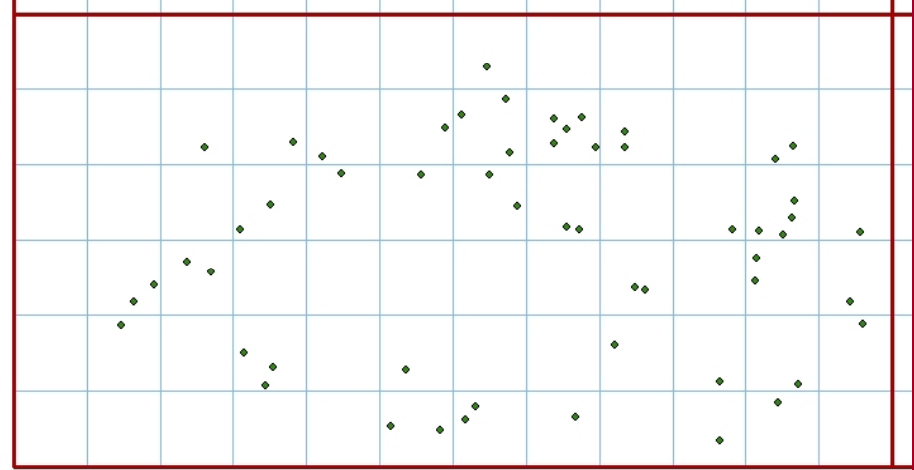
Date _____ Grid _____ Quadrat _____ Recorder _____

0 1 2 3 4 5 6 7 8 9 10 11

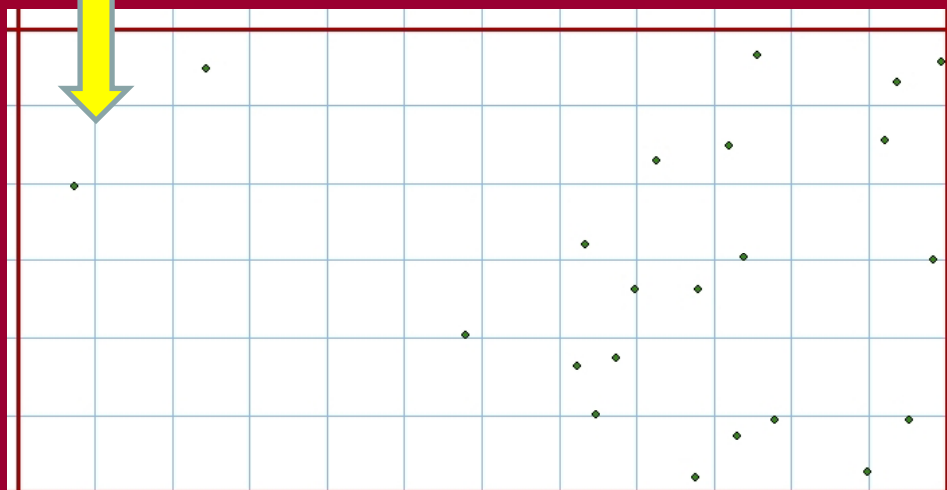
Examples of variation between years



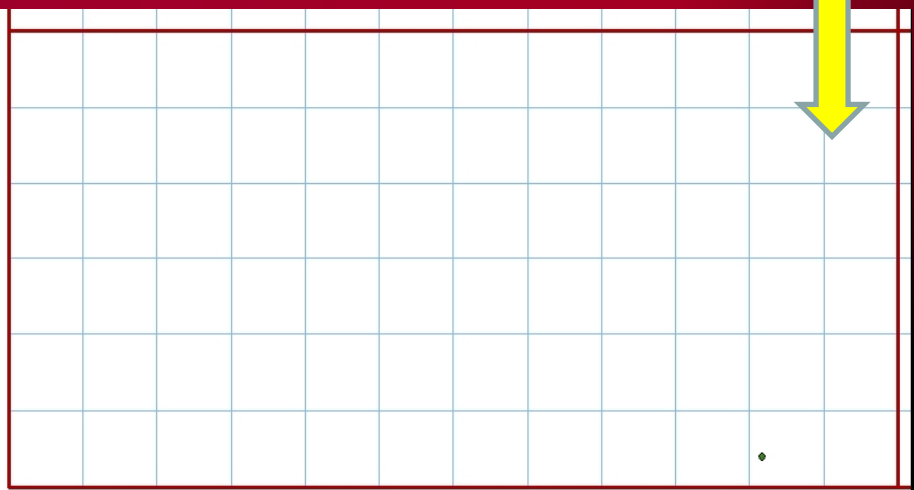
Sandy Cove 2008
Grid 4
Quad 8



Sandy Cove 2008
Grid 4
Quad 1



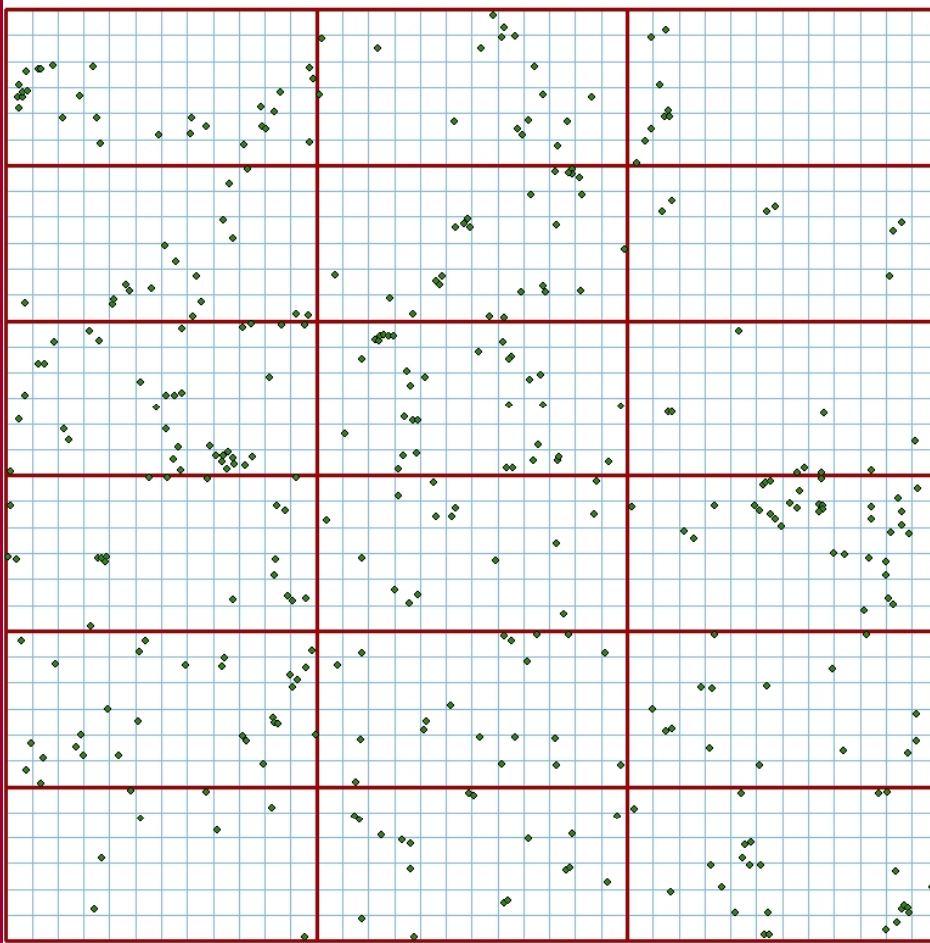
Sandy Cove 2009
Grid 4
Quad 8



Sandy Cove 2009
Grid 4
Quad 1

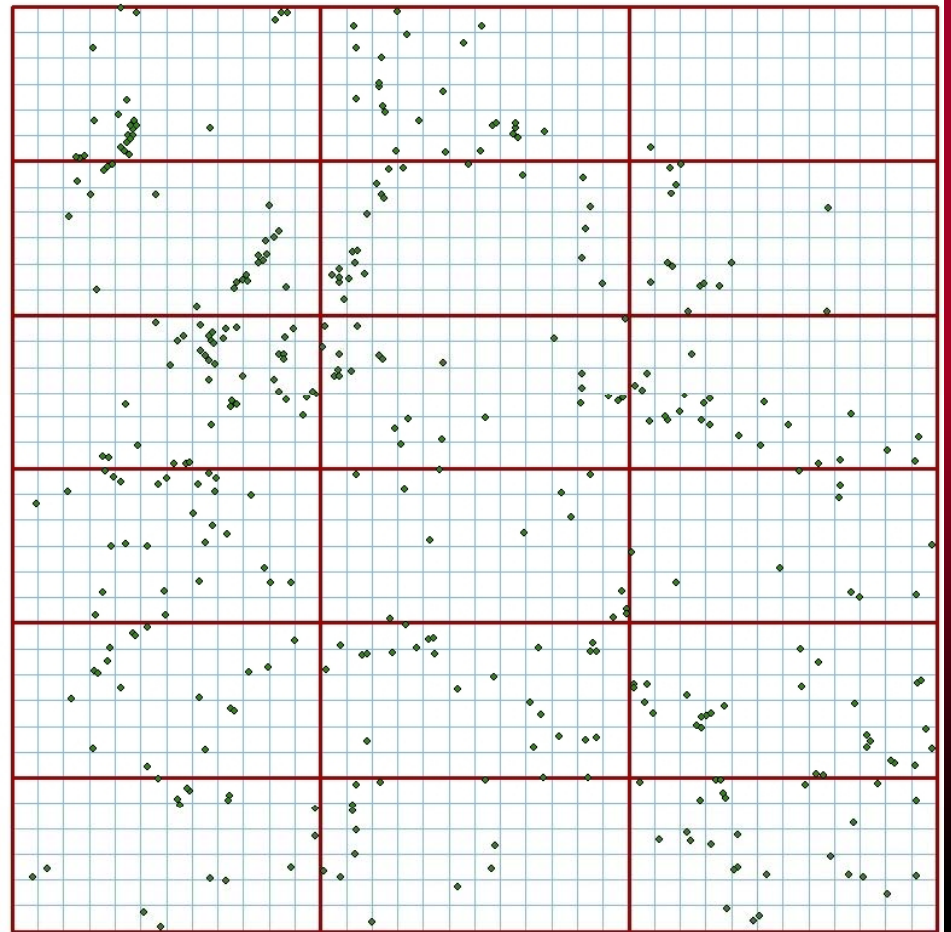


2008



Sandy Cove 2008
Grid 5

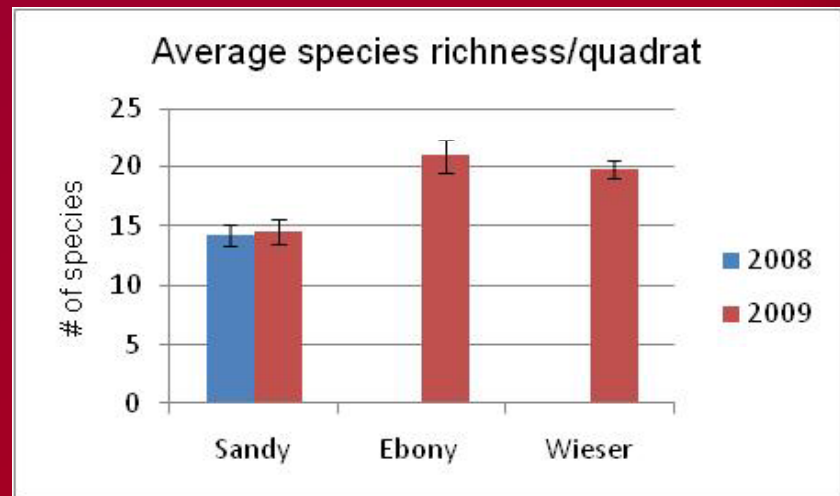
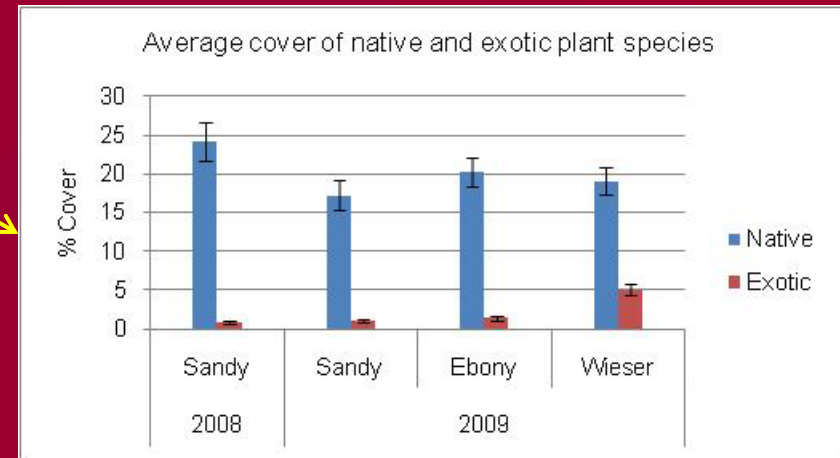
2009



Sandy Cove 2009
Grid 5

Preliminary Results

- Average % cover of native and exotic species per quadrat
- Average species richness



Abundance ranged from...

Sandy Cove...

- 0-137 per quadrat in 2008
- 0-92 per quadrat in 2009

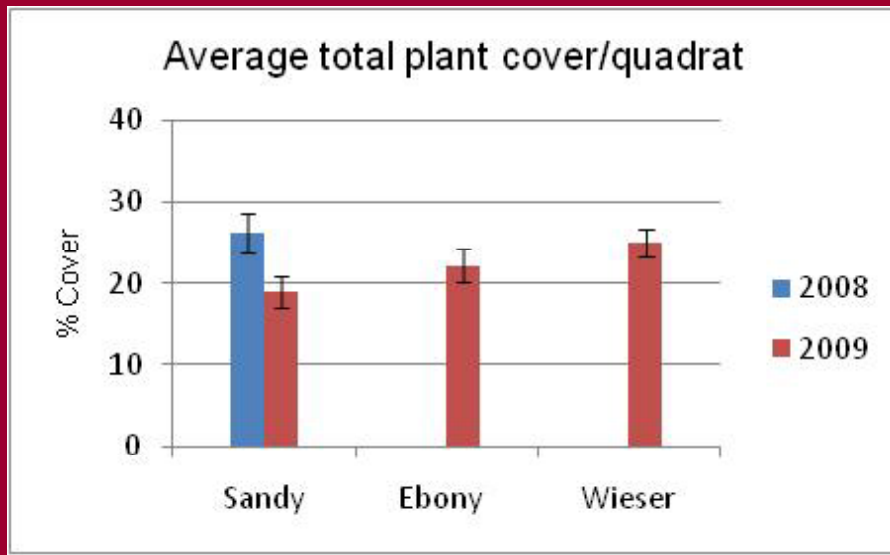
Wieser Wash...0-10 per quadrat

Ebony Cove...0-45

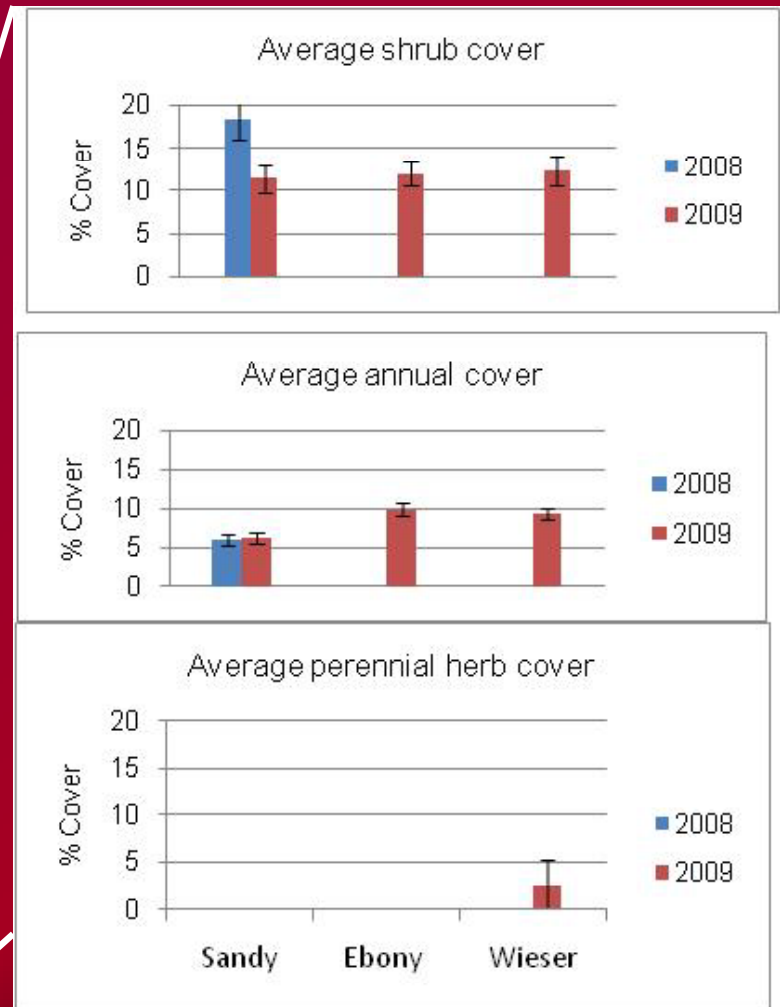
Average cover per quadrat

Community

- Sparsely vegetated
- Shrubs ~12-18% of vegetation
- Annuals ~6-10% of vegetation
- Perennial herbs - minimal



From ~19-26 %



- **Weather Data** – Limited data at this point but all gauges are in place
- **Soil analyses** - %CaCo₃ (inorganic carbon), total carbon and nitrogen, pH, EC, particle size

Sticky buckwheat (*Eriogonum viscidulum*)

Habitat

- Aeolian or fluvial deposits from Muddy Creek Formation (Tertiary aged sedimentary rock)

Species Description

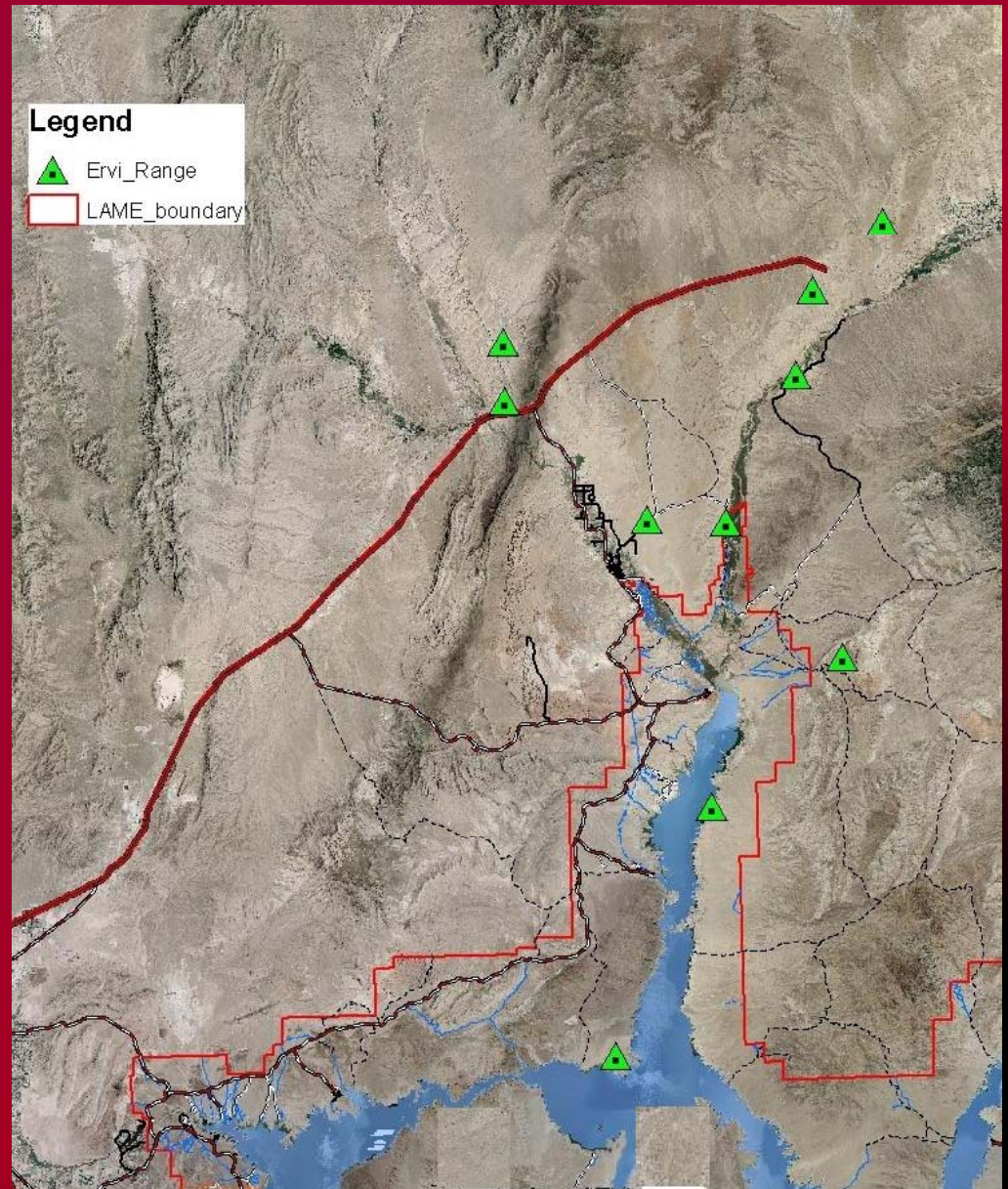
- Winter annual in the Polygonaceae (buckwheat) family
- Moisture and temperature important – wet winter for germination event
- Small yellow flowers– reproductive strategy unknown
- Sticky stems
- Delicate appearance



Sticky Buckwheat Distribution

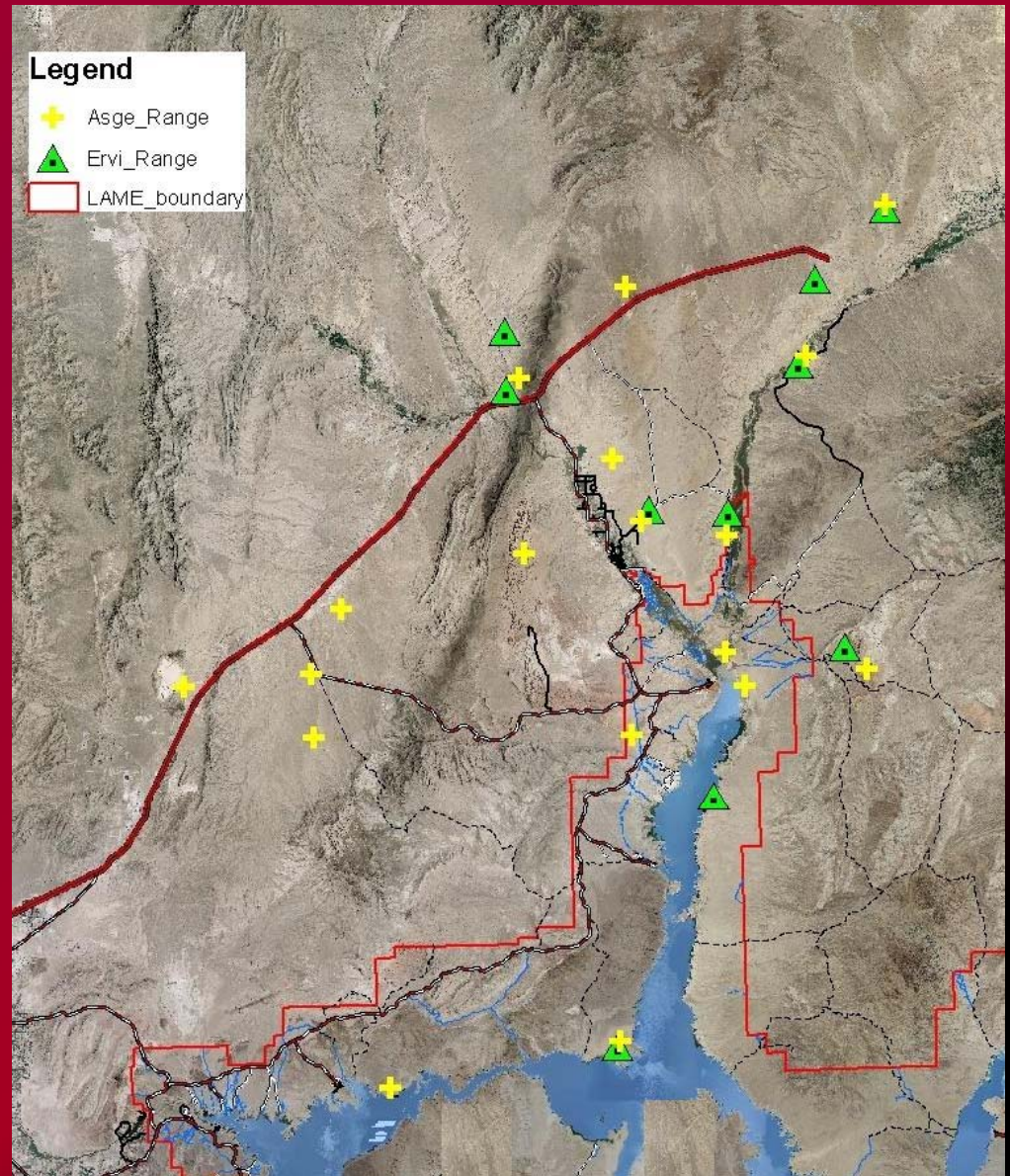
Northeastern Mojave Desert

- Northern extent – Sand Hollow Wash (Mohave Co., AZ.)
- Southern extent – Middle Point area (Clark Co., NV.)



Overlapping Distributions

threecorner milkvetch and sticky buckwheat



Threats

- Urban development and sprawl
- Energy development
- Invasive plant species
- Utility corridor development and maintenance
- Inundation and shoreline fluctuation
- Federal land disposal
- Livestock grazing/management
- Sand and gravel mining
- OHV use



Mediterranean grass

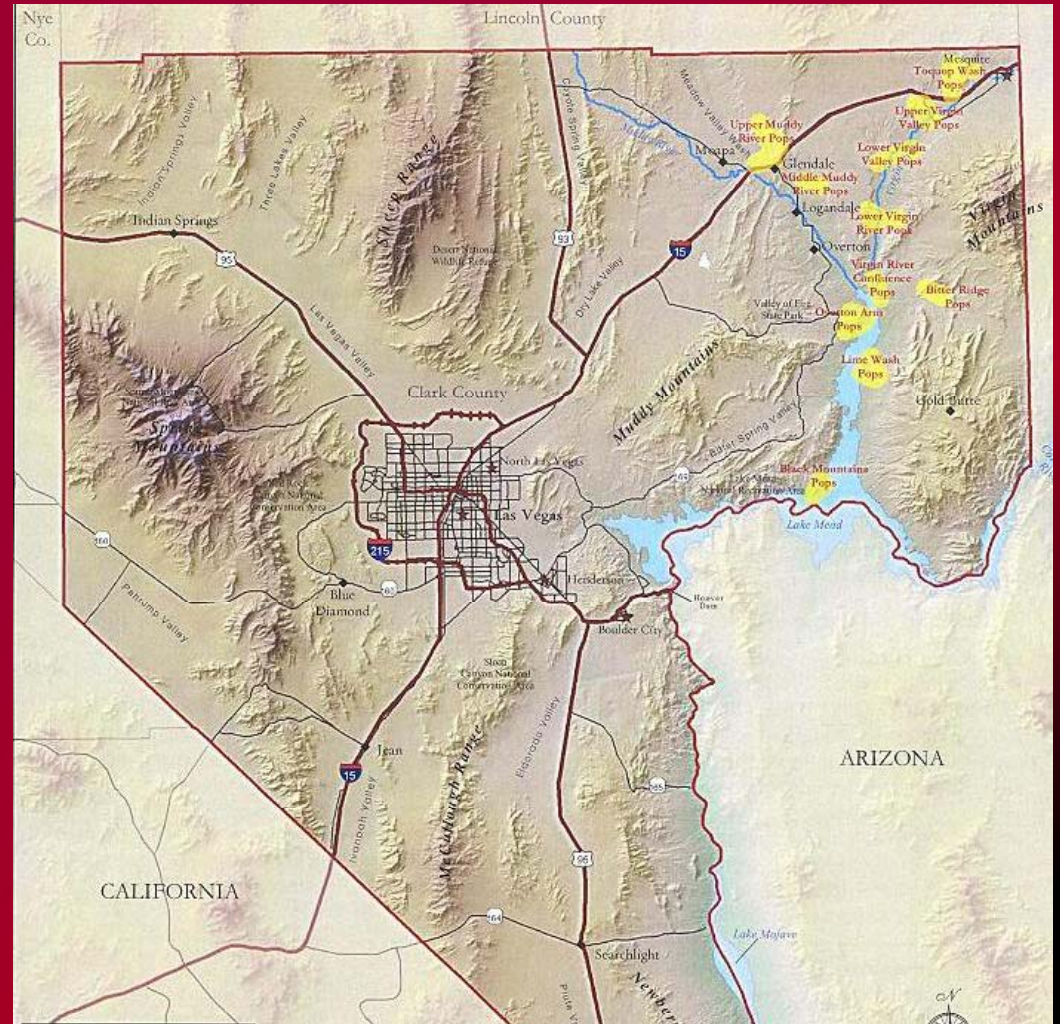


Sahara mustard



Project Approach

- We planned on re-surveying all known populations to determine which would be suitable for monitoring
- Suitable site = accessibility, size of population, and whether populations could be relocated at historical sites
- 2 sites in 2008
- No additional sites in 2009; more expected to be added after historical surveys are complete

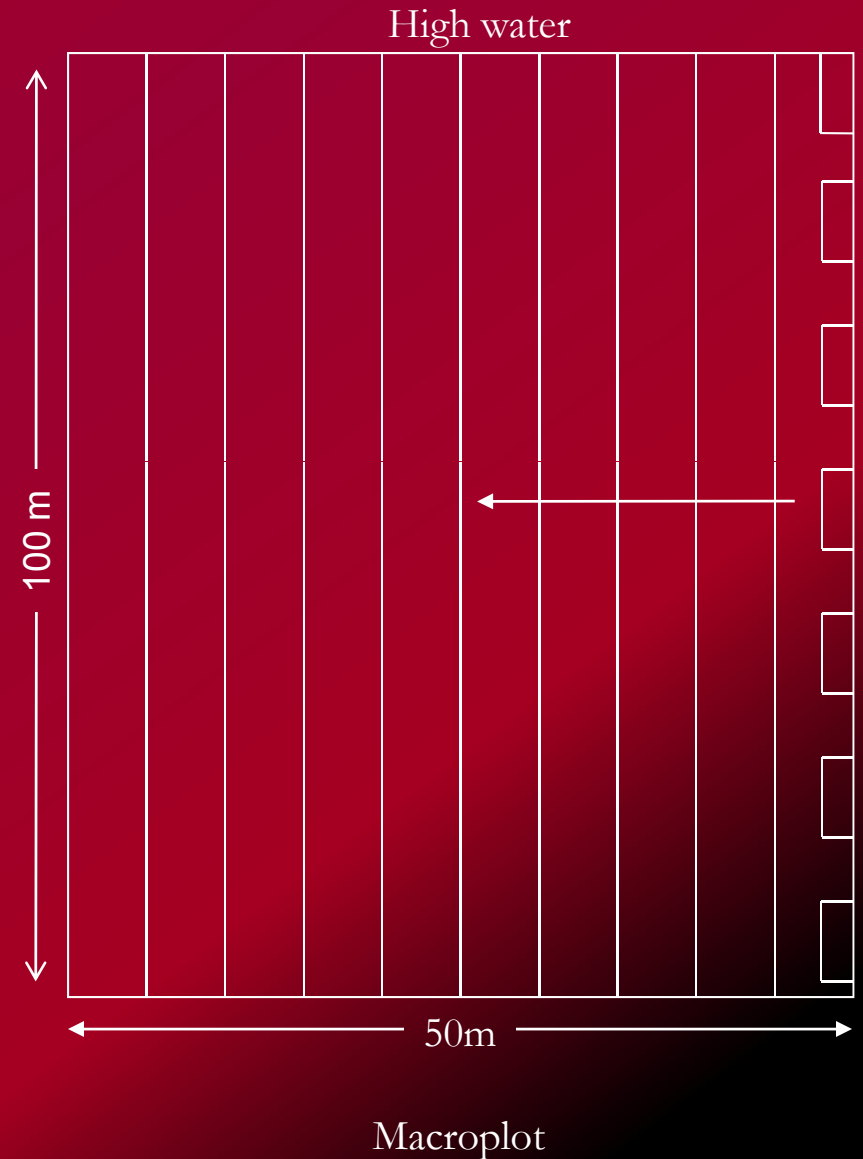


A conservation management strategy for nine low elevation rare plants – The Nature Conservancy

Project Approach

Systematic sampling

- 1 Macroplot per site
- 10 - 1 x 100m transects
- 70 - 1 x 10m quadrats



This design has issues!

Challenges

Difficult Terrain

- Landscape tiered
- Steep and rocky – investigator impact high
- Cattle presence



Lime Cove



Glory Hole

Challenges

Plant Morphology

- Lime Cove – plants ranged from ~5 - 40cm ht – identified 3 size classes)
- Original quadrat size (5 x 20 m) - we found ~1,200 size class 1 (≤ 6 cm) plants in one quadrat
- Modified design to accommodate smaller quadrat size (1 x 10m)

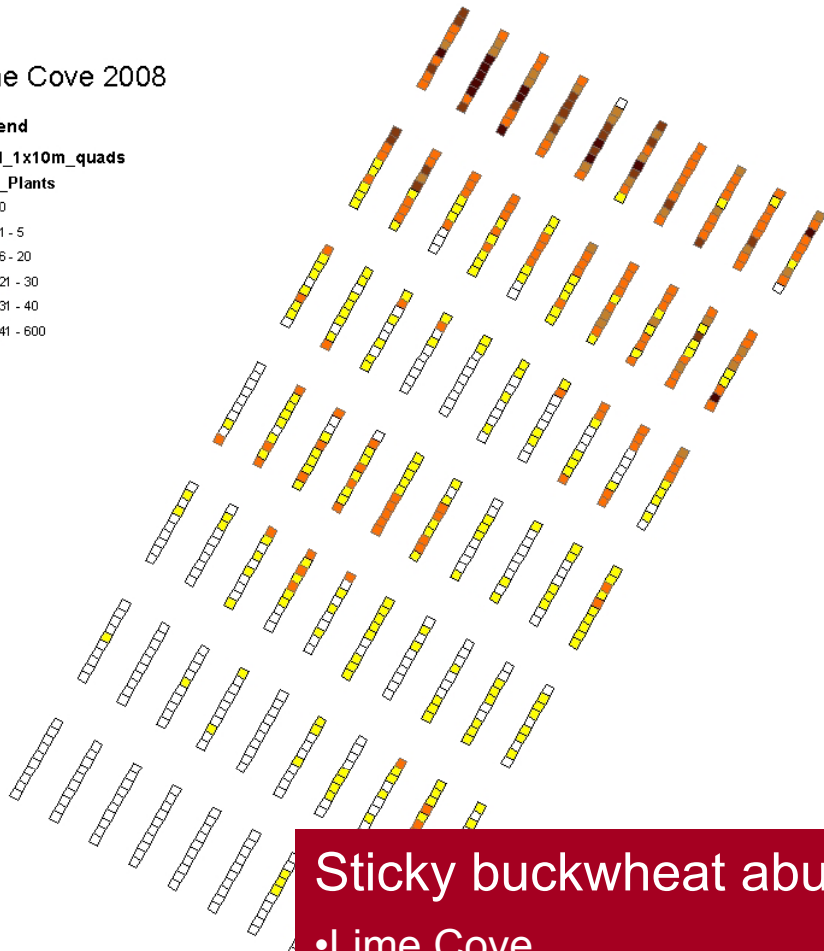
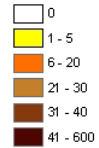


Lime Cove 2008

Legend

ERVI_1x10m_quads

Num_Plants

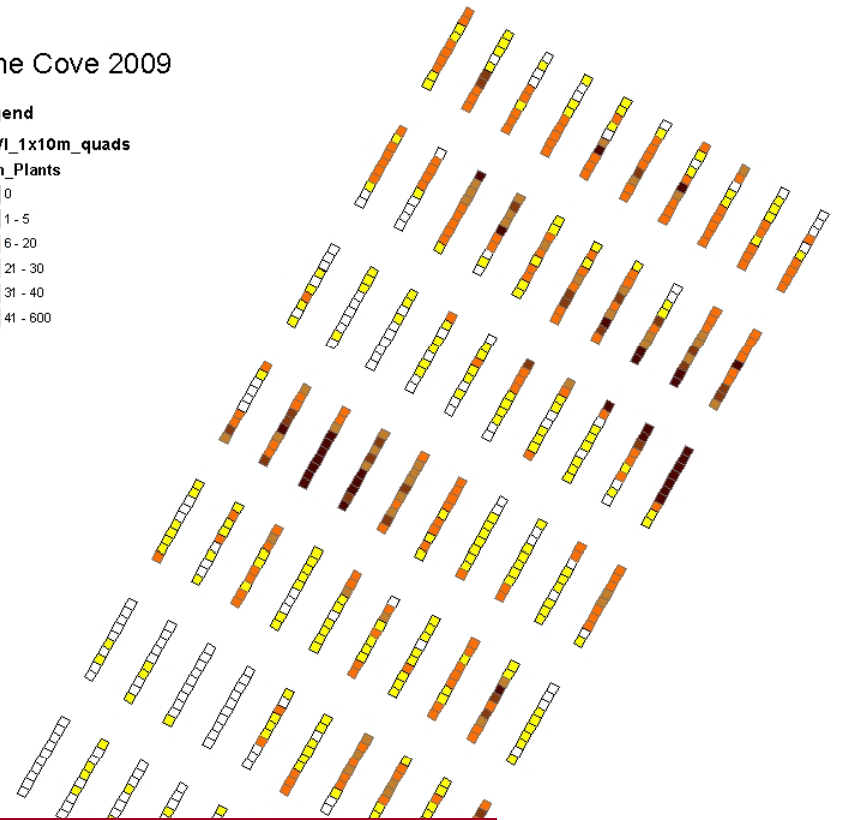
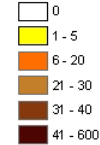


Lime Cove 2009

Legend

ERVI_1x10m_quads

Num_Plants



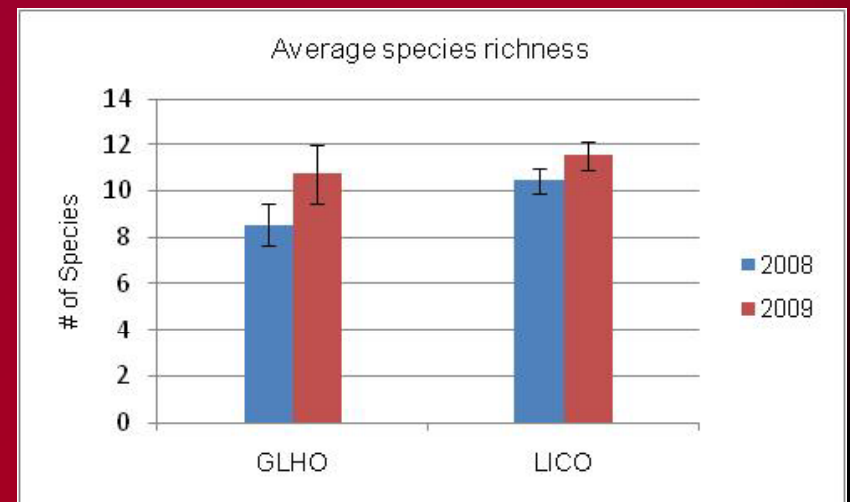
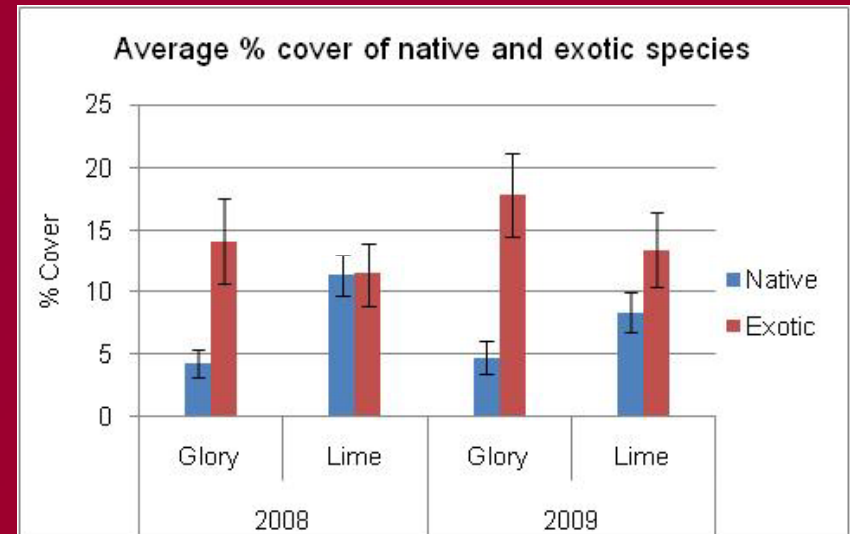
Sticky buckwheat abundance

•Lime Cove

- 2008 – ranged from 0-501 individuals/quadrat
- 2009 – ranged from 0-589 individuals/quadrat

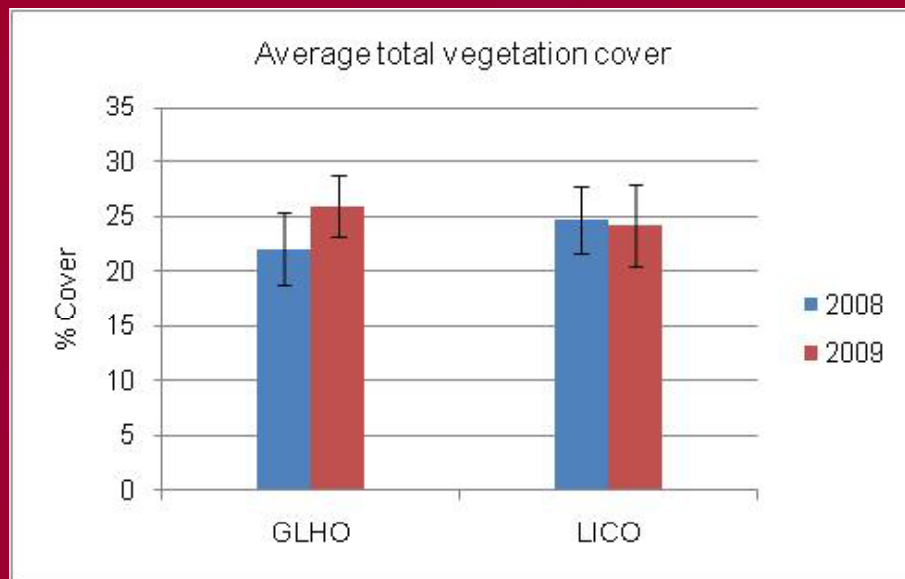
Preliminary Results

- Exotic and native % cover per quadrat
 - GH – *Tamarix*, *Salsola*, and *Schismus*
- Average species richness per quadrat

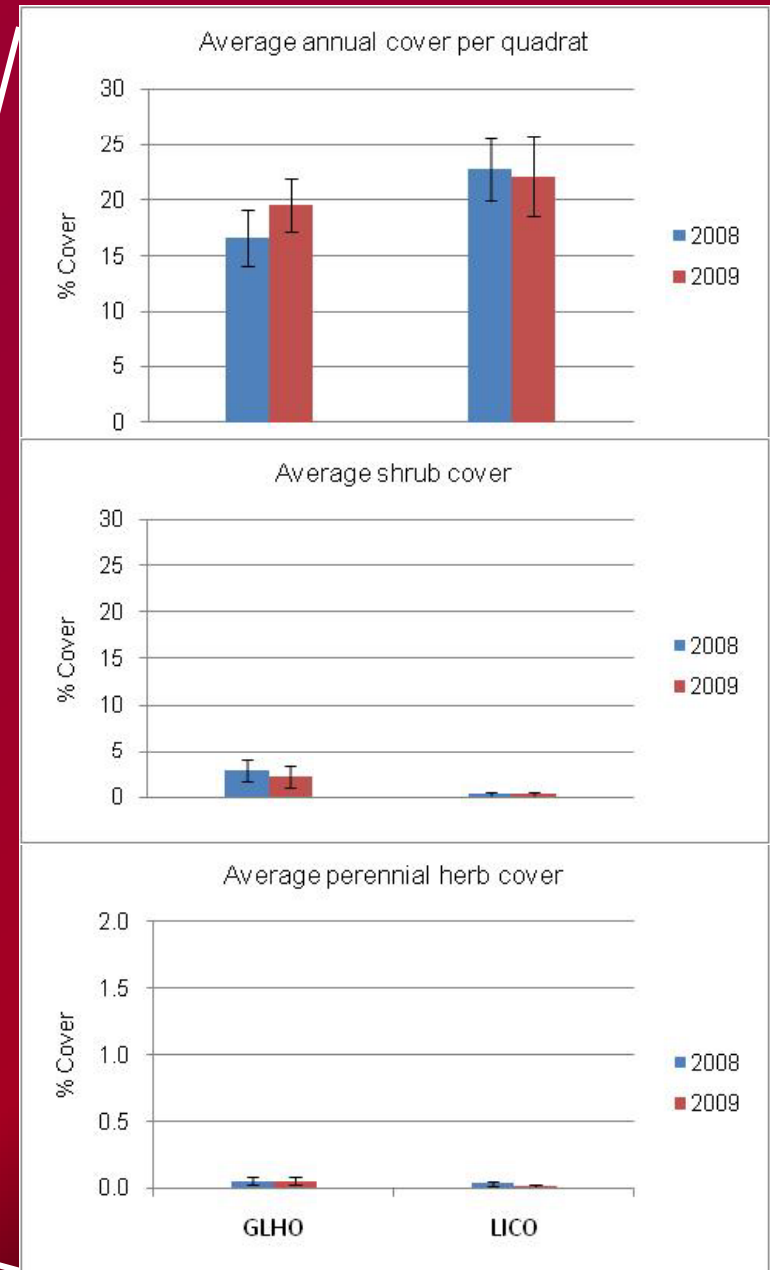


Community

- Sparsely vegetated
- Annuals ~17-23% of vegetation
- Shrubs ~0.5-3% of vegetation
- Perennial herbs – minimal



From ~ 22-26%



- **Weather Data** – Limited data at this point but all gauges are in place
- **Soil analyses** - %CaCo₃ (inorganic carbon), total carbon and nitrogen, pH, EC, particle size

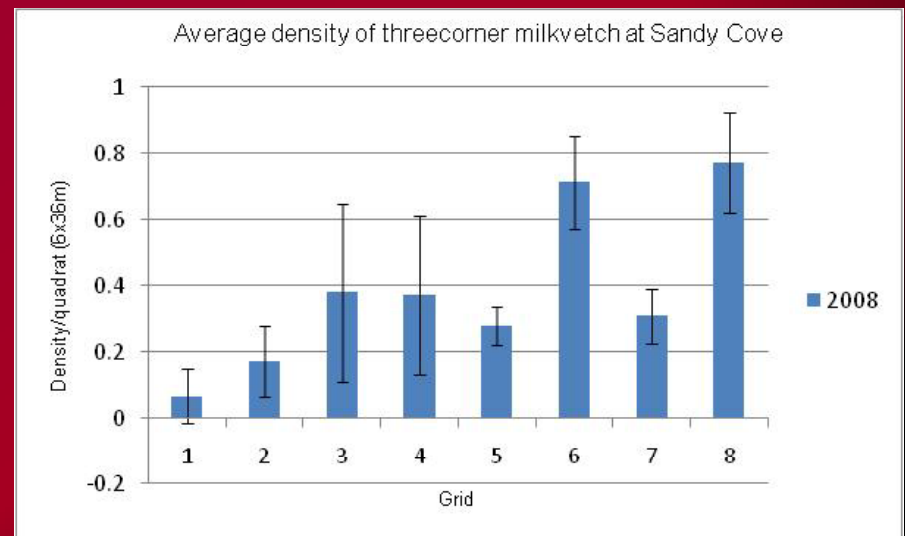
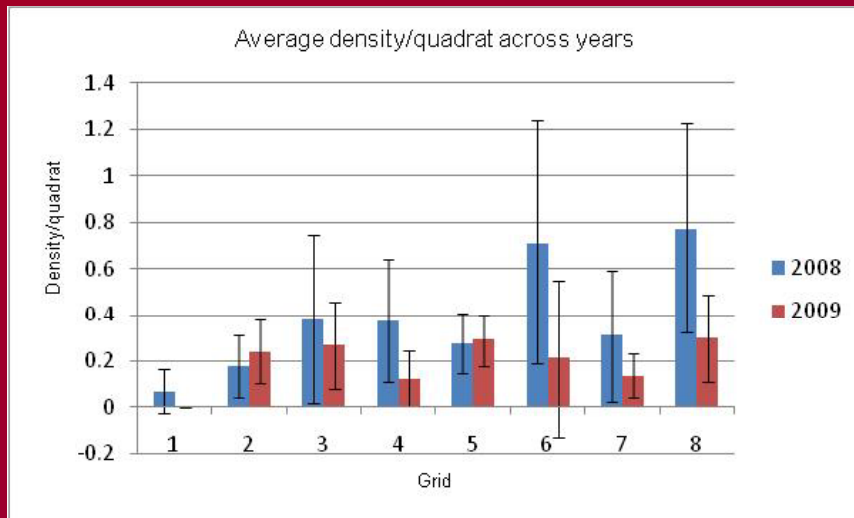
Adaptive Management

Recognizes the inherent **complexity** of managing natural resources thus structuring management as a **learning process**

Steps

- planning, management, monitoring, **evaluation** and adjusting management.

Sandy Cove example

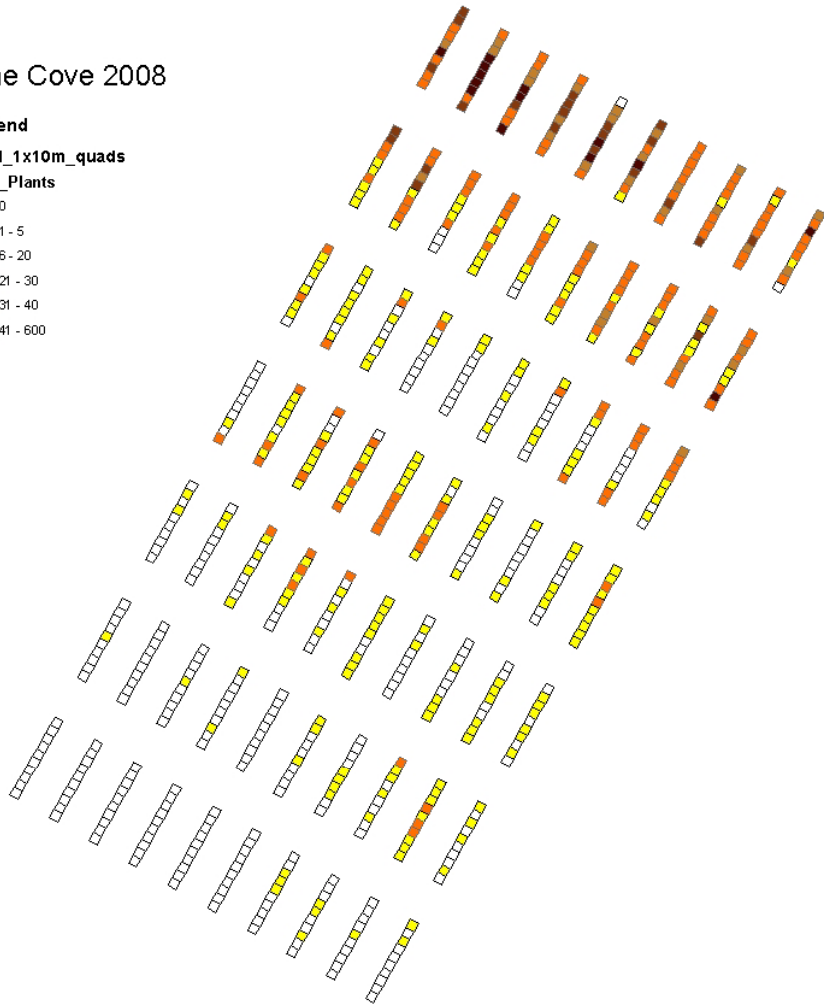
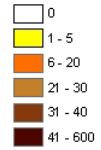


Lime Cove 2008

Legend

ERVI_1x10m_quads

Num_Plants

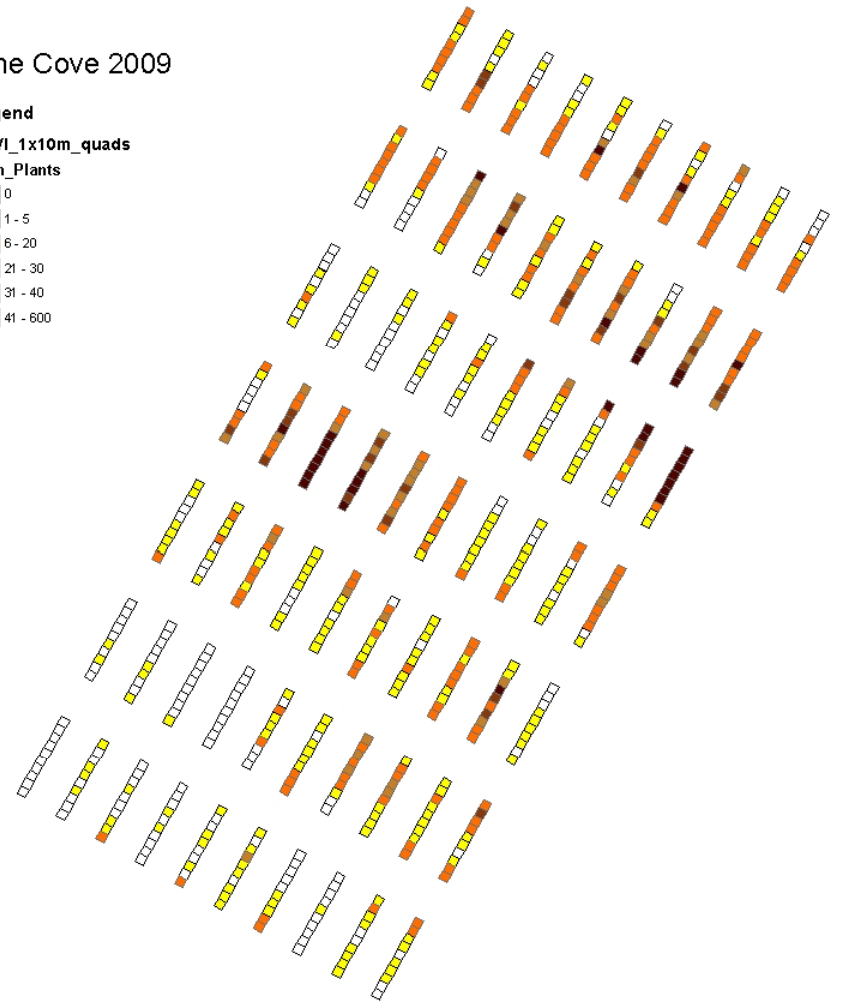
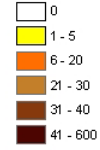


Lime Cove 2009

Legend

ERVI_1x10m_quads

Num_Plants



Research needs:

- Seed bank / Seed fate study
- Pollinator study
- Invasive species research and monitoring
 - monitor select species
 - effectiveness of Sahara mustard control
 - sand dune stabilization – *Schismus* sp. removal plots

Acknowledgements

- *Funding/Logistical support -*
 - Clark County MSHCP
 - NPS - Lake Mead NRA
 - LC MSCP
- *Planning assistance*– Rob Sutter, Sonja Kokos
- *Field* – Sarah Schmid, Jessica Spencer, Cayenne Engel, Jill Craig, Karen Maloof, Kate Prengaman, Teague Embrey, Corey ,NCC, many volunteers
- *Statistical advice* – Cheryl Vanier, Sean Neiswenter

Thank you!