PROJECT TITLE: Abundance and distribution of avian nest predators and predator activity at Wild Basin

INVESTIGATORS: Amy Belaire, Courtney Dunphy, Darrell Hutchinson, Rhiannon Vargas, Bethany Davidson, Andres Cuartes-Olarte, and Narda Salinas

---

INTRODUCTION

Urbanization directly affects biodiversity by altering the amount and configuration of habitat and the availability and types of local resources (Marzluff and Rodewald 2008). In addition to changing habitat, urbanization can change ecological processes like species interactions (Shochat et al. 2006). For example, urbanization can shift interactions between breeding birds and their predators (Rodewald et al. 2011, Stracey 2011), which can have important consequences for bird populations in more urban areas. Research has demonstrated that Golden-cheeked Warbler nests in and around Austin, Texas are subject to predation by species such as Western Scrub-jays, Cooper's Hawks, Brown-headed Cowbirds, and American Crows (Stake et al. 2004, Reidy et al. 2008), and understanding nest predation rates in relation to fragmentation and land use practices is an important research objective for recovery of this endangered species (USFWS 1992).

Generally, urbanization is accompanied by an increase in nest predators with a simultaneous decrease in predation rates, a phenomenon termed the "urban predation paradox" (Shochat 2004, Fischer et al. 2012). The mechanisms driving the predation paradox are unclear, but one likely explanation is that human-provided resources (e.g., bird feeders, pet food, or garbage) allow predators to switch from traditional prey sources to anthropogenic foods (Rodewald et al. 2011). Here, we explored the relationship between avian nest predator numbers and their predatory activity in an urban landscape. Our approach examined avian nest predator distribution and activity at a relatively fine spatial scale across the landscape of Wild Basin.

RESEARCH OBJECTIVE

The goal of this project is to evaluate the abundance and distribution of several common avian nest predators within the Wild Basin landscape and examine the relationship between predator numbers and predatory activity. Our research questions were threefold: (1) How are avian nest predators distributed across the Wild Basin landscape?, (2) How do nest predation rates vary across the Wild Basin landscape?, and (3) Does avian nest predator distribution correlate with nest predation rates in Wild Basin?

METHODS

Wild Basin is a 227-acre preserve comprised primarily of mixed Ashe juniper/oak woodlands. The preserve is located in a rapidly urbanizing part of western Travis County and is surrounded by residential development along its southern border, a major state highway along its western border, and another habitat preserve along its northern/ eastern border. The preserve was established in the 1970s and became part of the Balcones Canyonlands Preserve (BCP) in the

mid 1990s. The BCP represents almost 30,000 acres of habitat preserved under the Balcones Canyonlands Conservation Plan, the first multi-species regional habitat conservation plan in the US. Approximately 5-6 GCWA males establish territories within Wild Basin each year.

Figure 1. Grid point locations

For this study, we established a grid of points across the Wild Basin landscape, with 13 points spaced approximately 250m apart from one another (Fig. 1). At each point, we conducted 10-minute point counts between sunrise-9:30AM and recorded all birds seen or heard within 100m.

After point counts were completed, we set up artificial nests at each grid point along with a motion-triggered camera set to record video footage of any activity at the nest. Each nest contained one quail egg and one plasticine egg. Nests were placed to mimic GCWA nesting position to the extent possible. All nests were placed in Ashe juniper trees at either a "L" shaped branch intersection, where the branch extends perpendicular to the trunk, or a "Y" shaped crook, where a branch splits into two smaller branches. Nests were placed in spots with moderate to high direct foliage cover above the nests, approximately 8-12' high in a 15-35' Ashe juniper tree. Artificial nests and eggs were left in place for 7 days. At the end of the study, we analyzed all video footage and characterized the level and type of predator activity at each nest.

RESULTS

Avian nest predator distributions

During point counts, three avian nest predator species were documented: blue jay, western scrub-jay, and yellow-billed cuckoo. Western scrub-jays were documented at 3 points, all on the north end of the preserve, farthest from residential areas (Fig. 2). Blue jays were documented at 5 points, distributed across the preserve in no discernable pattern (Fig. 3).

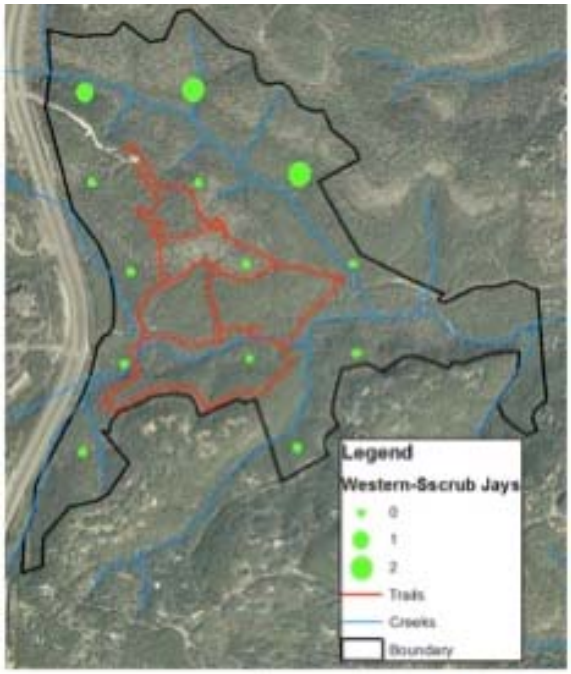

Figure 2. Western scrub-jays observed within 100m

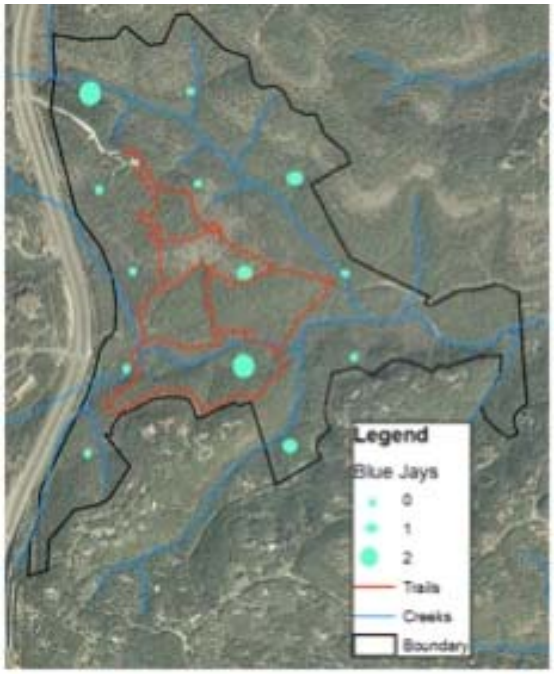

Figure 3. Blue jays observed within 100m

Visits to nest and predation activity

Western scrub-jays visited 3 nests, including 2 points where they were observed during point counts and 1 point where they were not (Fig. 4). In other words, western scrub-jays were present at a total of 4 points and visited nests at 3 of them. In terms of predation activity, western scrub-jays removed both eggs at each nest where it was observed (time to predation 1-

3 days; 100% of visits resulted in predation). In total, western scrub-jay presence translated to predation activity in 3 of 4 locations.

Blue jays visited 2 nests, and both visits were at points where they were **not** observed during point counts (Fig. 5). This suggests that the blue jays were more widespread than our point counts indicated. This also suggests that blue jays were not very interested in nests, since they were present at a total of 7 points but only visited nests at 2 locations. In terms of predation activity, a blue jay removed 1 egg from 1 nest (time to predation 6 days; 50% of nest visits resulted in predation). In sum, blue jay presence translated to predation activity in 1 of 7 locations.

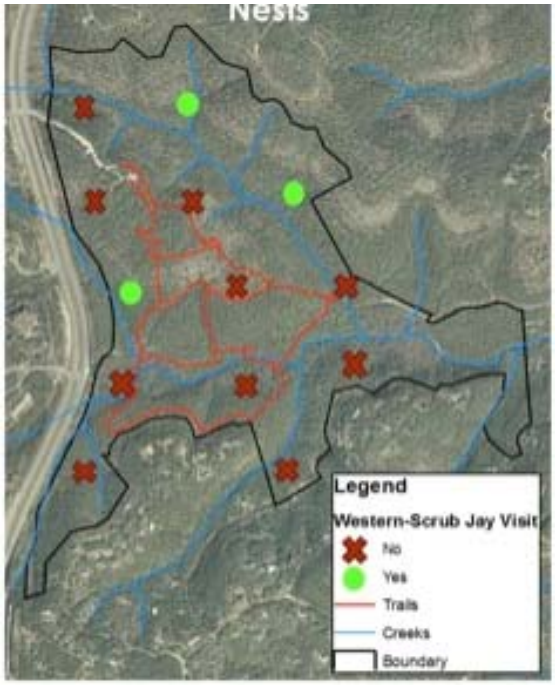

Figure 5. Western scrub-jay visits to nest

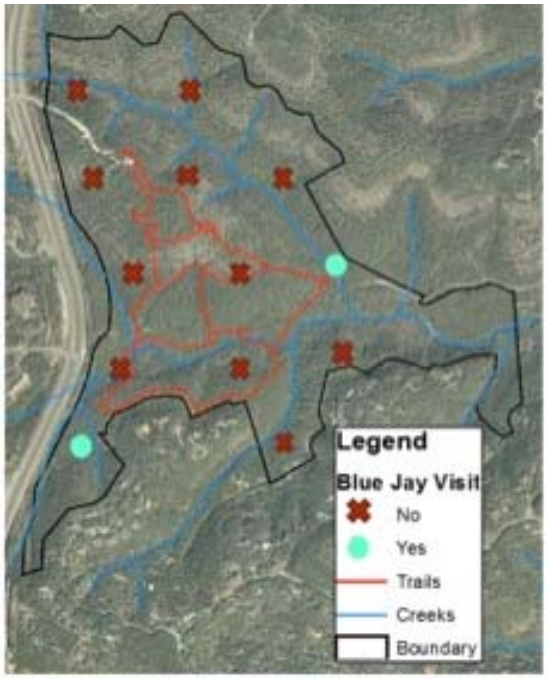

Figure 4. Blue jay visits to nest

These results suggest that the "urban predation paradox" may be occurring in this urban preserve, at least for blue jays which are considered an "urban adapter" species (McKinney 2002). Blue jays were more widespread across the preserve than were scrub jays, yet they visited the nests less often than we would expect based on their distribution. In locations where we observed blue jays, they didn't necessarily visit nests, and even when they did visit nests, they didn't actually remove an egg. This disconnect between blue jay presence and predation activity may be a result of blue jays feeding on anthropogenic resources in nearby urban land uses, rather than feeding on traditional prey sources.

On the other hand, western scrub-jays were observed in interior parts of the preserve and are considered "urban avoiders." They visited nests at locations that we found them during point counts. In each case, a visit to the nest ended with both eggs being removed (n=3). With the

western scrub-jays, we are seeing a typical relationship between presence and predation activity (unlike the decoupled relationship we saw for the blue jays).

PROJECT STATUS

St. Edward's University student Bethany Davidson presented the findings from this research at the NSF-CASAR/TG/Keck Summer 2015 Research Symposium in June 2015. We might expand the study to include additional sites in 2016, depending on funds and scheduling.

LITERATURE CITED

Fischer, J.D., S.H. Cleeton, T.P. Lyons, and J.R. Miller. 2012. Urbanization and the predation paradox: The role of trophic dynamics in structuring vertebrate communities.

Marzluff, J.M. and A.D. Rodewald. 2008. Conserving biodiversity in urbanizing areas: Nontraditional views from a bird's perspective. Cities and the Environment 1(2): Article 6, 27 p.

McKinney, M.L. 2002. Urbanization, Biodiversity, and Conservation. BioScience 52(10): 883-890.

Ralph, C.J., T.E. Martin, G.R. Geupel, D.F. DeSante, and P. Pyle. 1993. Handbook of field methods for monitoring landbirds. General Technical Report PSW-GTR-144-www. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 41 p.

Reidy, J.L., M.M. Stake, and F.R. Thompson. 2008. Golden-cheeked warbler nest mortality and predators in urban and rural landscapes. The Condor 110(3):458-466.

Rodewald, A.D., L.J. Kearns, and D.P. Shustack. 2011. Anthropogenic resource subsidies decouple predator-prey relationships. Ecological Applications 21(3):936-943.

Shochat, E., Warren, P.S., Faeth, S.H., McIntyre, N.E., Hope, D., 2006. From patterns to emerging processes in mechanistic urban ecology. Trends in Ecology & Evolution 21:186–191.

Stake, M.M., J. Faaborg, and F.R. Thompson III. 2004. Video identification of predators at golden-cheeked warbler nests. Journal of Field Ornithology 75:337-344.

Stracey, C.M. 2011. Resolving the urban nest predator paradox: The role of alternative foods for nest predators. Biological Conservation 144:1545-1552.

U.S. Fish & Wildlife Service. 1992. Golden-cheeked Warbler (Dendroica chrysoparia) Recovery Plan. Albuquerque, New Mexico. 88 pp.

Other summary data – quantifying predator activity within GCWA habitats:

We had 12 nests with records on whether eggs were removed or not:

- BLJA - 1 egg from 1 nest (time to predation: 6 days)
- WSJA - 2 eggs each from 3 total nests (time to predation: 1-3 days)
- Squirrel - 2 eggs from 1 nest (time to predation: 3 days)
  Unidentified - 1 egg missing from 1 nest; no camera record of removal
- **6/12 total nests had egg removal during the 1 week study period**

We also had video data for 11 nests, where we quantified "nest activity" in terms of whether BLJA, WSJA, or squirrels visited the nests. Here are those totals:

- BLJA - visits to 2 nests (50% of visits resulted in predation)
- WSJA - visits to 3 nests (100% of visits resulted in predation)
- Squirrel - visits to 2 nests (50% of visits resulted in predation)
- **6/11 total nests with video had visits from one of these 3 species**