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Pellet counts of herbivores in heath and meadow

Motivation

Willow thickets and adjacent meadows constitute hot spots for biodiversity in the otherwise barren tundra. They are important habitats for willow ptarmigan and small rodents, especially Root voles, but also lemmings in peak years. They also constitute important summer feeding habitats of reindeer. A third species of small rodents, the Gray-sided vole, reside in the dominant landscape element, the heath. The heath also constitute important habitat for willow and rock ptarmigan (at higher altitude). Herbivore abundance recording in heaths and meadow is part of the ptarmigan module monitoring of interactions between climate, small rodents, reindeer, ground-breeding birds (e.g. ptarmigan) and willow thicket vegetation.

State variables: Pellet counts in heaths and meadows are used as evidence of recent activity of small rodents and especially for calculating presence and abundance of ptarmigan and ungulates (Reindeer and Moose).

Reference to method: first publication of these data can be found in Henden et al., 2011 (Basic and Applied Ecology).

Spatial study design

The intensive design includes thirteen river valley sections (see table below). Each river valley section has 2-6 sites per habitat (meadow, heath near productive habitats, heath far from productive habitats).

The complete list of siteIDs included in the current data collection is:

locality	section	site_id
komagdalen	komagdalen_ovre	ko_ko_m_a, ko_ko_m_b, ko_ko_m_c, ko_ko_m_d, ko_ko_m_e, ko_ko_hn_a, ko_ko_hn_b, ko_ko_hn_c, ko_ko_hn_d, ko_ko_hn_e
komagdalen	komagdalen_midtre	ko_km_m_a, ko_km_m_b, ko_km_m_c, ko_km_m_d ko_km_m_e, ko_km_hn_a, ko_km_hn_b, ko_km_hn_c, ko_km_hn_d, ko_km_hn_e
komagdalen	Komagdalen_nedre	ko_kn_m_a, ko_kn_m_b, ko_kn_hn_a, ko_kn_hn_b
komagdalen	sandfjorddalen	ko_sa_m_a, ko_sa_m_b, ko_sa_m_c, ko_sa_m_d, ko_sa_m_e, ko_sa_m_f, ko_sa_hn_a, ko_sa_hn_b, ko_sa_hn_c, ko_sa_hn_d, ko_sa_hn_e, ko_sa_hn_f
vestre jakobselv	torvhaugdalen	vj_to_m_a, vj_to_m_bl, vj_to_m_c, vj_to_m_d, vj_to_hn_a, vj_to_hn_b, vj_to_hn_c, vj_to_hn_d
vestre jakobselv	bearaveaijohka	vj_be_m_a, vj_be_m_b, vj_be_m_c, vj_be_m_d, vj_be_m_e, vj_be_hn_a, vj_be_hn_b, vj_be_hn_c, vj_be_hn_d, vj_be_hn_e
vestre jakobselv	jakobselv	vj_vj_m_a, vj_vj_m_b, vj_vj_m_c, vj_vj_m_d, vj_vj_hn_a, vj_vj_hn_b, vj_vj_hn_c, vj_vj_hn_d

ifjordfjellet	eastordalen	if_ea_m_a, if_ea_m_b, if_ea_m_c, if_ea_m_d, if_ea_m_e, if_ea_hn_a, if_ea_hn_b, if_ea_hn_c, if_ea_hn_d, if_ea_hn_e
ifjordfjellet	storelva	if_st_m_a, if_st_m_b, if_st_m_c, if_st_m_d, if_st_hn_a, if_st_hn_b, if_st_hn_c, if_st_hn_d
ifjordfjellet	gurrojohka	if_gu_m_a, if_gu_hn_a
ifjordfjellet	suolojavri	if_su_m_a, if_su_m_b, if_su_hn_a, if_su_hn_b
ifjordfjellet	giksjohka	if_gi_m_a, if_gi_m_b, if_gi_hn_a, if_gi_hn_b
ifjordfjellet	iesjohka	if_ie_m_a,if_ie_m_b, If_ie_m_c, if_ie_m_d, if_ie_hn_a,if_ie_hn_b, If_ie_hn_c, if_ie_hn_d

These sites are in the GPS-file “intensive quadrats Varanger 2019.gpx”.
https://uitno.app.box.com/file/362192723278

Design within-site: Each site has a permanently marked 15*15m sampling quadrat. 8 pellet plots (50x50 cm) are distributed around the 15x15 m sampling grid according to figure xx (i.e. orange small squares), where plots 1-3 are located along the thicket edge from right to left standing with your back in the thicket. Note that in Sandfjorddalen the river has the same function in the location of pellet plots as the willow thickets. In each corner of the sampling grid the pellet plots are located inside the sampling grid (i.e. plots 1, 3, 6 and 8), whereas one plot is located on the outside at the mid-point of each of the four sides of the sampling grid, i.e. 7.5 m from the corner (figure below). Two of the corners of the pellet plots are marked with either nails with ribbon or they share the same marking pin as the grid corners (figure). In the heath habitat, the pellet plots are located in the same manner as the meadow plots (figure); starting with pellet plot 1 in the lower right corner when situated with your back towards the thicket/valley plain etc.

In addition, there are four more pellet plots along the **thicket edge** in the meadow grids (figure), two on each side of the sampling quadrat. They are spaced 7.5m apart, one meter into the thicket. These faecal plots are named 1b, 1c (outwards from faecal plot 1), and 3b and 3c (outwards from faecal plot 3). NOTE; these pellet plots are established only in areas with willow thicket (to monitor ptarmigans). Therefore, they do not exist at Sandfjorddalen, which is devoid of erect thickets.

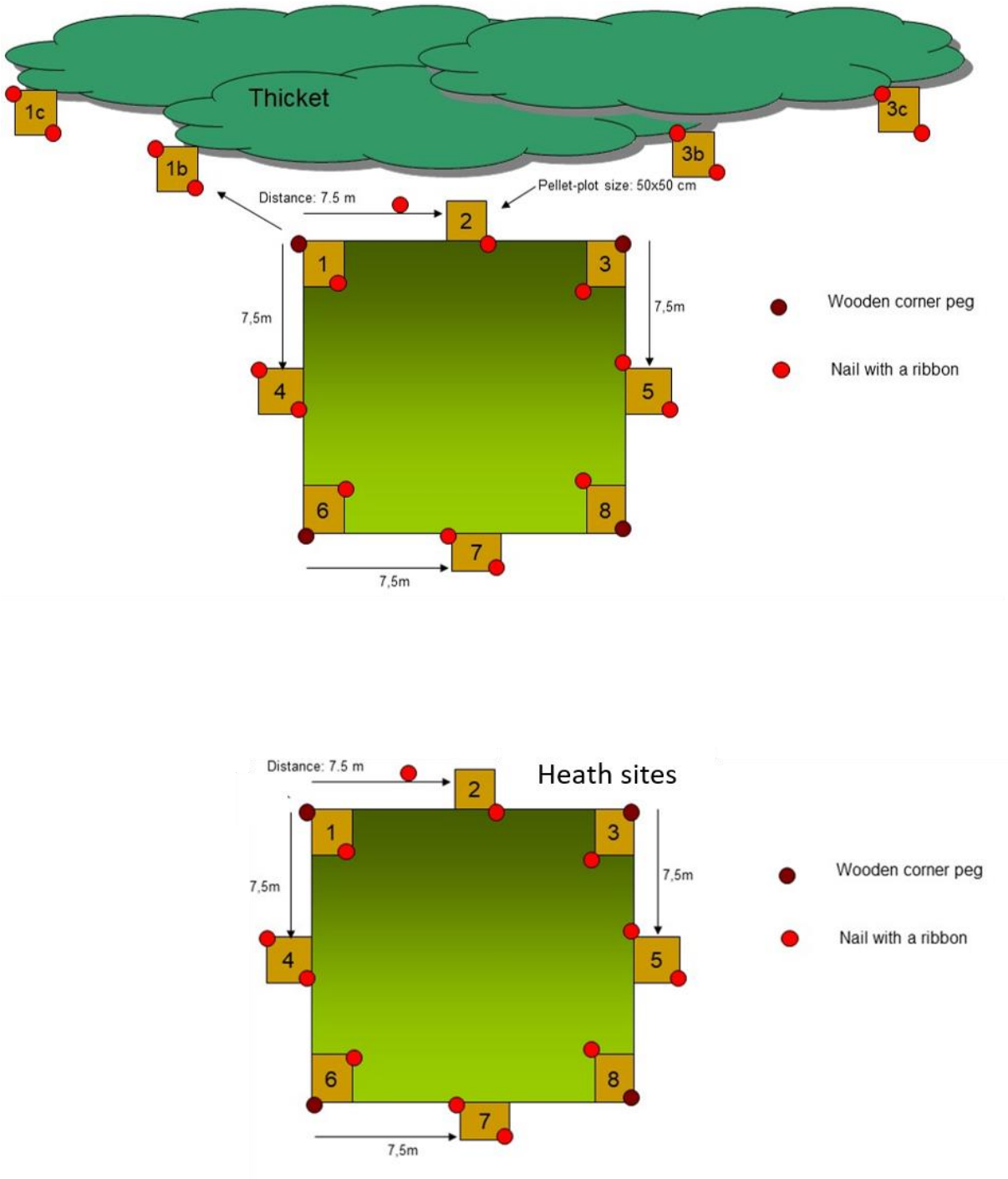

Figure: pellet count plots at a meadow/thicket site and at a heath site.

Temporal study design

The counts are conducted twice per year, soon after snowmelt (during 02.- 04.07.) and in early autumn (01.- 03.09).

Procedure

For sampling the pellet plots a metal frame (~50x50 cm) is placed on each pellet plot. Number of pellets of different herbivores are recorded to species, and all but rodent feces are thereafter removed.

Equipment needed

- Metal sampling frame (50*50 cm)
- Notebook, pencil
- Measuring tape (30 or 50 m long), to locate plots that are difficult to find
- A couple of new wooden poles (to replace the broken ones), 5 inch nails and blue marking tape

Information recorded in the field

For each snow bed, record: sampling date, observer

For each subplot within the removal plot, record:

- For each site, record the date and observer. For each plot, record number of pellets of different species. For rodents, register only **presence/absence** of new activity, such as fresh clipping of the vegetation along pathways or in burrows. With new activity, we mean activity that appears so new that it has occurred within a week or two. We do not record pellets as a sign of fresh activity. For reindeer, we may find clumps of faeces that are quite difficult to transform to individual pellets. In that case **clumps (**one clump is assumed to contain approximately 20 pellets**)** and pellets are counted and noted separately.
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Data processing

All field observers are in charge of typing their data into digital format (unless otherwise agreed with the data set responsible).

Template datasheet is available from John-Andre Henden. 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 (one datafile per year and locality), it should be saved as txt-file. Thereafter (unless otherwise agreed), data files are sent to dataset responsible (John-Andre Henden) who will quality-check them and store them in COAT data portal.

Training requirements and specialized skills

Field workers must be able to reliably identify the relevant herbivore species feces. See appendix. New field observers must work in teams with more experienced observers until this skill has been duly acquired.

Appendix: herbivore feces

Reindeer

Reindeer clump

Ptarmigan

Lemming/ Vole

Moose

Hare