We put Lygra on the map:

Using pollen as a proxy for human activity

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Introduction

Lygra is a protected coastal heathland shaped by farming, grazing and burning. Archaeological remains, including burial mounds, charcoal kilns, field terraces and stone walls, show a long history of human land use (Brekke & Kvamme, 2025). Traditional burning and grazing help maintain heathland, so we expected *Calluna* pollen and charcoal to provide evidence of landscape management (Rittl et al., 2025). We also examined changes in tree pollen, grasses, sedges and human-associated plants as possible signs of woodland decline and landscape opening (Li et al., 2008). Our research question was: **When does the pollen record first show evidence of human presence and vegetation use at Lygra?**

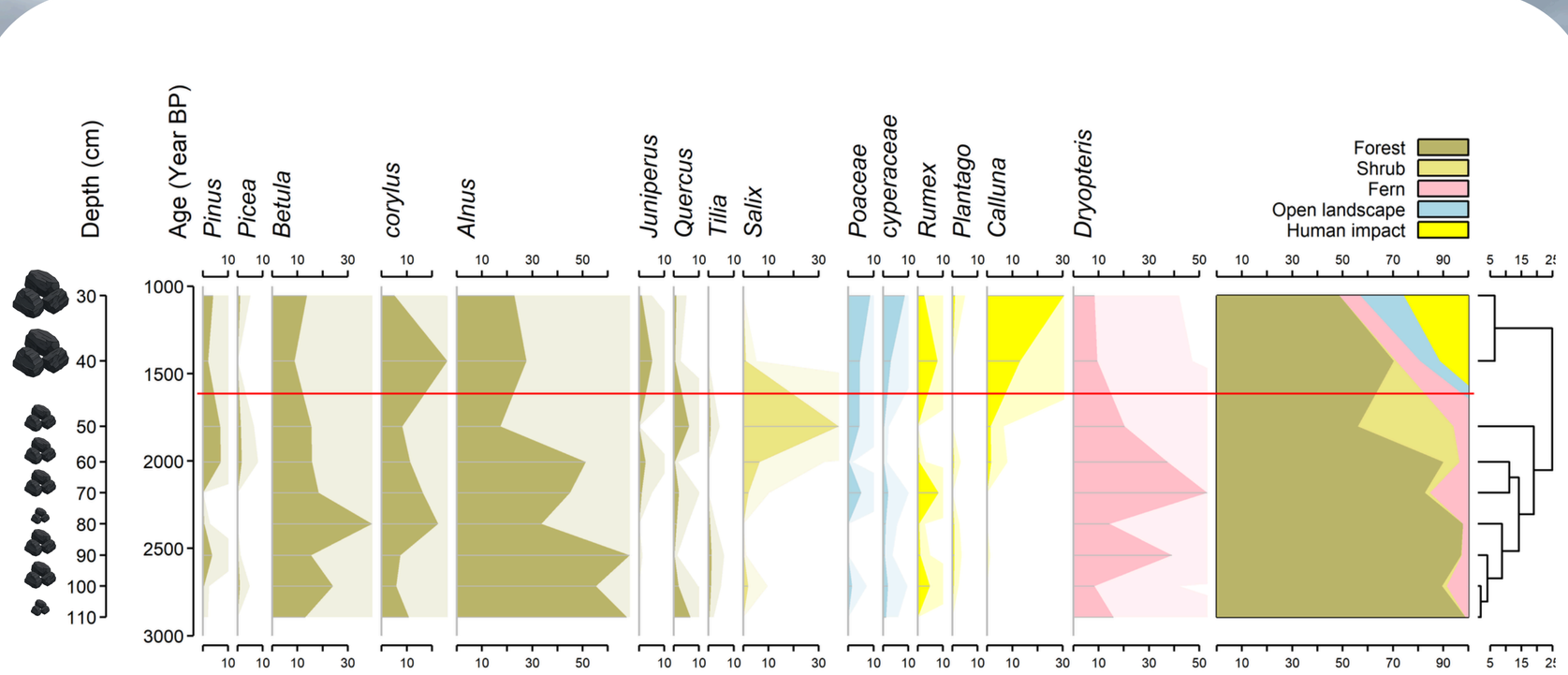


Figure 1: Figure 2 shows a pollen diagram of our counted taxa in percentages of the total pollen sum with calibrated years from c14 data, cumulative plots of the different groups. Red line indicates the biggest change between the sample depths. Charcoal data (group 2, 2022) in levels from 0-3 (0 = no, 1 < 5%, 2 < 10%, 3 < 25% of sum).

Result

- Vegetation was relatively stable and forest-dominated until around 2,000 years BP, with *Betula*, *Corylus* and *Alnus* common.
- From about 1,800 years BP, tree pollen declined and *Salix* appeared; grasses and sedges increased around 1,700 years BP, suggesting landscape opening.
- *Calluna* and charcoal appeared around the same time, consistent with human activity. Most other human-indicator taxa changed little.
- Euclidean distances show the greatest difference between two depths near the onset of cultivation, suggesting a vegetation shift.

Methods

- Analysed pollen samples from a 2017 Lygra peat core at 30–110 cm depth, sampled every 10 cm.
- Identified pollen and spores under a light microscope; counted at least 200 pollen grains per sample.
- Converted counts to percentages per sample.
- Made pollen diagrams in R using rioja and riojaPlot; calibrated radiocarbon dates to calendar years BP using Bchron.

Discussion & Conclusion

The decline in tree pollen, appearance of *Salix,* and later increases in grasses, sedges, *Calluna* and charcoal point to a more open, human-influenced landscape. Therefore our results suggest that human activity at Lygra began around 1,800 years BP, possibly as early as 1,950 years BP. Our findings aline with Kalands data on the surrounding Islands and fits with the geography that Lygra was inhibeted before lurekalven.

Limitations:
The timing remains uncertain: *Salix* has only one peak, *Calluna* is scarce at 50cm, and samples were spaced 10 cm apart. Higher preciesion and detail would have been acieved when samples where taken at more frequent depth.

Calluna pollen may reflect local vegetation, while wind-dispersed tree pollen can represent broader regional patterns.

Further improvement would have been when the observers would not have known the depth and expectation that come with that to prevent observer expectancy bias.

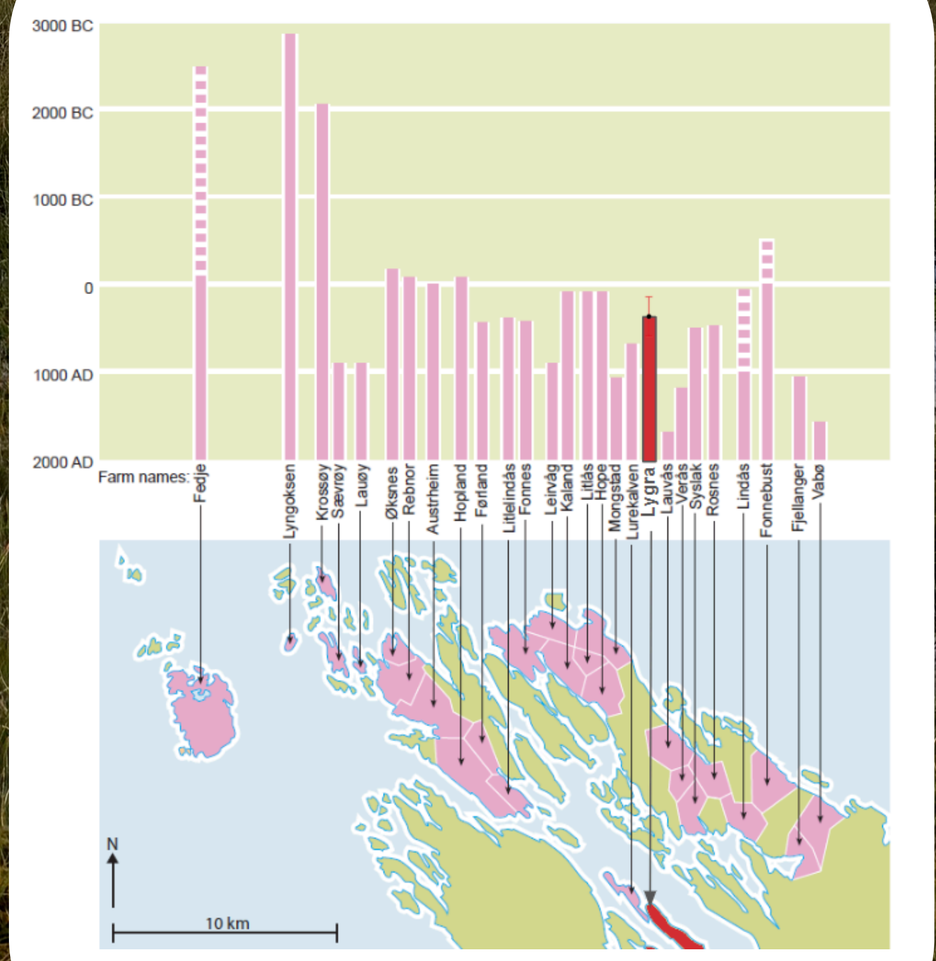


Figure 2: Modified figure by us (from Kaland 2014) of the establishment of heathlands on selected farms in Nord-Hordaland.

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