Douglas-Fir Tussock Moth

Orgyia pseudotsugata (McDunnough)
Lepidoptera: Lymantriidae

Mason, R. R. 1969. Sequential sampling of Douglas-fir tussock moth populations. Res. Note PNW-102. Portland, OR: *U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station*; 11 p.

Objective: To develop sequential sampling plans for classification of *O. pseudotsugata* populations.

Abstract: The Douglas-fir tussock moth periodically causes severe damage to Douglas-fir, *Pseudotsuga menziesii* (Mirb.) Franco, and true firs, *Abies* spp., in western North America. Outbreaks occur every 7-10 years and usually persist for 3-4 years. Growth loss, top-kill and tree mortality are common when *O. pseudotsugata* populations are high.

Sequential sampling plans for making quick classifications of incipient populations were developed for *O. pseudotsugata* eggs and larvae. After each tree is sampled, a sequential sampling plan is referenced, and sampling is discontinued when a decision threshold is reached. Populations are classified as either light or heavy. These plans are designed to be applied independently in a suspected infestation for distinguishing between low density populations and high density populations capable of reaching outbreak levels within one generation.

Sampling Procedure:

Egg: Sample one, two, and one whole branches from the upper, middle and lower crown, respectively. Count the number of egg masses on all four branches, and express their density per 0.645 m^2. After each tree is sampled, reference the sequential sampling plan (Fig. 2), and continue sampling until a decision threshold is reached, and infestations are classified as either light or heavy.

The number of eggs in the field plan (Fig. 2) is converted to egg masses by dividing the number of eggs by 260. These factors can be adjusted accordingly if there is reason to believe that the average number of eggs per mass deviates significantly from 260.

Larvae: Cut one 43-cm foliated twig sample from the outer mid-crown, and two similar sized samples from the inner mid-crown. The outside crown is defined as the outer 43 cm from the tip of the main branch. Special care should be taken when using pole pruners so that larvae are not dislodged from the samples. Count the number of larvae from all three twigs, and express their density per 0.645 m^2. After each tree is sampled, reference the

sequential sampling plan (Fig. 1), and continue sampling until a decision threshold is reached, and infestations are classified as either light or heavy.

Time larval samples to coincide with the presence of small larvae. If late instar larvae are sampled, classification may become less accurate. In endemic populations, it is much easier to locate young larvae dispersed in the foliage than egg masses. For this reason, extensive surveys for detection of low level populations will be obtained most efficiently by sampling larvae.

Note: The data used in developing these sequential sampling methods were gathered from infestations on white fir, *A. concolor* (Good. and Glend.) Lindl., and may not be applicable to infestations on other species.

Figures:

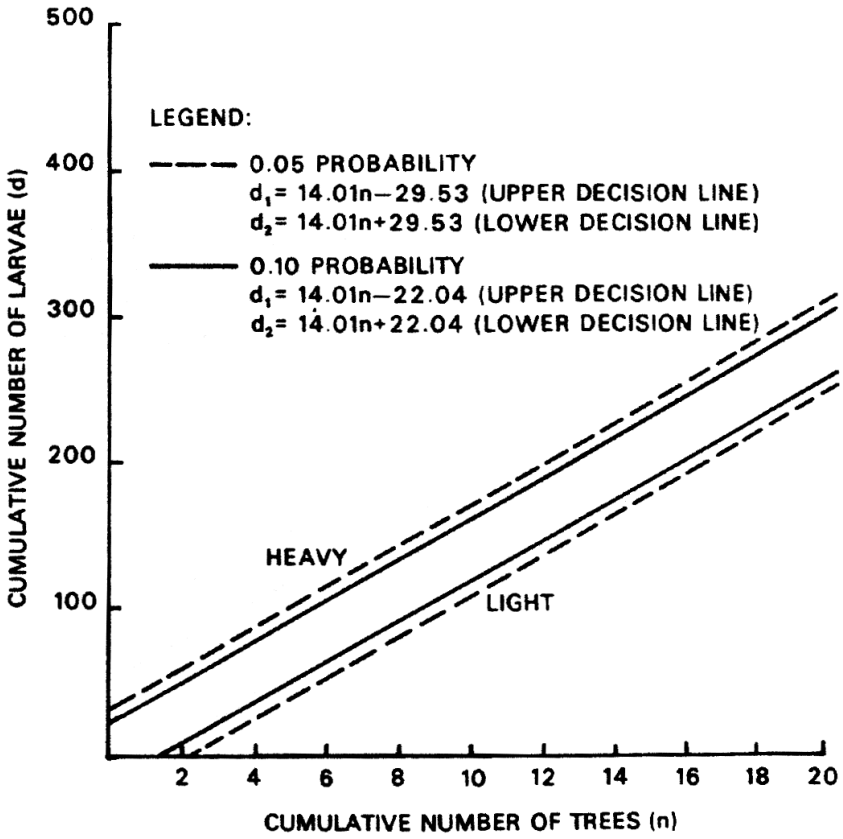

Figure 1.--*Sequential graph for classifying Douglas-fir tussock moth larvae into two population levels.*

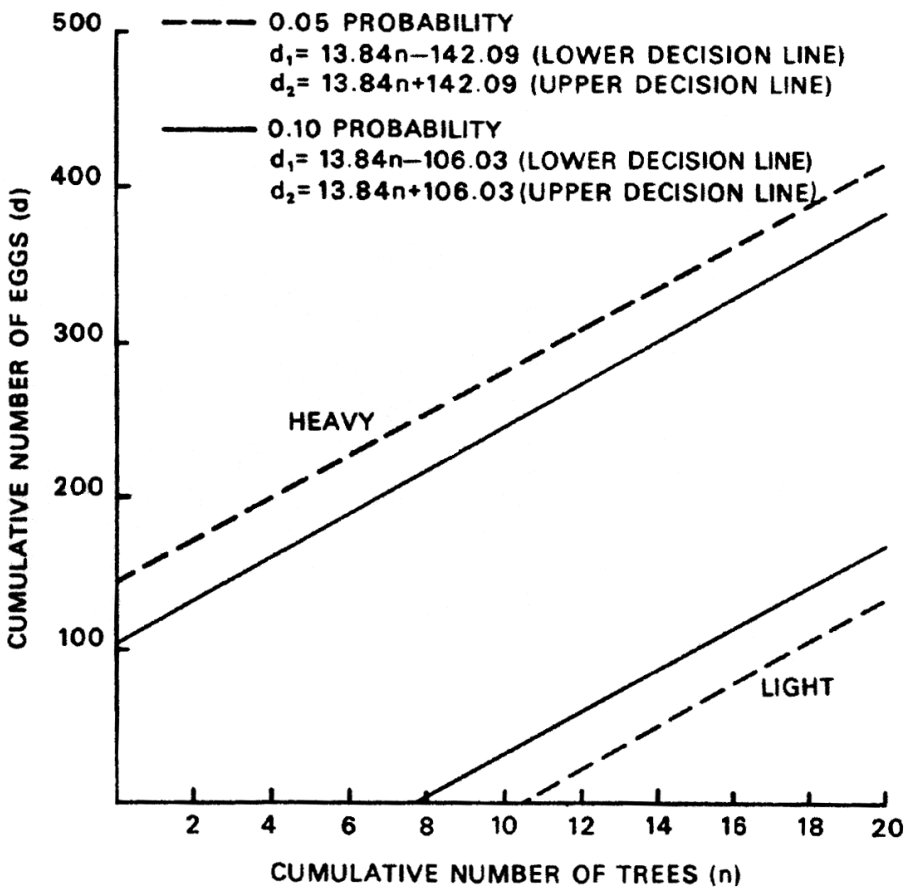

Figure 2.--*Sequential graph for classifying Douglas-fir tussock moth eggs into two population levels.*