



Dynamics in a Norwegian forest reserve. Are management needed to protect biodiversity?

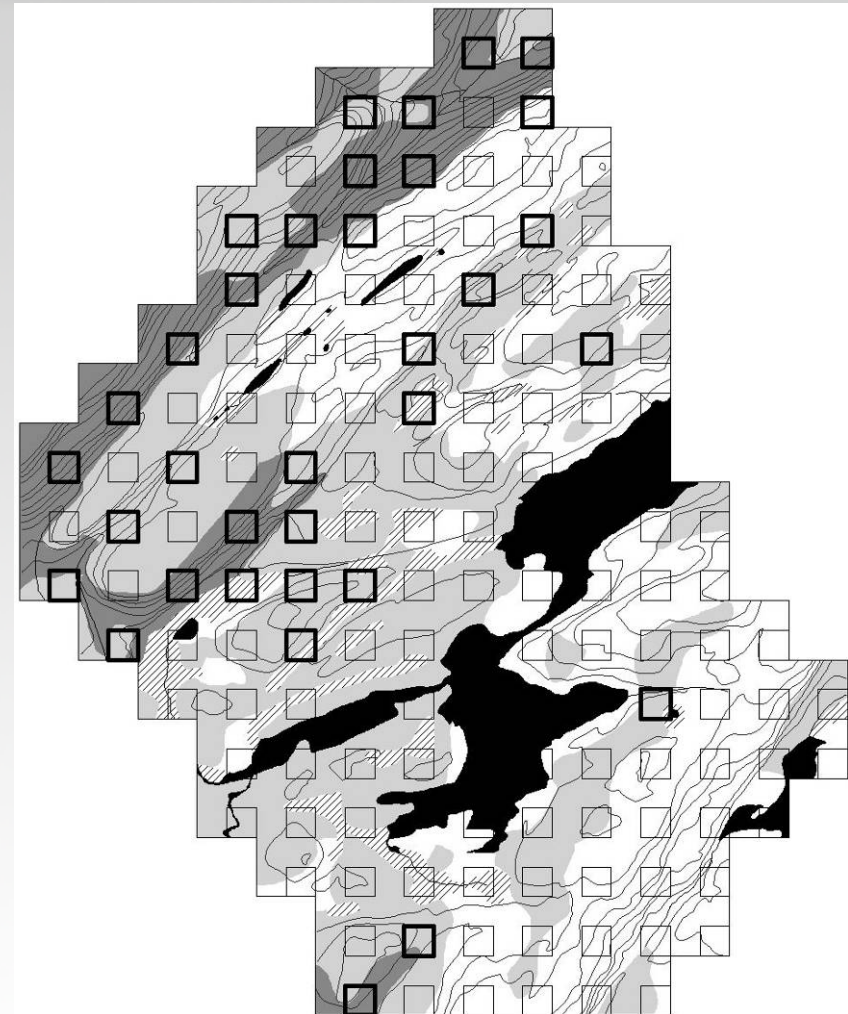
Ivar Gjerde, Norwegian Forest and Landscape Institute
23rd April 2015



Species inventories



- Vascular plants
- Bryophytes
- Lichens
- Polypore fungi
- Beetles
- Ant hills
- Spiders
- Snails
- Insects, spiders and mites in pine canopies



Time series data



- **1997:** Species inventories on 50x50 m plots (N = 136) for vascular plants, bryophytes, lichens, and polypore fungi.
- **2014:** Resampling of 40 plots for the same species groups.
- **Preliminary results:** Significant changes in species occurrences, similar numbers but 50% turn-over in red-listed species.

Publications from Geitaknottane nature reserve



- **Gjerde, I., Sætersdal, M., Rolstad, J., Blom, H. H., Storaunet, K. O.** (2004). Fine-scale diversity and rarity hotspots in northern forests. *Conservation Biology* 18: 1032-1042.
- **Gjerde, I., Sætersdal, M., Rolstad, J., Storaunet, K.O., Blom, H.H., Gundersen, V., Heegaard, E.** (2005). Productivity-diversity relationships for plants, bryophytes, lichens, and polypore fungi in six northern forest landscapes. *Ecography* 28: 705-720.
- **Heegaard, E., Gjerde, I., Sætersdal, M.** (2013). Contribution of rare and common species to richness pattern at local scales. *Ecography* 36: 937-946.
- **Ihlen, P. G., Coppins, B. J.** (1999). Two species of Arthothelium (Arthoniaceae, Arthoniales) new to Scandinavia. *Nova Hedwigia* 69: 391-397.
- **Ihlen, P. G., Gjerde, I., Sætersdal, M.** (2001). Structural indicators of richness and rarity of epiphytic lichens on *Corylus avellana* in two different forest types within a nature reserve in south-western Norway. *Lichenologist* 33: 215-229.
- **Sætersdal, M., Gjerde, I., Blom, H. H.** (2005). Indicator species and the problem of spatial inconsistencies in nestedness patterns. *Biological Conservation* 122: 305-316.
- **Sætersdal, M., Gjerde, I., Blom, H. H., Eide, E., Ihlen, P. G., Pommeresche, R., Skartveit, J., Solhøy, T., Aas, O.** (2004). Vascular plants as a surrogate species group in complementary site selection for bryophytes, macrolichens, spiders, carabids, staphylinids, snails, and wood living polypores in a northern forest. *Biological Conservation* 115: 21-31.
- **Thunes, K. H., Skartveit, J., Gjerde, I.** (2003). The canopy arthropod fauna of old and mature pine (*Pinus sylvestris*). *Ecography* 26: 490-502.
- **Thunes, K. H., Skartveit, J., Gjerde, I., Stary, J., Solhøy, T., Fjellberg, A., Kobro, S., Nakahara, S., Strassen, R. Z., Szadziwski, R., Hagan, D. V., Hassold, E., Kynde, B., Grogan Jr., W. L., Jonassen, T., Aakra, K., Anonby, J., Jensen, L. G., Aukema, B., Michelsen, V., Haenni, J. P., Heller, K., Emeljanov, A. F., Bloszyk, J., Douwes, P., Berggren, K., Franzen, J., Disney, R. H. L., Johanson, K. A., Mamaev, B., Podenas, S., Andersen, S., Gaimari, S. D., Narchuk, E., Søli, G. E. E., Papp, L., Midtgaard, F., Andersen, A., von Tschirnhaus, M., Bächli, G., Olsen, K. M., Olsvik, H., Földvári, M., Raastad, J. E., Hansen, L. O., Djursvoll, P.** (2004). The arthropod community of Scots pine (*Pinus sylvestris* L.) canopies in Norway. *Entomologica Fennica* 15:65-90 .

Changes in forest structure 1997-2014



- Grey alder (*Alnus incana*) stands collapsing.
- Pollarded nemoral trees wind-felled.
- Old Hazel (*Corylus avellana*) stems dying or overgrown by moss sheets.
- Birch (*Betula pubescens*) trees dying.
- Increased volume of logs and changed spatial distribution.
- Increased bark damages due to red deer (*Cervus elaphus*) browsing.

Grey alder stands collapsing



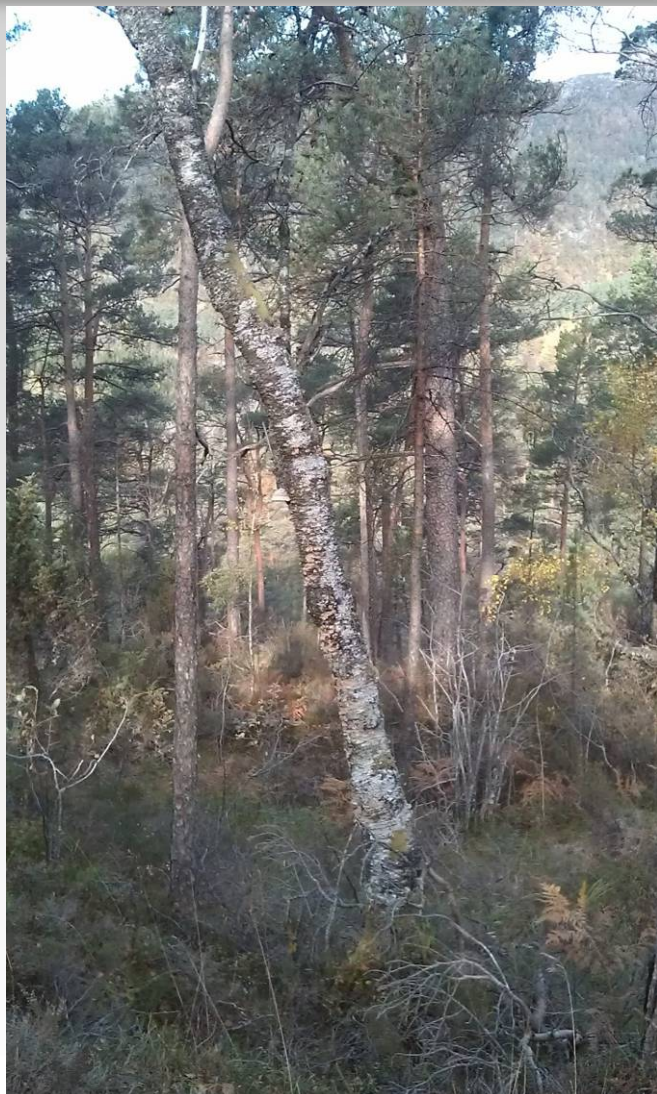
Wind-felling of pollarded nemoral trees



Old Hazel (*Corylus avellana*) stems dying or overgrow by moss sheets



A generation of birch trees in the pine forest is dying



Increased volume of logs and changed distribution



- 1949
- 1991
- 1994
- 2011
- 2015

Browsing by red deer



December – March 2010: Deep and lasting snowcover in lowland forests in western Norway

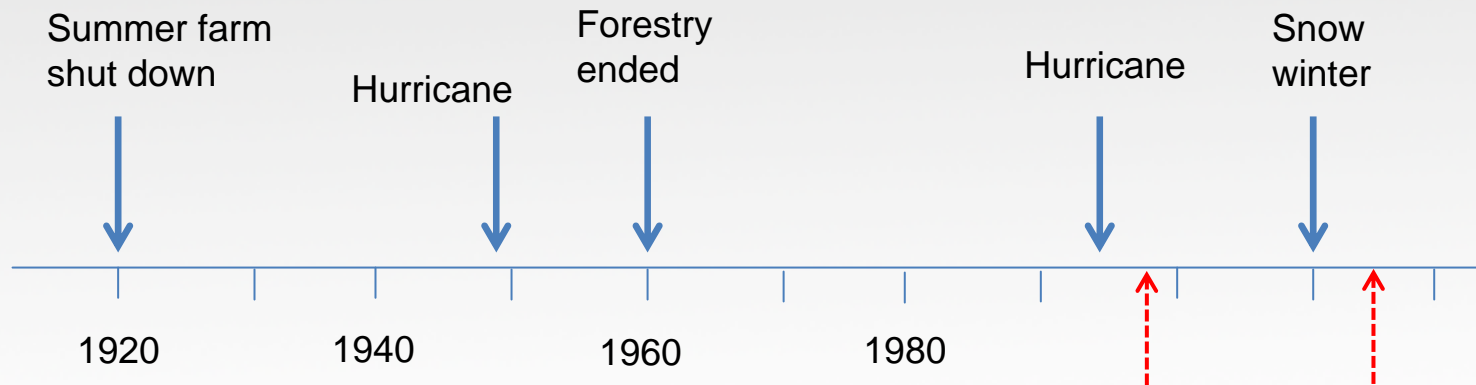
Long-term changes towards denser forests



Dynamics in nature reserves are the rule!



- Forest reserves in Norway are changing from one thing into something else.
- The changes in Geitaknottane nature reserve are mainly determined by the end of summer farming in the 1920s, end of forestry around 1960, and the history of extreme weather incidences.



Are management in nature reserves needed?



- Depends on the purpose of the reserve.
- If the purpose is to preserve the forest and species in the condition at the time of reserve establishment, then management is certainly needed.
- If the purpose is to promote natural development of the area, then management may not be needed.
- However, it should be noted that natural development may imply loss of biodiversity.
- A third goal may be to increase biodiversity through management.