

ENHANCEMENT OF KACHINA WETLANDS FOR WILDLIFE AND ENVIRONMENTAL EDUCATION

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Kachina Wetlands consists of approximately 100 acres of land that is owned and managed by Kachina Village Improvement District (KVID) for the storage and evaporation of treated wastewater. KVID also allows the public to visit the site, and it has become a popular place for walking, bicycling and bird watching. This presentation describes historic and current habitat enhancement work that has been performed at the wetlands and how that work mobilized individuals from several communities and organizations. Recent grants have enabled the promotion of environmental education, weed abatement, and the establishment of a pollinator garden. The current eBird tally for this area is 233 species, over half of which are wetland-associated.

BARK THICKNESS IS RELATED TO HAIRY WOODPECKER EXCAVATION OF PREY IN NORTHERN ARIZONA PONDEROSA PINE FORESTS

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Woodpeckers are important forest species, creating habitat for a diversity of animals by excavating nest cavities, and aiding in the control of the forest pests on which they feed. The need to better understand the ecology of umbrella and keystone species, such as woodpeckers, in threatened environments is increasing as Global Environmental Change and human population growth exacerbate the current forest loss rate of 0.6% per year. In the Coconino National Forest in northern Arizona, Hairy Woodpeckers excavate for food in live and healthy Ponderosa Pines (*Pinus ponderosa*) ~27 times more per available tree area in forests growing on young and coarse cinder soils than in forest growing on older and finer soils. Using data collected at 3 sites on coarse and 3 on fine soils, we investigated two hypotheses to explain why birds use coarse soil sites more than fine soil sites: I) there are fewer large-diameter trees available, thus increasing the use of each available tree, II) tree characteristics that potentially affect woodpeckers and their wood-boring prey differ between the two forest soil types. Hypothesis I was not supported, with no relationship existing between tree use and available tree-area per bird (n=6 sites, $\beta=-16.9$, $p=0.16$). Hypothesis II was supported. Phloem and bark thickness were both significantly smaller (~3mm, n=110; phloem $t_{107}=2.57$, $p=0.01$; bark $t_{104}=1.94$, $p=0.05$, respectively) in used trees vs. unused trees, with bark thickness being strongly correlated with use at unstressed sites ($r=0.71$, $p<0.001$).

A MULTI-SCALE FRAMEWORK FOR ASSESSING POTENTIAL CONFLICT OF WIND ENERGY DEVELOPMENT FOR GOLDEN EAGLES IN ARIZONA USING RANDOM FORESTS

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The demand for renewable energy has been rising in recent decades and wind power is the fastest growing clean energy source. The cost of wind power facility development has been reduced considerably, making wind power a feasible option to reduce harmful emissions while providing affordable electricity. Nonetheless, because ideal locations for wind power projects can potentially coincide with key habitats of wildlife species, there is a growing concern about the impacts of increasing construction of wind facilities can have on wildlife, especially on avian species that are susceptible and vulnerable to wind turbine collisions. We describe a multi-scale optimization modeling approach to assess potential conflict with wind turbine placement in wildlife habitat. Additionally, we demonstrate the application of the approach to prioritize conservation and management efforts for the Golden Eagle (*Aquila chrysaetos*) in Arizona as an example. We establish how the approach can help to identify economically feasible sites for wind turbine placement while minimizing conflict within nesting habitat of the Golden Eagle. The approach explained here provides a conceptual and quantitative framework for evaluating potential conflicts with wind power development on other wildlife habitats while acknowledging the need for renewable wind energy and providing practical solutions for such developments.

WESTERN YELLOW-BILLED CUCKOOS IN THE SKY ISLANDS OF SOUTHEASTERN ARIZONA: A WATERSHED PERSPECTIVE

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In recent years, Yellow-billed Cuckoos (*Coccyzus americanus*) have been observed in many upland ephemeral drainages in the mountains and foothills of southeastern Arizona, though little data exists on their breeding status in these atypical habitats. If most of these cuckoos are breeding, this newly discovered population could have important implications for species recovery. Leveraging enormous citizen science contributions and multi-organizational collaboration, we evaluated cuckoo breeding status and distribution in a subset of the Sky Islands mountain ranges, sampling over 80 drainages along elevational and habitat gradients. Over two field seasons, breeding was documented in most drainages where cuckoos were detected, and in most habitat types sampled. However, cuckoos did vacate some sites after stop-overs, particularly in highest elevation and sparsely vegetated field sites. These results indicate that the Sky Islands contain important breeding and migratory habitat much different than that of typical cottonwood-willow riparian woodlands, and that conservation measures for Yellow-billed Cuckoos should take place on a watershed scale. Preliminary analyses of biogeographic patterns of cuckoo occupancy will be presented, with an emphasis on the Santa Cruz River watershed. An assessment of citizen scientist contributions will also be discussed, highlighting the importance of volunteerism and collaboration in conservation research.

LANDSCAPE CHARACTERISTICS OF MONTEZUMA QUAIL HABITAT USE IN SOUTHEAST ARIZONA

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Montezuma quail (*Cyrtonix montezumae mearnsi*; MOQU) habitat use at second and third-order scales has remained unexamined historically due to limited or lack of mark-recapture and telemetry studies. Existing habitat-use models derived in GIS thus lack the accuracy needed for conservation of this species where management actions for its habitat are concerned. We evaluated landscape characteristics of MOQU habitat use in southeast Arizona using georeferenced locations in 3 study sites combined from flush-surveys and radio-telemetry. We used logistic regression to evaluate a combination of 61 landscape variables in a model to examine components MOQU were selecting when comparing actual to random locations. Landscape characteristics evaluated include elevation, aspect, ruggedness, and major Gap Analysis Program (GAP) vegetation associations. Our analysis revealed that quail use other vegetation types more so than Madrean oak woodlands and Encinal Mixed Oak, where they are typically expected to occur. Populations at the Appleton-Whittell Research Ranch (AWRR) predominantly used Semidesert-Mixed Grass, dominated by Sacaton (*Sporobolus wrightii*) bottomlands, even when the Encinal Mixed Oak vegetation type was available within their immediate range. Where *Sporobolus* was absent from a population's range, quail selected for Encinal Mixed Oak rather than more open grasslands. Elevation, ruggedness, and the interaction of these are significant components for Hog Canyon, whereby quail selected for high elevation and more rugged topography. At AWRR, elevation was a significant component for the time-independent and all time-dependent tests, but ruggedness was only significant for time interval 2 (1100–1459 hours) and interval 3 (1500–1859 hours).

PINYON JAY PRESENTATION - TBA

POSTERS

URBAN BURROWING OWL NEST ORNAMENTATION IN LAKE HAVASU CITY, AZ
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Burrowing owls in Lake Havasu City scatter paper and other litter, as well as domestic dog waste in front of their nests. Their ornamentation behavior has been studied previously in several locations in Western North America, however the only hypothesis with some support is that birds are marking their nests with items so the sites won't be selected by other owls. Research on Black Kites that exhibit nest ornamentation showed higher productivity at nests with more litter, suggesting there might be a relationship between bird status, fitness and nest productivity. We monitored 24 nests in urban/suburban Lake Havasu in spring 2019 and hypothesized that there would be a relationship between ornamentation and productivity. We documented the number of fledgling birds at each nest, the number of individual items, number of different types of items and percent cover of items present early in nesting season. We used the 21 successful nests in analysis. The mean number of juveniles was 5. The average number of items used was 42 with an average of 5.7 different types. The most used item was domestic dog feces and 3 nests

had over 100 items. We did not find a significant relationship between the number of fledglings and any category describing ornamentation activity. We suspect this may be due to lack of variation in the number of juveniles at each nest this year. A relationship may be determined with greater sample size or the ornamentation behavior may not be a factor influencing productivity when appropriate habitat and resources are abundant.

LUCY'S WARBLER NESTBOX EXPERIMENT

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The Lucy's Warbler (*Oreothlypis luciae*) is North America's smallest cavity nesting bird and is a secondary cavity nester. It is intricately tied to mesquite trees (*Prosopis* spp) for foraging, so much so that it has previously been called the Mesquite Warbler. However, the reduction in groundwater levels has resulted in die offs of entire stands of these native trees. Wood from large mesquites is also commercially valuable and results in substantial harvest from the few locations where they still manage to grow. With the reduction in the mesquite-based obligate habitat has come a concurrent reduction in the population of Lucy's Warblers. Part of this reduction is due to overall loss of habitat affecting the availability of suitable nesting cavities. Could nestboxes be a conservation tool for this species? Tucson Audubon's Lucy's Warbler Nestbox Project centers on breaking down the long-held notion that Lucy's Warblers will not use nestboxes. Tucson Audubon set out to prove that it is all a matter of finding the right design. Learn about our multi-year experiment of creating 8 different nestbox designs installed at 60 points in Lucy's Warbler habitat in southeast Arizona to identify the preferred nestbox design. With the tremendous support from the public with construction, installation and monitoring of these boxes, we have narrowed down the winning design: the triangle nestbox, which mimics the natural nests in peeling bark of mature mesquite trees.

FLAGSTAFF KESTREL PROJECT - INTEGRATING COMMUNITY INTO CONSERVATION

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The Flagstaff Kestrel Project (FKP) is integrating community into conservation. Driven by scientific inquiry, FKP seeks to understand the best practices for engaging laypeople into conservation work while concurrently creating a long-term monitoring program for American kestrels in Northern Arizona. This research will have wide ranging implications for other communities that wish to become involved in conservation efforts. FKP is working to create and strengthen community, contribute to scientific research, furnish participants with experience in field biology, and create nesting habitat for a declining species of falcon.

ASSESSING THE FEASIBILITY OF USING CITIZEN SCIENCE FOR SONGBIRD MONITORING TO EVALUATE FOUR FOREST RESTORATION INITIATIVE TREATMENT EFFECTS

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The Four Forest Restoration Initiative (4FRI) is a Collaborative Forest Landscape Restoration Program that demonstrates shared stewardship within the state of Arizona spanning 4 National Forests (Coconino, Kaibab, Apache-Sitgreaves, Tonto). Because of the large spatial extent of this effort, and consequent potential for proposed treatments to impact large areas, it is crucial to understand how those treatments affect native wildlife. The 4FRI Multi-party Monitoring Board selected songbirds to monitor treatment effects because they are excellent ecological indicators due to their linkages to specific resources based on foraging and nesting requirements, and multiple species can be monitored simultaneously, reducing costs. Monitoring objectives include: (1) evaluating songbird community metrics of species richness, species evenness, community dynamics, and multi-scale occupancy for all species in the community within project areas and across the region of the Coconino and Kaibab National Forests; (2) evaluating multi-scale habitat relationships with abundance of select songbird species with respect to treatment effects. Successfully monitoring songbirds within the 4FRI treatment areas in an era of shrinking federal budgets will require innovative, cost-efficient approaches. Citizen science may offer an opportunity to reduce monitoring costs while increasing public interest in songbirds and forest restoration, but the feasibility of incorporating citizen scientists in this effort is currently unknown. We present plans for a pilot study to provide the data necessary to rigorously evaluate the feasibility of using citizen scientists in songbird monitoring within the 4FRI area.

SPATIAL PRIORITIZATION FOR ENDANGERED YUMA RIDGWAY'S RAIL HABITAT ON THE GILA RIVER IN MARICOPA COUNTY, ARIZONA

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The Yuma Ridgway's Rail (*Rallus obsoletus yumanensis*) is a subspecies of the Ridgway's Rail (*Rallus obsoletus*) that can be found in freshwater marsh habitats along the lower Colorado River, the Gila River, and the Salton Sea. However, due to the disappearance and deterioration of their habitats, they are listed as a federally endangered species. Emergent marsh habitats on the Gila River near Phoenix are in small patches and not adequately mapped. Because of changing land uses and water regimes on the Gila River west of Phoenix and above Gillespie Dam, a need exists for more accurate identification of emergent marsh. Although a predictive occupancy model exists and was considered for use by the project team, there were important habitat details lacking. Audubon Arizona initiated a habitat suitability project using Geographic Information Systems technology as the main tool for building a localized preliminary habitat model. This poster presentation expands on the development and workflow of refining the model, as well as the development of a field survey protocol compatible with the North American Marsh Bird Survey Protocols for verifying habitat features.