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Title: Bird counts in mountain birch forest

Motivation

Bird communities are an important component of vertebrate biodiversity in the mountain birch forest. Community composition and diversity of birds is a target in the forest-tundra ecotone module of COAT.

State variables:

Bird counts are conducted to estimate the following state variables:

Community composition and diversity of birds in mountain birch forest (V73).

Reference to method:

Manual bird censuses are taken based on song activity during the breeding season. The census method is described in Vindstad et al. (2015).

Spatial study design

Bird censuses are conducted in the COAT Varanger regional design at two localities: Kirkenes and Tana. Each locality has a large-scale transect of 20-25 km length with 10 replicated sites. All sites are placed in mature mountain birch forest at elevations ranging between 60 and 120 m. a. s. l. Site 1-4 in Kirkenes and site 1-6 in Tana are placed in forest that has been heavily damaged by moth outbreaks during the mid-late 2000's, while the remaining sites are placed in undamaged forest. The design thus provides a spatial contrast between damaged and undamaged forest within two regions that are otherwise expected to have relatively homogeneous environmental conditions.

Design within site:

Sampling at all sites is conducted at a fixed observation point. The points are not marked in the field, and locating the points using a handheld GPS to an accuracy of a few meters is sufficient. No permanent plots or other sampling units exist. All coordinates can be found in the coordinate file included in the dataset V_bird_commun_deadwood on the COAT data portal.

locality	section	site_id
tana	NA	t_1 , t_2 , t_3 , t_4 , t_5 , t_6 , t_7 , t_8 , t_9 , t_10
kirkenes	NA	k_1 , k_2 , k_3 , k_4 , k_5 , k_6 , k_7 , k_8 , k_9 , k_10 (from 2017 onwards, site k_10 has been discontinued)

Temporal study design

Starting in 2011, bird censuses have been conducted in years when qualified personnel has been available, so far in 2011-2013, and 2016-2017. The censuses are conducted during the early parts of the bird breeding season, when song activity is at its peak. This will typically be during the last week of June. At this time, all sites should be visited thrice within a 3-day period, resulting in three repeated censuses with the exact same methodology. Up to two visits are allowed within the same day, provided that the visits to a given site are separated by at least three hours. Visits should ideally take place between 19:00 and 23:00 in the evening or between 02:00 and 10:00 in the morning, as birds sing most actively during these periods. The timing of visits should be alternated between sites, to avoid that some sites are consistently visited earlier or later in the day than others. Bird song activity is dependent on weather and very low (almost none) activity takes place in heavy rain and strong wind. Hence, censuses in periods with such weather should avoided.

Procedure

To conduct a bird census, the observer walks to the observation point and waits inactively for 5 minutes, to allow the local bird community to settle down after the disturbance. Subsequently, there is a 15-minute observation period, when all birds that can be seen or heard from the sampling point should be recorded. Different individuals of the same species should be recorded separately, to obtain an individual count for each species. Observations should be grouped into the following distance categories: <50 m, 50-100 m and >100 m from the observer. Distances are judged subjectively. Hence, the observer has to calibrate her/his perception of distance in advance of the sampling.

Equipment needed

- A handheld GPS with all site IDs loaded
- Pencil and notebook

Information recorded in the field

Field notes are taken in waterproof notebooks. For each site record the following:

- Date
- Name of observer
- Location name and site number
- Number of visit (1-3)
- Time of day when the observation period started
- General weather conditions (rain, cloudy, sunny, wind strength)
- Number of individuals recorded per bird species per distance category. Individuals that are observed flying over the site should be recorded separately.

Data processing

Each field worker is responsible for typing his/her own data unless otherwise agreed upon with the project leader. A template datasheet is available from the dataset responsible. Follow the datasheet

exactly; use exactly the same column names, large/small letters, for factorial values, do not add new categories etc. After completing a data file in excel, it should be saved as txt-file. Thereafter (unless otherwise agreed), data files are sent to the dataset responsible who will quality-check them and store them in COAT data portal.

If data cannot be typed while the fieldwork is ongoing, fieldworkers should take photos of filled pages in their notebooks at the end of each day (e.g. with a smartphone or camera) and store the photos in a safe place. Notebooks with data that has not been typed or photocopied should not be brought back into the field under any circumstances, due to the risk of losing them.

Training requirements and specialized skills

The observer must be able to reliably identify all bird species that normally occur in the mountain birch forest (see appendix) based on their song and appearance. This specialized skill requires substantial independent training by the observer in advance of the field season, and hence cannot be taught by COAT personnel during fieldwork.

References

Vindstad, O.P.L. , Jepsen, J.U. and Ims, R.A. (2015). "Resistance of a sub-arctic bird community to severe forest damage caused by geometrid moth outbreaks." European Journal of Forest Research **134**(4): 725-736.

Appendices

Bird species list

Table 1. List of bird species that are to be recorded and which the observer must therefore be able to recognize by song and visual appearance.

Latin name	Norwegian name	English name
Fringilla montifringilla	bjørkefink	brambling
Luscinia svecica	blåstrupe	bluethroat
Cuculus canorus	gjøk	common cuckoo
Poecile montanus	granmeis	willow tit
Carduelis chloris	grønnfink	european greenfinch
Carduelis flammea	gråsisik	common redpoll
Turdus pilaris	gråtrost	fieldfare
Anthus pratensis	heipiplerke	meadow pipit
Parus major	kjøttmeis	great tit
Corvus cornix	kråke	hooded crow
Phylloscopus borealis	lappsanger	arctic warbler
Perisoreus infaustus	lavskrike	siberian jay
Lagopus lagopus	lirype	willow ptarmigan
Phylloscopus trochilus	løvsanger	willow warbler
Turdus philomelos	måltrost	song thrush

Anthus sp	piplerke	pipit
Corvus corax	ravn	common raven
Lagopus sp	rype	ptarmigan
Phoenicurus phoenicurus	rødstjert	common redstart
Turdus iliacus	rødvingetrost	redwing
Emberiza schoeniclus	sivspurv	common reed bunting
Pica pica	skjære	common magpie
Anthus trivialis	trepiplerke	tree pipit
Lanius excubitor	varsler	great grey shrike
Eremophila alpestris	fjellerke	horned lark
Loxia curvirostra	grankorsnebb	red crossbill
Anthus cervinus	lappiplerke	red-throated pipit
Poecile cinctus	lappmeis	siberian tit
Calcarius lapponicus	lappspurv	lapland bunting
Motacilla alba	linerle	white wagtail
Acanthis hornemanni	polarsisik	arctic redpoll
Bombycilla garrulus	sidensvans	bohemian waxwing
Plectrophenax nivalis	snøspurv	snow bunting
Oenanthe oenanthe	steinskvett	northern wheatear
Ficedula hypoleuca	svarthvit fluesnapper	pied flycatcher
Motacilla flava thunbergi	såerle	grey-headed wagtail
Falco columbarius	dvergfalk	merlin
Buteo lagopus	fjellvåk	rough-legged buzzard
Surnia ulula	haukugle	northern hawk-owl
Falco rusticolus	jaktfalk	gyrfalcon
Asio flammeus	jordugle	short-eared owl
Aquila chrysaetos	kongeørn	golden eagle
Falco tinnunculus	tårnfalk	common kestrel
Falco peregrinus	vandrefalk	peregrin falcon