SECOND MEMORANDUM ON THE DOUGLAS FIR TUSSOCK MOTH OUTBREAK NEAR TROY, OREGON

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Introduction

This memorandum is a detailed supplement to the memorandum of September 23, 1946, in which the Douglas-fir tussock moth outbreak near Troy, Oregon, was briefly reported. In review it may be recalled that the outbreak was found on August 20, 1946, when the pine beetle survey crew cruised the Troy check plot. On September 18 and 19 the writer made a general examination of the area and estimated that the infestation involved some 10,000 to 12,000 acres. Almost complete kill of the Douglas-fir and white fir had occurred on some 500 to 600 acres in patches ranging up to 50 acres. Because of the extremely rough terrain and the general lack of roads, the area could not be adequately examined from the ground within the time available; hence, it was recognized that the estimated acreage of infestation might be materially low. Reports of local residents indicated that 1946 was the second year of the outbreak. Heavy deposits of eggs throughout the examined area indicated that the tussock moth population was sill increasing and that considerable timber would probably be killed in 1947.

The presence of this outbreak of the tussock moth on and adjacent to the Umatilla National Forest was of particular interest because of the concurrent, though much larger outbreak in Idaho, against which extensive control operations were planned. The proximity of these outbreaks made it desirable to coordinate the action program, especially the phases relating to control. Therefore, plans were made early in 1947 to obtain the factual information needed to decide what should be done on the Umatilla area.

Representative of the Forest Service and the Bureau of Entomology and Plant Quarantine met and agreed that: (1) an aerial survey should be made to delineate the area of infestation; (2) a detailed ground survey should be made to obtain supplementary data on the degree of defoliation and on the status of the overwintering tussock moth population; and (3) other information of possible use in organizing control should be gathered. The Office of Timber Management of the Forest Service agreed to finance the surveys and the Bureau of Entomology and Plant Quarantine agreed to collect the data and report upon the findings. The present memorandum records the results of the aerial survey and gives some general information that has been assembled to date. The ground survey will be made as soon as snow in the woods has melted sufficiently to permit access to the infested area – probably about the middle of April.

Aerial Survey Details

The aerial survey was made on March 24 and 25 with Forest Service pilot Larry J. Sohler at the controls. Ranger Willis W. Ward acted as navigator on March 24 and the writer acted as mapper and observer on both days. The airplane used was a Stinson Voyager on loan from the Division of Fire Control of the Forest Service. This 4-place, high-wing monoplane was generally suitable for the work, except that the cruising speed of 110 miles per hour was somewhat too fast for best results.

After several days' delay due to adverse weather conditions, the takeoff was made at 9:05 AM, Monday, March 24, from the Portland Municipal Airport. Martin's Airport at Walla Walla, Washington was reached two hours later. There Ranger Willis Ward, upon whose district the infestation is located, joined the party. The takeoff for the infested area, about 35 miles distant, was at 12:40 PM. Although there was a high overcast, visibility of the timber was good. Nine runs, from 6 to 20 miles in length and at elevations ranging from 1,000 to 1,800 feet above the trees were made over the stands on the Umatilla National Forest and the adjoining Wallowa National Forest that were suspected of harboring tussock moth infestation. These runs were flown at two-mile intervals and in an east-west direction. The last run was extended some 35 miles to the east for general scouting on the Wallowa. Turbulent air conditions caused by the tremendous canyons and gorges were encountered over much of the area. The return to Walla Walla was at 3 PM.

Soon after the survey got under way, it was realized that the larch, being bare of needles, presented a serious problem in the recognition of the defoliated fir. The magnitude of this problem is indicated by the fact that larch, Douglas fir, and white fir are about equally represented on the area of infestation. At the time of the survey the larch appeared as grey to brown streaks and patches in the general green canopy of the forest. The same was true of the defoliated firs, for the partially consumed needles that gave the defoliated trees a reddish-brown cast last fall had fallen during the winter, leaving the firs with a greyish brown appearance. At the altitudes flown there were practically no tangible characters for separating the larch from the completely defoliated fir. Only the partially defoliated trees could be relied upon to indicate the extent of infestation. Even such trees could not be wholly depended upon, for many of the white firs still retained cones in the top and consequently appeared to be partially defoliated. Despite these difficulties and some few uncertainties a good idea of the general extent and intensity of infestation was obtained. A relatively small amount of ground work should be sufficient to provide all the supplemental information that is needed.

During the course of the flight the extent and intensity of infestation was sketched in on a ½-inch-to-the-mile type map previously prepared for the purpose.

Because of the difficulties resulting from the prevalence of the larch, it was decided to make an additional flight over the area on Tuesday, March 25, and to fly closer to the tree tops. Ranger Ward, having other duties, was unable to make this second flight. With the lighter load, Pilot Sohler deemed it safe to fly much lower than on the first day and at times operated the plane within 200 feet of the trees. This low flying proved to be of no advantage because the trees passed by too rapidly and too close at hand to permit determination of the species. Very little additional information on the extent of the infestation was obtained. In view of the existing conditions it was felt that not much would be gained from additional flights. The return to Portland was completed at 1:10 PM after a two-hour flight from Walla Walla.

The total flying time for the project was 7 hours and 50 minutes. Of this time, 3 hours and 50 minutes were required for the actual survey.

Status of Infestation

The information obtained on the ground in September 1946 was a valuable guide during the aerial survey for defining the degree of infestation and delineating its extent. Heavy infestation was confined to the general area previously recognized as being most heavily affected. Much additional light to moderate defoliation was found. The indications were that some infestation was scattered throughout the Douglas fir/white fir stands in Townships 5 and 6 North, Ranges 40, 41 and 42 East (see accompanying map). No tussock moth infestation was discerned on the runs over the Wallowa National Forest. On the northeastern portion of the Wallowa near Yandel Ranger Station several small areas of light defoliation known to have been caused by the spruce budworm were visible; hence, any tussock moth infestation, if present, must have been very light.

On the area of known defoliation by the tussock moth (see accompanying map), heavy defoliation in patches is scattered over some 1,265 acres; moderate defoliation occurs on 23,890 acres; and light defoliation occurs on 30,910 acres. In all, about 56,065 acres supporting 140 million board feet of Douglas-fir and white fir are infested to some degree. Approximately 50 percent of this acreage supports 65 percent of the total susceptible volume and practically 100 percent of the accessible volume that warrants protection. It should be recognized that these acreage figures are tentative and that further groundwork may show that they should be revised, either upward or downward. However, it is felt that they are reasonably accurate.

Forest Statistics

The forest stand on the infested area consists chiefly of ponderosa pine, Douglas-fir, white fir, western larch, and Engelmann spruce. On north slopes and at the higher elevations ponderosa pine give way to the other species. These in turn give way to alpine species at the highest elevations. Lodgepole pine occurs in scattered pure stands and also in mixture with the alpine species. Only the Douglas-fir and white fir are primary hosts for the Douglas-fir tussock moth. The other tree species are attacked only under epidemic conditions, and seldom fatally.

The following data for the affected area were taken from the Forest Resource Survey of 1937 and are believed still to be substantially correct, for practically no cutting or other abnormal depletion has occurred since 1937.

TABLE 1 – BOARD FOOT VOLUME BY TREE SPECIES

Primary host species		Volume (MBM)
Douglas-fir		64,155
White fir		75,852
	Subtotal	140,007
Secondary host species		
Ponderosa pine		189,299
Western larch		69,235
Engelmann spruce		7,685
	Subtotal	266,219
	Total all Species	404,226

TABLE 2 – OWNDERSHIP BY ACREAGE

Ownerships	Acreage	Percent
Private, county, state	9,685	17
Forest Service, other Federal	46,380	83
Total	56,065	100

Area Description

As already indicated, the area of known infestation lies in Townships 5 and 6 North, Ranges 40, 41, and 42 East. The topography is extremely rugged, being characterized by many deep canyons cutting into a high timbered plateau. On the plateau between the Wenaha and Grande Ronde Rivers is the bulk of the timber that is accessible to logging and feasible for control. The mean elevation of this plateau is about 4,200 feet, and the exposure is to the east. In many places the gorge of the Grande Ronde River that borders the infested area on the south is more than 2,500 feet deep. The Wenaha and its tributaries have carved out similarly deep and precipitous canyons. The extreme range of elevation is from approximately 1,200 feet at Troy to 4,997 feet near Elk Flat Camp, a range of 3,797 feet in 14 miles. It is common for 2,000 foot differences in elevation to occur in a mile or less.

The significance of this rugged terrain is that it precludes any treating work (aerial application) in the timbered canyons, both because of the terrain itself and because of the associated turbulence of the air. In all probability the air disturbance would be greatly accentuated during warm weather and would have a pronounced effect upon spraying operations. The up drafts from the canyons would not only create hazardous flying conditions but would contribute materially to the problem of getting the spray to settle evenly on the trees. The bulk of the timbered plateau seems to present no special problems for aerial applica-

tion other than that it is somewhat high for optimum operation of heavily loaded small airplanes.

Control Considerations

The following details have a bearing on the feasibility of control and are presented now for preliminary consideration, even though all the essential facts are not yet available for a final decision on whether control should be undertaken.

General - The pertinent questions, how long will the outbreak last, how much timber will be killed, and how soon will the outbreak subside, have been asked. None of these can be answered with certainty. About the best that can be done is to look at the future through the past and draw what conclusions seem reasonable. On this basis it is recognized that the history of tussock moth outbreaks has not been consistent. Several outbreaks in the Blue Mountains have flared up and have quickly subsided without causing much damage. In contrast, there have been several outbreaks in the recorded history of the insect in which great damage has been done over a period of three or four years. There is every reason to believe that the present outbreak will ultimately subside due to parasites, disease, and other natural control factors. Meanwhile, the preliminary indications are that the outbreak has not yet reached its peak; hence, an extensive kill of timber is in prospect for 1947.

Whether aerial spraying should be undertaken to combat the tussock moth outbreak near Troy is a question that can be answered only when additional biological data are available. A ground survey to obtain the necessary information will be made as soon as snow conditions permit. It is hoped that the survey will be completed and reported upon by April 30. At best very little time will be available to organize a control project and get in operation by the time that spraying should begin, about June 1.

If it is assumed that control is necessary, there are numerous detailed questions as to costs, materials, equipment and procedures that must be answered. About the best that can be done is to be guided by the plans that have been made for handling the very large project in Idaho. For the details of the project, reference should be made to the report entitled "Report of an outbreak of the Douglas-fir tussock moth *(Hemerocampa pseudotsugata)* in Latah and Clearwater Counties, Idaho – 1946" by J. C. Evenden and E. J. Jost and dated November 12, 1946. For the moment, the significant features of the Idaho project are that DDT is to be applied at the rate of one pound in one gallon of oil and at an estimated cost of $1.70 per acre.

Landing fields - The nearest airport is at Walla Walla, Washington, some 35 miles from the area – too far for it to be used as a base for spraying operations. A number of farms adjoin the area on the south. On several of them the terrain is sufficiently level to permit the operation of spray planes of about 60-gallon capacity. There are a number of farms with suitable terrain for small landing fields across the Grande Ronde Canyon, about four miles south of the area. A larger farming community lies across the Wenaha, some two or three miles from the east boundary of the infestation. All of the suitable farm lands are cultivated fields; hence, they would be expensive to rent. No pasture land is sufficiently level to permit development of an airstrip.

Pilot Sohler was of the opinion that a landing strip could be constructed on the bald ridge near Big Hole Canyon. A temporary road probably could be bulldozed to the landing site without much trouble or expense. The ridge has an elevation of about 4,800 feet and is located near the western edge of the part of the area that would most likely be sprayed. Although such a site would not be ideal, it might have to be used in case no farm land were obtainable.

Rail heads - The nearest rail head that could be utilized for delivery of materials north of the Grande Ronde River is at Clarkston, Washington, some 50 miles distant. A road for trucking lumber to Clarkston from the mill at Troy has been completed, or is nearing completion. Supplies and equipment for a spraying program could be moved in over this route. In case the airstrip is developed on the south side of the Grande Ronde River, Wallowa or Enterprise would be the nearest rail heads.

Salvage Considerations

In general, salvage of insect-caused losses has an important bearing upon control plans. When losses are light, it may be possible to utilize practically 100 percent of the timber with no appreciable financial loss, thus making control an unnecessary expense. Only when losses become extensive and logging operations are inadequate for effective salvage are control measures essential. Hence, one of the major problems in judging the need for control is to weigh the salvage facilities against the anticipated loss.

In the case of the tussock moth outbreak near Troy some 140 million board feet of susceptible timber is threatened. There is the possibility that a major portion of the threatened timber may be killed, and also there is the possibility that the outbreak may expand beyond its present limits. So far as is known to the writer, facilities for utilizing the potential loss are very limited. In 1946 a small mill was constructed at Troy and the area opened to logging for the first time. The limited capacity of that mill and the difficulty of constructing roads on much of the area would limit the amount of salvage to a small amount of the possible loss. What other facilities might be developed for salvage are problematical, but it is certain that special arrangements would have to be made if any extensive kill were to be salvaged.

Discussion and Recommendations

No final recommendation regarding the need for control on the Troy area can be made until the status of the overwintering population of the tussock moth is determined by a detailed ground survey. Such a survey will be undertaken as soon as snow conditions permit.

Preliminary inquiry should be made as to the possibility of integrading control on the Troy area with control in Idaho.

It is desirable that further consideration be given to the possibilities of salvage.

Since there is considerable question as to the operational feasibility of an aerial spraying project on the Troy area, an experienced control operator should examine the area and advise whether a project would be practical from the flyer's standpoint. Such an examina-

tion need not be made at once, but it is an essential step in the early stages of planning for control.

For future reference, it is recommended that aerial reconnaissance for the detection or delineation of defoliator outbreaks be made in the fall wherever stands of larch are involved.

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