



Predicting natural forest regeneration: a statistical model based on inventory data

Authors: Horst Kolo, Donna Ankerst, Thomas Knoke

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Abstract

Regenerating forest stands through natural seedlings is a commonly accepted silvicultural strategy in Germany. To plan for and increase natural regeneration within a given stand, foresters must be able to estimate whether the stand in its current state can produce sufficient saplings to replace the overstory. In this paper, we present two approaches to building a model that can estimate the probability of natural regeneration occurring, based on variables that are typically readily available from forest inventories. To estimate model parameters we used the large database of the third National Forest Inventory, which covers forest stands and sites across the whole of Germany, as well as weather and soil data. We examined how these variables impact the emergence of natural regeneration, ultimately fitting a model that can predict the occurrence of natural regeneration in 72% of cases. The influence of the variables on the predicted occurrence of natural regeneration was mixed, with most stand variables contributing only minor impact and most likely influencing natural regeneration via complex interactions. The exception was vertical structure (number of stand layers), which accounted for a large proportion of the goodness-of-fit of the model. An important finding was that forest ownership structure is a key variable for the prediction of the presence of regeneration. Data from this study support the assumption that some forest owners manage their stands in a way that fosters natural regeneration.

Keywords

Natural regeneration | Federal Forest Inventory | Logistic regression | Ownership structure | Number of stand layers

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