

Seasonal Dietary and Behavioral Analysis of Rewilded Western Burrowing Owls (*Athene cunicularia hypugaea*) at the ASU Polytechnic Campus

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Background

The Western Burrowing Owl (*Athene cunicularia hypugaea*) is one of two subspecies of Burrowing Owls present in North America. Located on the west coast of the US and Canada and standing at an average of 19-25 cm, Burrowing Owls are characterized by prominent yellow eyes and a bobbing motion when scanning for other inhabitants. Contradictory to the majority of owl species, Burrowing Owls are most active during the day, although similarly to other owls, Burrowing Owls are altricial due to the offspring requiring extensive parental support to aid in proper development. A prominent difference between Burrowing Owls compared to other raptor species is the preference the Burrowing Owls have to reside underground in semi-arid and arid grasslands, agricultural fields, or sparsely vegetated and well-drained regions. The owls are classified as open-area specialists due to the specific needs this species requires to survive in a habitat.

The regions that the Burrowing Owls prefer are subjected to rapid development, which subsequently alters the composition of an ecosystem and causes habitat loss and fragmentation, promoting population declines. Within this habitat, Burrowing Owls rely on fossorial mammals, found in the Sciuridae family - i.e., prairie dogs and ground squirrels - to form natural underground structures and to serve as an energy source in the owl diet, leading to a significant overlap between the Burrowing Owl and the Sciuridae family range. Despite the formidable reliance the Burrowing Owl has on the dens of fossorial mammals, the owls are capable of inhabiting natural rocky crevices or artificial structures found in urbanized regions (i.e., golf courses, along canals, or on campuses) [2]. While the Burrowing Owls are capable of inhabiting ranges outside of the Sciuridae habitat, a reduction in prairie dog populations has correlated with a historic reduction in Burrowing Owl populations. The overlap between the bird of prey and Sciuridae family fosters a symbiotic relationship, however this relationship predisposes the owls to anthropogenic influences including extermination efforts - poisoning and pesticide use - intended for the fossorial mammalian 'pests'.

Further habitat alterations have occurred due to land mismanagement and a heightened disease prevalence.

In May 2021, ASU and Wild at Heart raptor rescue introduced four Burrowing Owls onto the Polytechnic campus in an effort to gain an understanding of the conditions needed to aid in the species survival.



Fig 1. Burrowing owl resident at the ASU Polytechnic campus



Introduction

Rapid urbanization and the subsequent habitat loss of Western Burrowing Owls (*Athene cunicularia hypugaea*) has prompted conservation efforts focused on rewilding programs. Rewilding is the conservation of a portion of the ecosystem - whether vegetative, prey, or predator related - to facilitate the recovery and natural regulation of a region - with as little human influence as possible in regards to the management of the species composition of an ecosystem. The ability of the Burrowing Owl to inhabit a mosaic of ecosystems, including highly urbanized areas, is due in part to the avians' opportunistic feeding strategy which allows the owl to extract a variety of prey, ranging from the Insecta, Rodentia, Amphibia, and Reptilia classes. The ability to consume a variety of prey allows the diet of the owl to differ seasonally and offers a method of examining foraging rates in wild and rewilded individuals, as well as provides an insight into the capability of the Burrowing Owl to survive in an artificial or anthropogenically altered environment. The Burrowing Owl diet is examined through pellets - undigested, regurgitated prey remains - that are deposited from the gizzard. The texture and composition of the pellet can vary but typically contains high and variable amounts of insects (i.e. Coleoptera and Orthoptera), bits of fur, feathers, bones, and claws.

Objectives

- Provide an understanding of the dietary differences in rewilded and wild Burrowing Owl populations; determine prey frequencies
- Examine the nutritional input and justify feeding behaviors through trail camera footage
- Categorize species frequency under a seasonal lens to provide an outline for a biological calendar that the owls may rely on throughout the year for survival given specific ecological factors

Methods

- Pellet collection and dissection; further analysis performed with dichotomous key
- Analyzes trail camera footage to review species interactions
- Calculate prey frequency throughout months to determine seasonal changes

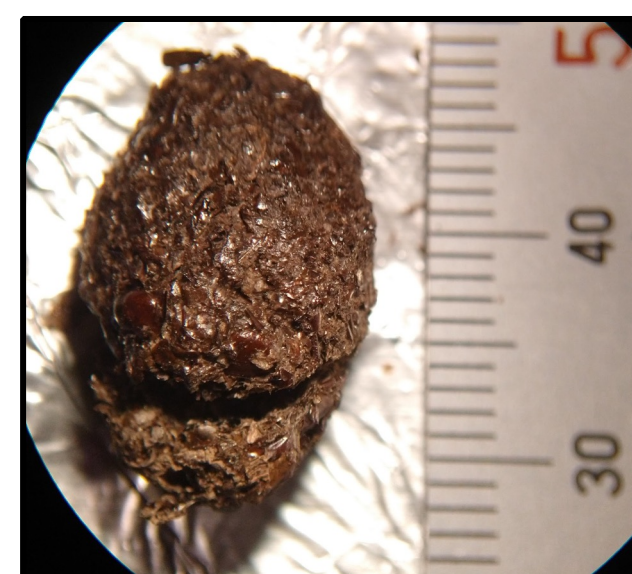


Fig 2. Burrowing owl pellet (mm)

Preliminary Findings

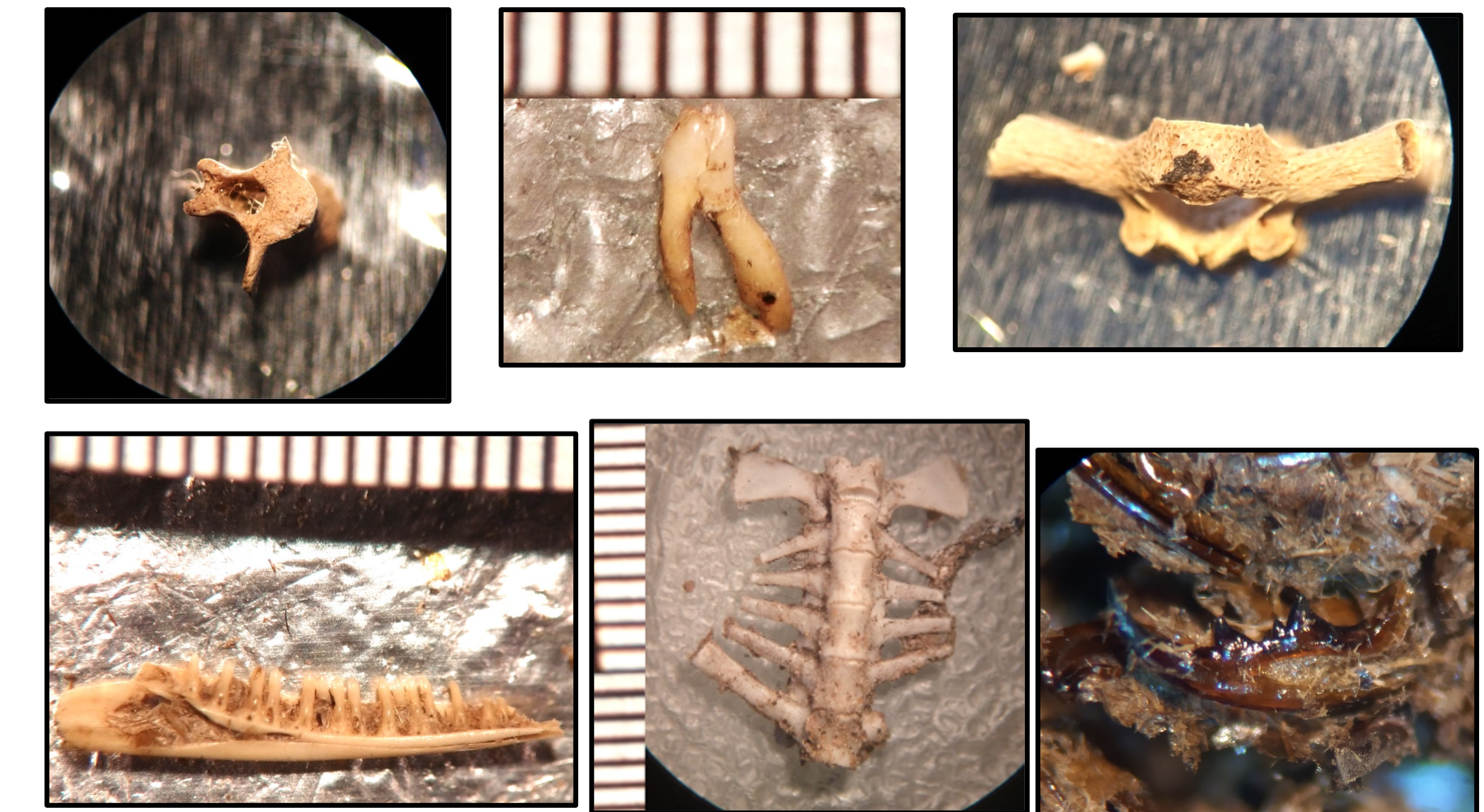


Fig 3. Burrowing owl pellet and prey remains (mm); vertebrae (top left and top right), rodentia molar (center), reptilian mandible (bottom left), anura spine (bottom center), insect mandible (bottom right)

Preliminary results have shown presence of reptilia and amphibia within the Burrowing Owl diet sooner than theorized. While only thirty-six samples - or eighty-one pellets - out of approximately ninety-three samples have been dissected and analyzed further, the frequency of samples found at a burrow location and the frequency of prey types found in the pellets on the site allow for an understanding of the prey species habitat use in conjunction with the habitat use of Burrowing Owls. Based on pellet findings, Burrowing Owls relied on burrow locations five, seven and eight the heaviest through the duration of the year. The owls actively avoided burrow one through four.

In correlation with previous studies, insects are the primary component in the Burrowing Owl diet, although significant use of rodentia species has been identified in early March. In the total dissected and analyzed portion of the samples, there is a total biomass of 113.15 grams, with bones comprising an approximate 12.6% of the diet. In early March, an increase of 2.3% was observed in bones collected from pellets and prey

Literature Cited

[1] Duarte A.M, C.J. Conway, G.F. Holroyd, H.E. Valdez-Gomez, M. Culver. 2019. Genetic Variation among Island and Continental Populations of Burrowing Owl (*Athene cunicularia*) Subspecies in North America," *Journal of Raptor Research* 53(2): 127-133
[2] Klute, D. S., L. W. Ayers, M. T. Green, W. H. Howe, S. L. Jones, J. A. Shaffer, S. R. Sheffield, and T. S. Zimmerman. 2003. Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States. U.S. Department of Interior, Fish and Wildlife Service, Biological Technical Publication FWS/BTP-R6001-2003, Washington, D.C.