United States Department of Agriculture | **Forest Service** | **Region One** | **200 East Broadway P.O. Box 7669 Missoula, MT 59807**

File Code: 3420 **Date:** November 21, 2005
Route To:

Subject: Budworm Defoliation on Flesher Pass (TR05-35)

To: Forest Supervisor Helena National Forest

In August and September of 2005, Nancy Sturdevant and Sandy Kegley evaluated western spruce budworm defoliation on Douglas-fir in thinned and unthinned areas near Flesher Pass on the Helena National Forest (NF). Specialists from the Lincoln Ranger District (RD) contacted us requesting more information about the amount of defoliation from western spruce budworm on Flesher Pass and potential tree mortality that might result from the defoliation.

The following trip report summarizes findings from that service visit. I hope this report is useful and trust the district will contact our office if they need further insect and disease assistance.

/s/ Cathy Scofield (for)
PAUL RIES
Acting Director
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Enclosure

cc:
Jack Kendley
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TRIP REPORT TR-05-35
Western Spruce Budworm on Flesher Pass
Lincoln Ranger District, Helena National Forest
November 9, 2005

In August and September of 2005, Sandy Kegley and I evaluated western spruce budworm, *Choristoneura occidentails* Freeman, in thinned and unthinned areas near Flesher Pass on the Helena National Forest (NF). Specialists from the Lincoln Ranger District (RD) and private citizens in the area were concerned about the amount of defoliation from western spruce budworm on Flesher Pass and potential tree mortality that might result from the heavy defoliation.

In Montana, number of acres defoliated from budworm increased three-fold since 2002—going from 53,000 in 2002 to 177,000 acres in 2004. Defoliation from budworm on the Helena NF is by far the most striking and has been increasing over the past four years. Defoliation is also significant on other east side National Forests such as the Gallatin and Beaverhead-Deerlodge. Little to no defoliation has been noted on the west side forests since the previous outbreak of budworm which collapsed in the early 1990s. The exception is several areas on the Kootenai NF that have been defoliated by budworm over the past few years.

Both weather and stand conditions are important factors in sustaining budworm outbreaks. Extended warm, dry periods result in higher survival of budworm larvae and adults which in turn translates into increased defoliation. This, in addition to warmer winter weather patterns, has prevented normal mortality in budworm populations to occur. However, if weather patterns return to more normal conditions, budworm numbers will usually drop to endemic levels quite quickly.

Historically, Douglas-fir trees on Flesher Pass have been defoliated by budworm during previous outbreaks. The most recent defoliation event was noticed on Flesher Pass in 2001 and was recorded via aerial survey during 2003. The current budworm outbreak in the Northern Region has probably been exasperated by the extended drought occurring across Montana and other western states. Historically in the Northern Region, mature trees that are repeatedly defoliated from budworm survive.

Survey on Flesher Pass

One-hundred trees in both thinned and unthinned areas on Flesher Pass were surveyed in September 2005. Harvesting in the thinned area occurred in the spring and fall of 2004, during the current budworm outbreak. Basal areas in the thinned area ranged between 80-100 square feet and in the unthinned area between 180-260 square feet. We did not sample trees near the edge between thinned and unthinned areas. Several transects were established in each of the thinned and unthinned units. Trees greater than 8 inches dbh were randomly chosen approximately every 20 feet along transects. The following measurements were recorded: 1) total defoliation; 2) top dieback or top kill; 3) successful or unsuccessful attack by Douglas-fir beetle; 4) tree mortality and 5) dbh. Defoliation was measured visually with binoculars for both new and old foliage.

The phloem of each tree in the unthinned area was examined by removing a small piece of bark. The phloem was rated either as moist or dry. The phloem of trees in the thinned area was not examined because the trees were on private land. However, very few trees in the thinned area had greater than 90% defoliation.

Results and Discussion

The average defoliation for trees in the unthinned area was 83.5% compared to 41.9% for trees in the thinned area. Eight trees in the unthinned area and six in the thinned area had dead tops. The average dbh in the thinned area (14.4 inches) was similar to the unthinned area (13.9 inches). Forty-two trees in the unthinned unit had greater than 90% defoliation as compared to 11 trees in the thinned unit. In general, trees in the thinned unit appeared greener and to be more vigorous than trees in the unthinned unit.

Figure 1. Budworm Defoliation on Flesher Pass, 2005.

Thirty-five trees in the unthinned unit were 100% defoliated. Of these, 18, or 50% had dry phloem and are probably dead. Seven trees, or seven percent, in the thinned unit were 100% defoliated by budworm and therefore have the highest probability of dying over the next few years. We did not check the phloem of these trees because they were on private land.

Table 1. Average Defoliation and Probability of Mortality of Trees in Thinned and Unthinned Units.

Units	Average Diameter	Average Defoliation	Douglas-fir Beetle Attack
Thinned	14.4	41.9%	1 tree
Unthinned	13.9	83.5%	1 tree

As mentioned earlier, we have documented very little mortality of larger trees during past budworm outbreaks in Region One. Even though a tree may be stripped of almost all of its foliage in any given year, they seem to survive through many years of repeated defoliation. However, we do expect some mortality of individual heavily defoliated trees in the next few years on Flesher Pass.

Thinning Douglas-fir stands can provide multiple benefits by improving aesthetics, forest health and reducing fuel hazard. Carlson et al. (1985) suggests that thinning stands from below has the advantage of minimizing increases in canopy temperature while maximizing subsequent tree vigor and mortality of small larvae. However research in Oregon showed that thinning during a budworm outbreak increased budworm populations and resultant damage on leave trees. They recommend delaying thinning until after the outbreak, salvaging dead trees and leaving the most desirable leave trees (Joseph & Oester 1987).

Although the results of this survey showed less damage and mortality in thinned versus unthinned areas of Douglas-fir, we must also point out that this survey was not replicated and the results should only be applied to Douglas-fir stands on Flesher Pass.

We will conduct a follow-up survey of the same trees in the unthinned and thinned areas to rate defoliation and mortality in the spring of 2006 after bud break. Regardless of mortality, the trees in the thinned area will no doubt be healthier and less susceptible to Douglas-fir beetle than those in the unthinned area. Also, improved moisture conditions will also increase the vigor of trees on Flesher Pass and make them less susceptible to budworm damage and Douglas-fir beetle. Reducing stand density in areas such as Flesher Pass will also reduce their susceptibility to damage from budworm and attack by Douglas-fir beetle.

/s/ *Nancy Sturdevant*

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/s/ *Sandy Kegley*

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References

Carlson, C.E., Schmidt, W.C., and N.W. Wulf. 1985. Silvicultural treatment. In: Managing trees and stands susceptible to western spruce budworm. USDA. Forest Service, Cooperative State Research Program, Tech. Bull. No. 1695.

Joseph, P and P. Oester. 1987. Western spruce budworm management alternatives. Oregon State University Extension Service.