Department
of
Fisheries and Forestry

FIELD INSTRUCTIONS
FOREST INSECT AND DISEASE SURVEY
BRITISH COLUMBIA
1970

Special Collections and
Specific Survey Problems

FOREST RESEARCH LABORATORY
VICTORIA, B.C.

April, 1970

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Notations and Reminders

INTRODUCTION

In 1970 the emphasis in detection survey approach has been realigned to concentrate more vigorously on important damaging pests. Random "beating" collections will be reduced to a minimum and larval sampling of defoliators will be done at permanent sample stations or areas considered to be representative of population trends of damaging insects. No further permanent sample stations will be established in 1970 but rangers should select sample areas with an eye to developing them into permanent sample stations in the future.

Staff adjustments and changes in approach have brought about a reduction in ranger staff to two men for each B. C. Forest Service administrative district. Convenient boundaries have been established as a means of describing working areas and ranger cabins or trailers are or will be suitably located as headquarters. Rangers, however, while being required to survey a specific area must consider themselves as assigned to the Forest District and available for specific surveys within the District, and if necessary in other districts. Senior rangers will be responsible for co-ordination of the detection survey in the Forest District including preparation of itineraries, arranging and co-ordinating aerial surveys, liaison with the Provincial Forest Service district headquarters and preliminary investigations of specific problems. Assignments of rangers are as follows:

Vancouver Forest District	S. J. Allen	Cultus Lake, Box 43, Sardis, B. C. (858-4472)
	H. P. Koot	506 West Burnside Road, Victoria, B. C. (479-7131)
Prince Rupert Forest District	E. V. Morris	P. O. Box 23, Terrace, B. C. (635-7660)
	J. S. Monts	P. O. Box 2259, Smithers, B. C. (847-3174)
Kamloops Forest District	R. O. Wood	P. O. Box 1030, Vernon, B. C. (542-3841)
	D. F. Doidge	146 Don Street, North Kamloops, B. C. (376-3079)

Nelson Forest District	R. J. Andrews	P. O. Box 7, New Denver, B. C. (358-2417)
	H. Vanderwal	P. O. Box 120, Wasa Lake, B. C. (422-3393)
Prince George Forest District	C. B. Cottrell	P. O. Box 687, Prince George, B. C. (963-7238)
	C. S. Wood	P. O. Box 687, Prince George, B. C. (963-7238)

The use of boats in most areas will be minimized except in special circumstances and aircraft will be used to a greater extent to gain coverage of otherwise inaccessible areas. Flying time must be used to the best advantage to pick up signs and symptoms of insect and disease damage. The northern portions of the Prince George and Prince Rupert Districts will not be surveyed annually. Arrangements with co-operators to report significant problems would necessitate only infrequent visits to investigate specific problems, supplemented by occasional surveys by air or road.

Defoliator populations generally have risen in most coastal areas in the last two years. In 1969 there was an outbreak of green-striped forest looper on North Vancouver Island and present indications are for a continuation or increase in 1970. Hemlock looper and black-headed budworm populations increased on the mainland section of the Vancouver Forest District from Harrison Lake west to Jervis Inlet. Black-headed budworm also increased on south Vancouver Island from Jordan River to Port Alberni. Spruce budworm populations increased in the Pemberton and Fraser Valley areas and around Kitimat.

In the Interior spruce beetle infestations were widespread in the Nelson and Prince George Forest Districts and in the northern part of the Kamloops District. Douglas-fir beetle and mountain pine beetle damage was recorded in Kamloops, Nelson and Prince George Districts.

Flying time for aerial surveys and detection sampling will be allotted during the spring. Rangers are requested to keep the supervisor informed of the progress of aerial surveys including date of flight, name of carrier, flying time used and cost. Maps showing the flight lines should be mailed to the supervisor, R. L. Fiddick.

There are no changes in the format of the weekly and monthly report forms. Reports should be concise and descriptive: a mere listing of the number of collections in an area is not sufficient. They should also give a clear indication of work progress. Junior rangers will send a copy of each of his reports to the senior District Ranger. Monthly reports should reach headquarters as close to the end of each month as possible.

FOREST INSECT SURVEY

Special Insect Survey Collections

Choristoneura spp.

Dr. C. J. Sanders of the Forest Research Laboratory at Sault Ste. Marie and Dr. G. Stehr of the Insect Pathology Research Institute, Sault Ste. Marie have requested collections of three species of spruce budworm in 1970. They would like 1,000 late instar larvae or pupae of C. orae (to be collected by E. V. Morris at Kitimat).

1,000 late instar larvae or pupae of C. occidentalis (to be collected by D. Doidge in the Lillooet area). 1,000 late instar larvae or pupae of C. biennis. (It may not be possible to fulfill this, but if material is available in the Prince Rupert or Prince George Districts, rangers should make every effort to collect and ship anything up to 1,000 larvae).

Package material with care and send via air express to Dr. C. J. Sanders, Forest Research Laboratory, P. O. Box 490, Sault Ste. Marie, Ontario. Telegraph him notice of shipment and show his telephone number on the telegram (Sault Ste. Marie 256-8461).

Parorgyia grisefacta

We have a request from Mr. J. C. E. Riotte for mature caterpillars of P. grisefacta from the Interior (Nelson and Kamloops districts). The larvae come out of hibernation some time in May, and may be found on coniferous trees. Records show that moths are present from the end of June to mid-August, so mature larvae may be found in a second generation later in the season. If possible, pregnant females or eggs laid by them would also be acceptable. Ship specimens in regular mailing tubes to Dr. J. C. E. Riotte, Department of Entomology and Invertebrate Zoology, Royal Ontario Museum, University of Toronto, 100 Queen's Park, Toronto 5, Ontario.

Specific Insect Survey Problems

Black-headed Budworm, Acleris variana

There was an increase in the population on South Vancouver Island from Jordan River to Port Alberni and on northern Vancouver Island at Haihte and Victoria Lakes. Light defoliation occurred in scattered areas. Egg counts in the fall of 1969 indicated a higher population in most areas in 1970. Early larval sampling will be done in areas where egg counts were made last year. Aerial surveys should be designed to cover these and other hazard areas later in the summer. On Vancouver mainland area high populations occurred from Harrison Lake west to Howe Sound north of the Fraser River. Moderate defoliation was observed at Indian, Pitt and Coquitlam Rivers and Furry and Raffuse Creeks and light defoliation east of Stave Lake and at Mills and Woodfibre Creeks on Howe Sound. Early larval sampling should be done at all egg-sampling locations. If further larval sampling is warranted for black-headed budworm, industry or B. C. Forest Service should be encouraged to participate.

Collections of larvae should be submitted to the insectary for parasite and disease determinations.

Aerial mapping should be done to include defoliated or hazard areas.

Egg and defoliation surveys will be done in infestation areas in the fall to appraise damage and determine population trends.

Balsam Woolly Aphid, Adelges piceae

In 1969 infected trees were found in several new locations on Vancouver Island and lower mainland resulting in an extension of the known boundaries of the infestation. Distribution is now defined as southeastern Vancouver Island as far north as Green Lake northwest of Nanaimo and west to Skutz Falls on Cowichan River, and on the mainland from Salmon Inlet east to Harrison Lake, including a new location at Boise Creek north of Pitt Lake. Dead alpine fir were observed from the air north of Harrison Lake near Glacier Lake, but these were not confirmed as being killed by balsam woolly aphid. Whenever possible, rangers should check suspect trees around the perimeter or outside the known infestation areas.

Submit collections wherever a problem is suspected; concentrate on finding stem attack or wool spots on the bark and gout. General foliage collections should be submitted only as a last resort where Abies spp. show signs of decline. All new locality records must be supported by collections identified by the insectary.

Green-striped forest looper, Melanolophia imitata

Surveys were made of the infestation area during the week of March 23, 1970 to determine mortality of overwintering pupae.

Larval sampling will be done during the early instar period around pupal sampling areas. If a large larval population is found and control measures are considered, intensified larval sampling should be done with the help of industry personnel, to determine hazard areas. If the population around Neroutsos Inlet is healthy, industry may wish to supply aircraft to investigate areas south of Brooks Peninsula where high populations occurred in 1969 - Millar Channel, Nasparti, Ououkinsh and Malksope Inlets. Close watch is to be kept for high larval populations or signs of defoliation in other areas north of Alberni Inlet and the northern section of the mainland portion of the Vancouver Forest District. There was a slight increase in numbers of larvae found on the Queen Charlotte Islands in 1969. Aerial surveys should be designed to cover hazard areas, particularly along the eastern portion of Graham Island.

Population assessments may be made during September together with estimates of damage to individual trees. Aerial surveys may be necessary to delineate the infestation boundaries and defoliation intensity over large areas.

European Pine Shoot Moth, Rhyacionia buoliana

One ranger will be assigned (N. Geistlinger) to work in co-operation with the Plant Protection Division on a survey of pine in nurseries in the Okanagan Valley in April and May. Rangers on Vancouver mainland and in Okanagan Valley will examine native pine stands for the European pine shoot moth in areas adjacent to known infestations or near nurseries where evidence of pine shoot moth has been found.

Spruce Budworm, Choristoneura spp.

Two-year-cycle (C. biennis) - Populations in the Prince George and Prince Rupert Districts remained low in 1969. No larvae have been found at the established spruce budworm plots for a number of years. Sampling for larvae, pupae and eggs, as outlined in the General Instructions Manual, will be discontinued at the plots until beating samples indicate a significant increase in populations, at which time branch sampling will be resumed.

One-year-cycle (C. fumiferana) - It will be impossible to sample spruce budworm plots along the Alaska Highway on an annual basis in the future. Populations had declined in all areas except on the Liard River. It may be possible to have this problem area sampled by a co-operator. Occasional surveys, every two or three years, would be sufficient to keep abreast of population trends in this area.

One-year-cycle (C. occidentalis) - Populations increased in the Fraser Valley and Pemberton - Lillooet regions and a trace of defoliation was evident in one or two areas. Beating sampling will be used to assess the larval population. If necessary, random sampling will be done in addition to the permanent sampling stations. If the population is sufficiently high to warrant egg sampling and defoliation estimates, these will be done near the larval sampling sites, or at the permanent plots established during the previous infestation. Egg and defoliation surveys will follow instructions in the General Instructions Manual.

C. orae - An outbreak of this budworm occurred in the Kitimat area in 1969. Samples of overwintering eggs indicated a low population in 1970, but this area should be watched closely for signs of increased populations.

Pissodes on Spruce, Pissodes strobi

Forest Insect and Disease Survey records show that Pissodes is a serious problem on Vancouver Island except on the extreme west coast and on the northern part. On northern Vancouver Island many plantations were established from 1961 to 1965 which were not old enough for adequate assessment of weevil hazard although examination of natural stands indicated (with one exception) a low level of infestation. Plantations to be examined are 5 and 6 in MacJack Valley west of Holberg and plantation 19 near Winter Harbour on Branch 12, plantations 23, 24 and 26 at Marble River near Alice Lake and a plantation on Branch 22 off the McMillan, Bloedel main, south of Sara Lake road. There are a number of plantations west and north of Port McNeil which should be checked periodically.

There is a low level of weevilling in natural regeneration at the north end of Bonanza Lake (Sitka spruce at nearby Nimpkish Lake suffered heavy damage); Perry (or Leiner) River mouth near Tahsis has no damage while further south there is some damage at Tssawwin River mouth just east of Nootka Island. These areas should be checked and where weevil attack is present 50 trees should be examined to determine intensity and trend.

In the Interior there was an increase in the incidence of weevilling in white and Engelmann spruce from 1967 to 1968; a few records of 1969 attack indicated a further increase. To determine if this is a continuing upward trend or just a population fluctuation 50-tree examinations should be made (in August and September preferably and 1969 and 1970 attacks recorded).

Larch Casebearer, Coleophora laricella

Sampling will be continued at the five plots near Salmo, Creston and Yahk in May and October to determine the population trend and effectiveness of native and introduced parasites. Collections of 200 larvae and 200 pupae will be made at each of four plots, West Creston, North Creston, Porthill, and Salmo, and submitted to the Victoria Insectary for parasite studies.

Four 18-inch branches from the mid-crown of each of four trees at each plot will be examined. The number of casebearers per 18-inch branch will be averaged and the population classified as: light, 1-10 casebearers; medium, 11-30 and heavy, 30+. Estimates of defoliation will be made during mid-June at the five plots and classified as follows: trace, occasional mined needles; light, mined needles but no visible discoloration; medium, partial discoloration on some trees; and heavy, pronounced "scorching" on most trees.

To determine the rate of spread of the casebearer, samples and observations will be made along a line some five miles beyond the known infestation boundaries. These areas will be sampled annually until the casebearer has reached this line.

Tent Caterpillars, Malacosoma disstria and M. pluviale

No special surveys are planned to assess or determine the extent of tent caterpillar infestations. Rangers will record extent and intensity wherever encountered and if warranted and feasible will map infestations from the air during aerial surveys.

Egg counts will be made in the fall, according to the General Instructions Manual, to facilitate predicting the following year's population.

Hemlock Looper, Lambdina f. lugubrosa

There were moderately high populations and light defoliation on Vancouver mainland around the south end of Coquitlam Lake and increased populations from Harrison Lake to West of Howe Sound as well as localized areas in Jervis Inlet and Toba Inlet. Egg counts indicated a declining population but these areas should be checked carefully during the larval period. Aerial surveys should be made to cover hazard areas when defoliation is most likely to show.

In Prince Rupert District a collection of more than 100 larvae was made at Deep Bay in Dean Channel. This area will be checked during the aerial survey of that area.

Douglas-fir Tussock Moth, Orgyia pseudotsugata

While populations have been low in the Kamloops Forest District for a number of years rangers should examine known hazard areas during the larval period.

Douglas-fir Needle Midges, Contarinia spp.

Permanent five-tree plots established in the Nelson and Kamloops Districts will be examined in the fall of 1970. The degree of infestation will be assessed in early or mid-September by taking five terminal twigs at breast height from each tree and recording the percentage of current year's needles infested. The stand should be checked generally for midge infestation and compared with results of the samples.

Douglas-fir Beetle, Dendroctonus pseudotsugae

The number of Douglas-fir trees killed by Douglas-fir beetle increased significantly in the western portion of the Kamloops District in 1969.

Ground surveys for beetle-killed Douglas-fir trees: As in the past, counts of red-topped Douglas-fir trees killed by Dendroctonus sp. beetles in the interior Douglas-fir zone will be made from vantage points, along roadsides, lakeshores etc. These counts will be used as checks for aerial survey counts. Delineate on a two-mile to the inch contour map (one with compartment boundaries) the area of countryside in which beetle attacked trees are visible.

Aerial surveys for beetle-killed Douglas-fir trees: Aerial surveys will be made over areas where beetle hazard exists and counts or estimates made of red-topped Douglas-fir. Trees should be plotted on two-mile to the inch map as accurately as possible. Aerial surveys should be done when attacked trees have discolored. Tree measurements should be made in representative stands for the purpose of computing volumes.

Mountain Pine Beetle, Dendroctonus ponderosae

Counts of "red-topped" pines killed by mountain pine beetle will be made whenever possible from roads, vantage points and from the air, as with Douglas-fir. Tree measurements should be made in representative stands for the purpose of computing gross volume estimates of killed timber.

Balsam Decline caused by Dryocoetes sp.

In the past extensive areas of Abies amabilis and A. lasiocarpa have been killed by an insect, Dryocoetes sp. in association with a disease Ceratocystis sp. In recent years there has been considerable increase in the amount of balsam mortality in some areas. Rangers should map in areas of dead balsam from vantage points and during aerial surveys. Where possible take measurements of dead trees in representative areas for use in computing volumes.

Spruce Beetle, Dendroctonus obesus

Spruce beetle infestations continued in the Interior in 1969, but at a lower level than the previous two years. Specific survey projects on the spruce beetle problem will include:

Overwintering Mortality Counts: Counts of living and dead adults and larvae will be made at four locations within the infestation areas in the Prince George and Nelson Forest Districts and two or three locations in the Kamloops District. Two square feet of bark will be examined from the top, mid and lower bole of each of two infested trees at each location. These counts should be made during the third or fourth week of May.

Instruction for Outside Agencies: B. C. Forest Service and forest industry personnel will be making extensive cruises of spruce stands in the Nelson Forest District to assess the beetle problem for the purpose of establishing cutting priorities and salvaging killed trees. Senior technicians will conduct a workshop in early May to instruct these crews in recognizing and recording spruce beetle damage.

Aerial Surveys: Aerial surveys will be conducted when 1969 trees have discolored sufficiently to be recognized easily from the air.

Ground Surveys: Involvement in ground surveys in the fall will depend on the extent of co-operator surveys during the year. It will be necessary to investigate new or previously unreported infestations and carry out sufficient population appraisals to forecast trends and indicate hazard areas.

FOREST DISEASE SURVEY

Rangers are again asked to make observations for diseases subject to annual fluctuation, including direct weather injury and those which are climatically influenced such as foliage diseases, dieback, wilt and blight diseases. Evaluate these by the quantitative method described in the methods manual under recommended sampling procedures for perennial and foliage diseases.

Rangers will continue to be responsible for preliminary analyses arising from extension requests and are reminded that a clear, consise report of a field examination supported by a good collection will enable headquarters to deal with the problem in most cases.

Specific survey problems will include collections and observations to fill in gaps in distribution records of economically important diseases. Rangers working in areas north of the 54th parallel are requested to submit collections of root and foliage diseases, stem cankers and dwarf mistletoe encountered between there and the northern Provincial boundary.

Aerial observations should be recorded on sampling form when the ranger has observed brooming caused by dwarf mistletoe. If it is possible to land near the infected area, the observation should be supported by a collection.

There have been no requests for special disease collections from research scientists but if any are received during the field season they will be forwarded through a senior survey officer in Victoria to the appropriate ranger to fulfil wherever it is considered feasible to do so.

Specific Disease Survey Problems

Dwarf Mistletoe, Arceuthobium spp.

Maps will be distributed showing the presently known distribution of A. douglasii, A. campylopodum f. tsugensis and A. campylopodum f laricis in relation to the host range and distribution of A. americanum. Rangers will make collections and observations in areas where the disease has not been previously recorded. Aerial observations will be accepted if the ranger is confident that he has observed brooming caused by the mistletoe. Specifically, collections and observations are required as follows:

A. douglassii: Within the host range outside the Okanagan Valley and the area around Creston.

A. campylopodum f laricis: Within the host range east of Highway 95.

A. campylopodum f. tsugensis: Collections required from western hemlock between Kingcome Inlet and Burke Channel, between Dean Channel and Douglas Channel but not in those, north of Portland Inlet along the Alaskan boundary. Dwarf mistletoe has not been collected in interior hemlock stands and observations should be continued in those areas.

A. americanum: Collections and records required from lodgepole pine north of the Yellowhead highway and east of Highway 97 and north of the 55th parallel.

Needle Disease of Pines, Elytroderma spp.

Ponderosa pine in six plots in the Kamloops Forest District will be examined for infection by Elytroderma deformans. Intensity will be recorded as percentage of foliage infected.

Rangers in the central and northern parts of the Province are asked to record and make collections of Elytroderma deformans on lodgepole pine between the 53rd and 59th parallel.

Root Diseases, *Armillaria*
Fomes annosus
Poria weirii

There are large gaps in the distribution records of these diseases in British Columbia north of the 54th parallel. Rangers working in these areas are requested to record incidence of infection and submit collections of material to the herbarium for verification.

Plantations of Exotic Tree Species

Rangers will continue with examination of exotic plantations. A revised schedule of examinations will be issued to the rangers concerned.

R. L. Fiddick
March, 1970
Victoria, B. C.