

II. The Forest Insect and Disease Survey in the Pacific Region

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The combined Forest Insect and Disease Survey (FIDS) originated with the 1962 unification of the pre-existing Forest Insect Survey and the Forest Disease Survey. FIDS was an early national network within the Canadian Forestry Service, and its predecessors, to detect and monitor insect and disease conditions in Canada's forests. Responsibilities among the six regional units, such as the British Columbia and Yukon unit, included monitoring forest pest conditions, keeping records to support quarantines and make predictions, supporting forestry research with records, and disease (herbaria) and insect collections, testing and developing survey techniques, and providing advice on insect and disease conditions.

FIDS and pest surveys were an early and integral part of the Canadian Forest Service in its various forms and departmental associations. Dr. J.M. Swaine was appointed as the first full time forest entomologist in Canadian government service in 1912. He conducted numerous inspections (surveys) and collecting trips in western Canada and published "Canadian Bark Beetles" in 1918.

In 1922 the Canadian government established an insect laboratory at Vernon to investigate forest insect problems in the BC interior, the Rocky Mountain National Parks and the east slopes of the Rockies. The four staff sharing an office in the Vernon courthouse included Ralph and George Hopping, Bill Mathers and Hec Richmond. Initially efforts focused on extensive bark beetle infestations in pine stands in south central BC and in Banff National Park, where from 1941-1943 more than 27,000 infested trees were cut and burned to prevent an outbreak of the mountain pine beetle from developing to epidemic proportions. Although the Vernon establishment was made a sub-lab administered from the Victoria centre in 1945, by 1951 the 18 staff were accommodated in a new office building on British Columbia Forest Service land on Pleasant Valley Road. An insectary and large garage-shop was added by 1954. When the Vernon lab was closed and staff transferred to Victoria in 1970, the facilities were sold to the British Columbia Forest Service for \$1.00

A sub-laboratory for insect and disease studies in the coastal forests was opened in Vancouver in 1925 in conjunction with the Forest Products lab.

In 1928, Dr. J.M. Swaine strongly urged the establishment of an "insect intelligence service" for a survey of forest insects because of the severe outbreaks of budworm, sawfly and bark beetles. This was supported by representatives of forest industries through the Canadian Pulp and Paper Association and the Canadian Society of Forest Engineers. In 1931, The Division of Forest Insects of the Entomological Branch of the Department of Agriculture organized the "Forest Insect Intelligence Service" A number of circulars giving popular accounts of the principal forest pests were prepared. These circulars, together with questionnaires were sent to industrial organizations and forest services, with the request that they be filled out by forest workers. In 1936 the Forest Insect Survey was established as a permanent, independent unit and 528 insect samples and records from eastern Canada reached Ottawa for identification and recording. In 1937 forest insect surveys from Vernon commenced as part of a survey which had national scope by 1939. To process the collections being sent to Vernon a Forest Insect Survey insectary was built nearby at

Trinity Valley in 1937. Mind you, this was only after obtaining direct approval from Dr. J.J. de Gryse, Chief, Forest Insect Investigations in Ottawa (and workers today think they are tightly controlled). Labor was to be at 70 cents an hour with total costs not to exceed \$300. With closure of the Vernon lab, and following some vandalism and a fire in 1968, the Trinity Valley site was turned over to the Department of Education about 1971 for outdoor studies.

The nation wide survey project was administered on a regional basis, coordinated through a headquarters at Ottawa, initially with the following objectives:

1. Conduct a year-to-year survey of the status of potentially destructive insect species.
2. Accumulate information relating to the many thousands of species affecting forest trees:
 - the characteristics of their attacks on the trees;
 - their distribution throughout Canada;
 - the tree species attacked in different parts of their range;
 - the parasites, predators and diseases which attack the insects;
 - the relation of the development of destructive insect populations to forest composition, age and other environmental factors.

These objectives were updated periodically, to include forest disease surveys in 1952, and damage appraisal, survey methodology and remote sensing in the Pacific Region, in 1966.

A permanent forest insect centre was established in 1940 in Victoria firstly in the "old, old" Post Office building (now the Customs and Immigration Building on Government St. and Wharf St.). About this time two wood-walled tent-covered frames at Lake Cowichan/Mesachie Lake Experimental Station were refurbished by Drs. Prebble and Graham (entomology) and Dr. Buckland (pathology). These were upgraded, although still far from being luxurious, by Survey ranger staff from 1947-1949. They along with a 1960s laboratory (now a meeting centre) served as a field station for research by Federal staff until 1983 when they were turned over to the British Columbia Forest Service.

After World War II permanent ranger staffs were assigned to the Forest Insect Survey with their first offices in Victoria in the Central Building on View Street before moving to the old post office. R.L. (Lew) Fiddick was taken on staff in the spring of 1945 as the first federal insect ranger in the Pacific Region. The first assignment under the direction of Dr. M.L. Prebble was an assessment of a western black-headed budworm outbreak on north Vancouver Island in the Holberg Inlet-Port Alice area. A spray program had been organized, but a very labor intensive egg survey on numerous, large, hand-felled trees showed the infestation had collapsed due to natural causes. Over the next 30 years FIDS was to be involved in forecasting and assessing population levels, forest damage and control efficacy for more than 25 infestations of numerous different defoliators (see Appendix). It contributed to the development of aerial spray technology applicable to the unique and challenging conditions of BC. Effective dosage levels were progressively decreased and the more acceptable biological insecticides were introduced and tested.

By 1949 the Department of Agriculture was advertising for additional Forest Insect Rangers, Grade 1 at the annual salary of \$2160-\$2460. Expense account allowances were: breakfast 70 cents, lunch 85 cents, supper \$1.15 = \$2.70/diem. The midnight ferry from Victoria to Vancouver was fare \$3.50, truck \$6.00 berth \$4.50. At its peak a total of 16 Forest Insect Survey Rangers were assigned to individual districts throughout BC.

In 1948, to undertake surveys of the more than 11,000 km of shore line at a time when there were virtually no roads, an 18 m (60 foot) vessel was purchased from War Assets and converted to a floating laboratory, the J.M. Swaine. Cramped quarters existed for the

skipper, a cook, engineer and two or three survey rangers or assistants. The vessel served the coastal areas until 1953 when it was sold and replaced by the smaller two-man vessel, the Forest Biologist. With somewhat improved road access and increased usage of aircraft the Forest Biologist was last used in 1968, although smaller one-person trailered boats continued to be used for sampling on smaller islands and along the lower coast. In 1968, a new ranger hired from the second graduating class of British Columbia Institute of Technology forest technicians, Peter Koot, had his first "sink or swim" summer surveying from Jervis Inlet to Smith Inlet using "The Okalla Queen". This was a V6 powered plywood, 6.4 m (21 foot) cabin cruiser/tub built by the "very experienced" boat builders from Okalla Prison. It would only get up and plane with a nearly empty gas tank, very little food on board, no water in the bilges (a rarity because it always leaked) and preferably without the student assistant.

Also in 1948 a Forest Insect Survey insectary and rearing facility in Langford was completed by the versatile Survey staff. In 1965 with the new Pacific Forest Research Centre research facilities in Victoria the old insectary building was turned over to the municipality and is now the offices of the Capital Regional District and part of Mill Hill Regional Park.

Between 1950 and 1963 a network of seasonal Forest Insect Survey field stations was built including Kye Bay (1950), Cultus Lake, Lakelse Lake (1951), New Denver, Christina Lake (1953), Wasa Lake (1954), Williams Lake (1952), Prince George, and Babine Lake. In following years additional stations were moved to or acquired at Terrace (1959), Kamloops, Agassiz, Powell River (1963), Smithers and Summerland. With the long-term and conspicuous involvement in many communities throughout the province the Survey became one of the most visible parts of the Canadian Forest Service and maintained a reputation for consistent service to the forest community. The cabins greatly reduced accommodation costs during the 4 decades of service and greatly appreciated in value compared to the average cost of construction (Cultus Lake \$3418; Kye Bay \$2937; Lakelse Lake \$3855; Williams Lake \$4045; Wasa Lake \$4359; Babine Lake \$5804 - costs were said to be higher here because of local shortages due to the ongoing construction of the Kitimat aluminum plant). Minimizing operating costs is a regular government mantra, but consider the extent in the 1950s: in July 1957, B.M. McGugan, Co-ordinator, FIDS in Ottawa wrote Ray Lejeune, Officer-in-charge, Forest Biology Laboratory, Victoria, "policy regarding ranger cabin furnishings will not allow the purchase of refrigerators". And in 1959, \$4.40 per month for a phone was considered too high to consider in the budget.

Remember at this time the paved roads ended at Clinton, the Hope-Princeton Highway was just being opened and the Rogers Pass and Kaslo-Salmo highways didn't exist. Initially the Survey organization "inherited" army surplus 4-wheel-drive vehicles called Heavy Utility Personnel Carriers (HUP's). Only slightly suitable for rough overland travel at slow speeds they were clumsy, noisy, dusty, right-hand drive and subject to break-down. When eventually new 1950 Ford vans were delivered to Victoria they didn't have heaters, Ottawa considered them unnecessary.

A Forest Disease Survey was formally organized in 1952 to include a survey of tree diseases. For both the Forest Insect and the Forest Disease Survey, a standard punch-card system of recording and sorting insect and disease records was established across Canada ("as many as 12 columns simultaneously and 400 cards per minute" were processed using Remington Rand sorting machines).

Annual forest insect and disease surveys in the Yukon were started in 1952, although a special survey for mosquitoes had been conducted in 1948 with an Ottawa-based scientist and support staff from Victoria (they certainly didn't collect them all!). The annual Yukon surveys by FIDS from the Pacific Forest Research Centre continued until 1965, and then

again from 1974 to 1996. From 1966 to 1972 the Yukon surveys were conducted from the Northern Forestry Centre in Edmonton. Initially an older house trailer in Whitehorse was used during the Yukon surveys before being replaced by a roll-up, sectional camper and then a modern hard sided truck mounted camper. One year, the FIDS ranger sleeping in the camper awoke suddenly to find a mother and two cub bear faces pressed against the window only inches away from his own. Being a sectional camper, one good shove would have separated the sections; fortunately the bears climbed down from the hood of the truck and departed, probably followed quite quickly by the ranger. Another time a bear climbed into the back of the truck while the ranger was away collecting, and then... but there are so many bear stories.

Although the first sketching of infestation boundaries from an aircraft was published as early as 1920, and periodic mapping was done for major outbreaks, it wasn't until the early 1950s that aircraft availability and cost was reasonable enough that organized annual overview flights and mapping of the major defoliators and bark beetles was initiated on an annual basis. Federal Government austerity always seemed to exist and there was seldom much money for aerial surveys. Acknowledgement is made of the considerable provision of flying time and cooperation by the British Columbia Forest Service and forest industry. The considerable amount of flying time provided to FIDS from other agencies annually for many years speaks well for the negotiating skills of the ranger staff and for the value of the information they provided. Without the many excellent contacts and cooperation established and maintained by the rangers the several decades of aerial detection and damage records would not have been as extensive.

Cooperation was not limited to just flying time, but included information, lodgings, assistance and loan of equipment. One courtesy provided in 1958 to ranger, Norm Alexander in the remote West Prince Rupert District was the loan of a large box "portable" radio which required that the antenna be thrown up over a branch then back away the 30.5 m (100 foot) length to make your call (hardly today's cellular phone).

Aircraft and pilot reliability was a somewhat different matter at times. e.g. One pilot refused to fly about 300-500 m above the ground necessary to distinguish and map damage. He was dubbed "sky blue Lou" and probably fortunately, was always on days-off when other FIDS flights were scheduled. On the other hand there was the pilot who, after mapping mountain pine beetle damage, bypassed the refueling facilities at McBride and headed for Prince George. The FIDS ranger made a few enquiries about running out of fuel and sure enough over Purden Lake the engine sputtered. Abrupt rocking of the plane kept the engine alive for a few moments, but not for long and elevation was being lost. Gliding silently over Tabor Lake, boaters were seen making hasty retreats to the shore and even into the lake. Fortunately the glide carried far enough for a relatively smooth landing in a hay field just beyond the lake. A different plane and pilot, but the same FIDS ranger finished mapping later that week and continued doing so for years.

Other enjoyable(?), memorable flights: En route to Sandspit, dark oily spots started appearing on the window and increased until visibility was nearly nil. Upon landing, smoke curled up from the engine cowling and the engine bust into flame. Luckily the pilot anticipated this (had it happened before?) and doused the flames with an extinguisher. Another incident occurred on an early 1970s flight made from Campbell River in a Beaver on floats. After dodging the many anglers in the harbor and just about to lift off, the engine died, causing a near nose dive into the chuck. These were the joys of a new pilot on a plane just brought back to Canada from the Peruvian Air force with an instrument panel still in Spanish and the gas tank switches opposite to those of other Beavers (the pilot had switched to an empty instead of full tank). Most rangers had hair-raising experiences of flying in marginal weather using fish boats and lighthouses for navigation, float-plane

landings hitting rough seas, logs or even basking sharks, and very tight turns in narrow or dead end (not a nice term) valleys. Invariably, they would comment "If it had been any other type of plane but a noisy Beaver, it would not have continued flying."

In 1960 the Forest Biology Division, Science Service, Department of Agriculture was joined with the Forestry Branch, Department of Northern Affairs and Natural Resources to form the Department of Forestry.

The Forest Insect Survey and the Forest Disease Survey were unified in 1962 as the Forest Insect and Disease Survey (FIDS).

While the Honourable J.R. Nicholson, the Minister of Forestry may have laid the cornerstone in August 1963 for the new Forest Research Laboratory on Burnside, it was FIDS rangers in 1957 who laid the more important first culvert and driveway for access to the site. This included hauling gravel from Goldstream in the back of the panel trucks because of government spending constraints. Guess who got the most press!

On February 15, 1965 the new Pacific Forest Research Centre on Burnside Road was opened, and for a short while the entire coastal unit of FIDS were together along with the herbarium and insectary. Then, after the 1969 austerity review, the Vernon lab was closed and all projects and personnel were transferred to Victoria (10 transferred, 2 quit and 2 positions were terminated). Along with staff transferred from the Calgary/Edmonton lab the Burnside lab became crowded and offices and labs were created for FIDS in the old headerhouse which had been constructed in 1957-1958 along with a separate greenhouse. (The herbarium cabinets stood just about where the Christmas luncheon is tabled). Although slightly separated from the main lab it was only a wet run away during coffee breaks and FIDS staff maintained a strong team unity (only the screams from the serious table tennis players in the silviculture group's annex next door shattered the noon-hour peace). With the addition of the "new wing" in 1985, the herbarium and all FIDS staff returned to the third floor again in association with the insectary. The new greenhouses were then built attached to the headerhouse.

Forest insect and disease punch card records were computerized in 1967 and new collections were recorded on a revised enclosure slip. Data processing was centralized in Ottawa.

In 1975 the FIDS unit at PFC led a national task force on Damage Appraisal and Pest-Caused Losses. The approaches developed were the basis for loss estimates contributed to Statistics Canada for the next couple of decades and used widely by the British Columbia Forest Service and others.

In 1979 there was another A-Base Review and a task force was struck by Canadian Forest Service Headquarters to review the FIDS program. Based on interviews and correspondence with over 150 individuals in federal departments, provincial agencies and the forest industry, the task force concluded: "there are sufficient and compelling reasons why the FIDS should be maintained as a national program". It also recognized that the transfer of FIDS from Agriculture to Forestry without provision for a mandate to replace the Plant Quarantine Act, and the de-emphasis of the national aspects of the program in the 1969 reorganization, required action to readopt and reaffirm the original strong rationale for a FIDS to provide essential data input to federal forestry programs and to federal policy and decision making. It was recognized that the demand for pest information was certain to grow at an increasing rate over the next decade, but periodic funding reviews would continue to target programs as large as the national Forest Insect and Disease Survey.

In 1984 FIDS at the Pacific Forest Research Centre began developing a computerized mapping and analysis geographic information system (GIS). It was up-graded in 1992 when the system was standardized nationally. GIS is now commonly and nationally utilized and the historical distribution and infestation records are available on the internet.

The Forest Insect and Disease Survey celebrated 50 years of service in 1986. Over this period of time and beyond, the motivation and self-reliant nature of FIDS staff was key to many accomplishments. They undertook annual in-service training programs most winters and tested and embraced new tools. Funds were found for 2-way radios in 1983 after Leo Unger walked more than 33 kms from a mud hole. Pheromone trap monitoring for gypsy moth detection was used since 1978 and pheromone monitoring systems for numerous other forest insects were tested and calibrated. Satellite tracking geographic positional systems and electronic field data recorders were added early in the 1990s.

From 1985-1996, FIDS provided information, undertook special surveys, developed and tested protocols and served on Science/Policy panels concerning the pinewood nematode and its effect on the export of Canadian lumber.

In 1995, after (yet another) program review and reorganization of the Canadian Forest Service, which included a 30% cut in resources, the decision to discontinue annual, operational surveys of important forest pests on a national basis was announced. Several provinces, including BC, felt that they could not politically accept the "off-loading" of what had been a Federal activity, or did not have the resources to continue the surveys. Subsequently the FIDS units were disbanded through early retirements, other packaged departures, and transfers to the various research networks that were established within the Canadian Forest Service.

PERSONNEL

FIDS has been an early and integral part of the history of the Canadian Forest Service in Canada and in BC/Yukon. Over a period spanning almost 6 decades many staff gained and shared an expertise and knowledge of the forests and its diseases, insects and natural control factors. More than 70 men and one woman served as Forest Insect and Disease Survey Rangers. Some remained only for a year or two but for many it was a long and dedicated career. Ranger staff in the Pacific Region with more than 25 years service included: Stan Allen, Dick Andrews, Cliff Cottrell, Lew Fiddick (the most senior with more than 37 years service, first as an insect ranger and then Chief Ranger), Jim Grant, Colin Wood, Roly Wood, and Bob Erickson, Peter Koot and Leo Unger who are still contributing as Forest Health network technicians. More than 50 other scientists and technicians have worked with FIDS in the herbarium, insectary, damage appraisal and methodology studies. Those with more than 25 years service included: George Brown, Don Collis, Al Dawson, Dave Evans, Ab Foster, John Harris, Daphyne Lowe, Alec Molnar, Erika Pass, Doug Ross, Dave Ruppel, Allan Van Sickle, Emil Wegwitz and Wolf Ziller.

Numerous others contributed and received a good foundation in FIDS before transferring to other projects in the Canadian Forest Service or to other aspects of forest pest management including (but not limited to): Norm Alexander, Rene Alfaro, Dennis Beddows, Clare Farris, Brenda Callan, Dennis Clarke, Don Doidge, Bob Duncan, Lee Humble, Rich Hunt, Ernie Morris, Doug Ruth, Terry Shore, Tom Silver, and Tad Woods. In addition, many casual employees and students, while working with FIDS to earn funds for further education, also gained an increased awareness of forest insects, diseases or geographic information systems, and the experience of federal government employment.

FIDS is indebted to the secretarial staff (Evelyn Andrews, Nancy Mason, B. Sugden and T. Gabriel at Vernon; Pat McLean, Heather Murchison, Francis Douglas, Susan Ticknor, and Joan Strobbe at Victoria), who patiently deciphered near incomprehensible telephone messages and hand writing; and to the many other technicians and scientists, regionally, nationally and internationally who worked closely with, and contributed greatly to the many accomplishments of FIDS.

MAJOR ACCOMPLISHMENTS OF FIDS

For more than 5 decades Forest Insect and Disease Survey staff provided expertise and a strong liaison for the Canadian Forest Service with the British Columbia Forest Service, the Yukon Territory, as well as with forest industry, universities and technical schools, provincial and federal parks, the public and other agencies. This was a time of growing awareness and concern about forest pests, their life cycles and control factors, both natural and chemical.

From the 1940s to the 1980s, FIDS staff undertook, often in cooperation with the Council of Forest Industries, or participated with research staff in the assessment and monitoring of more than 25 forest insect control projects. In numerous additional cases, careful assessments of population trends and natural control factors indicated that direct control was not required.

FIDS developed and implemented practical sampling and survey methods and frequently provided collections, information and assistance to other scientists across Canada and internationally.

The FIDS collections and associated data established the extensive data base of more than half a million records of forest diseases, insects and beneficial natural control agents from the forests of the Pacific Region of Canada. The curated permanent reference collection of more than 66,000 insect and 35,300 disease specimens is critical for accurate identification of native and exotic pests. An extensive photo and color slide collection was also assembled. Some of this information has recently been made available on the internet. It has also provided the basis for some biodiversity studies.

Many assessments of the natural biological control factors of forest insects were also conducted by FIDS. A data base of more than 20,000 records was compiled from collections and insectary rearings to better understand and predict the effects of natural occurring parasites and disease on insect infestations. Biological control experiments started as early as 1931 when parasites from Japan were caged with hemlock sawfly from the Queen Charlotte Islands. As well as monitoring the larch casebearer from its first detection in BC in 1966, FIDS initiated and participated in parasite introductions and assessments from 1969 to 1984. Other successful parasite releases and introductions were made for balsam woolly adelgid, the winter moth, larch sawfly and apple ermine moth.

In 1975 FIDS led a national task force on damage appraisal and pest-caused losses, developing the approach and providing estimates of forest insect and disease losses in the nation's forests for reporting by Statistics Canada for the following decades. These quantifications increased awareness of the major impacts of forest insects and diseases as well as identified areas needing further study and support. Damage appraisal, remote sensing of pest-caused damage, and statistically based sampling studies started first in FIDS before becoming separate studies.

Extensive biological surveys (insects, diseases, parasites and predators) were conducted up to 1969, after which emphasis was more on commercially important pests with increasing attention to introduced insects and diseases of potential risk to Canada's forests. An increased level of awareness and concern for the latter continues. FIDS provided both an annual and an historical perspective of forest pest conditions throughout BC and the Yukon. This was well documented in a great many timely reports and publications (even videos) and through participation in regional, national and international meetings.

FIDS first implemented a geographic information system (GIS) for the maintenance and reporting of insect infestations and disease distributions in 1984. Portions of the historical aerial survey outbreak maps and disease distributions are available on the world wide web.

An informative and popular Forest Pest Leaflet series describing the life cycles, damage and activities of more than 60 common forest insect and diseases was created and maintained by FIDS. These were also presented in PFC's first CD release (HFOREST - Hypermedia Forest Insect and Disease Knowledge Base and Diagnosis).

APPENDIX

Early aerial control trials of forest defoliators in BC.

Date	Insect	Location/area	Insecticide
1929	western hemlock looper	Burrard Inlet/45ac	calcium arsenate
1930	western hemlock looper + black-headed budworm	Stanley Park/800ac	calcium arsenate
1930	western hemlock looper	Seymour Creek/800ac	calcium arsenate
1946	western hemlock looper	Nitinat	DDT
1948	western false hemlock looper	Windermere Valley /11,200ac	DDT
(First time in Canada to use non-fixed wing aircraft, Bell 47 helicopter, in an operational forest pest control program)			
1956	black-headed budworm	Pt. McNeill/360ac	DDT
1956	phantom hemlock looper	Burnaby, Central Pk /200ac	DDT
1957	phantom hemlock looper	Burnaby, Central Pk /200ac	DDT
1957	phantom hemlock looper	New Westminster Queens Pk /75ac	DDT
1957	black-headed budworm	Pt. Alice-Pt Hardy /156,000ac	DDT
1959	western hemlock looper + greenstriped forest looper	Stanley Pk/550 ac	DDT
1960	black-headed budworm	QCI Moresby Is /160,000ac	DDT, Bt
1960	saddleback looper	Kitimat/1,800ac	DDT
1961	saddleback looper	Kitimat /9,800ac	DDT, Dibrom, Phosphamidon, Bt
1961	pine butterfly	Cameron Lake/1,500ac	DDT
1962	Douglas-fir tussock moth	Okanagan Valley/160 ac	DDT, malathion, NPV
1964	western hemlock looper	Enderby/50ac	Phosphamidon
1964	greenstriped forest looper	QCI Pt Clements/1,600ac	Phosphamidon
1965	hemlock needleminer	Holberg/1,000ac	Phosphamidon, Dimethoate
1973	western false hemlock looper	Salmon Arm/400 ac	Dipel
1973	black-headed budworm	Pt. Alice/28,000 ac	Fenitrothion
1974	Douglas-fir tussock moth	Kamloops/25 ac	NPV
1974	western false hemlock looper	Chase/120 ac	Dipel, juvenile hormone, Zoecon
1975	Douglas-fir tussock moth + western false hemlock looper	Kamloops/31,000 ac	Dipel, Orthene, Bt, NPV
1976	Douglas-fir tussock moth	Kamloops/20,000 ac	Orthene, Bt