

# Human Populations, Conservation Approaches

02 March 2007  
22nd class meeting

(Exam Two on Wed)

READINGS, Fri 02 March:  
[SDCP, Biosphere Reserves](#)  
Monday 05 Mar:  
[ESA and NEPA links](#)



Environmental Biology (ECOL 206)  
University of Arizona, spring 2007

Kevin Bonine, Ph.D.  
Anna Tyler, Graduate TA

Lab 28Feb/02Mar: **Meet AT VAN**  
**Tumamoc Hill**  
See reading assignment and  
handout on webpage  
Lab 07/09 Mar:  
**No lab**  
**(work on creativity projects!)**

[http://eebweb.arizona.edu/courses/Ecol206/206\\_Page2007.html](http://eebweb.arizona.edu/courses/Ecol206/206_Page2007.html)

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## Consilience\* in Environmental Biology

## Science and the Humanities

\* the uniting of knowledge

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## Scientists Urge Global Action on Clean Energy

By THE ASSOCIATED PRESS

Published: February 28, 2007

UNITED NATIONS, Feb. 27 (AP) — A scientific panel convened at the request of the United Nations called Tuesday for drastic reductions in fossil-fuel emissions around the world and rapid increases in spending on clean-energy research to head off the worst effects of global warming.

In a 166-page report, two years in the making, 18 scientists from 11 nations forecast a turbulent century of rising seas, spreading drought and disease, weather extremes and damage to farming, forests, fisheries and other economic areas.

It said the United Nations must better prepare to help tens of millions of "environmental refugees," and it urged all governments to **discourage new building on land less than one meter — about 39 inches — above sea level.**

The report was sponsored by the private United Nations Foundation and Sigma Xi, the Scientific Research Society.

The recommendations come three weeks after the Intergovernmental Panel on Climate Change, a United Nations network of 2,000 scientists, made its latest assessment.

That group concluded for the first time that global warming was "unequivocal" and that it had been caused largely by the accumulation of carbon dioxide and other heat-trapping gases in the atmosphere, mostly from burning coal, oil and other fossil fuels. **If nothing is done, it said, global temperatures could rise 11 degrees by 2100.** But it avoided recommending courses of action.

In contrast, the scientists who produced the new report said global carbon dioxide emissions should be made to level off in the years 2015 to 2020, and then be cut back to less than one-third of that level by 2100. This would happen, they said, through a vast **transformation toward greater efficiency, away from fossil fuels and toward biofuels and solar and wind technology.**

The scientists urged governments to immediately ban the construction of coal-fired power plants, except for those designed to capture carbon dioxide and store it underground or under water.

The Bush administration says it is spending almost \$3 billion a year on energy technology research as its major contribution to combating climate change. But the expert panel said such research was badly underfinanced, and required a tripling or quadrupling of worldwide spending, to \$45 billion or **\$60 billion a year,** from \$15 billion now.

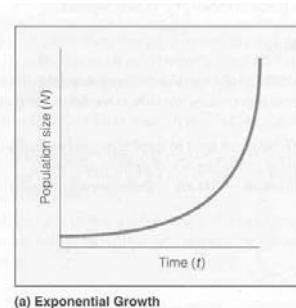
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## Population Growth:

On p.176 in VanDyke 2003 (Ch7) is the following quote:

**"the exponential growth curve 'has no ecology.'**

What does this quote mean?



Miller 2003

## Birth and Fertility

- Replacement Level Fertility = 2.1 – 2.5

- Total Fertility Rate (over lifetime of woman)  
1.6 in developed

3.1 in developing

(2.8 global average)

- Factors that affect birth rates (p. 80 Miller 2005):

1. Children in Labor Force
2. Urbanization
3. Cost to raise and educate
4. Female education and employment
5. Infant Mortality Rate
6. Age at first reproduction
7. Availability of pension/social security
8. Availability of abortions
9. Birth control availability
10. Religious and cultural beliefs

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### 4. Female education and employment

**"For poor women the only holiday  
is when you are asleep."**

#### Women:

- Do 2/3 of the work
  - 10% of the income
  - own 0.01% of the property
  - 70% of the world's poor
  - 2/3 of the world's illiterate
- (page 87 Miller 2005)

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## Decreased Death Rates

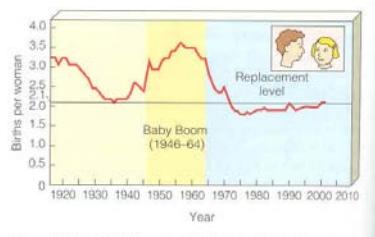
- Big contributor to population growth

1. Increased food supplies
2. Better nutrition
3. Medical Technology  
immunizations, antibiotics
4. Sanitation and Hygiene
5. Safer Water

<b>Infant Mortality Rate</b> 60/1,000 vs. 7/1,000
<b>Life Expectancy</b> 65 vs. 76 (67 avg.)

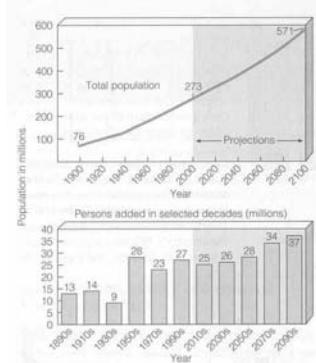
(ex. India, China, Thailand p. 87 Miller 2005)

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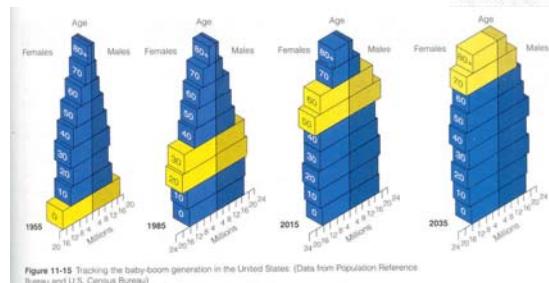


**Figure 11-8** Total fertility rates for the United States between 1917 and 2001. (Data from Population Reference Bureau and U.S. Census Bureau)  
Miller, 2003

### U.S. Population Example (baby boom)



**Figure 5-5** U.S. population growth, 1900–2000, and projections to 2100. (Data from U.S. Census Bureau)  
Miller, 2003



**Figure 11-15** Tracking the baby-boom generation in the United States. (Data from Population Reference Bureau and U.S. Census Bureau)

Miller, 2003  
your Fig 5-9

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## Demographic Transition

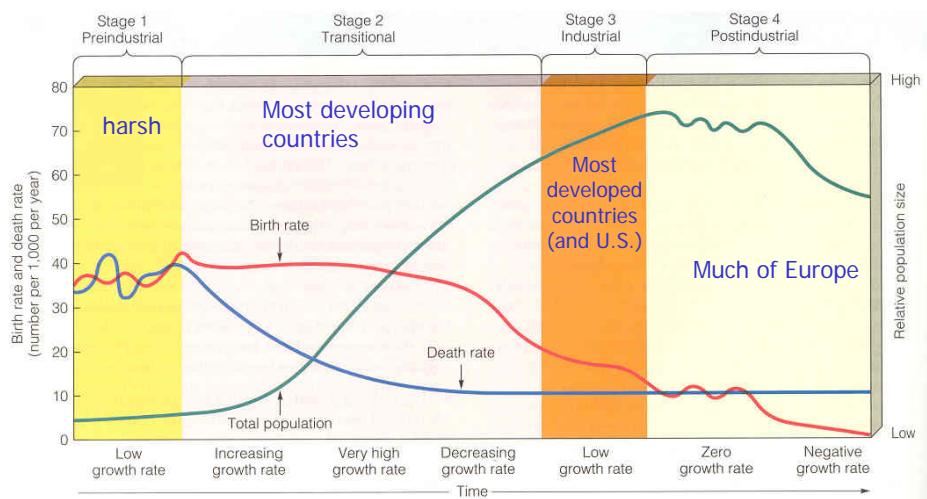


Figure 11-18 Generalized model of the demographic transition.

Miller, 2003  
your Fig 5-10

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## Ecological Footprint

Hall et al. 1994.

**The environmental consequences of having a baby in the United States.**  
Population and Environment 15(6):505-524

Class project at SUNY

Assumptions:

One child, to age 75, average American consumption, born 1990s

Looked at 100 impacts in 5 categories,

1. Waste
  2. Mineral consumption
  3. Energy consumption
  4. Ecosystem alteration (Forest, Wetlands, Water)
  5. Food consumption
- (as well as extinction of species and indigenous cultures)

Environment and human quality of life

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Hall et al. 1994.  
*The environmental consequences of having a baby in the United States.*  
Population and Environment 15(6):505-524

### Ecological Footprint

Lifetime per capita:

#### WASTE:

1,000,000 kg atmospheric  
10,000,000 kg liquid  
1,000,000 kg solid



#### CONSUME:

700,000 kg minerals  
4,000 barrels of oil (energy equivalent)  
25,000 kg major plant foods  
28,000 kg animal products (2,000 animals)  
162,000 cubic m water  
0.84 hectares of forest

-5,430 kg of fertilizer; 18,675 eggs; 1,654 chickens

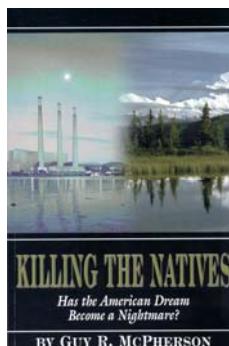
-95 Liters of liquid waste per roll of film used

-Each dollar spent results in 0.5 L oil extracted and burned

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### Killing the Natives, Chapter 3

U.S.: 4% global population  
25% fossil fuels  
>25% cars  
50% advertising spending



#### Goods vs. Bads

\$80 billion on shoes, jewelry, watches  
\$65 billion on higher education

Americans since 1950 have consumed  
more than all in history preceding

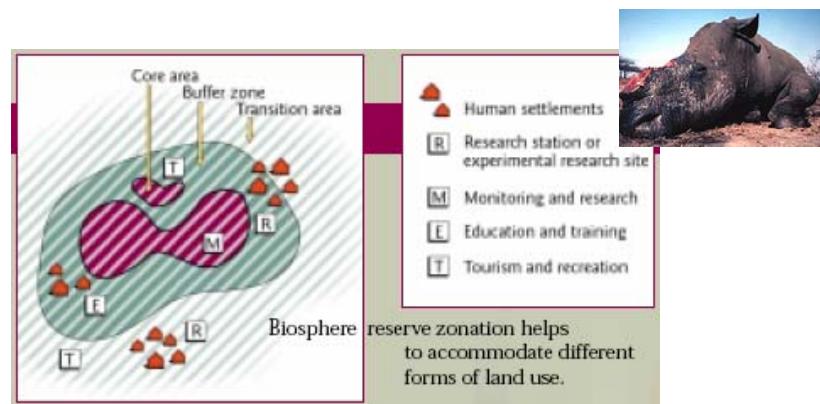
# indivs/house dropping in US

Jimmy Carter – malaise speech, reduce consumption...Reagan

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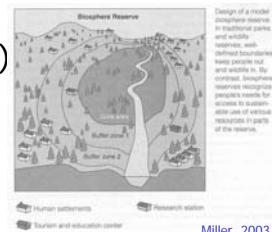
# Conservation Approaches

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Biosphere Reserves (core, buffer, transition)

- Research and Monitoring
- Conservation
- Local Development



Miller, 2003  
Chapter 7



<http://www.pima.gov/cmo/sdcp/>

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Date: August 14, 2006

To: The Honorable Chairman and Members  
Pima County Board of Supervisors

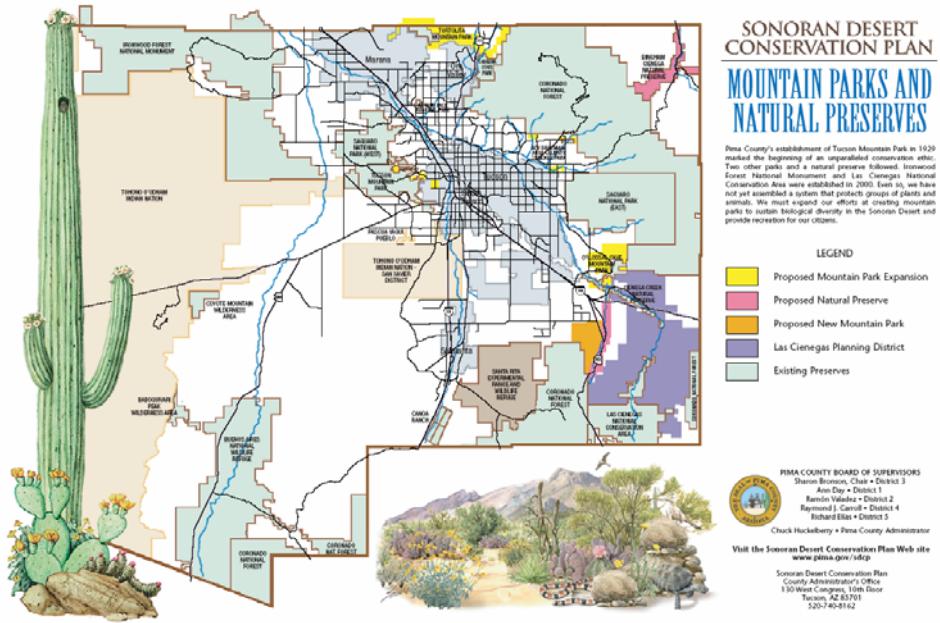
From: C.H. Huckleberry  
County Administrator

Re: Draft Multi-Species Conservation Plan

Introduction

Attached is the draft Multi-Species Conservation Plan that Pima County will submit to the United States Fish and Wildlife Service for a Section 10 permit. The permit package will also contain the Environmental Impact Statement, which belongs to the Service, and an Implementation Agreement that delineates obligations in a phased approach. Earlier drafts of the Multi-Species Conservation Plan have been published in 2003, 2005, and in January of 2006 as part of the extensive process of developing scientific information and inviting public review and comment.

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## Biological Basis of the Sonoran Desert Conservation Plan



Thanks to Bob Steidl and others...

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# SDCP Biological Goal

*Ensure the long-term survival of the full spectrum of plants and animals that are indigenous to Pima County...*



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## Approach

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



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## Select Species

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

*Species chosen should have little influence on ultimate reserve design*



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## Species List

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

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

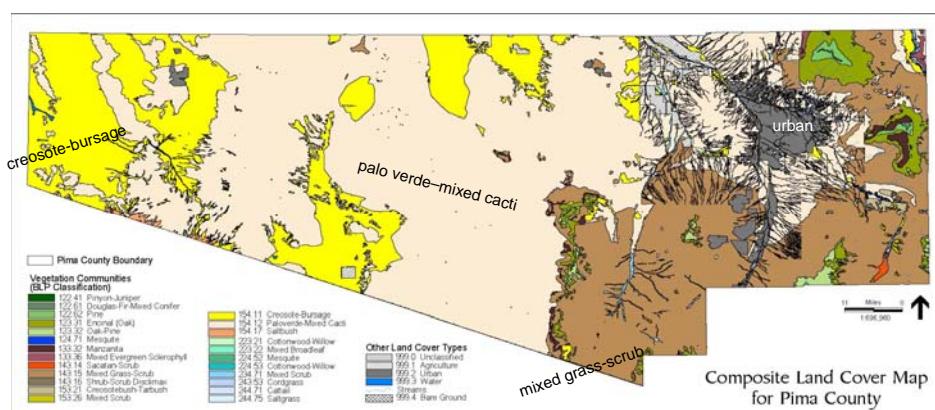
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# Species Information

- 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

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# Land Cover



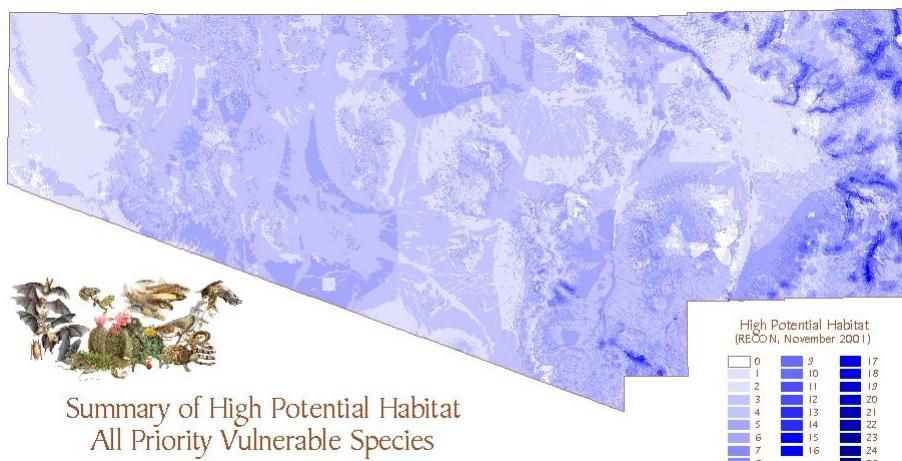
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# Species Distributions

- 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**

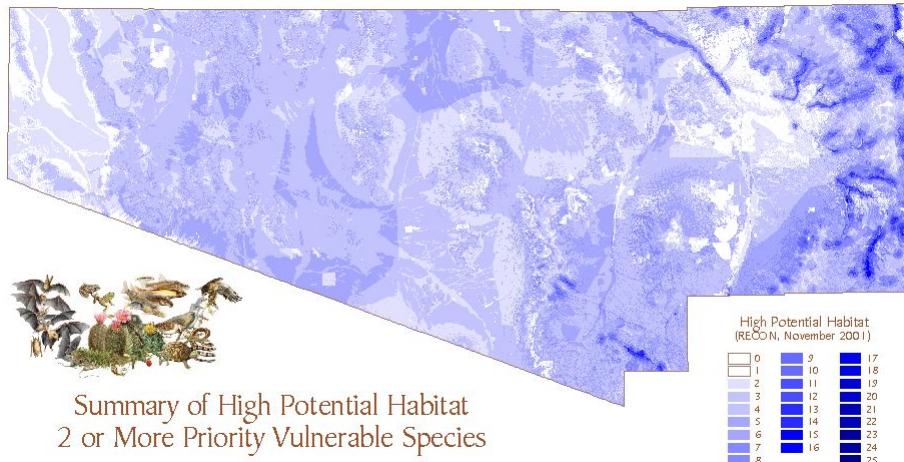
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## Species Richness, 1 or more



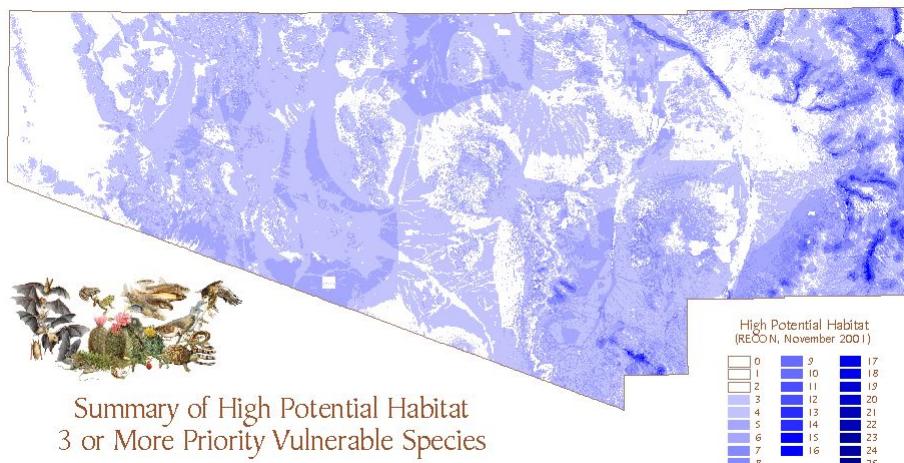
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## Species Richness, 2 or more



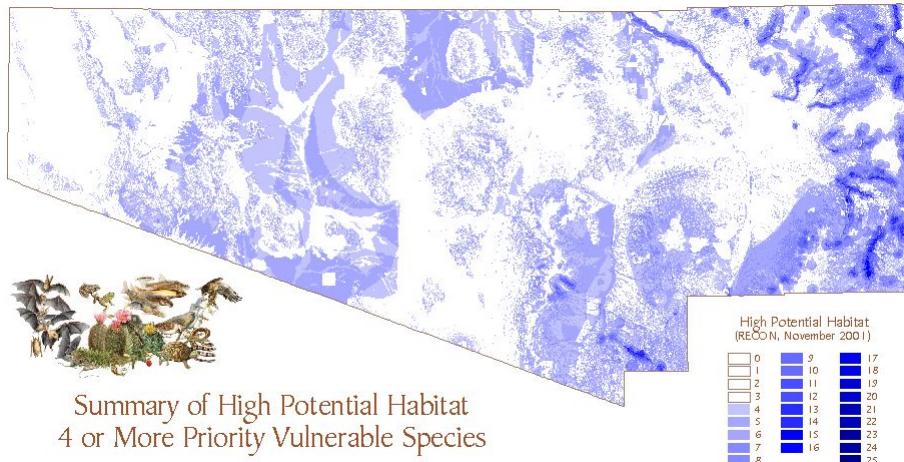
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## Species Richness, 3 or more



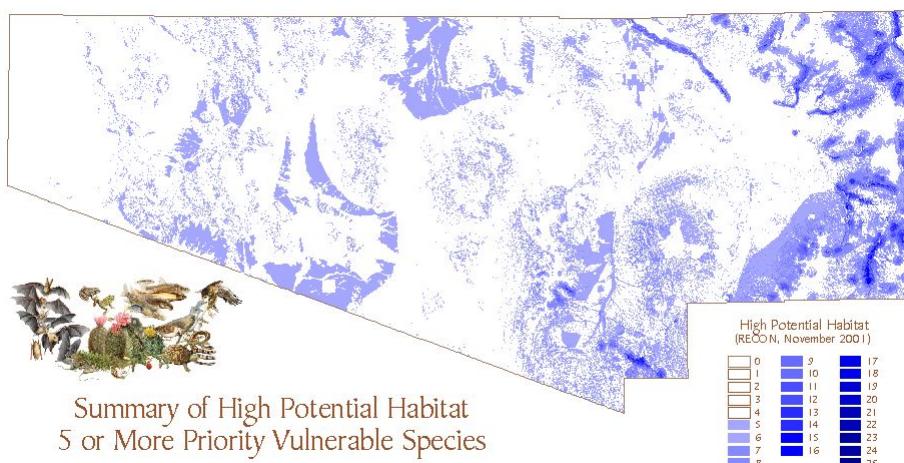
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## Species Richness, 4 or more



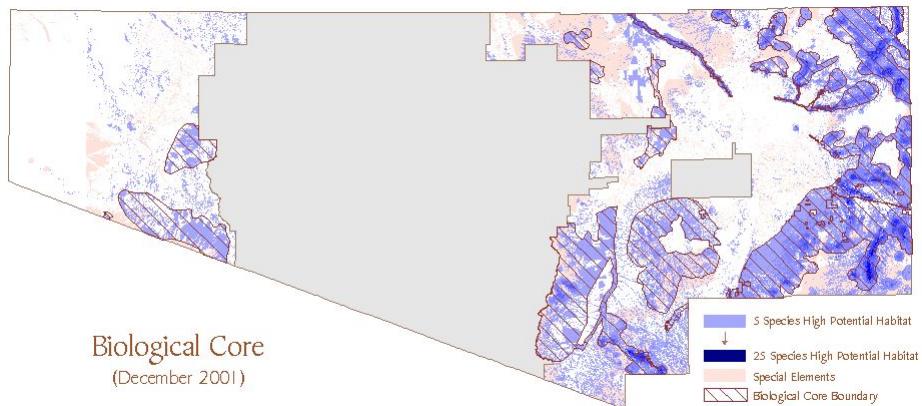
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## Species Richness, 5 or more



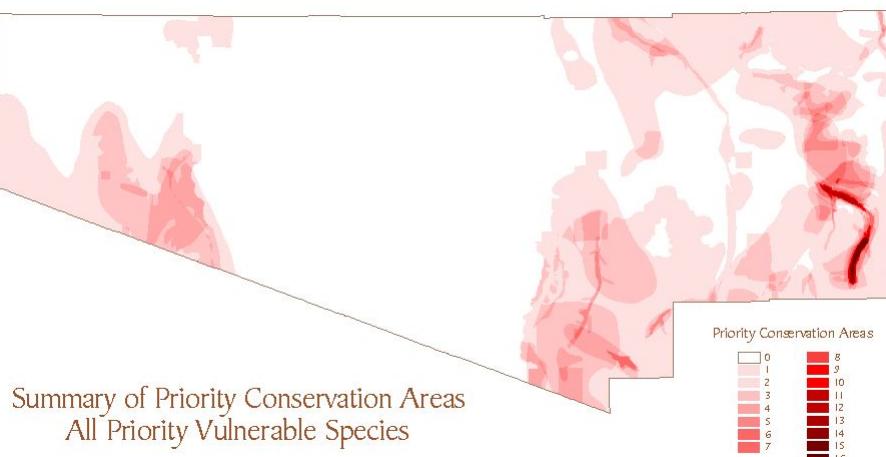
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## Biological Core



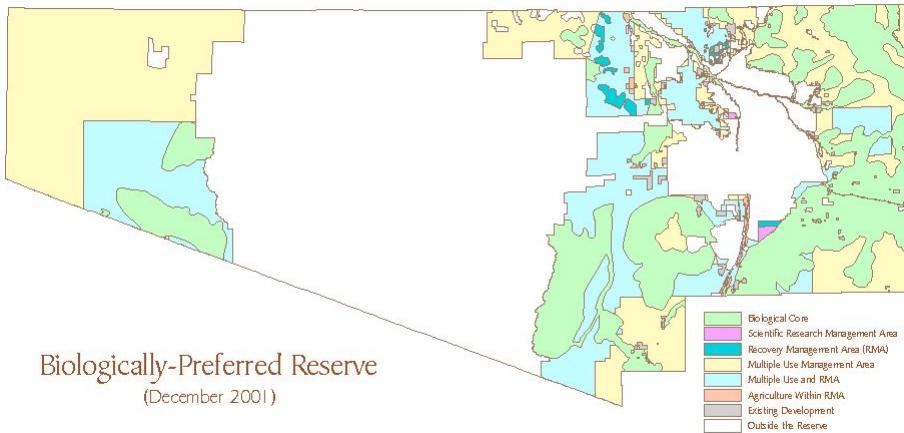
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## Species Richness – Expert Opinion



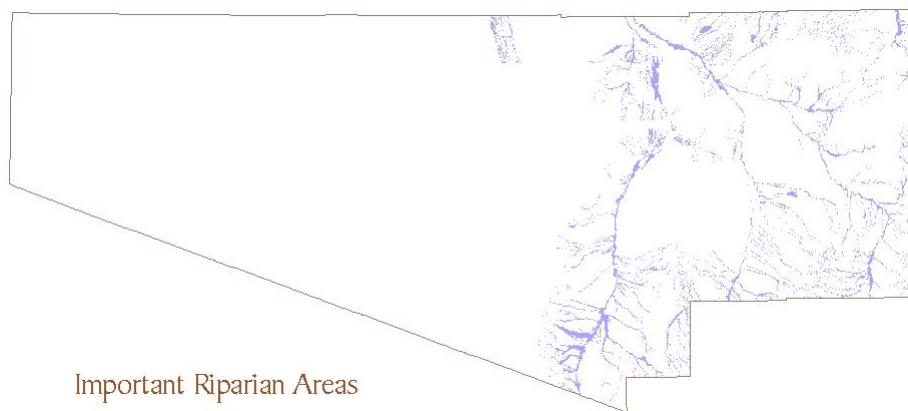
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## Biologically Preferred

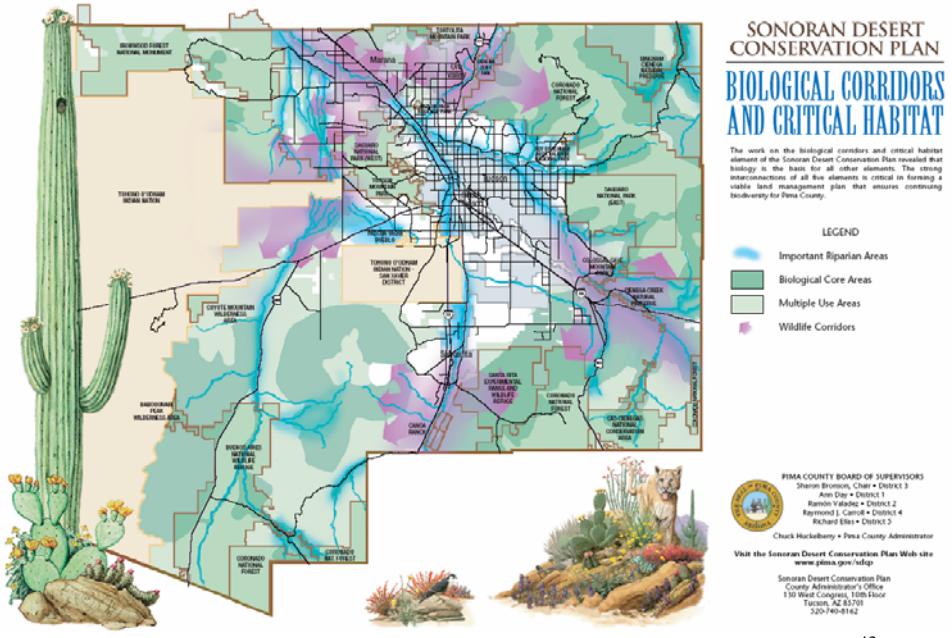


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## Riparian as Foundation for Linkages



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