

Summary

Optimization of final felling of stands in areas affected by large-area disasters

This paper presents a comparative analysis of various methods of determining the amount of felling exploitation and assesses their influence on the condition of tree resources and usefulness in the process of optimization of forest utilization in areas affected by large-area disasters. The study covered six forest districts: Bielsko, Jeleśnia, Ustroń, Ujsoły, Węgierska Górka and Wisła, belonging to the Regional Directorate of State Forests in Katowice. The research material was obtained from the State Forests Information System (SILP). Taxonomy descriptions of 11574 stands with a total area of 62107 ha were generated using the reporting platform State Forests Business Object.

The timber resources at the beginning of the study period were characterized by defining for each forest district: the distribution of stands in age classes, the share of stands according to felling categories, the average age, and the average abundance of stands. Then, the size of felling exploitation was plotted for each forest district according to the following methods: 1) maturity from mature stands, 2) maturity from near-mature and mature stands, 3) equalization of average age, 4) equalized area, 5) from regeneration class, 6) according to silvicultural needs. At the next stage, simulations were made of changes in wood resources that would take place over a 10-year economic period in the case of carrying out cuts at the level determined by the individual methods (simulations were not made for methods 5 and 6). In an analogous way, the simulation of the state of resources and the size of final cutting was carried out for subsequent periods up to and including the fifth decade.

The main results of the study are as follows: 1) The possibility of timber harvesting is best reflected by the yield determination by stand maturity. However, it is strongly dependent on the distribution of stands in age classes. In districts with a high share of mature stands, it reaches high values, while in consecutive periods, it fluctuates considerably and does not ensure uniformity of harvesting. 2) The yield determination by average age equalization allowance should not be used in stands with disturbed age structure. In forest districts with low average age, in order to realize the yield determined by this method, a considerable share of pre-felling stands would have to be allocated for felling. 3) The yield determination by equal area is also not recommended for forest districts with large-scale damage. This method, due to the determination of fixed felling area, designates for final cutting, apart from mature stands, pre-felling stands. 4) The yield determination by stands in regeneration class is a consequence of decisions made on cuts that initiate regeneration. The high volume of stands in regeneration

class are a result of conducted rebuilding in districts covered by the survey and area of stands in regeneration class. 5) The increment according to silvicultural needs strongly depends on the degree of stand damage, the degree of species composition compatibility with the site, and on the accumulation of old stands.

Due to the dominance of non-productive functions of stands and their systematic increase in importance, optimization of felling exploitation requires taking them into account to a greater extent in the ecosystem functions of the forest. The felling and near-felling stands included in the study have a simple age and species structure; therefore, the study assessed the usefulness of regulation methods applied in stands with a simple structure. As a result of changes in silvicultural methods through the implementation of complex felling systems and diversified species composition, stands of various ages are being created, in which it will be appropriate to apply felling control methods based on developmental phases of stands and breast height structure.

Key words: Beskid Żywiecki, Beskid Śląski, stand, sustainability, final felling, yield, age class structure, cutting age