Biological Basis of the Sonoran Desert Conservation Plan

SDCP Biological Goal
Ensure the long-term survival of the full spectrum of plants and animals that are indigenous to Pima County…

Approach
- Select elements for planning
- Establish quantifiable goals
- Develop explicit rules for reserve design process
- Organize, synthesize, and acquire information
- Evaluate
- Establish, Monitor, Manage

Planning Alternatives
- Biotic elements
  - Vertebrates
  - Vegetation communities
- Abiotic elements
  - Land cover, land form, elevation, aspect, etc.
- Unique elements

Select Species
- Regionally “vulnerable” species
- Short-list of 55 species

Species chosen should have little influence on ultimate reserve design

Species List
- 9 mammals
- 8 birds
- 7 reptiles
- 2 frogs
- 6 fish
- 16 invertebrates
- 7 plants
- 7 bats
- 6 riparian
- 3 riparian
- all riparian
- all riparian
- mostly snails
- 2 riparian

>60% of plants and vertebrates associated with riparian environments
**Species Information**

- Natural history accounts
- Species-environment matrix
- Decide best method by which to achieve goals for each species
- Less helpful if:
  - either rare or common
  - on lands that are protected or off-limits
  - limited natural-history information
- Reduced from 55 to 44 species

**Land Cover**

- Vegetation communities
- Abiotic / physical
- Urban, suburban, rural land-uses
- Ownership and level of protection
- Threats

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**Species Distributions**

- Based on models rather than known locations or published distributions
- Developed to predict species distributions based on potential habitat
- Input and evaluation by experts
  - Habitat associations, known distribution
- Iterate
- Combine to identify areas of high species richness

**Species-Environment Matrix**

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. Attributes</th>
</tr>
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<tbody>
<tr>
<td>Vegetation</td>
<td>29</td>
</tr>
<tr>
<td>Urban</td>
<td>9</td>
</tr>
<tr>
<td>Meso-riparian</td>
<td>9</td>
</tr>
<tr>
<td>Xero-riparian</td>
<td>13</td>
</tr>
<tr>
<td>Streams</td>
<td>8</td>
</tr>
<tr>
<td>Shallow groundwater</td>
<td>1</td>
</tr>
<tr>
<td>Springs</td>
<td>2</td>
</tr>
<tr>
<td>Elevation</td>
<td>13</td>
</tr>
<tr>
<td>Slope</td>
<td>9</td>
</tr>
<tr>
<td>Aspect</td>
<td>8</td>
</tr>
<tr>
<td>Landform</td>
<td>15</td>
</tr>
<tr>
<td>Carbonates</td>
<td>3</td>
</tr>
<tr>
<td>Geology</td>
<td>1</td>
</tr>
</tbody>
</table>

**Matrix Rank Scores**

Western Yellow Bat (*Lasiurus ega*)

<table>
<thead>
<tr>
<th>Elevation (m)</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 - 600</td>
<td>2</td>
</tr>
<tr>
<td>600 - 800</td>
<td>3</td>
</tr>
<tr>
<td>800 - 1200</td>
<td>3</td>
</tr>
<tr>
<td>1200 - 1400</td>
<td>3</td>
</tr>
<tr>
<td>1400 - 1600</td>
<td>2</td>
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<tr>
<td>1600 - 2000</td>
<td>** mask **</td>
</tr>
<tr>
<td>2000 - 2800</td>
<td>** mask **</td>
</tr>
</tbody>
</table>
Species Richness, 1 or more

Species Richness, 2 or more

Species Richness, 3 or more

Species Richness, 4 or more

Species Richness, 5 or more

Design Principles

• Comprehensive conservation
• Species richness as foundation
• Contiguosness and Connectivity
• Intactness
• Opportunity and Realism
Other Considerations

• Areas needed to meet species goals
• Landscape linkages
• Recovery areas for endangered species
• Areas identified by The Nature Conservancy as significant for conservation
• Special elements

Special Elements

Pygmy Owl Habitat
Saguaro and Ironwood communities

Reserve Building

- Species richness
- Mesoregions + important xeroriparian
- Special elements
- PCA richness
- Recovery areas
- Scientific research areas
- Reserve system boundaries

Conservation Lands System

- Biological Core
- Multiple Use
- Scientific Research
- Recovery Areas
- Agriculture Within Recovery Areas
- Existing Development

Species Richness, 5 or more

Summary of High Potential Habitat 5 or More Priority Vulnerable Species

Biological Core

Biological Core 2013
Riparian as Foundation for Linkages

Only Listed Species

Biologically Preferred

Monitoring and Adaptive Management

• Assess status and trends of representative organisms
• Information to assess land-management practices
• Careful and efficient design
• Long-term financial commitment