

# 2003 DOUGLAS-FIR TUSSOCK MOTH EARLY WARNING SYSTEM TRAPPING SUMMARY FOR OREGON AND WASHINGTON

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## Summary

Douglas-fir tussock moth (DFTM) pheromone traps were located on approximately 518 Early Warning System (EWS) plots scattered throughout Washington and Oregon in 2003. In 2003, DFTM trap catches remained at endemic levels throughout most of Washington and Oregon, except in the south central Oregon area, where traps indicated an increase in population levels. This area will continue to be monitored in 2004.

## Background

Douglas-fir tussock moth, *Orgyia pseudotsugata* (McCunnough) (Lepidoptera: Lymantriidae), outbreaks in the western United States and Canada tend to be cyclic, occurring about every 9 years (Shepard et al., 1988). In the Pacific Northwest, a Douglas-fir tussock moth population increase consists of four phases or years. During the first phase, the population begins to increase, but remains at suboutbreak levels. In phase II the population begins to increase to above the outbreak level threshold and some defoliation is apparent. In phase III, populations are extremely high and result in complete tree defoliation. Populations remain very high during phase VI; however, population pressure and insect pathogens cause the population to collapse during this phase. Additional defoliation will be incurred during this phase, subsequent to the collapse of the population.

Generally land managers do not recognize the significance of the severity of a DFTM outbreak until phase III when the first year of complete defoliation occurs. Once significant defoliation occurs, it is too late to implement any management options.

From 1971-1974, a widespread outbreak of Douglas-fir tussock moth occurred in eastern and central Washington, northeastern Oregon, and in adjacent Idaho. Since that time, populations have fluctuated three times which resulted in defoliation. The first two fluctuations resulted in outbreaks in more localized areas near Burns, OR in the early 1980's and near Halfway, in northeastern Oregon in the early 1990's. In 1991, about 116,000 acres of that outbreak was treated with the biological insecticide, *Bacillus thuringiensis* var. *kurstaki*. A more extensive outbreak occurred from 1999 to 2002. Approximately 220,000 acres of defoliation were

detected in northeastern Oregon in 2000, and 39,000 acres were treated with TM-BioControl-1, the natural virus of the DFTM. In 2001, and additional 16,690 acres were treated on the Okanogan National Forest in Washington. By the fall of 2002, populations had returned to near-endemic levels.

### **The DFTM Early Warning System**

DFTM population level trends are monitored annually throughout Oregon and Washington using pheromone traps. This on-going Douglas-fir Tussock Moth Early Warning System is a cooperative effort by the USDA Forest Service, the Oregon Department of Forestry, the Washington Department of Natural Resources, the USDI Bureau of Indian Affairs, and the USDI Bureau of Land Management. Other western Regions and States also participate in this west-wide survey. The objective of the EWS is to detect incipient DFTM outbreaks. When trap catches increase to predetermined levels, additional sampling activities are initiated to further quantify population levels (Sheehan, et al., 1993). The DFTM EWS is intended to provide an advance warning of population changes that would indicate a potential outbreak one to two years prior to the outbreak occurring. This would allow land managers an opportunity to evaluate, analyze, and implement management options before high levels of defoliation occur.

The pheromone traps are deployed according to standardized procedures (Daterman, et al., 1979) in specified trap sites in July and retrieved following moth flight in the fall. The pheromone lures contain a very low pheromone dose and are calibrated specifically to detect low populations. There are five traps per plot. The average number of moths per trap is calculated for each plot. Male DFTM are sampled annually on these permanent locations throughout eastern Oregon and Washington. This report summarizes the sampling results for 2003.

### **Population Monitoring Process**

Plot trap catch averages, trends in trap catches on plots from year to year, and trap catch density patterns over larger geographic areas are the factors considered when determining future sampling intensity and methodology. When plot averages exceed predetermined threshold levels and the trend of trap catches is increasing in areas where defoliation would concern land managers, ground sampling is initiated.

Cocoon, egg mass, and/or larval surveys, using methods described by Fettig et al. (2001), are conducted in the fall of the same year, or spring and summer of the following year, in the vicinity of plots with trap catch averages exceeding 40 moths per trap within areas of concern. Cocoon and larval survey data provide estimates of population densities and give more accurate indications of outbreak potential and population trends than the pheromone trap data, which indicate population changes over large geographic areas.

The DFTM Early Warning System **is not designed or intended** to predict exactly where the defoliation will occur; areas to be sampled on the ground should be selected on the basis of the impact of potential DFTM defoliation on management objectives. DFTM EWS traps are **not** calibrated for use during an actual DFTM outbreak and as populations increase, a decline in trap catches will typically be noted. Once the traps have signaled a population increase, larval and cocoon/egg mass surveys are used to determine what the populations are doing in that particular area.

## Results and General Trend

Figure 1 shows the average number of moths caught in DFTM pheromone traps distributed throughout the host range in eastern Oregon and Washington. Throughout the Region, trap catches remained at endemic levels. Figure 2 shows a significant increase in the number of traps, throughout the Region, with no moth catches. The slight increase in the mean number of moths caught (as shown in Fig. 1) is due almost exclusively to increased trap catches on the Fremont and Winema NF's. Figures 3 and 4, and Table 1, show the change in DFTM trap catches for those two Forests. In over 20 years of trapping, 2001 recorded the highest number of moths trapped on the Fremont NF, and, although not the highest trap catch for that Forest, the Winema NF also showed an increase during that year. In 2002, there was a noticeable drop in the number of moths caught. In 2003, trap catches again returned to record, or near record high numbers. Continued monitoring will be needed on these two Forests in order to ascertain what the population is doing, and trapping in 2004 will be important. Figures 5 and 6 are maps showing the distribution and location of the DFTM traps and where moths were trapped. Except for the south central Oregon area, DFTM populations throughout the rest of the Region should remain at endemic levels.

DFTM Early warning System data and summaries for Oregon and Washington can be found on <http://www.fs.fed.us/r6/nr/fid/data.shtml#dftm>.

## References Cited

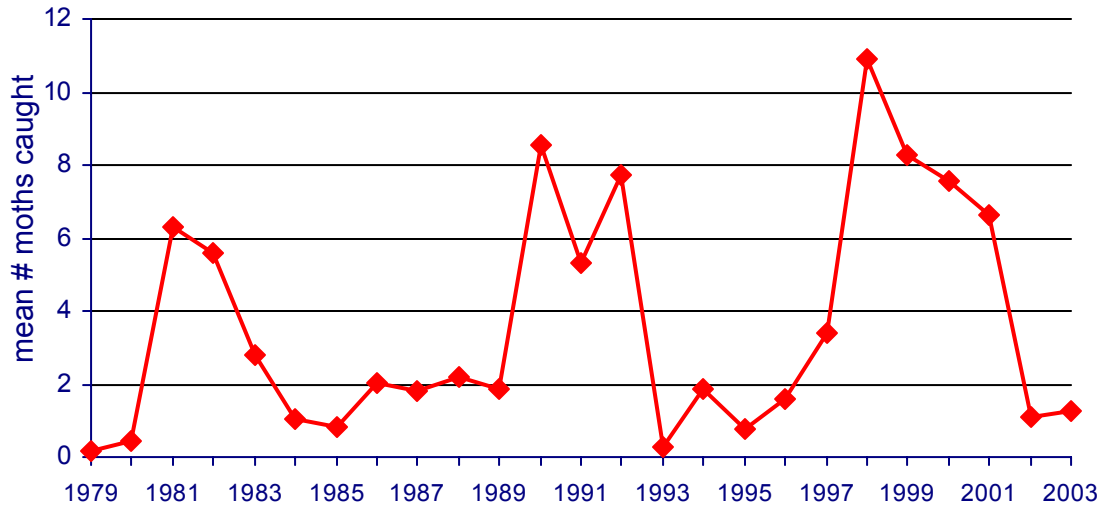
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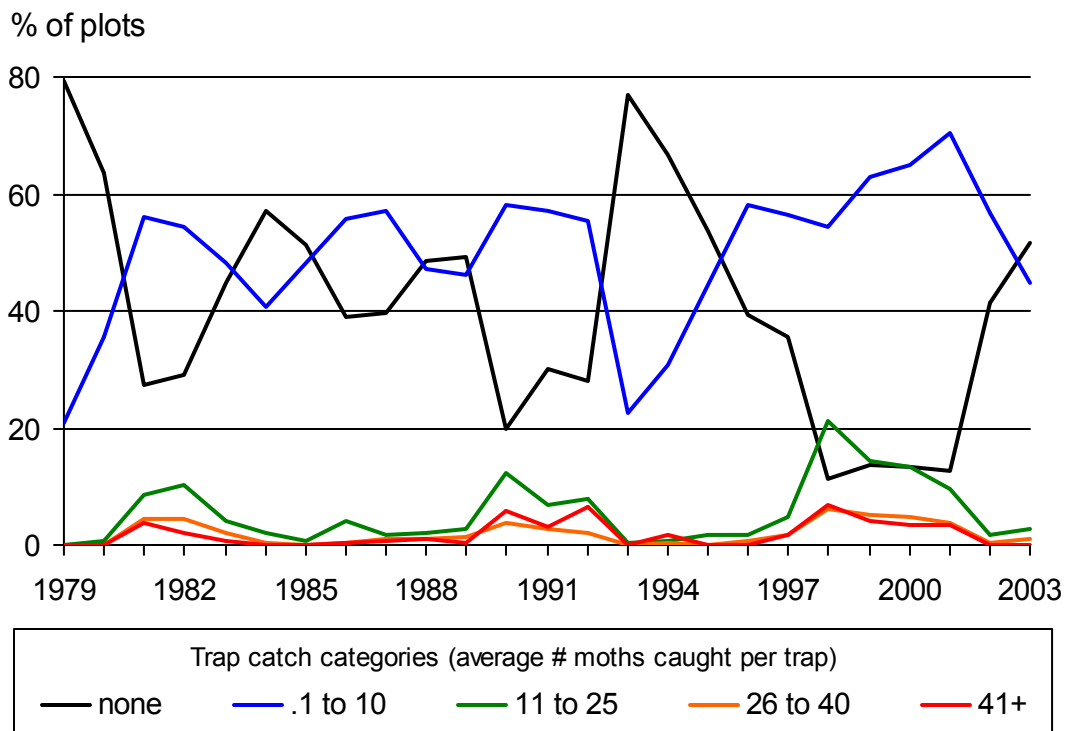
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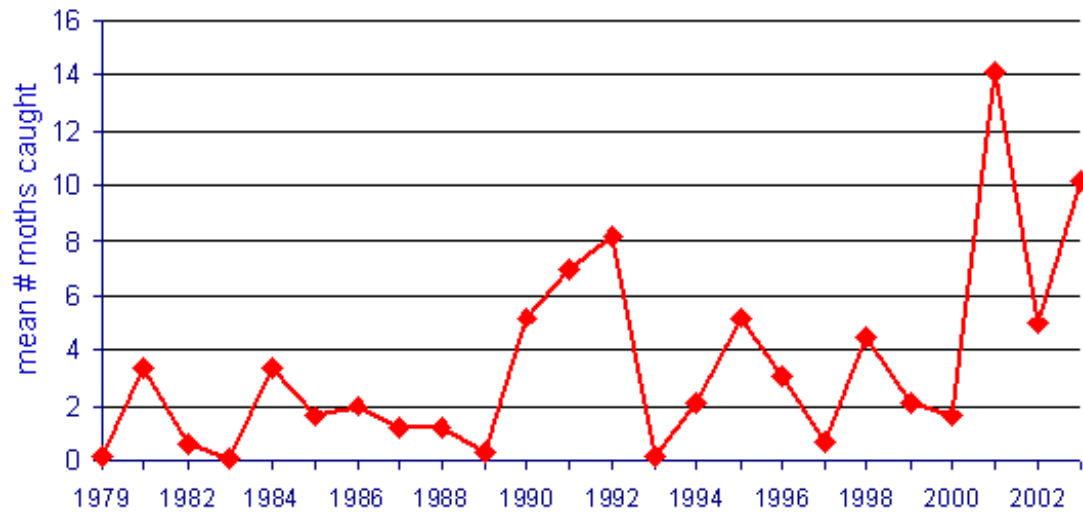
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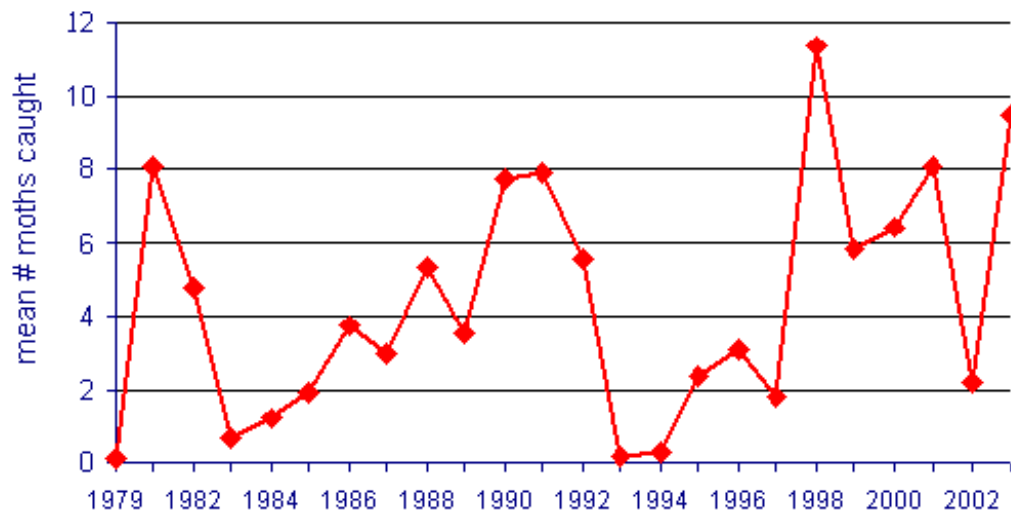
**Figure 1 – Average DFTM pheromone trap catches for Oregon and Washington.**



**Figure 2 – Percent of plots by trap catch category in Oregon and Washington.**

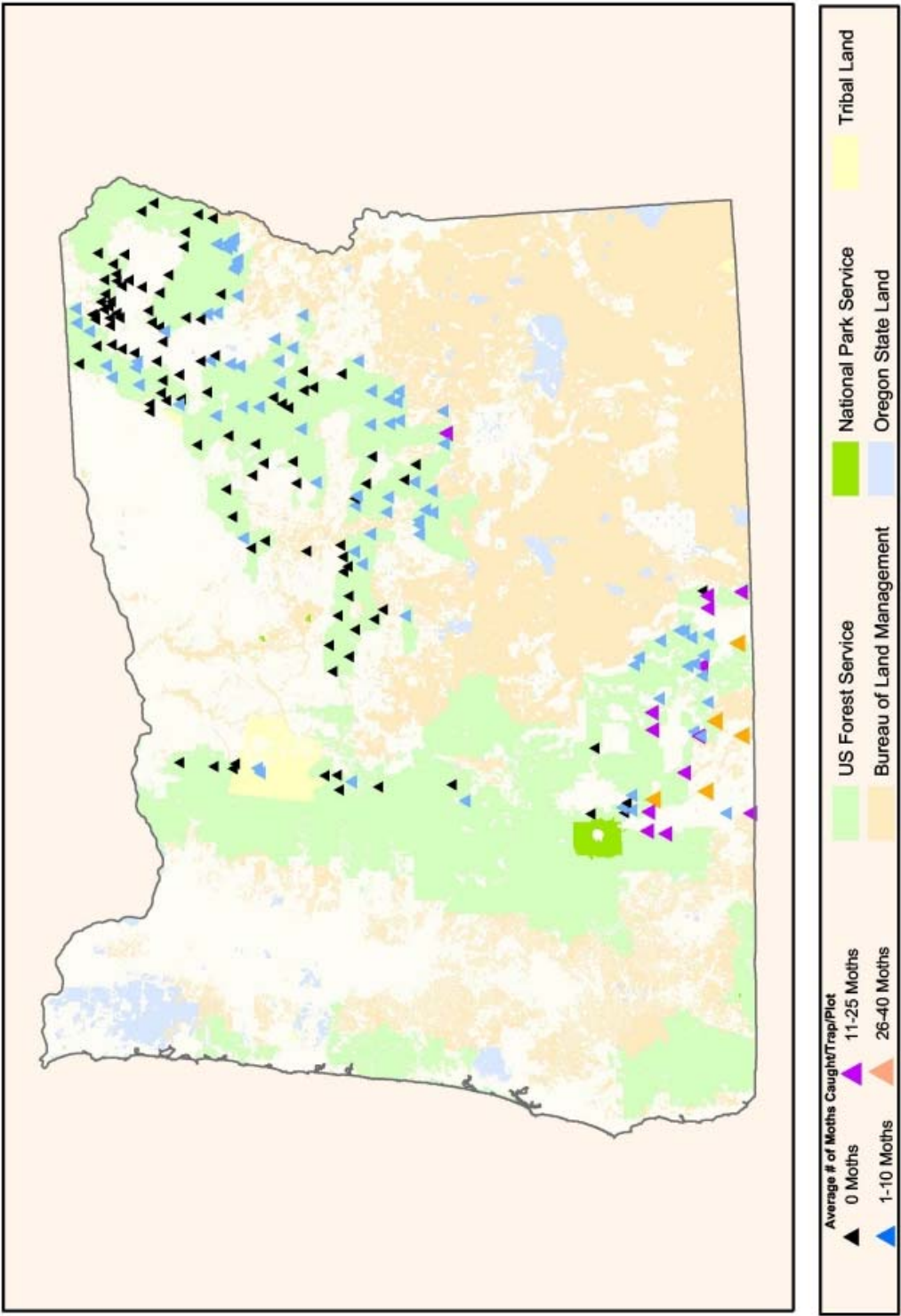


**Figure 3 – Average DFTM pheromone trap catches on or near the Fremont National Forest in south-central Oregon.**



**Figure 4 – Average DFTM pheromone trap catches on the Winema National Forest in south-central Oregon.**

Fig. 5: Douglas-fir Tussock Moth: 2003 Average Trap Catch/Plot in Oregon



**Fig. 6: Douglas-fir Tussock Moth: 2003 Average Trap Catch/Plot in Washington**

