not a contradiction of the last statement to say that hemlock is the most abundant reproduction on the unburned logged areas. It apparently originates, however, not from seed distributed after the logging, but from the small trees which already existed beneath the mature fir stands before the logging. One can demonstrate this by counting the annual growth rings of the hemlock, when he will find that the trees are much older than the logging operations. It is also to be noticed that the growth rings become materially wider, the same year or the year after the logging operations, showing that the growth conditions for the hemlock were improved at that time, that is, by the removal of the overtopping fir trees. Some typical examples of the condition of hemlock reproduction after logging may be given. On an area logged four years ago, there were 416 hemlock saplings 16 years old and only 24 hemlock seedlings four years old, or less, on an acre. An area logged six years ago disclosed 730 hemlock saplings 18 years old on an acre and only 50 seedlings younger than the age of the logging. On an area logged 12 years ago, an acre showed 1,450 hemlock trees 24 years old and 200 seedlings which had come in since the logging.

The young growth hemlock on the unburned logged-over areas occurs in dense groups in the more moist soils and as scattered individuals on the drier soils, so that the trees as they grow older form a broken crown cover. The more open places may eventually fill up with fir. This is indicated by the presence of scattered fir seedlings about stumps and along the length of fallen trees. Although the exact history of the areas is not definitely known, it is probable that the older age classes of the hemlock, represented in Table II, originated on unburned logged-over areas. It will be seen that the proportion of fir is small, indicating that the conditions for the reproduction of hemlock were very much better than those of the fir.

Logging with Burning

As already intimated, much the greater portion of the cut-over areas has been burned at least once since logging and most of the studies of forest reproduction were made on areas of this kind. In fact, extensive areas of commercial forest burned before logging were not found in the region explored. Moreover, the impression was gained that the large-sized and medium-sized trees were not seriously injured by one fire, although a succession of fires gradually weakens the trees until they become sickly and finally die. The forests not quite ready for the axe, however, and the small-sized forests of the higher slopes are readily killed by fire; extensive burns of this kind were encountered.

It is probable that light ground fires even stimulate the reproduction of hemlock, for the very best stands were found where fire had