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MANAGING LANDBIRD POPULATIONS IN FORESTS OF THE PACIFIC NORTHWEST

DECISION-SUPPORT TOOLS:

Notes for Managers and GIS Specialists

THE INSTITUTE FOR BIRD POPULATIONS
www.birdpop.org

Introduction:

The Institute for Bird Populations, through its Monitoring Avian Productivity and Survivorship (MAPS) program developed a monitoring, modeling, and management approach to the conservation of landbirds in forests of the Pacific Northwest. Since 1992, bird banding data collected at each of six MAPS stations on six national forests in USFS Pacific Northwest Region Six. These data were analyzed in conjunction with numerous spatial datasets to construct 13 species-landscape models that define the relationships between landbird population parameters (adults, young, reproductive success) and a suite of landscape variables (Nott et al. 2005).

Managing Landbird Populations of Forests of the Pacific Northwest is a web-based resource to help land managers and GIS specialists assess the impact of proposed management on species of management concern. The website can be found at (www.birdpop.org/usfsr6/usfspnwr6.htm). This resource was developed by The Institute for Bird Populations (www.birdpop.org) in collaboration with USFS Pacific Northwest Region Six, and using funding provided by the Pacific Coast Joint Venture, and USFS/BLM First Service Award.

Applying Models:

In order to apply the species-landscape models to proposed management scenarios we have provided decision-support tools consisting of Microsoft Excel-based modeling worksheets that allow the user to quantify the effects of proposed management on avian populations using data from spatial analyses of management actions (e.g. stand removal) simulated in GIS. Alternatively, the models can be used in a "what if" mode whereby small and realistic changes can be made to a landscape by adjusting the post-management values without formal spatial analysis.

Here are the basic steps required to use the tools quantitatively:

1. Users will require ESRI ArcView 9.x (or equivalent ArcGIS) with the Spatial Analyst extension.
2. Download the spatial datasets provided in www.birdpop.org/usfsr6/usfspnwr6_datasets.htm or obtain them on CD/DVD from IBP.
3. Establish GIS projects for the layers depending upon the dataset's projection and datum.
4. Download University of Massachusetts' FRAGSTATS spatial analysis software which must be installed and configured to operate with the Spatial Analyst extension in ESRI ArcGIS http://www.umass.edu/landeco/research/fragstats/fragstats.html
5. Download and install IBP's analysis toolbox www.birdpop.org/usfsr6/downloads/IBP_Super_tools.zip. These tools define multiple radii buffers around points, lines, or irregular shapes and call FRAGSTATS to analyze a raster datasets underlying the multiple buffers. The results are output as Comma Separated Values (CSV) format files that may be easily tabulated in programs such as Microsoft Excel.

The next stage is to simulate the proposed management action(s):
For each species and demographic (adults, young, or reproductive index) a Microsoft Excel worksheet www.birdpop.org/usfsr6/downloads/USFSR6_model.xls allows the user to input two sets values of landscape parameters. The first set of landscape parameters (marked "pre-management") reflects the pre-management

values of relevant landscape statistics, and the second set represents the proposed “post-management” values. A key to the landscape parameter abbreviations in each model can be found in the worksheet named “Landscape Classes”.

Assessing Impacts:

As an example of assessing the impacts of proposed actions examine the Microsoft Excel worksheet named “HAFL” represents the management model for Hammond’s Flycatcher. This species is typically found in landscapes featuring 50-95% cover of coniferous forest, however, none of the models contain any statistic for coniferous forest cover. Open shrubland cover of between 10 and 20% benefits populations but deciduous forest cover is associated adult populations.

We simulated a management scenario in which we simulated fragmenting a portion of the high density canopy cover deciduous forest and converted it to successional shrubland. As a result the total core area of the successional habitat increased but the total core area of the high canopy forest, including coniferous forest was fragmented and therefore decreased disproportionately by 7%. The pre- and post-management numbers can be examined for each demographic parameter.

In this case, post-management demographics predicted an increase in the numbers of adults of 17%. However, the numbers of young only increased by 4%. Accordingly, the predicted reproductive index decreased by 3%. We can conclude that the proposed landscape change would negatively affect Hammond’s Flycatcher populations by increasing the numbers of adults but decreasing productivity. Ideally, a landscape change should increase abundance and/or productivity towards establishing an abundant and highly productive source population. Regardless of landscape-scale processes other management guidelines, especially those that suggest microhabitat maintenance and restoration techniques, should also be considered and implemented (e.g. Altman and Hagar 2007). Of course, we might expect that management impacts species differentially, thus the scenario should be applied to models for all species of conservation concern that breed in the proposed management area in order to assess the “community effect”.

Northwest region-wide analyses of MAPS data (Michel et al. 2006) provide region-wide estimates of apparent survival rates and numbers of young and adults captured which allow region-wide means and ranges (per station) to be formulated. The survival rates and numbers of birds in local populations can be compared to these regional mean values to evaluate the performance of the local populations.

References:

Altman, B., Hagar, J.C., 2007, Rainforest Birds - A Land Manager's Guide to Breeding Bird Habitat in Young Conifer Forests in the Pacific Northwest: U.S. Geological Survey Scientific Investigations Report 2006-5304, p. 60. http://pubs.usgs.gov/sir/2006/5304/

Michel, N., D. F. DeSante, D. R. Kaschube, and M. P. Nott, 2006. The Monitoring Avian Productivity and Survivorship (MAPS) Program Annual Reports, 1989-2003. NBII/MAPS Avian Demographics Query Interface. (December 2006) *from which* Rate Estimates for Landbirds of Northwest MAPS Region1992-2003 was derived.

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. Download *Full Report (5.3mB)* or *Executive Summary (412KB)*

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