

The Effect of Fire on Avian Communities

A Ph.D. Dissertation Prospectus

by

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The ecological literature is rife with studies detailing the effects of disturbance on ecological communities. However, few attempts have been made to synthesize the results of individual studies to elucidate general patterns and trends of how communities respond to disturbance. This is despite the fact that theories of how disturbance may affect such community properties as species diversity or richness abound.

Studies of the effect of fire on avian communities are especially numerous, owing largely to the prevalence of fire, both natural and man-made (i.e., the practice of prescribed burning in wildlife management and forestry), and the fact that birds, in many ways, can be considered an ideal study organism; i.e., they are extremely sensitive to spatio-temporal changes in the environment, they provide a simultaneous assessment of a variety of ecosystem attributes due to their use of a diverse array of resources, and they are easily studied, using well-established and easily replicated protocols.

For my dissertation, I thus propose an investigation of the effect of fire on avian communities. This investigation will take place in up to three phases. In the first phase, I will construct a database of existing studies investigating the effects of fire on avian communities. In the second phase, I will synthesize and critically evaluate past methodologies, metrics, and knowledge in this area of investigation. In the last phase, I will then conduct selected meta-analyses on all or part of the data to elucidate broad response patterns.

Phase I: Database construction

In this phase, I will compile a database of literature on the effects of fire on avian communities. To this end, I will search relevant bibliographic databases, such as BIOSIS, Digital Dissertations, Ecology Abstracts, Forest Science Info, and Wildlife Worldwide, using the search string “(bird* or aves or avian) and (burn* or fire* or wildfire*)”. Citations retrieved through this

search will be evaluated individually to separate out spurious citations. All retained citations will then be entered into an electronic database. A hardcopy of each citation will be procured and kept on file. This phase of the project will culminate in an annotated bibliography, published by the United States Geological Survey as a technical report, which will summarize and index the existing literature of fire effects on avian communities.

Phase II: Synthesis and critical evaluation of the existing literature

This phase of the project will focus on answering 4 questions:

1. Why do we study the effect of fire on avian communities?—i.e., what reasons have authors of past studies provided to justify their research, and are these reasons valid in light of ecological theory?
2. What methodological approaches have we used in assessing the effect of fire on avian communities?—i.e., what experimental designs and statistical analyses have been used by authors of past studies, and are they appropriate in providing valid and strong inference? If not, what better approaches could or should be taken?
3. What metrics have we used in assessing the effect of fire on avian communities?—i.e., how have authors of past studies measured “effect”? Are measures currently in use appropriate, and if not, what better measures could or should be used?
4. What is the current state of our knowledge regarding the effect of fire on avian communities?—i.e., can the current body of literature of fire’s effect on avian communities be summarized in a fairly simple story, or are the results of individual studies conflicting?

I strongly believe that these questions need to be answered, both to satisfy my own curiosity, and to provide justification for any further work on this subject matter, before I can embark on a

meta-analysis of the existing literature. I envision that an answer to each of these four questions will result in the development of a manuscript for publication in a scientific journal (such as Auk, Condor, Journal of Field Ornithology) or as an agency technical report (USGS, USDA Forest Service).

Phase III: Meta-analysis/-es

From a practical point of view, the third phase of this project will be the pay-off phase: In this phase, the indexed and cross-referenced database constructed in phase one of the project will allow me to quickly select and retrieve parts of the existing literature to answer specific questions through targeted meta-analyses; the understanding gained during phase two of the project will inform these meta-analyses by allowing me to pose ecologically articulate questions, identify suitable methodological approaches, and select appropriate metrics. While I imagine that one or several of these meta-analyses will be included in my dissertation, I envision the majority of analyses to take place in my “post-Ph.D. life”.