Wildlife habitat use and activity along a human-modified river corridor

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INTRODUCTION

- River systems provide important habitat for a diversity of wildlife species and facilitate animal movement and habitat connectivity, especially in arid environments in the Southwestern United States.

- However, many river systems have been transformed through human activities, water diversion, and degradation of riparian areas, especially in areas associated with varying levels of urbanization.

- Relatively little is known about how wildlife populations respond to altered river systems and are influenced by abiotic, biotic, and anthropogenic landscape factors.

- The Salt River corridor (Figure 1) has different landscape characteristics between urbanized and non-urbanized areas.

Figure 1: The Salt River corridor in an urbanized area near Phoenix, AZ (a) and in a non-urbanized landscape on the Tonto National Forest (b). Photos taken by Jesse Lewis and Mélanie Banville.

OBJECTIVES

The objective of this project is to evaluate how wildlife species respond to varying levels of vegetation, urbanization, and other landscape factors along the Salt River corridor in Phoenix, AZ. Specific objectives include:

1. Evaluate wildlife habitat use in relation to the gradients of vegetation (i.e., NDVI), urbanization, and water availability across three seasons: hot-dry, hot-wet, and cool-wet.
   a) We predicted that responses would vary by species, but that most species would have a positive relationship with vegetation and a negative relationship with urbanization.

Figure 2: Wildlife along the Salt River corridor.

STUDY AREA

- Study sites occurred across the Salt River corridor in Phoenix, AZ and within the Sonoran Desert, which is home to diverse wildlife (Figure 2) and experiences distinct seasons (Figure 3).

- Historically, the Salt River flowed through the Phoenix Valley. Today, it is mostly dry with few areas of riparian vegetation and has undergone mining projects, channelization, and increased urbanization.
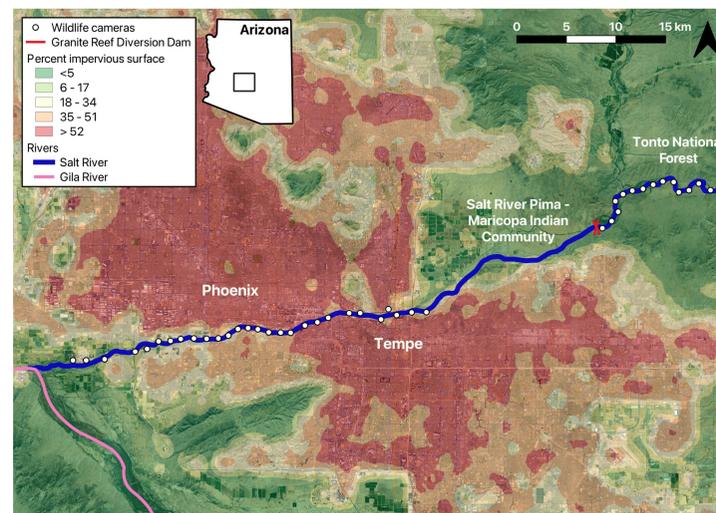

Figure 3: Wildlife cameras sites along the Salt River in Phoenix, AZ.

METHODS

- During 2020-2021, we maintained 43 wildlife cameras along the Salt River corridor to sample the gradients of vegetation, urbanization, and water availability.

- Utilized single-species single-season Royle-Nichols (RN) models to evaluate wildlife habitat use.

RESULTS

- Of our 14 focal species, 9% of detections were ground-dwelling birds, 29% were carnivorous mammals, and 61% were herbivorous mammals (Table 1).

Table 1: Total number of detections for 14 focal wildlife species along the Salt River corridor.

	Season					
	Hot-dry (1,959 days)		Hot-wet (3,197 days)		Cool-wet (6,361 days)	
Species	Occasions	Sites	Occasions	Sites	Occasions	Sites
Black-tailed jackrabbit	69	17	79	12	183	18
Bobcat	25	11	57	14	169	28
Coyote	167	37	225	31	507	41
Desert cottontail rabbit	112	29	130	24	385	38
Gambel's quail	93	24	61	18	187	29
Gray fox	18	9	36	13	115	20
Greater roadrunner	66	20	67	21	148	37
Javelina	26	12	55	12	105	19
Mephitis spp.	26	7	47	13	96	12
Mountain lion	9	6	7	7	19	8
Mule deer	13	7	10	4	10	5
Raccoon	41	15	39	17	162	33
Rock squirrel	54	17	59	16	101	25

RESULTS (continued)

- Most species exhibited similar relationships with habitat use and urbanization across seasons (Figure 4).

- Bobcat, gray fox, and javelina exhibited a negative relationship with urbanization in one or more seasons (Figure 4).

- Desert cottontail rabbit, Gambel's quail, greater roadrunner, raccoon, and rock squirrel exhibited a positive relationship with urbanization in one or more seasons (Figure 4).

- Habitat use peaked at low and moderate levels of urbanization (i.e., quadratic relationship) for black-tailed jackrabbit, coyote, and gray fox in one or more seasons (Figure 4).
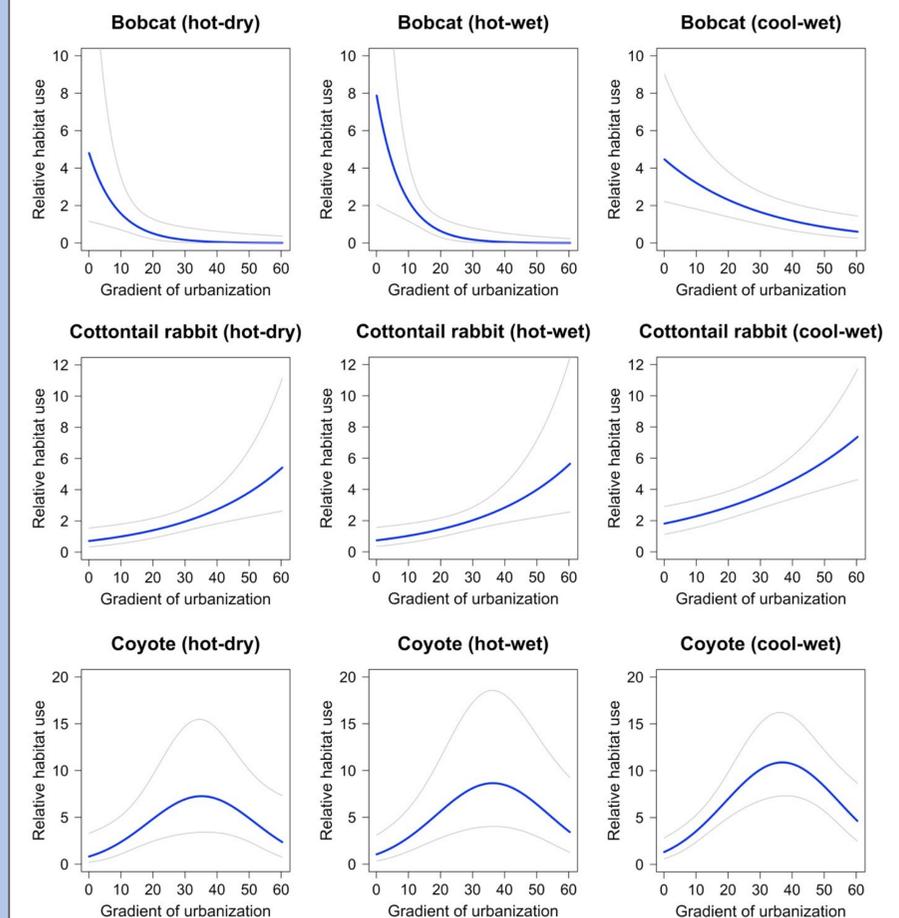

Figure 4: Seasonal habitat use relationships (i.e., positive, negative, quadratic) for three wildlife species in relation to urbanization along the Salt River corridor in Phoenix, AZ.

BROADER IMPACTS

- Our results can be used to conserve wildlife populations in areas with expanding urbanization and to inform management decisions about ecological restoration of rivers in arid environments.

ACKNOWLEDGEMENTS