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THE INSECT SITUATION IN 1913

ON THE

WHITMAN NATIONAL FOREST.

J. F. Pernot,

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Introduction.

During July and August, 1913, a study was made of the insect infestations on the Whitman National Forest. The main object of this investigation was to secure data on the progress and status of the infestation of the Mountain Pine Beetle, in order to determine whether or not further insect control operations on this Forest are necessary or practicable. Other forms of insect activity also were noted and studied, when found occurring in living timber.

The Infestation of the Mountain Pine Beetle.

Distribution. – The Mountain Pine Beetle (Dendroctonum monticolae Hopk.) was found wherever lodgepole pine occurs throughout the Forest. The distribution of this species in the Blue Mountains follows so closely the distribution of lodgepole pine, that it may be considered as being primarily a lodgepole pine beetle, in this region at least.

The main body of the infestation is, as it has been in former years, in the high mountain region in the northern part of the Forest, where occur the largest and most nearly contiguous bodies of lodgepole pine. The center of the infestation at the present time extends from the Anthony Lakes in T 7 S, R 36 and 37 E. west for five or six miles following the divide between the drainages of the Grande Ronde and the North Fork of the John Day rivers.

Around the Anthony Lakes, where the present infestation has existed at least four or five years, the percentage of infested lodgepole pine is still heavy at the present time. This condition also is true in the lodgepole pine areas on upper Anthony Creek, Antone Creek, Dutch Flat Creek, and, in fact, through the entire upper drainage tributary to North Powder River, south of Anthony Butte in the northwest part of T 6 S, R 37 E. North and east of this point, there is but very little infestation.

Heavy re-infestation occurs in the upper watershed of the Grande Ronde River, from the very head of the stream, down as far as lodgepole pine extends. In the watershed of the North Fork of the John Day River, the heaviest infested areas are near the head of the stream in T 7 and 8 S, R 36 E, on Crawfish Creek, on upper Trail Creek, and on Trout Creek, especially in the vicinity of Trout Meadows in T 7 S, R 35 E. Infestation in lodgepole pine occurs in various degrees, in the watershed of all of the southern tributaries of the North Fork of the John Day River, as far west as T 8 S, R 35 E. Around Crane Flats in Sec. 10 and 15, T 8 S, R 35 ½ E, from 25% to 40% of the lodgepole pine in many nearly

pure and mixed stands is infested, while a light infestation extends down Crane Creek from Crane Flats west to the North Fork of the John Day River.

South and west of Bald Mountain in T 8 S, R 36 E, new insect work occurs in lodgepole pine stands on the ridges at the higher elevations, on upper Boulder and Granite Creeks, and along the stream flats of Boundary Creek, south to the Boundary Creek Ranger Station.

The southwest limits of the main infestation must now be considered as being from two to four miles southwest of that indicated by Forest Ranger Smith in his map of 1912. This extension of the limits of the severe infestation is not necessarily the result of the spread of the beetles, from previous heavily infested areas alone. It is due more to the gradual increase of the beetles, from incipient infestations, throughout the heavy areas of lodgepole pine.

From this limit, to the south and east, wherever lodgepole was noted, both old and recent work of barkbeetles was found. Infested trees were noted at various points along Silver Creek, north from Sumpter to the California mine, at the head of Bull Run Creek in T 9 S, R 36 E, along the flats of Powder River in the Sumpter Valley, near Tipton, outside of the Forest in T 10 S, R 35 ½ E, and in the upper drainage of the Middle John Day, near White Pine, in T 11 S, R 35 ½ E.

Occurrence.- Throughout nearly the entire portion of the infested areas examined, the insect work is confined to lodgepole pine. The composition of the stands in which this infested timber occurs, varies widely. Around the main divide of the Powder River Mountains and in other portions of the Forest where the elevation range from 6500 to 8500 feet, lodgepole pine forms from 10% to 90% of the stand, associated with Alpine fir, Engelmann spruce, and white bark pine. Below 6500 feet, lodgepole pine occurs in nearly pure stands along the streams, and on the slopes forms mixed stand with Douglas fir, white fir, western larch and yellow pine.

From 20% to 90% of the lodgepole pine has been killed on the areas covered by the infestation prior to 1912. The same figures nearly apply to the amount of infested lodgepole pine on areas involved at the present time. No average figure concerning the number of infested trees per acre can be given for the entire infestation. In heavy pure stand along stream flats, this may be as high as 200 or 300 per acre, while in north slope mixtures, often only an occasional tree is infested. The results of a few counts are given to show the great variation in this respect, under different conditions of slope, altitude and forest composition.

On one acre near the Anthony Lakes, in a mixture of lodgepole pine, Engelmann spruce and Alpine fir, lodgepole pine constitutes 83% of the stand. Of 194 trees per acre, of this species, having a diameter of 6 to 13 inches, 47% had been killed in the past three years, 35% were infested in August

with the 1912-13 brood of beetles, and 18% were healthy and not attacked. This number of 68 infested trees per acre is a fair average for the present heavily infested areas of this region. Counts made around Beaver Meadows in T 5 S, R 37 E, give 250 trees per acre in nearly pure lodgepole pine stands. Of these, from 60% to 90% have been killed in the infestation four or five years ago. Counts made in the present infestation on Crane Flats, T 8 S, R 35 ½ E, in open lodgepole pine stands averaging 30 trees per acre, give the following percentages: Trees infested and killed in 1910-1911, 18%; trees infested and killed in 1911-1912, 44%; trees infested in 1912-1913, 38%. The relative percentages, however, on small areas are not indicative of the general status of the infestation.

The infestation of Dendroctonus monticolae in white bark pine is irregular and very scattered. Along the summit and on the upper slopes of the North Fork of the John Day-Powder River divide, occasional trees are infested with living broods of this beetle. A few infested trees of this species were also found on the summit of Bald Mountain, in T 8 S, R 36 E, and scattered infested trees probably occur wherever the species occurs within the heavy areas of infestation.

Extensive work of Dendroctonus monticolae in yellow pine has nearly ceased. Along the eastern edge of the Forest in the Powder River drainage, where the control operations of 1911 were largely conducted, there were in August, 1913, only occasional scattered large trees of this species newly infested. In the yellow pine belt from Anthony Creek south to North Powder River, there are still many scattered lodgepole pine, also occasional groups of small yellow pine, in which the infestation still exists.

It is impossible to determine whether this cessation of insect work in yellow pine can be attributed to the control operations of 1911, or whether it is due to natural factors having a bearing upon the duration of the infestation. Undoubtedly the insect work was greatly checked locally at the time, but the fact that many infested lodgepole pine remained after the operation, and many infested trees still occur in and surrounding the areas worked, point to the conclusion that the present conditions are not due to control operations alone.

Small percentages of yellow pine are still being killed by Dendroctonus monticolae in other parts of the Forest, in and around the regions of heavy infestations. On the North Fork of the John Day River in the southern part of T 8 S, R 36 E, there are scattered yellow pine trees from 6 to 40 inches in diameter, infested, in mixed stands on south slopes. Occasional yellow pine are infested on steep rocky south slopes facing Crane Creek in the northern part of T 7 S, R 35 and 35 ½ E, for several miles above its confluence with the North Fork of John Day River. East of Granite, in the northern part of T 9 S, R 35 ½ E, there is more or less infestation, both in lodgepole pine and yellow pine, nearly to the summit of the divide between the John Day and Powder River drainages. Except on Boundary Creek,

the amount of yellow pine that is dead and infested is not of importance. On Boundary Creek, in Sec. 1 and 12, T 9 S, R 35 ½ E, and in Sec. 5 and 6, T 9 S, R 36 E, there is an area of about 2 sections on which approximately 15 M ft. B.M. of yellow pine to each forty has been killed prior to 1912. Approximately 1 M ft. B.M. of yellow pine to the forty was killed in the infestation of 1912-1913. A considerable percentage of this timber was killed by Dendroctonus brevicomis.

Examination was not made of the infestation in that portion of the Grande Ronde River watershed in the extreme northern part of the Forest. In the lodgepole pine areas there is much present infestation in this watershed, for four of five miles north of the Anthony Lakes Ranger Station in T 7 S, R 37 E.

Condition of the Broods.- Throughout the entire infestation on the Whitman National Forest, there is abundant evidence of the destruction of the broods through the increasing prevalence of insect enemies and fungous diseases.

Large numbers of the larvae of Dendroctonus monticolae in many trees have been destroyed by the larvae of Hymenopterous insects. In August, 1913, the parasitic forms were found, either in the working larval stage, or lying in pupal cases in the cells formerly occupied by the larvae of the barkbeetles. Several species of predatory beetles, especially Trogosita viadescens and Clerus sphegeus, were abundant.

One of the most important factors tending to check the infestation is a fungous disease that attacks the larvae, mainly from the time they area bout one-half developed, until the period of pupation is reached. The white filaments of this fungus usually line the mines and pupal cells, and envelop the working or pupating larvae. In most cases the larvae are eventually killed and become surrounded by a heavy layer of the mycelia. Occasionally the larvae are able to resist the action of the fungus and successfully transform through pupae to the adult stage, still inclosed in the fungous growths.

A few instances are cited to show the heavy mortality that occurs among the broods. On one 11-inche lodgepole pine near Anthony Lakes, were numberous primary galleries formed by an attack of Dendroctonus menticolae early in the season of 1912. On the north side of the tree, one gallery, four feet from the ground, was 17 inches in length. From this gallery, 33 larvae had commended working, but not one was present at the time of examination in August. In most cases, the larval mines varied from one-fourth to one and one-half inches in length. Eleven of the mines and pupal chambers were occupied by the pupal cases of the Hymenopterous form already mentioned, and in the other the larvae had been destroyed either by insects or through the action of fungous or bacterial diseases.

Numerous small yellow pine trees infested with the Mountain Pine Beetle, were found in the upper watershed of the North Fork of the John Day River. In many of these trees a few larval mines, from three-quarters to one and one-quarter inches in length, also occasional pupal cells, were found, but only a very small percentage of the larvae were present or had successfully transformed and emerged. In infested lodgepole pine on the same slopes, the emergence of the 1912-1913 broods had been heavy. On flats along the stream in the immediate region, a mortality of 75% of the broods was noted in lodgepole pine.

On the flats of Crane Creek in the eastern part of T 8 S, R 35 E, occasional trees, heavily infested in 1912, were noted in which only five to ten beetles had successfully transformed and emerged from each primary gallery.

Although the broods in a large percentage of the infested trees, are suffering heavily from the above causes, there is still an abundance of badly infested timber from which the broods, for the most part, will emerge another season.

Throughout a large part of the infested areas on the Whitman, the insect work apparently is ceasing. In other places where the infestation has not been severe for more than one or two years, it does not show any appreciable decline. A return to normal conditions of infestation through natural adjustment, is almost certain, although this may not take place for several years.

It is recommended that no extensive projects be attempted for the control of this beetle on the Whitman National Forest, mainly for the following reasons: The stands endangered are mostly lodgepole pine, having little or no present value. The cost of any effective work in insect control would far exceed any value this timber may have, (if saved), for many years. The areas of heavy infestation are so extensive that this cost of attempted control would be beyond reason. Infestation in lodgepole pine is almost general over the Whitman National Forest; therefore, successful control, if it could be accomplished, in certain areas or watersheds, would have little or no effect upon the infestation in the surrounding region. The infestation throughout much of the Forest apparently has passed the most severe stage and now is being controlled by natural agencies.

The Western Pine Beetle (Dendroctonus brevicomis Lec.)

Dendroctonus brevicomis is generally distributed throughout the yellow pine areas on the Whitman National Forest. This beetle is responsible for the death of far more yellow pine than Dendroctonus monticolae, as it is present over large areas, and continues its work without cessation from year to year.

In the latter part of July, numerous yellow pine trees in the vicinity of White Pine and Austin, Oregon, were found newly infested with beetles of the 1912-1913 broods. Yellow pine that had been windthrown in June also were heavily infested. Limited recent work of Dendroctonus brevicomis was noted in the yellow pine stands on lower Antone and Anthony Creeks and Powder River, along the east boundary of the Forest; at various points along the North Fork of the John Day in the Sumpter Valley, and in the Bull Run watershed near Granite.

From rough counts that have been made, it is estimated that at least one tree in every forty acres is killed annually in mature and decadent yellow pine stands. Many of the trees attacked are small and defective, or have been weakened through various causes,- fire, lightning, unfavorable soil and moisture conditions, and decay. Others, up to the largest sizes, apparently are healthy otherwise, and their death is due to the infestation of these beetles alone.

An exhaustive study of the work of this species is necessary before making any attempts towards its control.

The Douglas Fir Beetle (Dendroctonus pseudotsugae Hopk)

Around White Pine and Austin, Oregon, the Douglas fir in mixed stands has suffered severely from the work of Dendroctonus pseudotsugae. On many dry slopes, from ten to twenty percent of the trees of this species were killed, apparently ten years or more ago. The presence of reproduction and uninjured small trees of other species, makes it evident that fire was not the cause of death of this timber. As the mines of Dendroctonus pseudotsugae commonly are abundant on the loose bark and decaying wood, it is very probable that they have been the cause of the death of this timber.

On August 1, two Douglas fir trees infested with this beetle were noted in mixed stands near Austin, Oregon. These trees, which were 12 and 17 inches in diameter, were free from all forms of injury, except distortion of the branches by mistletoe. When examined, a few pupae and great numbers of immature beetles of this species were found lying in cells beneath the bark.

This beetle apparently is capable of attacking healthy Douglas fir, and under favorable conditions, causing considerable loss in the dry regions of the eastern part of Oregon.

The Western Larch Borer (Tetropium velutinum Lec.)

This beetle is partly responsible for the death of a considerable percentage of the mature western larch in the Blue Mountains and Wallowa Mountains.

Much of the larch in these regions is badly infested with mistletoe, that attacks both the main trunk and the branches. Large brooms usually are formed on the limbs, which cause many of them to

be stripped from the trunks in snows and heavy storms. Many trees are nearly destitute of foliar surface from this cause. In advanced stages the cambial tissues often are partially intercepted at various points of infection along the stem. Under these conditions, the trees are so weakened that growth is almost entirely arrested.

The larvae of this beetle were found in abundance in these weakened trees. Their work is mainly between the bark and wood. Here a broad flat mine is excavated in a very irregular manner near the ground, and nearly following the circumference near the middle of the trunk. Before pupation, the larvae enter into the sap wood in depth of one-fourth to one inch. Numerous larvae, pupae and adult insects were taken from the sap wood of living trees during July and August. Death of the tree ordinarily does not result in one season, but from repeated attacks of several years that finally girdle the trunk.

This beetle apparently does not attack healthy, vigorous growing trees, but is in a great measure responsible for the death of those that have been weakened through other causes. It nearly always is present in larch logs and tops, when cut and left on the ground during the summer season, also is commonly found in windthrown trees and fire-killed timber

Control of this species depends primarily upon the reduction of mistletoe infection in western larch.

J. F. Pernot