FOREST INSECT AND DISEASE SURVEY
PEST REPORT
Pacific Forest Research Centre ● Canadian Forestry Service ● Victoria

November 14, 1972.

MOUNTAIN PINE BEETLE INFESTATIONS IN KITWANGA AND HAZELTON RANGER DISTRICTS, PRINCE RUPERT FOREST DISTRICT, 1972.

Richard Andrews, Robert Erickson and Laszlo Safranyik

Scattered mountain pine beetle attacks in lodgepole pine stands were observed near Date Creek in 1969, followed by an outbreak near Weegett Creek in 1970. Aerial surveys in 1971 indicated an increase in the number of pine trees killed near Weegett Creek. In addition, scattered infestations were seen near Kitwanga, east along the Skeena River to Hazelton and north of Kispiox Village along the Kispiox River to Kline Lake.

During 1972 a general increase was noted in all known infestations, including new patches of infestation within the same general area.

The stand type in the damaged area is predominantly lodgepole pine, mixed with spruce and/or western hemlock and deciduous species.

Sample strips, traversing the infestations near Seeley Lake and Carnaby were run in 1971 and disclosed that up to 48% of the stems were attacked. In May, 1972, samples taken to determine possible overwintering brood mortality indicated that beetles in up to 50% of the stems attacked near Carnaby had been drowned out by heavy exudation of resin. This denoted heavy resistance of the trees to attack. Near Seeley Lake fewer trees were able to pitch-out attacking beetles and large broods successfully overwintered.

In August and September, 1972, prism cruise plots were established at seven locations in the infested areas. Compass lines were followed through the infested stands with prism sweeps at two chain intervals. All trees seven inches dbh and greater were tallied as: unattacked; currently attacked; red, or attacked in 1971; and gray or attacked prior to 1971.

Table 1 summarizes information pertaining to the infested stands and lists the locations and length of strips.

Table 1

Location	Length of strip (in chains)	Total no. of stems examined	Av. no. stems per acre	Av. age of infested stems	Av. tree dbh 7+"	
					unattacked	attacked
Weegett Cr. #1	110	273	169	84	9	13
#2	100	206	142	84	9	14
Sammon L.	130	151	57	95	12	13
Date Cr.	128	181	93	86	11	12
Seeley L.	70	159	195	100	9	13
Natlin Cr.	50	85	63	111	13	15
5 Mi. (Kitwanga)	30	58	102	98	11	13

Table 2 shows a breakdown of the stands in categories by percent of unattacked and attacked stems at seven locations cruised by Canadian Forestry Service personnel and two locations where similar information was obtained by British Columbia Forest Service personnel.

Table 2

Percentage of healthy and mountain pine beetle-infested trees at nine locations in Kitwanga and Hazelton Ranger Districts, 1972

Location		Year Attacked		
	Healthy	1972	1971	Prior to 1971
Weegett Cr. #1	41	14	30	15
#2	46	24	19	11
Sammon L.	36	22	23	19
Date Cr.	60	14	4	21
Seeley L.	27	23	33	17
Natlin Cr.	52	33	15	0
5 Mi. (Kitwanga)	25	0	54	21
Pintz L.	55	15	24	6
Keynton L.-Burdick Cr.	60	27	8	5

Additional survey data on the same areas obtained by the British Columbia Forest Service personnel indicates that the percentage of freshly attacked trees may be higher than that found by our survey (see B.C.F.S. Report).

Cruising for volume and acreage was carried out extensively by British Columbia Forest Service personnel in some of the infested areas (Map 1). Table 3 shows the results.

Table 3

Map Key no.	Location	Area (acres)	Volume (M.c.f.)	*Intensity Classification
1	Kline L.	50	75	H
2	Mi. 7 Kispiox F.D.R.	10	20	L-M
3	Pintz L. #1	41	53	H
4	#2	300	250	H
5	Bras L.	100	120	M-H
6	Sunday L.	80	120	L-M
7	Date Cr. #1	300	450	M-H
8	#2	20	25	H
9	Seeley L.	60	45	H
10	Burdick Cr. #1	1,500	2,200	M-H
11	#2	10	13	M
12	Andimaul Cr.	50	35	-
13	Kitwanga R. 2 mi.	25	30	-
14	7 mi.	100	110	H
15	5 mi.	10	15	H
16	12 mi.	60	90	M-H
17	Kitwancool	15	12	L
18	Kitwanga L.	150	160	L-M
19	Weegett Cr.	1,750	2,000	H
20	Sharpe Cr.	30	25	-
21	Kwun Cr.	10	12	-
22	Natlin Cr.	700	1,050	H
23	Carnaby	30	50	H
24	Tenas Hill	60	75	M-H
25	Nine Mi. Cr.	5	7	L-M
26	Gramophone Cr.	40	50	L
Total		5,506	7,092 M.c.f.	

*British Columbia Forest Service Intensity Classification:

Light: 0 - 30% of pine infested
Medium: 30 - 60% of pine infested
Heavy: over 60% infested

Combined analysis of the cruise data for all locations is given in the following table.

Table 4.

Year of attack	1970	1971	1972
Year of foliage discoloration	1971	1972	1973
Av. % red trees in all locations cruised	14.9	21.5	*19.3

*Green-infested (red in 1973)

This table indicates that the greatest percentage increase in tree mortality occurred between 1970 and 1971. The percentage of attacked trees in 1972 was about the same as that in 1971.

Broods in currently attacked trees varied in development. A number of larval stages as well as eggs were present at all locations in mid September indicating a prolonged flight period during 1972. However, due to mild weather in the infested areas during late September, the majority of the eggs hatched and, unless an unfavorable winter occurs, a population comparable to that of 1972 will survive and emerge in 1973.

The populations were especially high at Natlin and Burdick Creeks and considering the maturity of the stands in these two areas, we believe that attacks in 1973 might be appreciably higher than in 1972. In the other infestations examined, the populations are expected to be about the same as in 1972. At the present we do not have sufficient knowledge to forecast the course of an epidemic with reasonable accuracy beyond the next season. However, we do know that mature and overmature stands are the most susceptible to attacks and the greater the average dbh of these stands the greater the brood producing potential and thus the rate of tree mortality. On the basis of this knowledge coupled with the observation that past epidemics by the mountain pine beetle in lodgepole pine lasted from five to eighteen years, with an average of about 9 - 10 years, it is highly probable that high level beetle activity will continue in the pine stands of susceptible age and size in the Hazelton-Kitwanga areas for a number of years.

CONTROL CONSIDERATIONS

Les Safranyik

Experience has shown that once an outbreak reaches an intensity and spatial extent similar to that in the Hazelton-Kitwanga areas, direct suppression work is neither practical nor likely to succeed. The alternative is to attempt to reduce the potential of the populations to spread and increase in size by removing infested and/or susceptible timber from some of the high-hazard areas. Decision-making on the manner and extent of cutting operations will be aided by a review of the pertinent characteristics of lodgepole pine stands that affect outbreak hazard.

Stand Characteristics

Outbreak hazard generally increases with increasing stand age.

Outbreaks rarely develop in stands 60 years old or younger. In general, tree resistance to attack is the highest during the time when current annual increment culminates (i.e., between 40 to 60 years) and begins to decline at about the same time as mean annual increment culminates (this varies between 80 and 110 years on medium to good sites). The relation between stand age and tree resistance is affected by many factors. We believe that climatic factors such as duration, intensity and spatial extent of drought and high temperatures during the growing season are the most important in predisposing trees to attack over large areas.

Outbreak hazard increases with increasing diameter and density of trees greater than 10 inches dbh.

The mountain pine beetle strongly favors trees of large diameter each year as well as over the life of the infestation. Large diameter trees not only produce more beetles per unit area of bark, but also more per tree because of their greater surface area. In an average year, stands, where the majority of trees are less than about 10 inches dbh, will not produce enough brood to maintain a static population. Conversely, the higher the density of trees over 10 inches dbh in a stand of susceptible age, the higher the brood-producing potential of the stand.

When the majority of the larger diameter trees are killed, the infestation will either collapse or the beetles will migrate in search of other susceptible stands in adjoining areas. At the end of the infestation tree mortality in the various dbh classes greater than about 5 inches will be approximately proportional to the respective basal areas. Trees less than 4-5 inches dbh are rarely attacked. Standing trees or wind-throws with roots attached to the

ground are strongly favored over slash or trees severed at the stump.

The effect of species composition.

The presence of non-host species in a composition of up to about 40% by numbers of stems will not affect significantly the course of an outbreak.

Brood Establishment and Survival

In addition to stand and tree characteristics discussed above, weather factors play an important role in the establishment and survival of broods and thus in the course of epidemics. In general, hot and dry weather during late summer and early fall, coupled with a mild winter, favor good brood survival and population build-up.

Spread of the infestation.

The epidemic generally spreads outward from its origin as emerging beetles attack trees around the periphery of the infested stand. The rate of spread and directional movement of infestations depend largely on the availability of suitable host trees to the population, the distribution of these trees in the stand, climatic factors and topography.

Guide Lines

1. Cutting priority. When possible, priority should be given to the removal of mature infested stands of the largest average diameter and the greatest density of large diameter trees where the greatest increase in percent attack occurred during the past year. There is special urgency to cut some of the stands in this category that are located on the periphery of the infestation to stop the spread of epidemics into uninfested stands.

2. Cutting plan.

   A. When an entire infested stand is removed prior to beetle flight in 1973. (beetles are expected to fly late July, early August). There are no specific guidelines for layout of the cutting operation; most of the infested trees, however, should be removed (even if this procedure will necessitate removal of a band of largely uninfested trees from the edges of the infested area.

   B. When most of the currently infested trees cannot be removed from an infestation prior to beetle flight. The best strategy would be to remove about a 6-10 chain wide strip of

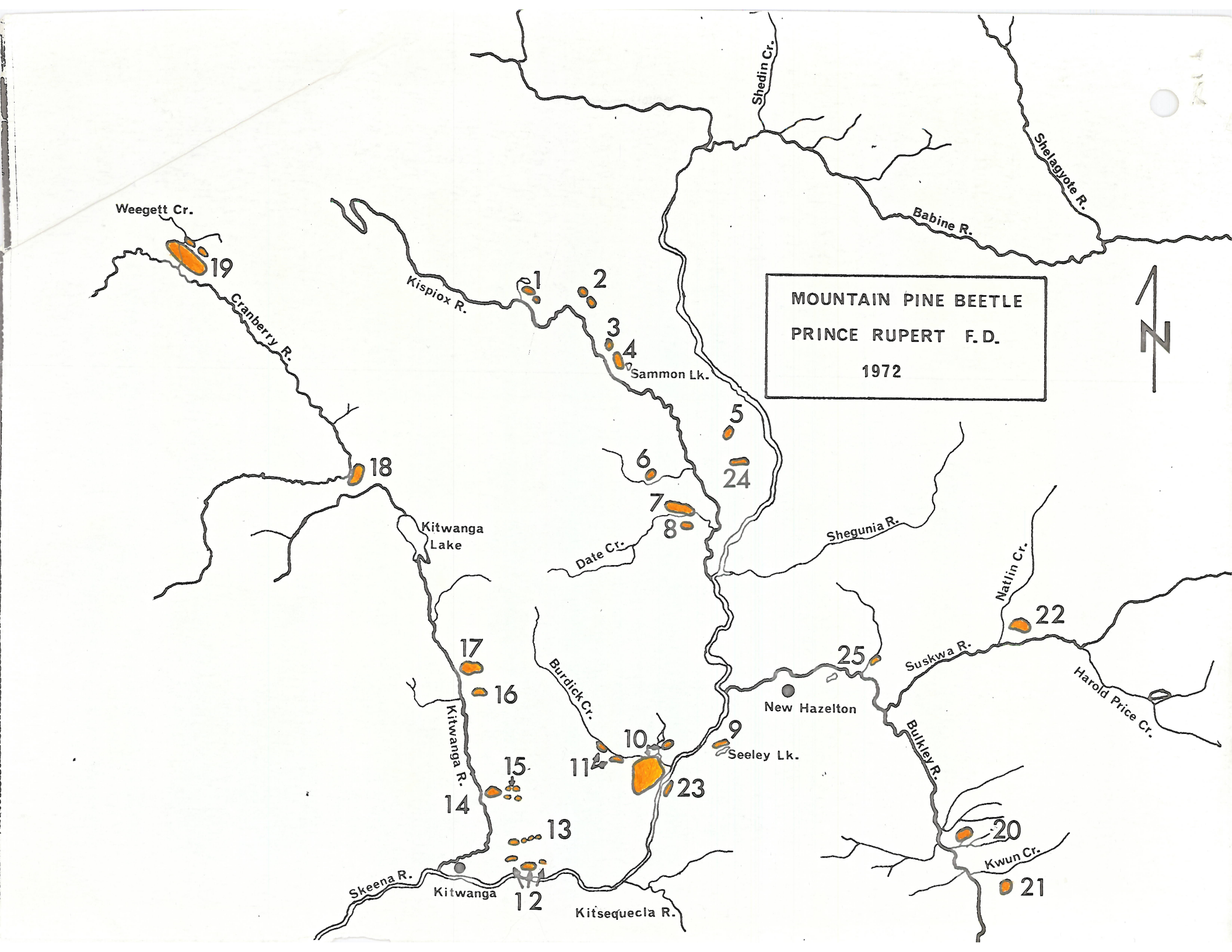
uninfested timber from around the edges of the infestation before beetle flight, but making sure that the number of uninfested trees inside the cut band was about the same as the currently attacked trees in order to absorb most of the emerging population. The uncut patch of infested timber could then be disposed of following beetle flight together with patches of timber that became infested outside the cutting boundary.

C. When the infested area is too extensive or otherwise prohibitive to follow the cutting strategy outlined under B, above. Efforts then should be made to remove a strip of uninfested timber from the head of the infestation, if there is a general directional spread, in conjunction with the removal of the largest diameter currently infested trees before beetle flight.

These recommendations are made with the awareness that the type of salvage and/or control action taken will be based on consideration of economics as well as management problems posed by the outbreak.

3. Long term outlook.

Although the present outbreak may be successfully combatted eventually, extensive stands of mature and overmature pine will invite chronic, high level activity by the mountain pine beetle.


MOUNTAIN PINE BEETLE
PRINCE RUPERT F.D.
1972
N
Shedin Cr.
Shelagyote R.
Babine R.
Weegett Cr.
Cranberry R.
Kispiox R.
Sammon Lk.
Kitwanga Lake
Date Cr.
Shegunia R.
Natlin Cr.
Suskwa R.
Harold Price Cr.
Burdick Cr.
New Hazelton
Seeley Lk.
Bulkley R.
Kwun Cr.
Kitwanga R.
Skeena R.
Kitwanga
Kitsequecla R.
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25