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## RESEARCH AND TECHNICAL REPORT

## The recovery of soil compaction in the selection logged over area at Tokyo University Forest in Hokkaido\*

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## 1. Introduction

When the soil is compacted, the particles are pushed closer together and the amount of pore space is reduced and the soil density is increased. Increasing soil density or reducing pore space will reduce the site productivity. Root penetration and growth are decreased in compacted soil because the hardness or strength of the soil prevents the expansion of roots (5). The natural condition such as root expansion, soil organism activity, freeze-thaw and wet-dry cycles influence the soil recovery from compaction. Therefore, not only the degree of soil compaction but also the rates of recovery from compaction have to be investigated.

There are some reports on the rate of recovery of compacted soil (6). The recovery time for compacted soils ranges from two to over fifty years. According to a study about the rate of recovery of the disturbed soil from ground-based logging in Pahang Malaysia, the average times required for natural recovery of bulk density of the skid trail was 19 years, and the secondary forest road was 14 years to the undisturbed condition (3). The research of Froehlich *et al.* (1) determined the recovery of the bulk density of soil in major skid track of the volcanic and granitic soil at the surface to a 30 cm depth. Except for the surface of the granitic soil, none of the bulk densities in skid trails had returned to the undisturbed value in the 23 years since logging.

The purpose of this paper is to clarify the recovery rates of soils from the compaction of logging operations. For this purpose, the bulk density of compacted soils was investigated in the natural forest in Hokkaido. The organic matter content was also investigated to clarify the recovery of compacted soils from the viewpoint of chemical properties because logging operation usually affected chemical properties as well as physical properties. Then, the times required for natural recovery of the bulk density to the undisturbed condition were estimated.

## 2. Site and Methods

The research took place in the natural forest of Tokyo University Forest in Hokkaido. The natural forest management of the Tokyo University Forest in Hokkaido shows a successful example of natural forest management (4). It is situated in the central part of Hokkaido, 43° N, 142° E. The area covers 22,800 ha. The forest is located in the ~~temperate~~ forest zone between the cool-temperate and the sub-boreal zone with coniferous and broad-leaved species such as *Abies sachalinensis*, *Ficus japoensis*, *Quercus mongolica*, *Kalopanax pictus*, *Fraxinus mandshurica*, *Betula maximowicziana*, *Tilia japonica* and others. About 40 species are treated as valuable forest management trees. Most of the forest floor is covered with *Sasa senanensis*. *Sasa senanensis*

\* 東京大学北海道演習林の択伐集材跡地における土壌締め固めの回復

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rate and heavily impacted trees reached 12 percent over a 16 year period. The next study should be conducted to find out the natural regeneration and seedling growth response.

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