Responses of forest birds to land use and landscape structure across different spatial scales

A Data Management Plan created using DMPTuuli

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Project abstract:

The intensive era of forest management, based on clear cutting as the regeneration method in most forests since the early 1950s, has caused declines and local extinctions of hundreds of species in Fennoscandia. Specific reasons include loss of old-growth forests, lack of wildfire, overgrowth of previously open forests, and shortage of dead wood and very large tree individuals in these forests. Clearly, there is a shortage of processes and structures created by natural disturbances in most Fennoscandian forests, and consequently an urgent need for both qualitative and quantitative improvements in forest management. Ways to improve these conditions include agreements, legislation and guidelines, reserve formation, and modifications in forest management. One way to mitigate negative effects is continuous-cover forestry (CCF) that is on methods other than clear cutting. Still, due to the novelty of CCF, and the lack of knowledge concerning ecological large-scale phenomena, research at landscape and regional scales is essential for conservation and management, but also for understanding ecological patterns and processes. The proposed project aims at fulfilling these knowledge gaps by quantifying landscape- and regional-level responses of forest-bird communities to forest area, heterogeneity, productivity and forest management intensity. The project also tests the validity of theories of island biogeography, niche, and intermediate/increasing disturbance in terrestrial ecosystems. Three objectives are proposed: (1) evaluation of the theories of island biogeography, niche and intermediate/increasing disturbance in predicting the richness of forest birds, through quantification of geographic variation in bird community responses to the landscape-level amount, diversity, productivity, and stand ages of forests across Southern Finland; (2) examination of CCF by comparing bird communities of CCF landscapes to those of intensively managed and unmanaged forest landscapes; and (3) evaluation of the relative contributions of long-term management history and landscape structure in determining bird communities, through comparisons of Finnish landscapes (intensive management since 1950s) and Russian landscapes (much less intensive management and different forest age structures). Four data sets will be used: (1) the Multi-Source National Forest Inventory data (MS-NFI), (2) permanent-grid line-transect census bird data of the Finnish Museum of Natural History, covering Southern Finland and Westernmost Russia, (3) line-transect census bird data collected at protected areas by Metsähallitus, and (4) DISTDYN project line-transect census bird data. Regarding the latter, additional data will be collected in the first year of the project to assess landscape-scale effects of CCF. The data mostly exist already, but because of the short history of the use of CCF methods in the DISTDYN landscapes (since 2010), experimental CCF harvesting has only recently begun to reach significant shares of land areas. Therefore, it is crucial to sample these landscapes now, during the proposed project. The project bears both applied and theoretical value. It produces empirical knowledge on threshold conditions and response linearities, assessed against landscape structure through non-linear modeling. Such information on, for example, critical amounts or qualities of habitat, is crucial for applications of ecological theory, and is readily applicable in conservation and land-use management. The abundance or richness of individual species, or different ecological groups of species (such as cavity nesters or ground-

nesting species), likely show different response curves to changes in the amount or quality of habitat: roughly linear decreases or increases, abrupt changes at some point of a gradient in question, or intermediates between these. The proposed research evaluates the commonness of different sorts of response curves, with specific focus on species of conservation concern, such as habitat specialists, and rare and threatened species. It also quantifies geographic variation in these responses for a given species or species group. Such measures support species-abundance modelers in selecting appropriate response curves. Species-level modeling will also provide measures of shared or specific variables of landscape structure among species, and if response specificity is realized at the landscape scale.

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1. General description of data

The project data will be gathered from multiple sources. (1) Multi-Source National Forest Inventory (MS-NFI) data belong to the Natural Resources Institute (Luke). These data can be freely downloaded from an open-source national map resource at www.paikkatietoikkuna.fi. (2) Bird data come from three approaches: (i) national transect-count network by the Finnish Museum of Natural History (FMNH); (ii) protected-area transect-count data from Metsähallitus; and (iii) transect-count data from DISTDYN project (Koivula et al. 2014) from University of Eastern Finland (UEF) and Natural Resources Institute (Luke). The respective institutes will hold all rights of data. UEF will obtain funding and organize data collecting.

A formal agreement on using these data will be made between institutions prior to the commencement of research. The project will use and publish only copies of original data, as subsets tailored to required analyses. Each institution is responsible for publishing respective original data.

1. Collaborators

For abbreviations, see above. Luke will store the original MS-NFI ansd DISTDYN bird data, including original paper sheets and electronic formats, in their archives. FMNH and Metsähallitus will store their original data as listed above.

2. Types of data

* MS-NFI data on Finnish forests, including, for example, site type, dominant tree species, and basal area, volume and height of trees, stand specifically (for protocols and other details, see www.metla.fi/ohjelma/vmi/vmi-moni-en.htm). Collected and stored by Luke.
* Forest inventory data for DISTDYN areas at Ruunaa and Isojärvi represent qualitative and quantitative aspects of forest, such as dominant tree species, volume, site type, and information about implemented and planned logging operations (timing, area covered, removed amount of timber, etc.). Collected and stored by Metsähallitus.
* FMNH data on Russian forests from bird transect counts.
* FMNH and Metsähallitus bird count data will be collected in Southern and Central Finland will be collected and stored by these institutions.
* DISTDYN bird count data will be collected in Isojärvi and Ruunaa experimental forest areas in collaboration with Luke and UEF. Col

Data will be stored in original and photocopied paper sheets, and in electronic formats. All data sheets and related documents (such as data collecting protocols, study-area maps, etc.) will also be scanned to PDF format. The data to be used will be stored using both text-only format (e.g., comma separated text files) and standard data storage and management software (such as MS Excel and Access).

Experienced ornithologist will collect the data. The transecs have been randomized and the data will be cross-checked for typologic errors. All the sampling methods are standarized widely used and their bias are well understood.

2. Ethical and Legal Compliance

Original data and documentation will be stored by the partner institutions as described above. UEF will store copied subsets of original data in electronic formats in their servers. These data versions will be specifically tailored for the project, and will not be used for other purposes without an acceptance of the collector/storer institution. The documentation includes sufficient metadata, containing collecting methods, sampling design and other protocols, sampling dates, issues regarding sampling (such as occasional samples missing for specified reasons), collectors, and explanations of applied terms and abbreviations. Where applicable, the project data will

be managed by applying standard methods as described in Chapman (2005).

Data publishing can be done through the Pensoft data-publishing platform (www.pensoft.net) or platforms of publishing journals. Publishing will be done using DarwinCore (DwC) standard for data storing and global reuse. Each research partner, however, is responsible for managing, storing and opening their own original research data as described above.

In general, the project will follow the principles of openly-available research data and aims at promoting open science and information availability. Thus, whenever legal, ethical or contractual conditions do not restrict, the project metadata, materials and methods (sampling protocols) will be made publicly available no later than five years after the end of the funding period. The availability will follow guidelines of the Open Science and Research Initiative.

Collected data can be released without privacy restrictions because it does not constitute private information.

Apart from storing original data at the above-given institutions, all used data will be stored into a project database at UEF. The most accurate species data are related with restrictions for endangered species. These data will be treated so that individual observations are not published with data or study results to protect these species and their habitats.

The project will not use data that are protected as an intellectual property of a third party without obtaining an official license. Each project partner will sign an agreement on making data arising from the research project openly available where possible. The intellectual property of the generated data will remain with the research partner who generated it.

3. Documentation & metadata

Metadata are stored in a research metadata profile, which closely follows EU JoinUp DCAT application profile (https://joinup.ec.europa.eu/asset/dcat_application_profile/description) and is stored in xml format. The metadata can also be browsed from standard OGC WCS web interface (http://www.opengeospatial.org/standards/wcs) by Etsin service, acting as a common research data finder. The metadata documentation provides contact information, information on data producers, project details, general description of data and all steps taken to produce the data, time span that the data covers, and spatial extent and preferred references (publications) to cite the data.

4. Storage and backup during the research project

Original data and documentation will be stored by the partner institutions as described above. UEF will store copied subsets of original data in electronic formats in their servers. These data versions will be specifically tailored for the project, and will not be used for other purposes without an acceptance of the collector/storer institution. The documentation includes sufficient metadata, containing collecting methods, sampling design and other protocols, sampling dates, issues regarding sampling (such as occasional samples missing for specified reasons), collectors, and explanations of applied terms and abbreviations. Where applicable, the project data will be managed by applying standard methods as described in "Chapman, A.D. 2005: Principles and methods of data cleaning – primary species and species-occurrence data. Version 1.0. – Report for the Global Biodiversity Information Facility, Copenhagen. 75 p".

Each research partner is responsible for managing, storing and opening their own original research data.

5. Opening, publishing and archiving the data after the research project

Only the data subsets which have been used in each manuscript will be made available. Data publishing can be done through the Pensoft data-publishing platform (www.pensoft.net) or platforms of publishing journals. Publishing will be done using DarwinCore (DwC) standard for data storing and global reuse.

The project will follow the principles of openly-available research data and aims at promoting open science and information availability.

Whenever legal, ethical or contractual conditions do not restrict, the project metadata, materials and methods (sampling protocols) will be made publicly available no later than five years after the end of the funding period.

The availability will follow guidelines of the Open Science and Research Initiative. The initial data will be permanently stored at the data collecting institutions.

Most of the data has been collected already and verified. The data from 2019 will be collected in June and verified and cross-checked in July-August 2019.

Data analyses for the three manuscripts will be prepared sepparately for each manuscript. The limited geographic region and habitat are described in each intended manuscripts.