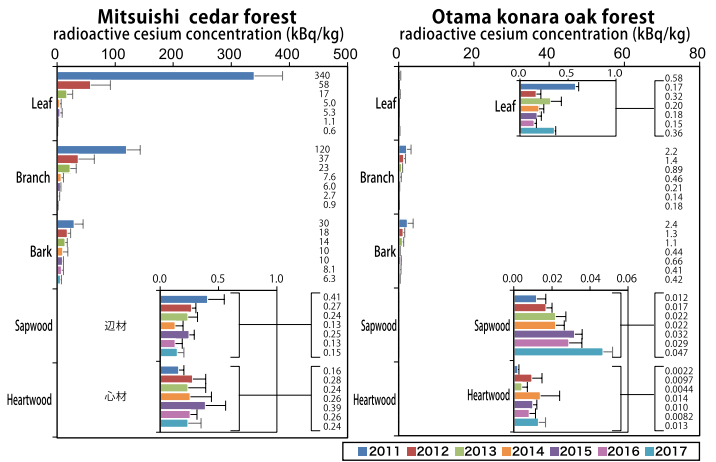


Distribution of Radioactive Substance Concentrations in Each Part of Trees

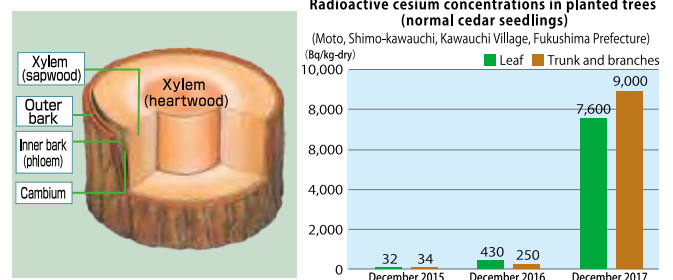
Concentrations of radioactive cesium in the leaves, branches, bark, and other parts of trees declined sharply between 2011 and 2012, but after 2012, the decline in concentrations has been more gradual. Also, in every investigation area, the heartwood and sapwood within timber has had lower concentrations than the leaves, branches, bark, and other parts (Figure 1).

The decline of concentrations in the leaves of evergreen trees such as cedar and Japanese cypress is thought to be influenced by replacement with new leaves as old leaves fall, in addition to washing by rain.

As concentrations of radioactive cesium within wood have not changed greatly since 2011, it appears that most of the radioactive cesium absorbed immediately after the accident accumulated in internal parts of trees. Also, as the leaves of konara oaks, which are grown new every year, include radioactive cesium, and concentration changes are observed in the sapwood and heartwood of cedars and konara oaks, it appears that part of the radioactive cesium concentration is migrating within trees. In cedars, in particular, research to date has revealed a rising trend in radioactive cesium concentrations in heartwood. Furthermore, as radioactive cesium is found even in saplings that were grown after the accident, it is also necessary to investigate the effect of absorption from the root (Figure 3).



[Figure 1] Changes in Radioactive Cesium Concentrations in Each Part of Trees in Mitsubishi Cedar Forest and Otama Konara Oak Forest
Reference: Forestry Agency "Results of a Survey of Radioactive Cesium Distribution in Forests" (2017)



[Figure2] Structure of a Tree Trunk
Reference: "Data Collection to Know Forest No.1", Zenrinkyou

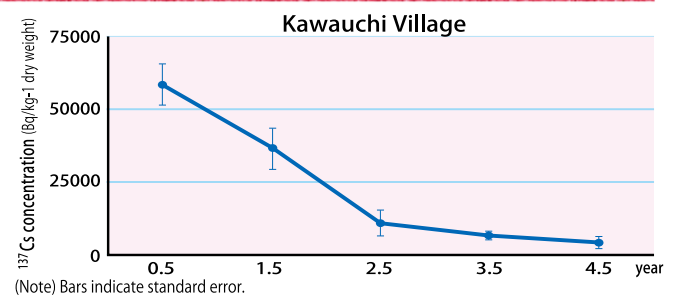
[Figure3] Changes in Radioactive Cesium Concentrations in Planted Trees
Reference: Forestry Agency "Validation Project for Forestry Revitalization in Districts Preparing for Evacuation Order Lifting" (Futaba District), 2017

Impact of Radioactive Substances on Small Mammals Living in Forests

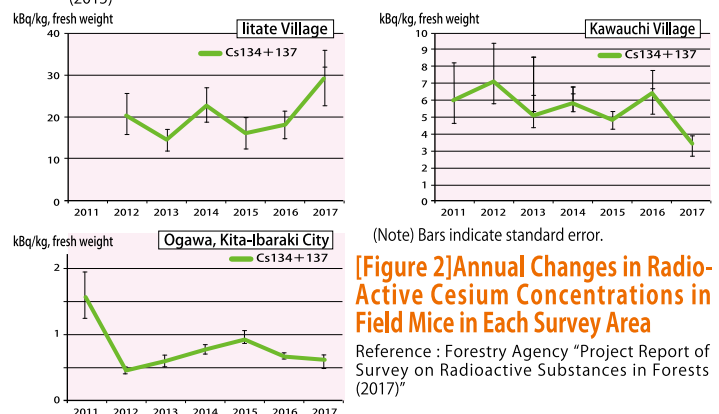
Since 2011, the Forestry Agency has been running a survey to grasp the real state of radioactive contamination in earthworms and field mice living in forests.

Radioactive cesium concentrations in earthworms collected in Kawauchi Village decreased substantially between 0.5 and 2.5 years after the accident, and then continued with a more gradual decline (Figure 1). To see the ease of radioactive cesium movement into the bodies of earthworms, the ratio between radioactive cesium concentrations in the litter layer that they eat and in the bodies of the earthworms was investigated. Compared to the concentration in the litter layer, the concentration within earthworm bodies tended to be lower. That is thought to be the case because as the absorption of radioactive cesium from the litter layer to clay etc. advances, it becomes harder for it to migrate into earthworms.

Also, looking at annual changes in radioactive cesium concentrations in the bodies of field mice, there was an increase in levels in field mice in Iitate in 2017, a decrease in Kawauchi Village, and no significant change in Kita-Ibaraki. Patterns of concentration change differed regionally (Figure 2).



[Figure 1] Changes in Radioactive Cesium Concentrations in Earthworms (gastrointestinal tract content removed, per unit dry weight)
Reference: Forestry Agency "Project Report of Survey on Radioactive Substances in Forests (2015)"



[Figure 2] Annual Changes in Radioactive Cesium Concentrations in Field Mice in Each Survey Area
Reference: Forestry Agency "Project Report of Survey on Radioactive Substances in Forests (2017)"