Douglas-Fir Tussock Moth

Orgyia pseudotsugata (McDonnough)
Lepidoptera: Lymantriidae

Objectives: To determine the vertical distribution of *O. pseudotsugata* egg masses; to identify growing populations during suboutbreak conditions using timed visual samples of foliage.

Abstract: Douglas-fir tussock moth, *Orgyia pseudotsugata* (McDonnough), is a periodic defoliator of Douglas-fir, *Pseudotsuga menziesii* (Mirb.), and true firs, *Abies* spp., in western North America. Outbreaks occur quite unexpectedly every 7–10 years and usually persist for 3–4 years. Defoliation by *O. pseudotsugata* can be severe and cause widespread tree mortality during the first year of an outbreak. Surviving trees may exhibit growth loss, top-kill, and tree deformity.

Few studies have examined *O. pseudotsugata* in suboutbreak conditions, when intermediate populations begin to expand. During outbreak conditions egg masses and cocoons are typically found in the lower crown because high densities of larvae have defoliated the upper crown (Luck and Dahlsten 1967; Mason 1970). Distribution of eggs within the host tree may differ during suboutbreak populations, when less defoliation has occurred.

The vertical distribution of *O. pseudotsugata* egg masses in suboutbreak conditions was examined on felled trees and a recommendation for timed visual samples was made for standing trees. Egg masses were found throughout the canopy but with a concentration towards the upper crown. Approximately 10% of the total egg masses present on the trees were visible to an observer conducting timed, 1-minute visual samples of the foliage. Thirty 1-minute observational periods of individual trees within a 20 ha area could serve as a rapid survey of expanding populations with outbreak potential. Damaging outbreaks during the following season are considered unlikely if several egg masses cannot be found within 30 minutes of observation.

Sampling Procedure: Randomly select trees for sampling from a distance at which any cocoons present on the trees cannot be distinguished. At each selected tree, spend one minute visually searching for cocoons and egg masses. Focus on visually sampling the lower crown, where cocoons and egg masses can be seen more easily. Thirty 1-minute observational periods of individual trees within a 20 ha area could serve as a rapid survey of expanding populations with outbreak potential. Damaging outbreaks during the following season are considered unlikely if several egg masses cannot be found within 30 minutes of observation.

Notes: The trees selected for this study were 15-20 cm diameter at breast height, approximately 12 m tall, and with a crown approximately 5 m wide at its widest. In addition, selected trees had foliage close to the ground and grew close to neighboring trees. These sampling specifications were set by the land manager and the authors' observations may not hold for trees with differing characteristics.

The authors acknowledge that a more specific sampling scheme using visual observations should be developed. While not explicitly stated by the authors, sampling cut trees as specified would supplement the visual sampling of the lower crown as presented here. Felled trees with more egg masses in the upper crown would indicate the presence of low or intermediate-level populations, while larger numbers of egg masses in the lower crown would suggest that populations are building to outbreak levels, or an outbreak is underway.

References:

Luck, R. F.; Dahlsten, D. L. 1967. Douglas-fir tussock moth (*Hemerocampa pseudotsugata*) egg mass distribution on white fir in northeastern California. Canadian Entomologist 99: 1193-1203.

* Mason, R. R. 1970. Development of sampling methods for the Douglas-fir tussock moth, *Hemerocampa pseudotsugata* (Lepidoptera: Lymantriidae). Canadian Entomologist 102: 836-845.