Background

- Over 23,000 acres
- 25 endemic species
- 30+ seeps and springs
- History
  - Agriculture
  - Mining
  - Grazing
  - Irrigation system
Objectives and Applications

- Baseline inventory and assessment
- Restoration site selection
- Seed and stock harvesting
- Development of habitat management plan
- Predictive habitat models
- Non-native species control
Field Data

• 2007–2009 field seasons
• Over 6,500 polygons
• Communities classified to Alliance and Association levels
• Data collected:
  – Species composition and aerial percent coverage
  – Hydrology
  – Topography
  – Canopy height
Overview of Moisture Classes

- **Xeric (5,042 acres)**
  - Eastern boundary, badlands, alluvial fans and ridges
- **Mesic (14,886 acres)**
  - Central to west in mid elevations
- **Wetland (1,674 acres)**
  - Carson Slough, Lower Crystal, and Big Spring drainage
Overview of Moisture Classes

• Riparian (321 acres)
  – Concentrated at Point of Rocks Springs, Bradford Springs, and Scruggs Springs areas

• Disturbed (1,508 acres)
  – Transitioning agriculture areas, active restoration sites, and nonnative communities including *Tamarix* species.
Common Vegetation Communities

- *Larrea tridentata-ambrosia dumosa* Shrubland Alliance (creosote bush-white bursage)
- *Atriplex confertifolia* Shrubland Alliance (shadscale)
- *Sporobolus airoides* Herbaceous Alliance (alkali sacaton)
Common Vegetation Communities

- *Juncus arcticus* Herbaceous Alliance (Arctic rush)
- *Typha* species Herbaceous Alliance (cattail)
- *Prosopis pubesence* Woodland Alliance (screw bean mesquite)
- *Prosopis glandulosa* Shrubland Alliance (honey mesquite)
**Larrea tridentata-Ambrosia dumosa Shrubland Alliance**
(creosote bush-white bursage)

- Eastern boundary of Refuge
- Occupies highest elevations and most xeric conditions
- Associated species:
  - *Atriplex hymenelytra* (desert holly)
  - *Atriplex confertifolia* (shadscale)
  - *Ephedra* species
  - *Krameria greyi* (white ratany)
**Atriplex confertifolia Shrubland Alliance** (shadscale)

- Widely distributed throughout mid and low elevations
- Most common species on Refuge
- Associated species:
  - *Isocoma acradenia* (alkali goldenbush)
  - *Ericameria nauseosus* (rubber rabbitbrush)
  - *Suaeda moquinii* (Mojave seablite)
  - *Sporobolus airoides* (alklai sacaton)
  - *Ambrosia dumosa* (white bursage)
**Sporobolus airoides** Herbaceous Alliance (alkali sacaton)

- Concentration in Crystal Reservoir and marsh areas
- Often bordering wetland in low elevations
- Associated species:
  - *Distichlis spicata* (saltgrass)
  - *Atriplex confertifolia* (shadscale)
  - *Juncus arcticus* (Arctic rush)
  - *Isocoma acradenia* (alkali goldenbush)
**Juncus arcticus** Herbaceous Alliance
(Arctic rush)

- Occupies west-central wetlands
- Often forming nearly monotypic meadows
- Associated species:
  - *Distichlis spicata* (saltgrass)
  - *Sporobolus airoides* (alkali sacaton)
  - *Carex pragracilis* (clustered field sedge)
  - *Typha species* (cattail)
  - *Juncus species*
Typha species Herbaceous Alliance (cattail)

- Occupies Carson Slough, Peterson Reservoir, and Crystal and Horseshoe Marshes
- Year-round or near year-round access to watertable
- Associated Species:
  - *Phragmites australis* (common reed)
  - *Juncus arcticus* (Arctic rush)
  - *Schoenoplectus americanus* (three-square bulrush)
  - *Baccharis emoryi* (Emory baccharis)
Prosopis Pubescens Woodland Alliance (screw bean mesquite)

• Evenly distributed throughout mid elevations on the Refuge
• Occupies both riparian and nonriparian areas
• Associated species:
  – Atriplex lentiformis (quailbush)
  – Baccharis emoryi (Emory baccharis)
  – Isocoma acradenia (alkali goldenbush)
  – Sporobolus airoides (alkali sacaton)
  – Distichlis spicata (saltgrass)
Prosopis gladulosa Shrubland Alliance
(honey mesquite)

- Largest concentration west of Horseshoe Marsh
- Often forming dune communities
- Associated species:
  - Atriplex confertifolia (shadscale)
  - Isocoma acradenia (alkali goldenbush)
  - Suaeda moquinii (Mojave seablite)
  - Atriplex canescens (four-wing salt bush)
  - Larrea tridentata (creosote bush)
# Total Acreage of Communities Reviewed

<table>
<thead>
<tr>
<th>Community</th>
<th>Acres</th>
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<tbody>
<tr>
<td>Atriplex confertifolia Shrubland Alliance</td>
<td>3,682</td>
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<tr>
<td>Juncus arcticus Herbaceous Alliance</td>
<td>694</td>
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<tr>
<td>Larrea tridentata-Ambrosia dumosa Shrubland Alliance</td>
<td>3,494</td>
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<td>Sporobolus airoides Herbaceous Alliance</td>
<td>1,049</td>
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<td>Typha species Herbaceous Alliance</td>
<td>314</td>
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<td>Prosopis glandulosa Shrubland Alliance</td>
<td>715</td>
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<tr>
<td>Prosopis pubescens Woodland Alliance</td>
<td>1,054</td>
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<tr>
<td><strong>Total Acreage</strong></td>
<td><strong>11,002</strong></td>
</tr>
<tr>
<td><strong>Percent of Refuge</strong></td>
<td><strong>48%</strong></td>
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