A baseline assessment of migratory and resident bird use of a prairie restoration site in eastern Washington

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Introduction

- Grasslands (including prairies) among the most threatened ecosystems on earth, largely due to agriculture, fossil fuel extraction, and climate change (Correll et al. 2019)
- Losses to grassland flora led to concomitant losses in fauna. For example, grassland birds have declined by 50% since the 1960s (Sauer et al. 2015)
- Extensive losses of native prairie in eastern Washington led Eastern Washington University (EWU) to established the Prairie Restoration Project on campus
- We assessed bird use of the EWU restoration site (Fig. 1) before restoration, and a comparison site consisting of native prairie, as indicator species of ecosystem health
- Our study helps inform future restoration efforts on the benefits and outcomes of restoring native grasslands locally, and worldwide.

Objectives

1) Assess bird abundance and diversity at EWU Prairie Restoration Site to be used to monitor progress during, and after, restoration

2) Assess bird abundance and diversity at a nearby intact prairie site to inform goals for restoration efforts at EWU

Study Sites

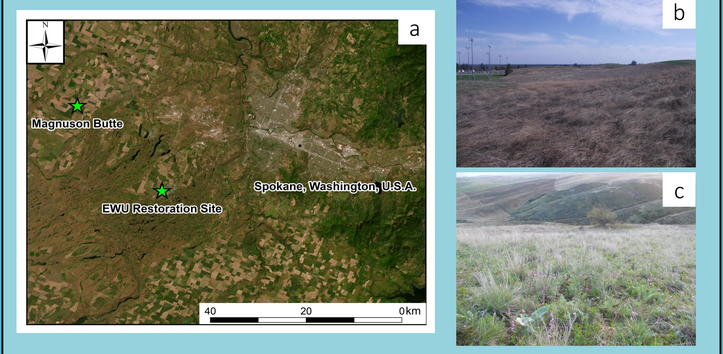

Figure 1. Map (a), and pictures of the ~5-ha EWU restoration site (b) and more-intact native prairie site (Magnuson Butte, a 20-ha preserve managed by The Nature Conservancy; c) near Spokane, Washington

Figure 2. Vesper Sparrow (left) was the most-common species detected at Magnuson Butte. Savannah Sparrow (right) was uncommon at Magnuson Butte, but the most-abundant species found at the EWU Restoration Site.

Methods

Data collection:

- Surveyed birds for 1-hr on 3 mornings beginning at sunrise using line-transect method (Burnham et al. 1980)
- Used auditory and visual cues to identify and count birds along one 250-m transect at each site 3 times between 19 Apr – 4 May, 2023

Data analysis:

- Estimated species richness (number of species present) at each site
- Diversity estimated using Shannon-Wiener Diversity Index with vegan package (Oksanen et al. 2022) in R statistical software (R Core Team 2023)
- Distance analysis (Miller et al. 2019) used to derive estimates of bird density
- All species detected during surveys included in diversity analysis, but only species detected during ≥2 of the three surveys used in Distance analysis

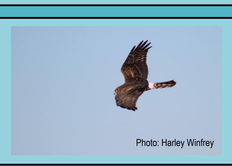

Figure 3. A pair of Northern Harriers (left) were observed displaying courtship behavior at Magnuson Butte. American Goldfinch (right) regularly-detected at Magnuson Butte, but absent from EWU Restoration Site despite being an urban-adapted species.

Table 1. Species detected at EWU Prairie Restoration Site and Magnuson Butte Preserve from 19 Apr-4 May, 2023.

Common name	Scientific name	EWU Restoration Site	Magnuson Butte
American Goldfinch	Spinus tristis		x
American Robin	Turdus migratorius	x	x
Black-billed Magpie	Pica hudsonia		x
Black-capped Chickadee	Poecile atricapillus	x	
Brewer's Sparrow	Spizella breweri		x
California Quail	Callipepla californica	x	
Chipping Sparrow	Spizella passerina		x
Dark-eyed Junco	Junco hyemalis		x
Gray Flycather	Empidonax wrightii		x
Gray Partridge	Perdix perdix		x
Great-horned Owl	Bubo virginianus		x
Hermit Thrush	Catharus guttatus		x
House Wren	Troglodytes aedon		x
Mourning Dove	Zenaida macroura		x
Northern Harrier	Circus cyaneus		x
Red-winged Blackbird	Agelaius phoeniceus		x
Ring-necked Pheasant	Phasianus colchicus		x
Ruby-crowned Kinglet	Regulus calendula		x
Savannah Sparrow	Passerculus sandwichensis	x	x
Say's Phoebe	Sayornis saya		x
Vesper Sparrow	Pooecetes gramineus		x
Western Meadowlark	Sturnella neglecta		x
White-crowned Sparrow	Zonotrichia leucophrys	x	x
Yellow-rumped Warbler	Setophaga coronata		x

Results

- Detected 108 birds belonging to 24 species
- Species richness substantially greater at Magnuson Butte vs. EWU (Table. 1)
- Shannon-Wiener Diversity Index at Magnuson Butte vs. the restoration site was 2.68 vs. 0.95, respectively (Fig. 4)
- Bird density ~3 times greater at Magnuson Butte vs. the restoration site (Fig. 5)

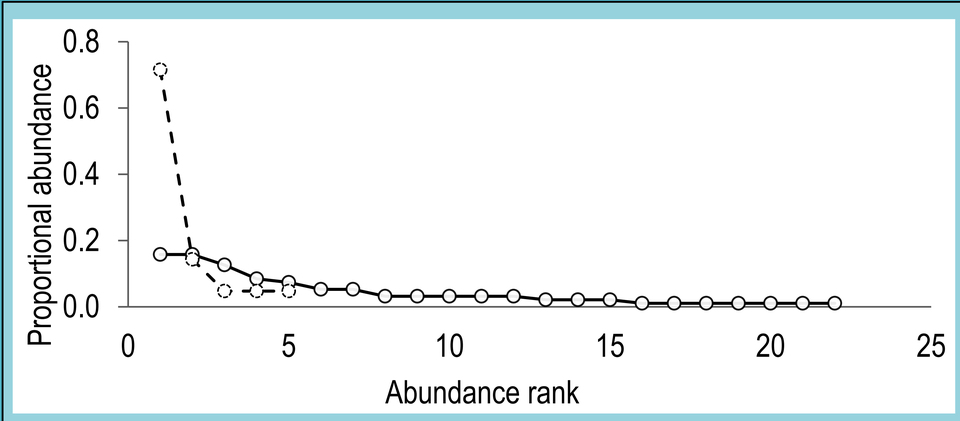

Figure 4. Rank Abundance Curve depicting proportional abundance vs. abundance rank for 5 species detected at the EWU Restoration Site (dashed line) and 22 species detected at Magnuson Butte (solid line) during line transect surveys.

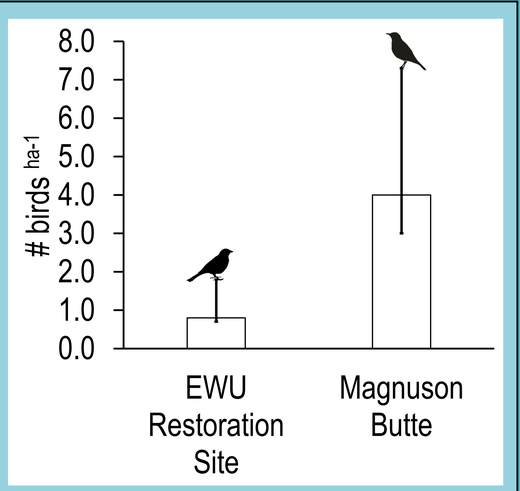

Figure 5. Estimates of bird density +/- 95% CI at EWU Restoration Site vs. Magnuson Butte Preserve. Few preliminary data show large CI values.

Discussion

- Our study provides the first quantitative assessment of bird abundance and diversity at Magnuson Butte and EWU Restoration Sites
- Magnuson Butte apparently important migratory and breeding bird habitat, with at least nine species detected using the site as stopover habitat
- Magnuson Butte diversity and abundance may serve as a gauge by which to monitor community recovery post-restoration at EWU site, but EWU site size and plant community might yield a somewhat-different bird community

Future Research

- Four more surveys planned in May to increase sample size
- Will also document evidence of breeding at each site
- Will assess insect diversity and abundance at each site, and relationship with bird use

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