Relationships of Fire Ecology and Avian Communities in North America[1]

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Wild and managed fires have become increasingly prevalent across North America since the 1980's. Interest and concern about the influence of fire on ecological systems has also increased (Laverty and Williams 2000, USDA 2000). We summarize a symposium on fire and avian ecology, identifying patterns and differences in bird responses to various fire conditions in vegetative communities across North America. The symposium was presented at the Third International Partners in Flight Conference, Asilomar, California, on 23 March 2002. Fourteen major vegetation types, their corresponding fire regimes, and the associated bird communities are reviewed in ten chapters. Summaries of these chapters are included in this volume, but more developed treatments will appear in the monograph series, Studies in Avian Biology (Saab and Powell, in press).

Vegetative communities summarized at the symposium included boreal forests of Canada, grasslands and forests of northern Mexico, and within the United States, grasslands and shrublands in the northeast; eastern deciduous forests; pine-grasslands of the southeast; tallgrass prairie of the mid-west; shrubsteppe of the interior west; deserts, grasslands, shrublands, and forests of the southwest; coniferous forests of the Rocky Mountains; and oak woodlands of California (*table 1*). Most of these vegetation types have fire as some component of their natural disturbance regime. The diversity of climate, topography, and vegetation across North America results in a wide range of wildfire regimes from small-scale, frequent, low-severity fires to large, infrequent, high-severity events (*fig. 1*). Historical fires differ from contemporary fire regimes in most cases, although historical fire regimes are not always well understood (e.g., Baker and Jehle 2001).

Primary causes of altered fire regimes include livestock grazing, timber harvest, fire suppression, spread of invasive plant species, and habitat fragmentation (*table 1*). Fire suppression was the most pervasive problem in causing alterations of natural fire regimes. Secondly, invasive plants and livestock grazing were reported with equal frequency as a primary cause of disrupted fire regimes.

Changes have occurred in the timing, frequency, severity, and spatial scale of fires. Major vegetation types in which there has been little change in natural fire regimes are those outside of the United States, in boreal forests of Canada and pine/grasslands of Mexico. The spatial scale of fires has generally decreased in eastern and central United States, while it has increased in size in the western United States and across Canada in boreal forests. Prescribed fire is being used as a habitat restoration tool in 10 of the 14 major vegetation types, but not in desert scrub, xeric shrubsteppe, and riparian woodlands of the western United States or boreal forests of Canada.

Disruptions of natural fire regimes have not only led to alterations in landscape patterns and processes, but also to changes in population structure and the composition of bird communities (Brawn et al. 2001, Kotliar et al. 2002). Based on summaries of the literature, we observed general patterns of bird responses to fire over the short-term (within five years after fire). Cavity-nesting species generally favored high to moderate burn severity; open-cup, ground-nesting birds responded favorably to moderate and low severity burns; while open-cup, canopy-nesting species preferred unburned habitats. Longer-term responses will likely differ in that species within each of the above nest types (open vs. cavity) and nest layer (ground, shrub, and canopy) could respond positively to all burn severities.

Research and conservation issues included in the symposium were: determining the appropriate spatial and temporal scales for fire and the mosaic of habitats necessary to conserve avian communities; identifying potential negative and positive effects of post-fire salvage logging; understanding the ecological consequences of using management tools (e.g., mowing, prescribed fire, timber harvest) to mimic natural fire; and predicting the effects of climate change on fire regimes, vegetation types, and associated bird communities. Efforts by ecologists will continue to

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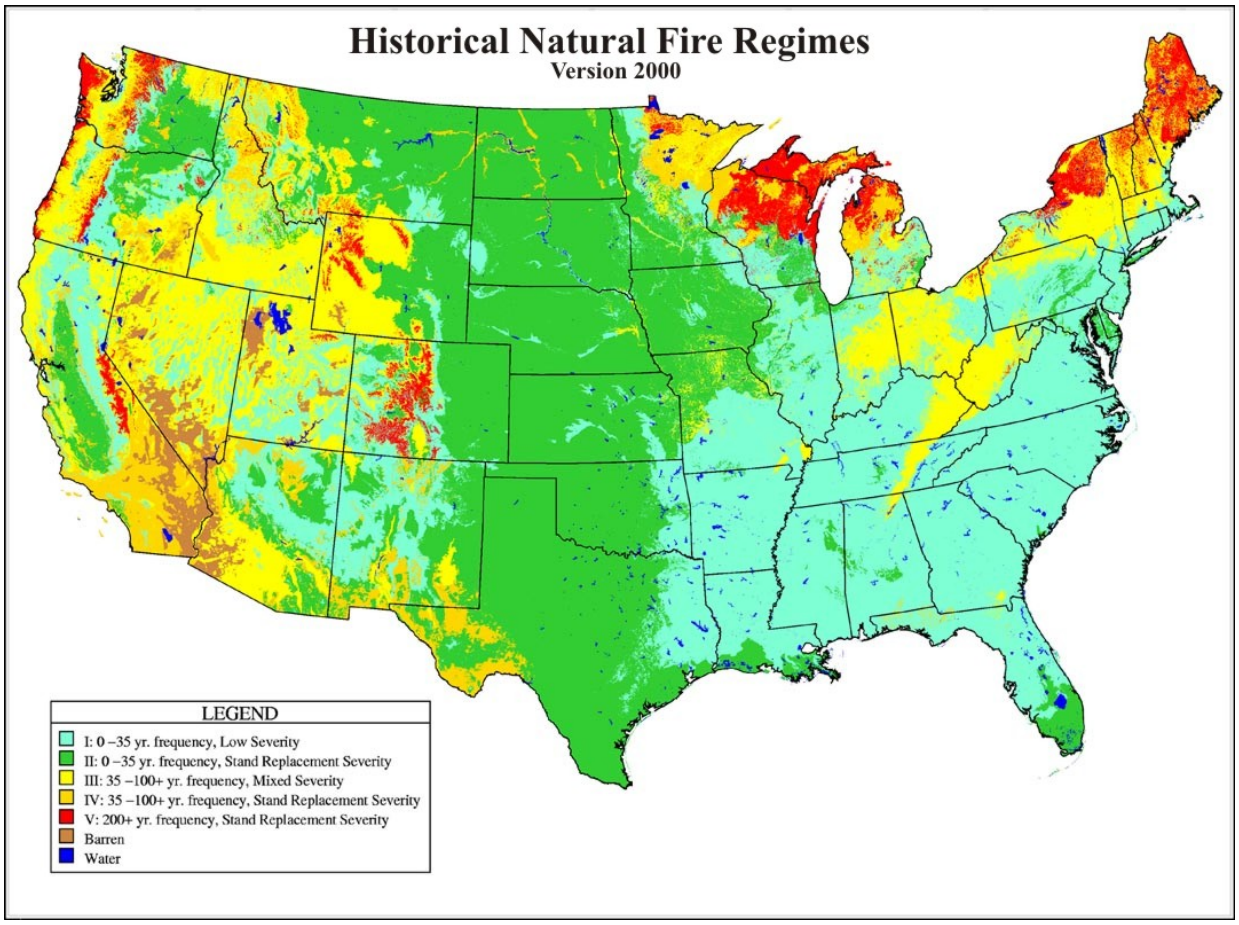

Figure 1— Historical natural fire regimes estimated for the last 500 years within the United States. The source for this image is http://www.fs.fed.us/fire/fuelman/firereg2000/maps.html. Metadata for this map are found at http://www.fs.fed.us/-fire/fuelman/firereg2000/firereg_v2k.html.

understand how the process of fire influences patterns in bird communities and to determine the mosaic of fire and habitat conditions that are necessary for the long-term persistence of avian communities.

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