



BIRD SPECIES DIVERSITY IN THE GREATER PHOENIX AREA

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INTRODUCTION

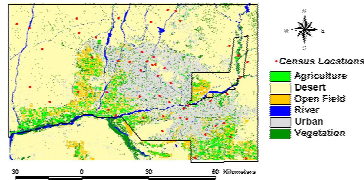
Compared with the natural habitats that they are replacing, cities support breeding bird communities that can be characterized by:

1. Different species composition
2. Lower species richness, and,
3. Higher population densities.

In the greater Phoenix area we tested whether the same patterns occur in the non-breeding season.

During October-November 2000, we used point counts to census birds at 51 sites in four habitats. Each site was censused 3 times.

Census Locations:



Habitats:

Desert (15 sites)



Urban (18 sites)



Agriculture (7 sites)



Riparian (11 sites)

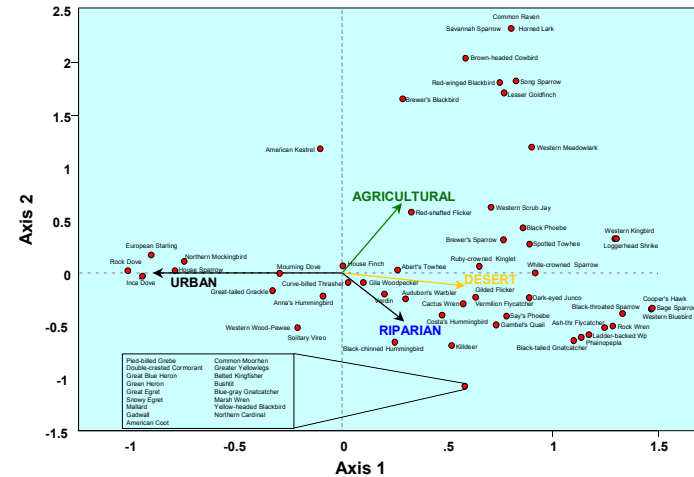


- The 40 non-riparian sites are a subset of the sites from the 200-point survey.
- We added 11 riparian sites since this important habitat was underrepresented.

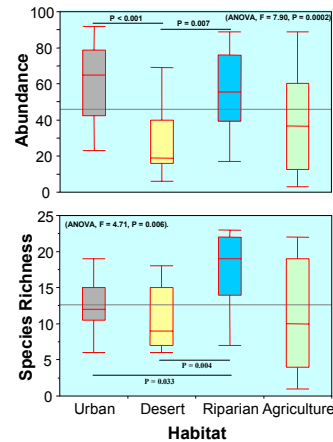
SPECIES DISTRIBUTION

We used Detrended Canonical Correspondence Analysis to describe gradients in species abundance and distribution. In this direct gradient analysis several environmental factors are combined into two major axes. The location of each species along these axes is calculated according to its weighted average distribution and abundance in the sample plots.

- Altogether we recorded 84 species.
- We omitted 14 species that were recorded only once throughout the census.
- The factors we used to describe the environment were the four habitat types, shown by arrows in this figure.
- The first ordination axis accounted for 14.3% of the variation and separated urban from all other species.
- Along the second axis (5.6% of the variation) species associated with agriculture were further separated from species of native habitat – i.e., desert and riparian.



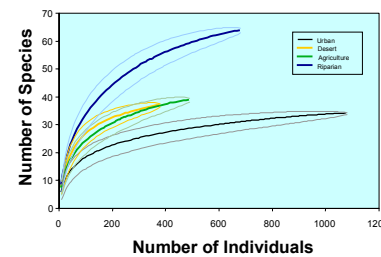
SPECIES RICHNESS AND ABUNDANCE



- Species richness and abundance differed between the four habitats.
- The desert had significantly fewer individuals than urban and riparian habitats, which supported the most birds.
- Riparian was the most species rich habitat, with significantly more species than desert and urban.

SPECIES DIVERSITY

We compared species diversity between habitats by using rarefaction. This method illustrates how species richness increases with the number of individuals. Rarefaction curves are useful to control for differences in sample size, and assess whether differences in species richness are a sampling artifact, or based on biological factors.



- Although urban habitat supports relatively high species richness and abundance, its species diversity is the lowest.
- The highest diversity seen in riparian habitat may be partially due to the non-random sampling locations, and the many habitat specialists such as waterfowl.
- Species diversity is similar in desert and agricultural habitats, and significantly higher than in urban habitat, even though they support fewer individuals.

SPECIES COMPOSITION

To further investigate differences between habitats, we compared species composition, using Morisita's index of similarity which ranges from 0 (totally different) to 1 (identical).

	Urban	Desert	Riparian
Desert	0.13		
Riparian	0.38	0.52	
Agriculture	0.20	0.29	0.53

- The urban bird assemblage shows the lowest similarity with the rest.
- Although desert and agricultural habitats have very similar species diversity curves, they share relatively few species.

CONCLUSIONS

- The greater Phoenix area supports a relatively high diversity of bird species, distributed among several distinct habitats.
- However, the dominant and expanding urban habitat supports the lowest species diversity.
- If the overall bird diversity of the area is to be preserved, urban development needs to preserve the existing range of habitats in a relatively intact state.

Acknowledgments: We thank Diana Stuart, Jo Marie Lemmer and Beverly Rambo for doing the point counts. Matt Luck helped us produce the lovely map you see here, and we thank him for initiating us into ArcView.