

Project Title: USFS Region Six MAPS Dataset Re-analysis for the Development of Management and Climate Change Support Tools for Landbird Populations

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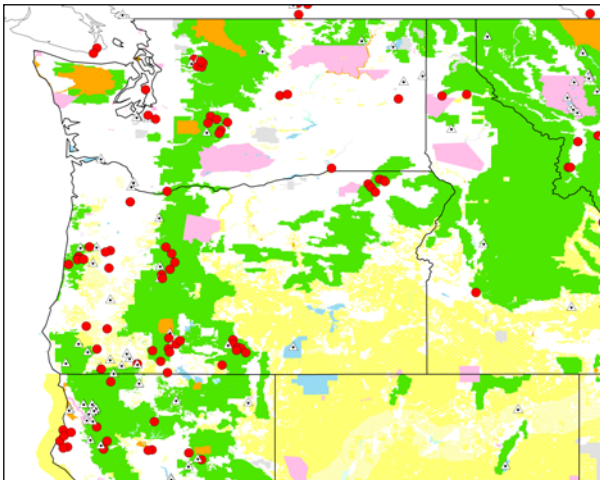
Program/Project Synopsis: To improve decision-support tools for the management of landbird populations with consideration of climate change effects on landbird populations in forested habitats of the northwestern United States by retrospectively analyzing Pacific Northwest MAPS landbird demographic data (1992-2008).

Project Description: The predictions of global climate models provided by the International Panel on Climate Change (IPCC 2007) pose a variety of problems to landbirds (including many Neotropical migrants and T&E species) that breed in forests of the northwestern United States. Recently, strong evidence of increasing tree mortality rates in the western United States (van Mantgem 2009) predicts structural changes that will impact all wildlife in mature forests. The long-term Monitoring Avian Productivity and Survivorship (MAPS) demographic dataset may reveal how predicted patterns of climate-related forest fragmentation, pest outbreak, and disease affect bird populations. In addition, climate change can influence Neotropical migrant species in their winter habitats and influence subsequent reproductive success (Nott et al. 2002).

The distribution of Pacific Northwest Region Six MAPS stations includes 49 stations located on USFS or BLM lands that are operated by The Institute for Bird Populations, Klamath Bird Observatory, or Redwood Sciences Laboratory. Data from six national forests (represented by 36 stations) in Washington and Oregon were previously used to estimate landbird demographics (survival rate and reproductive success). Landscape-level spatial analyses provided management recommendations (Nott et al. 2005) and decision-support tools (Nott and Kaschube 2007) for maintaining or creating quality habitat for landbird species of conservation concern (including many Neotropical migrants). The dataset has also provided critical information concerning species-specific responses to landscape patterns, landscape change, forest pest outbreaks (Nott et al. 2005), climate fluctuations, and weather extremes (Nott et al. 2002).

However, previous studies were limited in their geographic scope (six national forests) and only used a ten-year (1992-2001) MAPS dataset. Since 2001, the PNW has experienced the influences of three deepening phases of oceanic-atmospheric phenomena on seasonal weather, and in turn, habitat quality, and resource availability for breeding birds. La Nina conditions continue to dominate the Pacific Ocean and are associated with cold, snowy, wet, active winters to the northern Cascades and the northern Rockies. Wintertime North Atlantic Oscillation indices have been in negative phase which is associated with colder winters and more frequent wind storms at northerly latitudes. Lastly, Pacific Decadal Oscillation indices are in positive phase which can lead to drier, warmer winters. For a few species, initial examination of capture rates since 2001 suggest that these conditions have resulted in healthier more productive populations.

We propose to analyze the 17-year Pacific Northwest MAPS dataset (2002-2008) to a) assess the likely impacts of climate change on both resident and migrant species, and b) provide management recommendations to forest managers in consideration of the predicted impacts of climate change on breeding birds. This project will take full advantage of a variety of existing environmental datasets developed by multiple federal agencies including USFS, NOAA, and NASA, plus products from state or academic institutes (e.g. ReGAP, JISAO).



Of the 99 stations that have ever operated in the Washington, Oregon, and Northern California region, 62 were active in 2008, including 42 stations on USFS land and seven stations on BLM land (also see Nott et al. 2006). The core of the dataset is 17 years of bird-banding data from 36 monitoring stations on six national forests. Four of these forests lie on a latitudinal transect (Fremont NF, Willamette NF, Wenatchee NF, and Mount Baker NF). The remaining two are the highly fragmented Siuslaw NF and the Umatilla NF that has suffered repeated pest damage in recent decades.

Figure 1. Distribution of MAPS stations superimposed upon federal lands of Northern California, Oregon, and Washington (USFS – green, BLM – yellow, BIA – pink, DoD – grey, NPS - blue) showing active stations (red circles) and inactive stations (triangles).

Approach: The project will address goals in three areas of interest each of which can be funded as a separate entity.

1. Baseline Demographic Reporting – the entire 1992-2008 regional MAPS dataset will be analyzed to provide essential background demographic information for a suite of species of conservation concern, including:

- species-specific analyses of demographic patterns by individual ranger districts,
- comparing MAPS, BBS trends, and other regional avian datasets,
- report winter monitoring data (MoSI program) throughout Mexico and Central America,
- assessment of proximal demographic causes of observed population change,
- reporting and dissemination of results via fact sheets, reports, and website.

Duration: 2 months Cost:

2. Landbird population responses to fluctuations in climate and weather – expand the scope of and develop new analytical and modeling techniques towards climate based modeling of avian population dynamics. The following actions will allow for the consideration of climate change in avian management plans:

- identify important climate, weather and environmental datasets and derive subsets relevant to the ecology of focal species throughout their annual life cycle,
- improve and apply climate/weather driven models of avian demographics that were initially developed under DoD, and USFS funding,
- facilitate the consideration of climate and climate change (according to alternate IPCC predictions) in the management of forested habitats and the species that breed in them,
- provide decision-support tools (DSTs) and other materials through website.

Duration: 4 months Cost:

3. Land Management Modeling – a spatio-temporal analysis of the environmental landscapes surrounding western MAPS stations is required to construct or update species-landscape models of avian demographics, and provide improved landbird management recommendations and decision-support tools for managers and planners:

- identify and analyze a suite of GIS layers that can provide station-specific spatial datasets (e.g. NLCD change datasets [1992, 2001, 2006], ReGAP products),
- update previously employed spatio-temporal datasets (e.g. USFS Forest Health Aerial Survey data, NWRgap) to include 2002-2008 data,
- reconstruct or create species-landscape models using the entire 1992-2008 PNW MAPS dataset (adds 7 years of data to existing models) and new spatial data, and
- liaise with regional offices of federal agencies throughout the northwestern region to develop DSTs and provide training in their application to proposed management and alternate climate change scenarios.
- update existing decision-support tools (DSTs) and improve website interface.

Duration: 6 months Cost:

This work will be predominantly carried out by PhD level research scientists using existing equipment and data analysis software. The project will also require the development of new analysis methods and software authoring in MatLab, ArcView, and R.

Public benefits and significant outcomes:

The geographic extent of this project initially benefits USFS Pacific Northwest Region Six and the Bureau of Land Management that manage millions of acres of forested land in Washington and Oregon. Furthermore, this proposal provides a framework in which federal agencies can address their responsibilities under the Migratory Bird Treaty Act (MBTA) and Executive Order (EO) 13186 that are covered in a document (Instruction Memorandum No. 2008-050) interim to the signing of a Memorandums of Understanding between USDA Forest Service, BLM and the US Fish and Wildlife Service.

Currently, we know little of the influence of different land management practices upon breeding birds and their habitats. Furthermore, without knowledge of how non-breeding season environmental patterns affect the population dynamics of landbirds (especially Neotropical migrants) it is difficult to accurately assess the efficacy of management. The primary benefits and outcomes of this project are to:

- realize the potential of existing datasets (collected using federal funding) to further our knowledge of avian ecology in the western United States,
- quantify the effects forest pest outbreak and disease on avian community shifts and species-specific demographics,
- identify the relationships between bird demographics and regional weather patterns,
- guide federal land managers in the creation or maintenance of habitats that support healthy, productive landbird populations,
- provide consideration of climate change in management plans and practices
- conserve avian diversity and abundance for future generations,
- publish and disseminate fact sheets and reports relevant to project findings, and
- provide web-based resources (downloadable DSTs, data, or other materials).

References:

Nott, M. P., D. F. DeSante, P. Pyle, and N. Michel. 2005. *Managing Landbird Populations in Forests of the Pacific Northwest Region*. Publication No. 254 of The Institute for Bird Populations.

Full report (<http://www.birdpop.org/usfsr6/downloads/NWFFullReport.pdf>), or Executive Summary (<http://www.birdpop.org/usfsr6/downloads/NWExecReport.pdf>)

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