Community Science and the Ecological Merits of Backyard Habitat Patches and Adjacent Green-Spaces for Urban Avian Species

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BACKGROUND

- Structurally complex environments like Backyard Certified Habitats in the Portland neighborhood Hillsdale, OR are used by a subset of avian species and may improve overall functional connectivity.[1]
- The preservation of backyards and their adjacent green-spaces are crucial in the long-term persistence of native bird assemblages, however urban conservation efforts have focused on native green-spaces, not backyards.[2]
- Avian richness models show urban avoider species are preserved by reducing nonnative land cover and maintaining canopy closure in adjacent green-spaces (Fig 1).[3]
- Community science provides an opportunity for Backyard Certified residents to provide their own unbiased data to aid in the monitoring of bird populations.[4]
- The ecological effects of backyard networks on avian abundance and species richness have not been adequately studied.

Fig 1. Examples of urban avoider species: western tanager (left) and black throated gray warbler (right)

OBJECTIVES

1) Evaluate the influence of green-space proximity on Backyard Certified Habitats (collaboration of the Audubon Society of Portland and Columbia Land Trust) on avian abundance and species richness.
2) Develop a framework for an urban backyard habitat community science program that consists of workshops, interactive training, and project specific curriculum.

METHODS

- Avian point counts (50m radius) were conducted in 5 certified backyards (n=1 per yard) and the Keller Woodlands (green-space) (n=6) in Hillsdale, OR. Surveys were conducted April through June 2016.
- Two community science workshops were held at the beginning and end of the project.
- Avian abundance, species richness, and community analyses were conducted in R Studio version 1.0.143
- Tree canopy (2014) was quantified using ArcGIS version 10.4.1.5686, data and map courteously of Oregon Metro Data Resource Center.
- Knowledge of local backyard habitat research and avian food-webs was evaluated among certified residents by distributing a survey after the initial workshop.

RESULTS

- Avian abundance and richness was not statistically different when in close proximity to Keller Woodlands (green-space) ($p>0.05$) (Fig 2, Fig 3).
- Backyard 3 had the greatest abundance with a mean of 15.8 birds and Backyard 2 had the greatest species richness with a mean of 12.1 (Fig 2).
- Keller (S10) and Backyard 1 (S1) were most similar in species community analysis (Fig 4).
- Canopy was the highest (150-180ft) in backyards closest to the green-space (1, 2) (Fig 5).
- Black throated gray warbler, an urban avoider species, had greater abundance in Keller Woodlands and Backyards 1 and 2 (Fig 6).

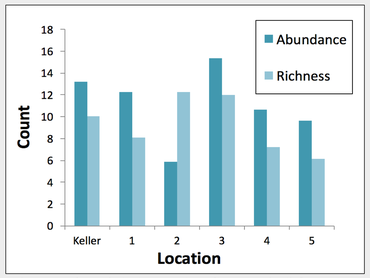

Fig 2. Backyards in increasing distance (mi) from Keller Woodlands and the mean abundance and richness for the backyards and Keller Woodlands.

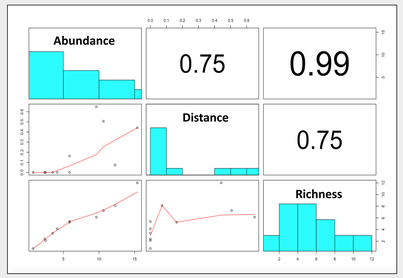

Fig 3. Coefficient matrix with non-normal, skewed distributions in the histograms and high relatedness in the coefficients and scatterplots.

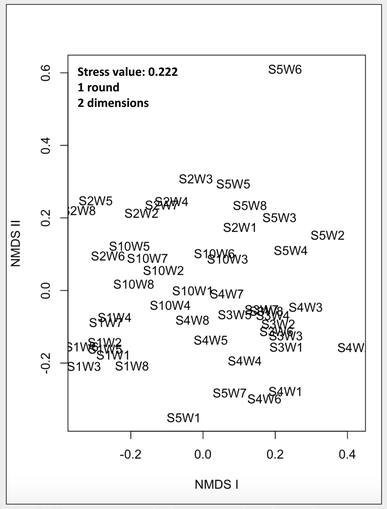

Fig 4. Non-metric multidimensional scaling schematic representing avian species in backyards (S1-S5) and Keller Woodlands (S10). S=location, W=week (1-8).

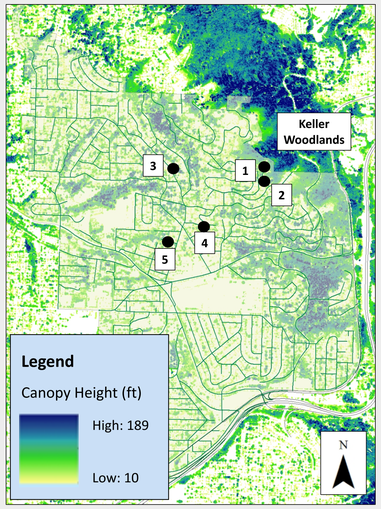

Fig 5. GIS display of tree canopy in the neighborhood Hillsdale, OR. Backyards (1-5) are labeled in increasing distance from the green-space.

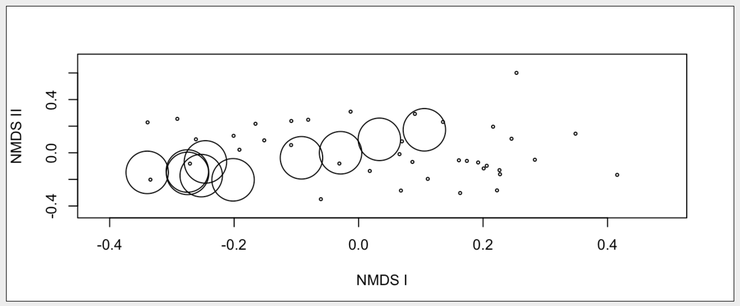

Fig 6. Species abundance bubble plot of black throated grey warbler based on the NMDS plot. The dot size increases with abundance.

RESULTS (cont.)

- 71.43% of certified residents ranked their primary goal as, "To gain a greater appreciation for the environment and ecology of the organisms present in my backyard" (Fig 7).

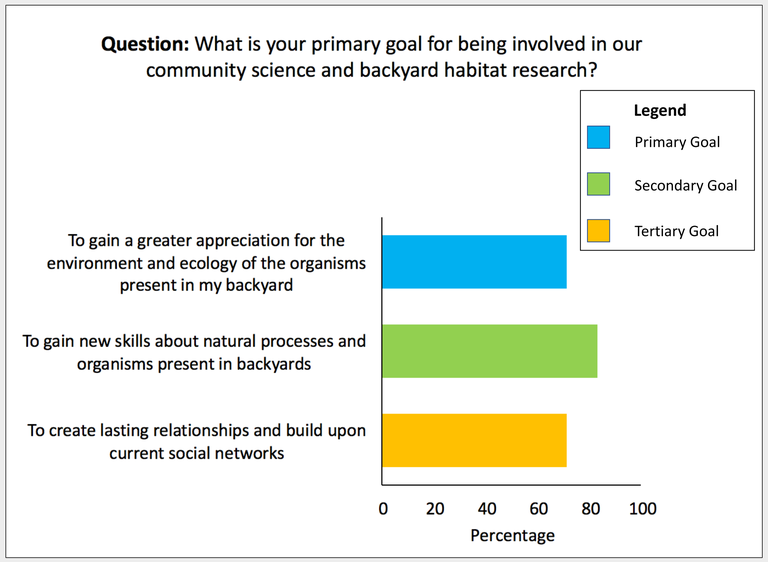

Fig 7. The goals of certified residents (n=8) that participated in the community science and backyard habitat research affiliated with this project.

CONCLUSIONS

- Variables that affect avian abundance and species richness such as diversity in vegetation species, structure, canopy, and diameter at breast height should be studied concurrently in green-spaces and certified backyards.
- In addition to large green-spaces, smaller green-spaces with substantial canopy may serve as important population sources and may result in an increase of native, avoider species.
- Food-web and predator prey studies using manipulative experimentation in addition to point count surveys are advised.
- We recommend using half-circle point counts (50m radius) in small yards for training ease during future surveys. Highly interactive, communicative, and in-depth workshops are also necessary to achieve the desired learning outcomes.

WORKS CITED & ACKNOWLEDGMENTS

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