PROVINCE OF BRITISH COLUMBIA

DEPARTMENT OF LANDS AND FORESTS

HON. R. G. WILLISTON, *Minister* R. G. McKEE, *Deputy Minister of Forests*

REPORT

of

THE FOREST SERVICE

YEAR ENDED DECEMBER 31ST

1960

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1961

VICTORIA, B.C., March, 1961.

To Major-General the Honourable GEORGE RANDOLPH PEARKES,
V.C., P.C., C.B., D.S.O., M.C.,
Lieutenant-Governor of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

Herewith I beg respectfully to submit the Annual Report of the Forest Service of the Department of Lands and Forests for the calendar year 1960.

R. G. WILLISTON,
Minister of Lands and Forests.

The Honourable R. G. Williston,
Minister of Lands and Forests, Victoria, B.C.

SIR,—There is submitted herewith the Annual Report on activities of the Forest Service during the calendar year 1960.

R. G. McKEE,
Deputy Minister of Forests.

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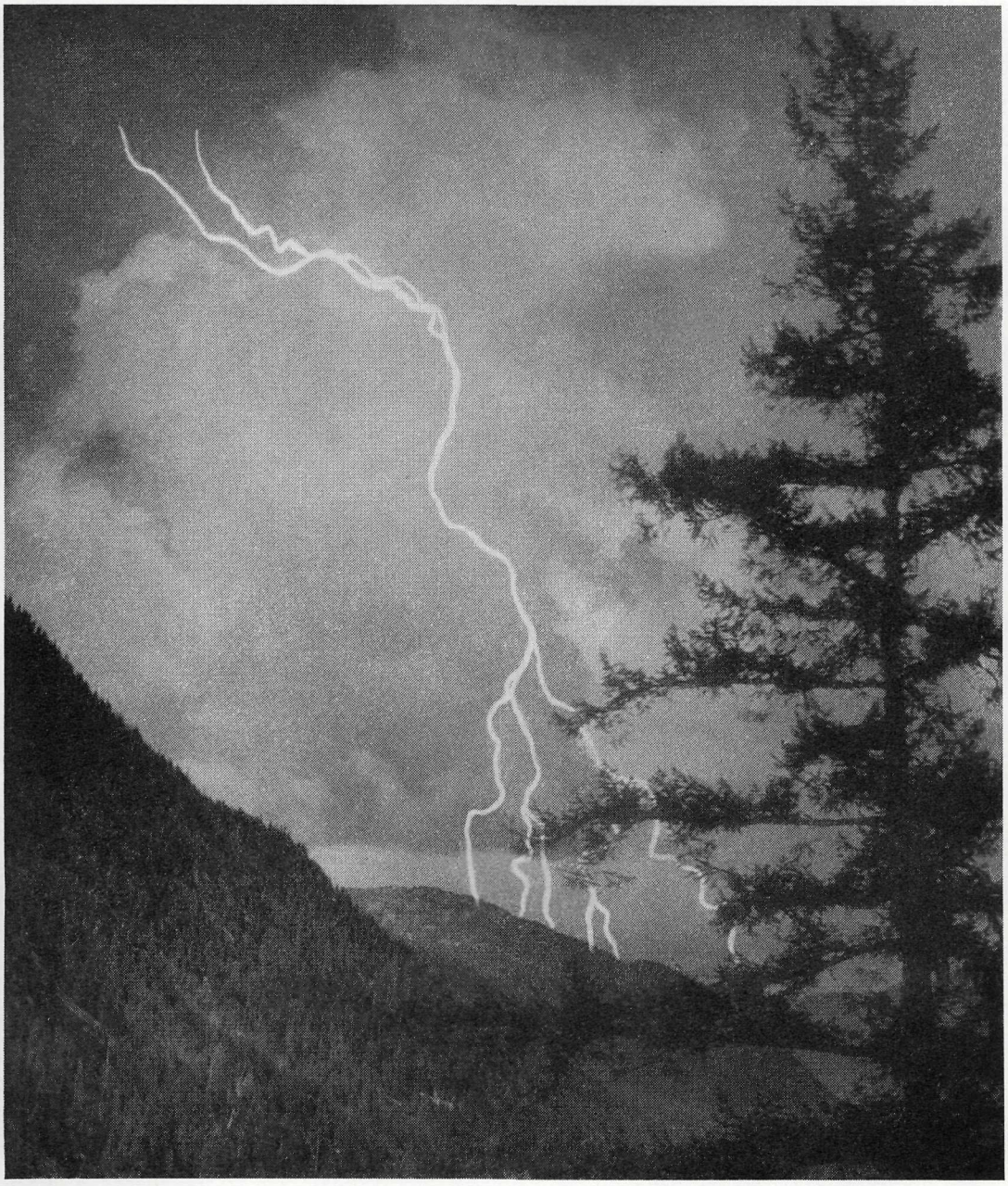


Lightning—the prime 1960 enemy. In one three-hour period on July 13th lightning caused 407 forest fires over a 14,000-square-mile area in the central Kamloops District.

REPORT OF THE FOREST SERVICE, 1960

CHIEF FORESTER'S SUMMARY

Introduction and Legislation

Amendments to the *Forest Act* during 1960 include one important addition in the form of a new subsection to section 17 which designates a sustained-yield unit being overcut by 150 per cent or more of its capacity as an emergency area and provides for new procedures in the granting of timber sales within that area. The purpose of the amendment is to protect established operators in the unit from outside competition for timber supplies necessary to carry them over the current cut-adjustment period.

Among the other amendments was one giving the right to the Crown to seize a vehicle transporting timber out of the Province without a permit and one extending liability to the principal to a contract for violation of the Act by his contractors.

Log-salvage regulations were amended for the sake of clarity. The *Grazing Act* was also amended to simplify procedures for establishing grazing districts and the grazing regulations were amended to provide a new basis for the computation of grazing fees.

The Deputy Minister acted as Chairman of the B.C. Sub-committee of the Canadian National Committee for the Fifth World Forestry Congress held in Seattle, Wash. Subsequent to the Congress proper, thirty-six delegates, representing twenty different countries, visited the Province from September 12th to 16th, inclusive. The considerable assistance given by many segments of the industry, the Federal Government, the University of British Columbia, and the Canadian Institute of Forestry did much to make this study tour a success.

Through the courtesy of the Forest Entomology and Pathology Branch, Canada Department of Forestry, this Report again contains submissions from the Victoria unit of that organization on forest-insect and forest-disease conditions in British Columbia.

Surveys and Inventory

Financial assistance by the Federal Government continued under the *Canada Forestry Act* and was expanded by agreement during the year to include assistance toward the implementing of intensive management surveys in Crown forest units.

Survey and Inventory field crews were active in all five forest districts, covering an area of 19,418,254 acres for purposes of forest classification, sampling, regeneration surveys, and studies of volume-table and loss-factor projects.

Various studies of air-photo interpretation techniques were carried out, and the Division has developed a method of obtaining flying heights above the ground using two cameras mounted on booms beneath a helicopter.

Forest Research

Technical details of the research programme for the year will be published in the annual Research Review, available in the fall of 1961.

General maintenance and improvement work was carried on at the Cowichan Lake and Aleza Lake Experiment Stations. Due to a drop in the market for small wood, the thinning programme being carried out at Thurlow Island and the Cowichan Lake Station was inactive during the year. The energetic programme directed

toward the selection of " plus " trees for use in seed orchards continued with significant assistance from industry.

Fertility studies started in 1958 were continued with mineral fertilizer and organic amendment trials at the Duncan, Quinsam, Green Timbers, and East Kootenay nurseries.

Reforestation

Weather conditions both on the Coast and in the Kootenays resulted in considerable damage to nursery stock. Damping-off reached a high average of 12 per cent at the Duncan Nursery.

Some 7,000,000 seedlings were shipped by the nurseries during the year. Total planting throughout the Province by all agencies, public and private, using Forest Service stock, amounted to 6,732,475 seedlings on 18,185 acres.

A new nursery is being established in the Chilliwack Public Working Circle, with crews from the Attorney-General's Department doing much of the work. In less than five months these crews cleared, fenced, and sowed 178 seed-beds, using hand-labour for the most part.

Working Plans

At the end of 1960 almost 48,000,000 acres of productive forest land with a total annual allowable cut of 783,721 M cubic feet, equivalent to 65 per cent of the total Provincial scale, were under regulatory working plans.

Seven new public sustained-yield units were approved during the year, and one new tree-farm licence, No. 37, went into operation, and two additional licences were awarded.

Of the total area under regulation, 40,257,302 acres are within seventy-two public sustained-yield units (annual allowable cut, 464,620 M cubic feet) and 7,099,111 acres are within thirty-nine tree-farm licences (annual allowable cut, 296,695 M cubic feet).

Public Information and Education

In nearly all categories the work of this Division increased over the previous year. Some 11,000 photographic prints were produced for the press and other organizations. Special motion-picture footage and still photos were obtained of water-bombing activities and the general fire situation in the Kamloops and Vancouver Districts. Location filming of a new subject on logging damage was completed. Film library subjects were seen by 165,340 persons.

Information activities on radio and television increased markedly during the year. School lecturers covered 202 schools and gave 260 lectures to 40,000 students.

There was a general increase in the production of special articles for periodicals and in the level of news media liaison activities.

Forest Management

Despite the continuing trend to lower log and lumber prices carried over from last year, 1960 recorded a new high value of $738,360,000 for all forest products and a new high total cut of 1,199,843 M cubic feet. The 1960 value was up $68,245,000 over the revised 1959 value figure and the cut was up 150,698 M cubic feet over the previous year.

Of the total value, lumber represented $380,600,000 (52 per cent) and pulp and paper, $242,925,000 (33 per cent). The remainder was accounted for by plywood at $75,760,000, plus minor-product values.

All five forest districts showed a gain in total scale over 1959, but the most significant was that of Prince Rupert District (Coast), up 63 per cent over the previous year. The principal species cut according to volume were Douglas fir (32 per cent of total), hemlock (23 per cent), spruce (17 per cent), and red cedar (13 per cent). Fir was the leading species cut in the Interior, and hemlock on the Coast.

Improvement in water-borne shipments accounted for a goodly portion of the increased cut. Total overseas shipments were up nearly 600,000 M f.b.m. to 1,675,351 M f.b.m. for the year, with the greatest increases going to the United Kingdom, United States, Africa, and Australia, in that order.

At the end of 1960 there were 6,815 active timber sales in existence with a total area of 3,476,000 acres. Of the 1,843 sales auctioned during the year, 90 per cent were non-competitive and accounted for 78.6 per cent of the total volume sold.

The year saw the first operation in the Interior to provide pulp-chips from sawmill waste and the first pulp-mill to be established anywhere in the Interior, at Castlegar.

The seventy-two public sustained-yield units in the Province actually recorded a cut of 385,000 M cubic feet during the year, which represents 83 per cent of their combined allowable annual cut and 32 per cent of the total Provincial scale.

By the end of the year, the selling prices for lumber appeared to have stabilized at a lower level than the previous year and log prices, for all but spruce and fir, declined steadily during the year. The most significant decline in log prices was for cedar, which ended up some $10 per thousand below 1959.

Reflecting the price trend, the Service made 5,372 downward adjustments in stumpage rates during the year, as against only 383 upward adjustments.

Intensification of scaling supervision was continued in the Interior during the year, with greater emphasis being placed on check scaling.

Various stand-treatment techniques were applied to some 600 timber sales, involving approximately 188,480 acres. Also, 3,194 acres were scarified, an increase of 1,437 acres over the 1959 programme.

Grazing

1960 was a good year for the ranching industry. Forage production in the northerly part of the range country was phenomenal and all hay harvested was put up in good condition.

Cattle prices strengthened toward the end of the year and reached a weighted average of $17.25 per hundredweight by the fall.

Range surveys were interrupted by the demands on staff of the heavy fire season, but 340,000 acres were covered, bringing the total surveyed acreage since 1945 to almost 10,000,000 acres. Range seeding was a major feature of the improvement programme, and 35,450 pounds of grass and legume seed were sown on severely burned areas.

Satisfactory progress was made in this first year of special pasture-development work in the Peace River area.

Engineering Services

Work continued on Forest Service roads with an extensive programme of engineering investigations, route reconnaissance, location, and construction. During 1960, road routes totalling 751 miles were reconnoitred and 278 miles of previously constructed haul-road were maintained.

The major building construction undertaken during the year was the erection of Dawson Creek Ranger Station buildings and the Smithers office and warehouse building. In both instances the accommodation incorporates a headquarters cache for reserve fire-fighting equipment. The design of a new 60-foot Ranger boat for the Queen Charlottes was completed, and tenders have been called for the construction of the hull.

Radio expansion continued, particularly in forest-protection communication equipment, with a net increase of 298 units added during the year.

Forest Protection

After a slow start in hazard build-up, the fire season hit its peak in July, when 50 per cent of the season's total of 4,113 fires occurred, only seven less fires than the record year of 1958. Fire-fighting costs for the Forest Service and damage to forest-cover reached $7,797,418, representing a loss in stumpage value only of $3,725,316, well over twice the ten-year average damage value. Lightning-caused fires accounted for 68 per cent of the total fire-fighting cost and for 69 per cent of the 285,820 acres of forest land burned over.

Aircraft, both fixed wing and helicopters, played a vital role in fire-fighting during 1960. A total of 3,551 hours of flying-time was logged by fixed-wing aircraft in strictly protection operations, of which 2,126 hours were on water bombing. Helicopters on fire duty ran up a total of 1,762 hours of flying-time.

Throughout the Province, forest-protection roads now exceed 2,000 miles, of which 254 miles were constructed during 1960. Eight hundred and fifteen miles of protection trail now exist, of which 166 miles were constructed during the year.

Considerable new work was done on the important investigations leading to the establishment of standard fire-danger ratings for the Province, and close liaison was maintained with the Federal fire research agency with this end in view.

The extremely hazardous conditions necessitated the imposition of sixty-six forest closures of differing types throughout the Province.

Ranger School

The eleventh class, consisting of twenty-one enrollees, graduated in December, 1960.

Although there were no major changes in the curriculum, a new two-day trial course in the operation of launches was conducted at the Marine Station.

The school facilities were used during April for an in-service training course arranged by the Department of Recreation and Conservation, with thirty-six in attendance.

Personnel

In order to assist in the greatly increased load of sustained-yield administration and research requirements in the districts, seven graduate foresters were added to the permanent establishment of the Service, which now stands at 839 permanent employees of all classifications. Ten graduate foresters and four engineers left the Service, and fourteen foresters and four engineers were hired during the year.

Turnover rate for the Service, including permanent and full-time casual employees, averaged 13.4 per cent, up slightly over 1959. Prince Rupert District had the highest rate of turnover, with an over-all average of 22.9 per cent and a high of 51.4 per cent in the office staff.

A marked increase in safety-training activity was evidenced during the year, with committees being set up in all forest districts and Victoria headquarters.

Accounting

The record timber scale of 1960 resulted in charges against logging operations reaching $32,964,679, the highest since 1956 and 20 per cent above the 1959 figure. Prince Rupert District showed the largest increase, being 48 per cent up over the previous year.

Direct Forest Service collections rose to a record calendar-year total of $30,523,729, of which $26,374,420 were stumpage fees and $2,281,028 royalty payments.

Forest Biology

The Forest Biology Division of the Canadian Government is reporting this year for the first time as a part of the newly formed Canada Forestry Department.

The year was marked by a large number of defoliating insect outbreaks on the Coast and a generally low level of such activity in the Interior.

Severe infestations of western hemlock by the green-striped forest looper over an area of 26,000 acres on the west coast of Vancouver Island were recorded during the year. An intense outbreak of saddle-backed looper occurred on some 14,000 acres of hemlock and balsam in the Kitimat area, and this is expected to continue into 1961. Many other diverse outbreaks of varying size and intensities were investigated during the year.

Assessments of the effects of aerial spraying by the forest industry of 30,000 acres of the Queen Charlotte Islands infested with black-headed budworm indicated that the weakened solution of DDT (reduced to one-quarter pound from 1 pound per acre) gave adequate control of the budworm and yet produced no harmful side effects to fish-life.

F. S. McKinnon,
Chief Forester.

FOREST SURVEYS AND INVENTORY

INTRODUCTION

During 1960 the Division completed the third year of the maintenance inventory programme. Financial assistance was continued by the Government of Canada according to the agreement for forest inventory implemented under the *Canada Foresty Act*. A significant step was made during the year when the Government of Canada agreed to extend its financial assistance to include intensive management surveys in Crown forest units. This long-term programme will commence in 1961.

Field work covered an area of 19,418,254 acres in the five forest districts, as detailed below:—

Forest District	Acres
Vancouver	3,060,745
Prince Rupert	1,977,159
Prince George	10,006,907
Kamloops	4,097,258
Nelson	276,185
Total	19,418,254

FIELD PROGRAMME

OPERATIONS

Field supervisors again directed forest inventory projects from field headquarters located at Smithers, Prince George, and Kamloops. Coast projects were conducted from three launches.

Radio communications were invaluable in co-ordinating far-flung activities of field crews, launches, and contract helicopters. Tape recorders carried in helicopters once more proved to be useful in recording forest-type data during low-level observation along predetermined flight plans.

Two Bell 47 G-2 helicopters on a four months' charter were used by forest classification crews to collect forest-type information and by sampling crews to provide rapid transport to ground samples located in the more remote areas. Owing to frequent diversions of the machines for fire-protection work in the Kamloops and Prince George Forest Districts during the month of July, the contract was extended for an additional month. Nine hundred and seventy-five hours were flown on forest inventory projects throughout the Province during 1960 and an additional 200 hours on forest-protection work in the Kamloops and Prince George Forest Districts.

The services of the Division's mobile mechanics were again in great demand by field crews throughout the Province.

FOREST CLASSIFICATION AND SAMPLING

Two parties of foresters using Bell helicopters examined and classified approximately 12,500,000 acres.

Three Interior and two Coastal sampling parties covered an area in excess of 19,000,000 acres and established 4,924 sample plots. An additional 816 sample plots were provided by a private firm under a co-operative agreement.

REGENERATION SURVEYS

An intensive regeneration survey was completed for the Crooked River Public Working Circle during 1960. While the greater emphasis was placed on the

logged-over areas, valuable information was obtained on the older and more recent burned-over areas. The following summary shows that portion of the burned and logged-over areas that was covered by the survey:—

	Acres
Logged-over areas	8,721
Burned-over areas (prior to 1958)	31,300
1958 burned-over areas	2,050
Total	42,071

The information obtained by this survey, along with detailed information obtained on the single-tree selection areas over the past three years, provides a very complete regeneration picture for this management unit. The compilation and analysis of the basic data are proceeding at the present time.

Volume-table and Loss-factor Projects

Volume Tables

During 1960 work continued on revision of the 1955 interim standard cubic-foot volume tables for the commercial tree species of British Columbia. The revised tables will be published during 1961.

Log-position-volume tables for Coast Douglas fir, western red cedar, western hemlock, balsam, and Sitka spruce (Forest Survey Note No. 4) were published and distributed.

Loss Factors

A study of decay and related losses in spruce, balsam, and lodgepole pine was initiated in the Kamloops Forest District. Objectives of the study are to determine the extent of decay in forest stands; to determine the external signs of decay and to assess their value as aids to cruising; and to identify the fungi of major importance. A local-volume table study is being carried out concurrently with the decay study. During the summer a total of 700 trees was measured in detail in the Hendrix Creek area. These studies are being carried out in co-operation with the cruising staff of the Kamloops Forest District.

Studies of logging breakage were carried out on three operations on the west coast of Vancouver Island. The objective of these studies is to provide realistic reduction factors for defect, breakage, and utilization losses occurring in all phases of the logging operation.

A complete revision of the Interim Diameter-class Loss Factors for the Commercial Tree Species of British Columbia (1957) is in progress. The new factors will incorporate all data collected to date and will provide more realistic allowances for waste and breakage.

The work on taper curves, commenced last year to provide curves for five Coast species, was extended to include the Interior species of major importance. It is hoped to have this information published for distribution at a later date.

OFFICE PROGRAMME

Photo Mensuration

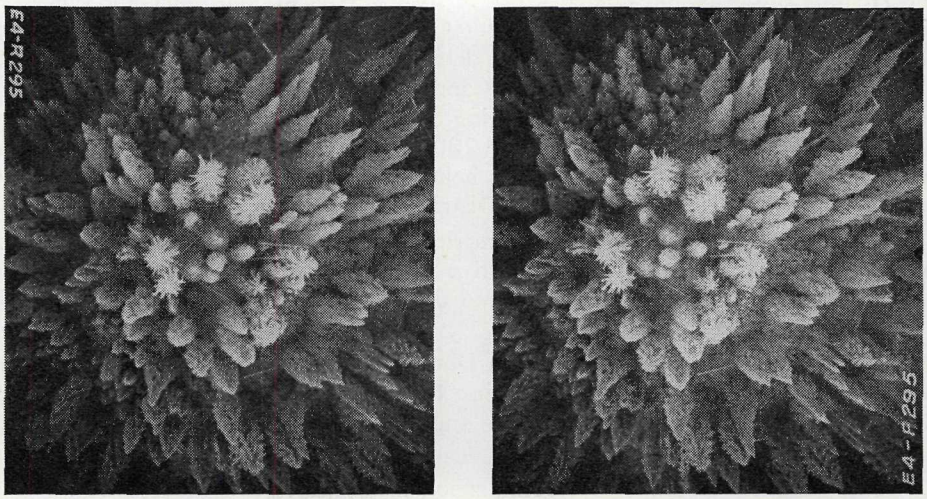
Following a number of years of investigation in the application of photo-mensuration techniques, details of practical use were published in Forest Survey Note No. 5, entitled "Timber Volume Estimates from Aerial Photographs."

Measurements of stand height and crown density made on aerial photographs were used, in conjunction with a zonal photo stand-volume table, to obtain an estimate of gross cubic volume per acre for a 10,000-acre mature spruce-lodgepole pine stratum in the Babine Public Working Circle. Double ground-photo sampling was used to adjust the estimate for local conditions.

The photo volume estimate of 3,850±525 gross cubic feet per acre at a probability of .95 (±14 per cent error) required twenty man-days. To attain comparable accuracy by ground sampling only would have required sixty-five man-days.

Another study was carried out in connection with photo stand-volume tables for lodgepole pine and (or) deciduous types in Subzone 940, Zone 4 (Central Interior), where a total of 1,295 photo samples were measured. These samples covered 140 strata (species-age-height) for which volume estimates were calculated. The conclusion reached was that, for these types, a local table will provide volume estimates of greater reliability than will a regional table adjusted to local conditions.

The Division has developed a method of obtaining flying height above ground from the photo-measured base length of two cameras, mounted one at each end of a 15-foot boom suspended beneath a helicopter. Results show that flying height can be estimated from such measurements to a considerable degree of accuracy. At a flying height of 250 feet the standard error of estimate of flying height is ±4.4 feet or 1.76 per cent. Tree heights have been measured on these photographs, and results are encouraging. The average error of measurement of thirty-four trees on several pairs of photographs was ±6 feet. Studies are under way to determine the accuracy of estimating plot size, number of trees per plot, species of each tree, height of each tree, crown diameter of each tree, and condition of each tree.



A 70-mm. low-elevation helicopter stereogram of balsam-spruce type; heights variable from 90 to 130 feet; flying height, 383 feet.

Growth

Permanent Growth and Yield Plots

The Division is responsible for the remeasurement of 120 experimental plots, made up of 709 sub-plots. During the year fourteen experimental plots (fifty-five sub-plots) were remeasured in current work areas. To date, gross close cubic-foot

volume statements to four diameter limits are available on 1,708 plot remeasurements. For the forest types concerned, periodic and mean annual increments may be readily obtained from this data.

Empirical Growth Estimates

Preparation of Forest Survey Note No. 6, entitled " Empirical Yield Tables," was completed during the year. These revised Provincial growth estimates were based on a total of 13,371 samples, each consisting of four or more plots, established during the six-year period 1953 to 1958. All the major growth types within the Province were represented, excluding those for Zone 3 (North-west Interior).

Additional growth estimates have been calculated for twenty-eight Crown management units, and net mean annual increments are now available for major growth types in the following areas: Arrowhead, Babine, Cottonwood, Crooked, Edgewood, Kettle, Kyuquot, Nakusp, Narcosli, Naver, Niskonlith, Purden, Quesnel, Sechelt, Similkameen, Slocan, Smithers, Stuart, Upper Kootenay, Westlake, Williams Lake, Willow River, Carp, Big Bar, Lac la Hache, Morice, Nicola, and Stum management units.

Forest Mapping

Final forest-cover maps were draughted for the Sechelt and Williams Lake management units. Additional units that were partially completed at the year's end were the Lac la Hache, Quesnel Lake, and Chilliwack areas. In addition, an interim forest-cover mapping programme designed to accelerate the publication of all plotted field data has completed portions of the Babine, Creston, and Robson units.

During the year, 11,678 maps were distributed at the request of various public and private agencies.

Computation of Statistics

Seventy requests were received requiring statistical summaries to be used mainly for management planning and access-road development. They involved a total area of 30,000,000 acres and a net timber volume exceeding 46 billion cubic feet.

Forest-resources bulletins, which, with the exception of Bulletin No. 34, were based on Provincial inventory data, were issued for the following units during 1960: Bulletin No. 14, Rivers Inlet (amendment); Bulletin No. 34, Williams Lake (amendment); Bulletin No. 52, Kyuquot (first issue).

Increased use was made of punched-card data processing equipment and an L.G.P. 30 electronic computer in meeting various divisional needs. Such efficient equipment will always be essential for species projects and for local and Provincial surveys.

FOREST RESEARCH

As in previous years, technical details of research projects are published in the Forest Research Review, hence the following is but a brief account of the highlights of the year.

A number of research officers were privileged to attend the Fifth World Forestry Congress held at Seattle during September, where they had the opportunity of hearing and meeting outstanding forest scientists in various fields of work. Subsequently, a number of Congress delegates visited British Columbia and some useful personal contacts were established.

COWICHAN LAKE EXPERIMENT STATION

Fifty acres on the station cleared for special exotic and genetic plantings were fenced against deer. A number of seedlings and graftings were set out in the tree bank for " plus " tree candidates.

The camp facilities were again used for field-days, the British Columbia Forest Service Ranger School, the Committee on Forest Tree Breeding in Canada, and senior forestry students from the University of British Columbia each spent two days at the station.

ALEZA LAKE EXPERIMENT STATION

The Aleza Lake Experiment Station was open for eight months, housing crews of from six to thirty men mainly engaged in road construction and maintenance.

The West Branch Road has been completed. On the East Branch, 1 mile of clearing was completed during the winter and 1 mile constructed, including access to a gravel deposit and a new nursery-site. On the main road, 1½ miles of ditching, gravelling, and grading completed the maintenance work.

No logging took place last year; however, three new timber sales have been prepared, including 830 acres in the Long-term Selection Working Circle, 67 acres in the Clear-cut Working Circle, and 8 acres for nursery development.

FIELD PROGRAMME

Due to personnel changes, the field season was slightly less active as new men became oriented.

It is disappointing to report that the thinning programme at Thurlow Island and Cowichan Lake Experiment Station is currently inactive due to poor markets for small wood. A number of sample plots in different thinning experiments have been remeasured but not enumerated in the table below.

The tree-breeding programme continues to be mainly concerned with selecting " plus " trees of superior quality for use in seed orchards. The interest and co-operation of the forest industry in this work are both significant and appreciated.

Ecological studies included a trial of seven species on the west coast of Vancouver Island. Douglas fir shows the most vigorous initial growth, with an average height of 55 inches and a maximum height of 8 feet in three years. In a study of climatic factors controlling the limits of Douglas fir on the Coast, a reciprocal plantation from different altitudinal provenances was established, and already some differences are showing up with respect to late-spring frost damage.

Aspects of the work on nursery fertility started in 1958 at Green Timbers are being followed up by mineral fertilizer and organic amendment trials at Duncan,

Green Timbers, and Quinsam nurseries. Growth of outplanted stock from the initial Green Timbers experiment was followed up at five sites on Vancouver Island. At the East Kootenay nursery, the value of different organic soil amendments is being assessed.

On the west coast of Vancouver Island, studies on seed-fall distance and direction and on seed germination and seedling survival were continued.

A new regional research officer was appointed in the Prince Rupert District, and a certain amount of time was spent in becoming familiar with studies already initiated. Five plantations have now been established to test different kinds of stock. The two original plantations have a two-year survival for white spruce of 50 to 65 per cent. A trial of the Dunemann nursery bed, established in 1959, has been very successful. With the aid of fertilizers 250 vigorous seedling per square foot have been raised, averaging over 3 inches in height. Two scarification trials were undertaken in the Babine Lake area, and a preliminary examination indicates one-hour-per-acre scarification with an Allis Chalmers H.D. 16 or International T.D. 14 may be all that is required.

Prince George studies on planting white spruce throughout the growing season were repeated. Survival and growth studies on areas scarified in 1956 were completed. Experiments in direct seeding of spruce were carried out on 160 acres in which Endrin-treated seed was compared with untreated seed. Another study is concerned with the rate of deterioration of scarified seed-beds. There is some indication that invading vegetation after three growing seasons prevents the establishment of spruce seedlings.

In the Kamloops region a number of projects were maintained dealing with seed-dispersal of Douglas fir, effect of burning on the regeneration of cedar-hemlock stands, and scarification in spruce-alpine fir stands. Comprehensive planting trials with ponderosa pine have been carried out with the S. M. Simpson Company, of Kelowna. Shading was not found to be a major factor in survival, whereas site preparation which influences soil moisture and plant competition was found to be signifiant. In view of the current practice of seeding logged areas to grass, an examination was made to determine the influence upon tree regeneration. The results are inconclusive, and a more detailed study has been initiated to compare the effect of grass seeding upon Douglas fir germination and survival.

In the Nelson region the research officer spent considerable time familiarizing himself with the problems and projects under study. Comprehensive trials with planting ponderosa pine were carried out, and again the beneficial effect of soil preparation was noted. Preliminary investigations of the site types in the Montane forest region were begun, and a classification for Christmas-tree production based upon site types was compiled.

Tabulation of Active Research Projects, 1960

Experimental Project No.	Title	Region
226	Cone production in immature stands of Douglas fir	Vancouver Island.
274	Cone production in mature stands of Douglas fir	Vancouver Island.
368	The adaptability of tree species to forest sites	Vancouver Island.
370	Partial cutting study, Interior Wet Belt	Nelson.
388	Commercial thinning in hemlock	Thurlow Island.
392	Field survival of experimentally treated nursery stock	Vancouver Island.
428	Plantation trials	Kamloops.
429	Mixed species spacing trial	Vancouver Island.
439	A preliminary study of growth and development of some Douglas fir-ponderosa pine types	Kamloops.
442	Planting trials	Prince George.
458	Seed production and dispersal under various stand conditions in the spruce-alpine fir type	Prince George.
460	Seed production of conifers in relation to climate	Prince George.
463	Seed-fall and regeneration study	Nelson.
465	Plantation of exotic species in the Southern Interior	Kamloops.
467	Regeneration studies in the spruce-alpine fir type	Kamloops.
468	Cone-crop studies	Kamloops.
474	Inbreeding experiments with Douglas fir	Vancouver Island.
478	Phenotypic selection in open-grown Douglas fir	Vancouver Island.
479	"Plus" tree selection for Douglas fir seed orchards	Vancouver Island.
480	Co-operative seed provenance study of Douglas fir	Vancouver Island.
482	Climate and the altitudinal distribution of conifers	Vancouver Island.
483	Record of plantations of exotic species throughout British Columbia	
487	Studies on seed-dispersal of Douglas fir	Kamloops.
502	Plantation trials	Prince Rupert.
505	Planting of white spruce throughout the growing season	Prince George.
510	Planting-stock trials	Nelson.
512	Seeding and planting trials	Nelson.
513	Planting of exotic conifers for future hybridization	Vancouver Island.
520	Experimental seeding of spruce	Prince George.
523	Seed-bed soil-amendment trials	Nelson.
524	Regeneration on scarified areas	Prince George.
525	Swamp regeneration project	Nelson.
528	Influence of time on the effectiveness of scarified seed-beds in spruce-alpine fir	Prince George.
529	Regeneration problems in decadent cedar-hemlock stands	Kamloops.
531	Anatomical characteristics of selected trees	Vancouver Island.
533	Scarification trials in spruce-alpine fir	Kamloops.
534	Spacing trial of Douglas fir	Vancouver Island.
537	Spacing trials	Prince Rupert.
538	Seed dissemination and the influence of weather conditions	Vancouver Island.
539	Studies in the improvement of cone-handling and seed-processing	Vancouver Island.
540	Cone maturity and seed-ripening study	Vancouver Island.
541	Natural nurseries	Prince Rupert.
543	An ecological classification of stands for Christmas-tree production	Nelson.
544	Spacing and growth studies of white spruce	Prince George.
546	Test of fertilizers on nursery stock	Vancouver Island.
547	Test of secondary fertilizers on nursery stock	Vancouver Island.
548	Test of organic amendments on nursery stock	Vancouver Island.
551	A study of methods of planting ponderosa pine (1960)	Kamloops.
553	Ecological investigations of Montane forest region	Nelson.
555	Germination and survival of western hemlock and associated species	Vancouver Island.
558	Scarification trials	Prince Rupert.

RESEARCH PUBLICATIONS, 1960

Forest Research Review for the year ending March, 1960.

Illingworth, K., and Arlidge, J. W. C.: Interim Report on Some Forest Site Types in Lodgepole Pine and Spruce-Alpine Fir Stands. B.C. Forest Service Research Note No. 35, 1960.

Decie, T. P., and Fraser, A. R.: Miscellaneous Notes on Scarification Trials, Prince George Forest District, 1956 to 1959. B.C. Forest Service Research Note No. 36, 1960.

Schmidt, R. L.: Factors Controlling the Distribution of Douglas Fir in Coastal British Columbia. Quarterly Journal of Forestry, Vol. LIV (2) 156, 1960.

Schmidt, R. L., and Marshall, J. R.: A Wind-direction Recorder for Remote Stations. Ecology, Vol. 41 (3) 541, 1960.

REFORESTATION

FOREST NURSERIES

The climate pattern during the winter was similar to the previous year. Considerable damage was done to seedlings in several nurseries. Damaged seedlings managed to survive the summer but had to be culled during lifting in the fall. Many seedlings had the bark almost completely stripped from the root collar, and although this had partially calloused over, they were not of plantable quality. Weather conditions in the East Kootenay were not favourable to growth, and a large proportion of the ponderosa pine will have to be held over an extra year in order to reach optimum size for field planting. Late-type damping-off reachd serious proportions at Duncan, averaging 12 per cent but reaching 35 per cent in some seed-lots.

During the year, nurseries shipped out some 7,000,000 seedlings, of which 75,000 were transplanted. At the end of the year, a total of 5,625,000 trees was available for immediate planting. During the spring, 1,712 beds were sown throughout the Province. These, together with some small two-year stock, total some 11,250,000 seedlings. A new nursery is being established in the Chilliwack Public Working Circle with the assistance of the Attorney-General's Department. An outstanding achievement here was the clearing, fencing, working-up, and sowing of 178 seed-beds in less than five months, mostly with hand-labour. In all, some 6.5 acres were cleared and prepared for nursery seed-beds.

Autumn sowing of seed-beds appears to be the answer to growing western hemlock and also produces high-quality Douglas fir seedlings. A total of 306 beds was sown in the autumn. At one nursery, sowing could not be completed because of unfavourable weather and ground conditions. It is hoped that the superior root system and sturdiness of autumn-sown seedlings will produce good-quality one-year seedlings suitable for planting certain clean sites and a two-year seedling which will compare well with transplants for restocking brushy areas.

SEED AND EXTRACTION

The extraction of the bumper crop of cones collected in 1959 was completed in the early part of this year. Careful attention to collection and extraction have proven well worth while. Yields were higher than in former years, and several Coastal Douglas fir lots had a germinative capacity of 94 per cent. At the end of the year, there were some 427 seed-lots totalling 5,965 kilograms (13,100 pounds) in cold storage at 8 per cent moisture content and a temperature of 0° F. In order to facilitate record-keeping and the calculation of nursery sowing rates, all records concerned with tree-seed weights are kept in the metric system.

There being practically no cone-crop anywhere in the Province this year, no cones were collected.

RECONNAISSANCE AND SURVEY WORK

This type of work was kept to a minimum on the Coast during 1960. Some work was done late in the season by a reforestation crew which carried out detailed regeneration surveys over 10,000 acres. An additional 14,000 acres were covered by reconnaissance.

In the Crooked River Public Working Circle a reforestation crew under the supervision of the Forest Surveys and Inventory Division intensively examined 8,700

acres of old timber sales cut under the diameter-limit system. A more extensive survey was conducted over 37,000 acres of old and new burns.

PLANTING

Forest Service planting commenced in the Campbell River area on February 24th but had to close down for one week at the end of the month due to frozen ground. In the Cowichan Valley, planters commenced on April 7th but, after fighting snow for two weeks, had to shut down completely for a further fifteen days. Planting was not completed in this district until May 26th. Reforestation Division crews planted a total of 1,899 acres, mainly of private land under section 167 of the *Forest Act*. The forest industry and others planted 8,387 acres on tree-farm licences, etc. In the fall, reforestation and Attorney-General's Department crews planted 711 acres on four small projects. Industry planted 6,793 acres on tree-farm licences.

During the spring season, reforestation and stand-treatment crews planted 273 acres in the East Kootenay. Stand-treatment crews planted 20 acres in the Kamloops District and 35 acres in the Prince George District. The forest industry planted 24 acres in the Southern Interior.

Planting in the Interior during the fall was limited to 28 acres in the Prince Rupert District.

Total planting in the Province for the year by all agencies amounted to 6,732,475 trees on 18,185 acres (*see* Table 2 of Appendix for statistics of planting over the past ten years).

Plantation Improvement and Maintenance

Thirty-four acres of Douglas fir plantation were pruned at Campbell River. During the winter 157 acres of overstocked ponderosa pine stands were thinned near Rampart in the East Kootenay. A total of 534 acres has now been thinned in this area.

Fencing of the Green Timbers plantations to prevent Christmas-tree poaching was continued. In the Robertson River valley, 8,000 feet of deer-proof fence was constructed to protect valuable experimental plantations. Ten miles of plantation roads were brushed out.

Preparation of Planting-sites

Near the Campbell River nursery two seed-orchard sites totalling 12 acres were cleared in preparation for the planting of root stocks. In the Chilliwack Public Working Circle 36 acres of deciduous brush were slashed by Attorney-General's Department crews in preparation for planting. Reforestation Division crews felled snags on 6,306 acres which are to be planted or are adjacent to planting-sites.

PERMANENT IMPROVEMENTS

At the Duncan nursery, a 32- by 38-foot seed cold-storage building with a capacity of 13,000 kilograms of seed was completed. Adjoining this, a 31- by 34- by 14-foot seedling cold-store with a capacity of approximately 3,000,000 seedlings was constructed. An 8- by 16-foot baling-shed was added to the implement-shed.

At the Cowichan Lake camp, a 16- by 40-foot workshop and a 16- by 22-foot vehicle-inspection shed were constructed.

A new irrigation system at the Campbell River nursery involved the installation of 1,700 feet of 4-inch plastic pipe.

WORKING PLANS

INTRODUCTION

During 1960 seven new public sustained-yield units and three new tree-farm licences were approved or awarded. One of the tree-farm licences, to Canadian Forest Products Limited, in the Nimpkish drainage, was formally ratified by the signing of a contract. As a result, there are now in operation seventy-two public sustained-yield units and thirty-seven tree-farm licences. Two additional tree-farm licences were awarded during the year. In addition, there are twenty-four (out of a total of thirty-six) *Taxation Act* tree-farms which are not managed as an integral part of the tree-farm licences, and also forty-nine farm wood-lot licences.

The total area now committed under working plans amounts to 47,874,997 acres of productive forest, with a total allowable annual cut of 783,721,000 cubic feet, equivalent to 65 per cent of the total Provincial scale for 1960. The following table illustrates the progress made to 1960 in the organization of the various forms of units committed to forest management under working plans for sustained yield:—

Progress to 1960 of Sustained-yield Programme

Type of Unit or Tenure	Number of Units	Productive Area (Acres)	Allowable Annual Cut (M C.F.)
Publicly managed units	72	40,257,302	464,620
Tree-farm licences operating and awarded	39	7,099,111	296,695
Tree-farms (excluding those in tree-farm licences)	24	506,922	22,095
Farm wood-lots	49	11,662	311
Totals	184	47,874,997	783,721

PUBLIC SUSTAINED-YIELD UNITS*

Work on public sustained-yield units was devoted mainly to bringing additional developed, operable areas into the sustained-yield programme through the establishment of suitable unit boundaries and systems of regulation of the allowable annual cut. Seven new units were approved to commit an additional 4,718,802 productive acres, estimated to be capable of an annual cut of 36,360 M cubic feet, to the programme. Also, boundary changes to nine units and changes made as a result of obtaining improved inventory for a further nine units affected certain established units, with the result that the total productive acreage in this classification is now 40,257,302 acres with a total allowable annual cut of 464,620 M cubic feet.

New units approved during the year were the Dean, Blueberry, Moberly, Barton Hill, Raft, Shuswap, and Salmo.

The seventy-two approved public sustained-yield units in operation are listed below, by forest districts:—

Vancouver Forest District

Name of Sustained-yield Unit	Productive Area (Acres)	Annual Allowable Cut (M C.F.)
Barkley	47,665	2,500
Broughton	355,431	13,000
Cape Scott	104,873	3,800
Chilliwack	73,023	3,000

* Forests, including public working circles, which are managed by the Forest Service.

Vancouver Forest District—Continued

Name of Sustained-yield Unit	Productive Area (Acres)	Annual Allowable Cut (M C.F.)
Harrison	142,989	6,400
Kyuquot	341,929	19,650
Redonda	257,099	17,000
Sayward	111,876	3,500
Sechelt	304,881	15,000
Seymour	224,815	4,200
Soo	214,799	8,300
Yale	402,726	20,000
Totals	2,582,106	116,350

Prince Rupert Forest District

Name of Sustained-yield Unit	Productive Area (Acres)	Annual Allowable Cut (M C.F.)
Babine	1,248,239	8,000
Burns Lake	1,024,791	5,500
Dean	711,141	11,800
Graham	585,882	8,600
Hecate	862,782	15,500
Kitimat	305,875	4,400
Kitwanga	529,416	3,000
Morice	778,957	7,000
Ootsa	1,720,969	9,300
Rivers Inlet	374,041	7,500
Smithers	506,810	4,500
Terrace	220,175	6,400
Totals	8,869,078	91,500

Prince George Forest District

Name of Sustained-yield Unit	Productive Area (Acres)	Annual Allowable Cut (M C.F.)
Big Valley	353,179	6,000
Blueberry	1,016,997	3,500
Bowron	340,128	7,300
Canoe	202,270	3,000
Carp	1,390,074	6,600
Cottonwood	412,367	5,350
Crooked River	604,231	8,740
Longworth	646,247	9,200
Moberly	1,518,682	5,000
Monkman	581,575	4,950
Narcosli	1,136,526	4,000
Naver	302,217	6,720
Parsnip	980,922	7,000
Purden	190,681	3,250
Robson	363,165	4,000
Stuart Lake	723,847	7,500
Westlake	595,570	6,000
Willow	259,446	7,000
Totals	11,618,124	105,110

Kamloops Forest District

Name of Sustained-yield Unit	Productive Area (Acres)	Annual Allowable Cut (M C.F.)
Barriere	262,777	4,400
Barton Hill	150,590	1,060
Big Bar	1,488,311	12,000
Botanie	462,852	5,600
Eagle	228,862	2,600
Lac la Hache	1,492,729	13,000
Nehalliston	355,529	2,000
Nicola	714,060	7,000
Niskonlith	222,301	2,350
North Thompson	219,975	3,000
Quesnel	1,249,189	14,900
Raft	455,933	5,000
Salmon Arm	145,216	2,000
Shuswap	438,708	6,500
Similkameen	712,829	7,100
Spallumcheen	561,428	9,700
Stum	1,454,184	3,000
Taseko	2,006,885	4,200
Williams Lake	741,645	6,300
Yalakom	425,515	3,000
Totals	13,789,518	114,710

Nelson Forest District

Name of Sustained-yield Unit	Productive Area (Acres)	Annual Allowable Cut (M C.F.)
Arrowhead	119,374	2,000
Creston	511,934	5,000
Edgewood	226,739	2,800
Granby	491,290	3,000
Kettle	679,011	5,750
Nakusp	64,946	2,200
Salmo	426,751	3,500
Slocan	188,852	2,500
Upper Kootenay	186,506	4,700
Windermere	503,073	4,500
Totals	3,398,476	35,950
Grand totals	40,257,302	464,620

TREE-FARM LICENCES

During the year a tree-farm licence in the Squamish area was awarded following the hearings conducted in 1958 by the late Honourable Gordon McG. Sloan, Forest Adviser, and, in 1959, by Judge C. W. Morrow, who was appointed a Commissioner on this matter when the untimely death of the Forest Adviser prevented his advising the Government.

Also this year, two tree-farm licences, the last of those recommended for approval in the Royal Commission report of 1956, were awarded following hearings conducted by the Minister under authority of the then section 33 of the *Forest Act*.

One of these was established, late in the year, as the Nimpkish Tree-farm Licence, No. 37.

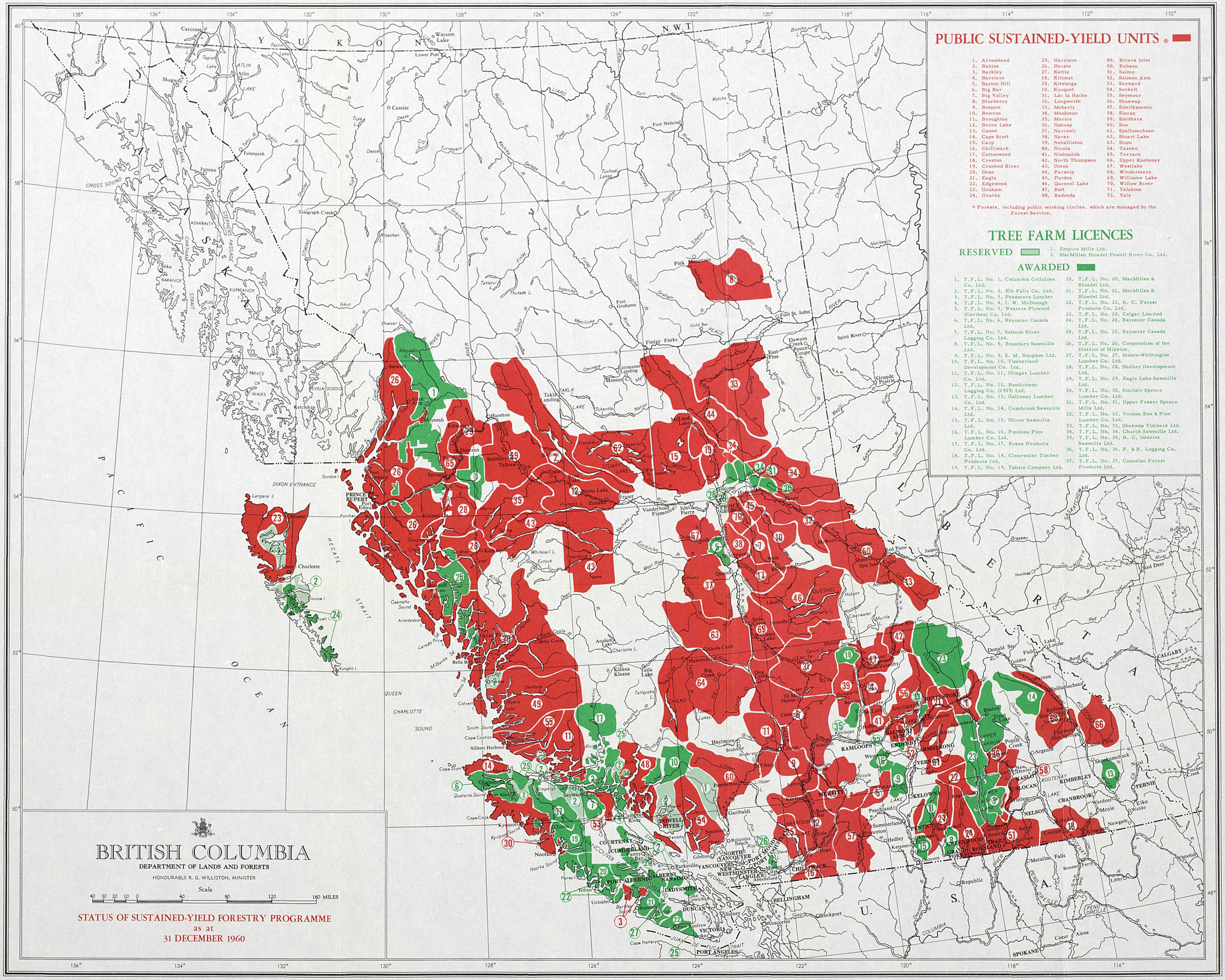
Thus the total of tree-farm licences in operation was increased by one during the year, to thirty-seven. Processing of the two awarded licences continues, and it is expected that this will be completed during the coming year. The award of these three tree-farm licences has committed an additional 1,250,000 productive acres, estimated to be capable of an annual cut of 68,154 M cubic feet, to the forest-management programme under this form of tenure. The total productive acreage in this classification is now estimated to be 7,099,111 acres, of which 5,683,795 acres are Crown and 1,415,316 acres are private. The total annual allowable cut under this tenure is estimated to be 296,695 M cubic feet.

TREE-FARM LANDS

There are still thirty-six tree-farms under the *Taxation Act,* although one new tree-farm, comprising 837 productive acres, was certified in 1960. One tree-farm of 518 productive acres was decertified. Additions totalling 14,032 productive acres were made to six of the previously existing tree-farms. The net increase in acreage under this classification was 14,351 acres. Twelve of the thirty-six tree-farms, with a productive acreage totalling 249,733 acres and allowable cuts totalling 10,906 M cubic feet, are managed under the tree-farm licence legislation, and these statistics are included in the totals for tree-farm licences. The remaining twenty-four tree-farms commit a further 506,922 productive acres, with a combined allowable annual cut of 22,095 M cubic feet, to the over-all sustained-yield programme.

FARM WOOD-LOT LICENCES

One farm wood-lot licence was added and two cancelled during the year, bringing the number in good standing to forty-nine. The acreage of productive forest land involved in this phase is 11,662 acres and the allowable cut is 311 M cubic feet.


PUBLIC SUSTAINED-YIELD UNITS *
1. Arrowhead
2. Babine
3. Barkley
4. Barriere
5. Barton Hill
6. Big Bar
7. Big Valley
8. Blueberry
9. Botanie
10. Bowron
11. Broughton
12. Burns Lake
13. Canoe
14. Cape Scott
15. Carp
16. Chilliwack
17. Cottonwood
18. Creston
19. Crooked River
20. Dean
21. Eagle
22. Edgewood
23. Graham
24. Granby
25. Harrison
26. Hecate
27. Kettle
28. Kitimat
29. Kitwanga
30. Kyuquot
31. Lac la Hache
32. Longworth
33. Moberly
34. Monkman
35. Morice
36. Nakusp
37. Narcosli
38. Naver
39. Nehalliston
40. Nicola
41. Niskonlith
42. North Thompson
43. Ootsa
44. Parsnip
45. Purden
46. Quesnel Lake
47. Raft
48. Redonda
49. Rivers Inlet
50. Robson
51. Salmo
52. Salmon Arm
53. Sayward
54. Sechelt
55. Seymour
56. Shuswap
57. Similkameen
58. Slocan
59. Smithers
60. Soo
61. Spallumcheen
62. Stuart Lake
63. Stum
64. Taseko
65. Terrace
66. Upper Kootenay
67. Westlake
68. Windermere
69. Williams Lake
70. Willow River
71. Yalakom
72. Yale
* Forests, including public working circles, which are managed by the Forest Service.
TREE FARM LICENCES
RESERVED
1. Empire Mills Ltd.
2. MacMillan Bloedel Powell River Co. Ltd.
AWARDED
1. T.F.L. No. 1, Columbia Cellulose Co. Ltd.
2. T.F.L. No. 2, Elk Falls Co. Ltd.
3. T.F.L. No. 3, Passmore Lumber
4. T.F.L. No. 4, I. W. McDonagh
5. T.F.L. No. 5, Western Plywood (Cariboo) Co. Ltd.
6. T.F.L. No. 6, Rayonier Canada Ltd.
7. T.F.L. No. 7, Salmon River Logging Co. Ltd.
8. T.F.L. No. 8, Boundary Sawmills Ltd.
9. T.F.L. No. 9, S. M. Simpson Ltd.
10. T.F.L. No. 10, Timberland Development Co. Ltd.
11. T.F.L. No. 11, Olinger Lumber Co. Ltd.
12. T.F.L. No. 12, Bendickson Logging Co. (1939) Ltd.
13. T.F.L. No. 13, Galloway Lumber Co. Ltd.
14. T.F.L. No. 14, Cranbrook Sawmills Ltd.
15. T.F.L. No. 15, Oliver Sawmills Ltd.
16. T.F.L. No. 16, Pondosa Pine Lumber Co. Ltd.
17. T.F.L. No. 17, Evans Products Co. Ltd.
18. T.F.L. No. 18, Clearwater Timber Products Ltd.
19. T.F.L. No. 19, Tahsis Company Ltd.
20. T.F.L. No. 20, MacMillan & Bloedel Ltd.
21. T.F.L. No. 21, MacMillan & Bloedel Ltd.
22. T.F.L. No. 22, B. C. Forest Products Co. Ltd.
23. T.F.L. No. 23, Celgar Limited
24. T.F.L. No. 24, Rayonier Canada Ltd.
25. T.F.L. No. 25, Rayonier Canada Ltd.
26. T.F.L. No. 26, Corporation of the District of Mission.
27. T.F.L. No. 27, Moore-Whittington Lumber Co. Ltd.
28. T.F.L. No. 28, Shelley Development Ltd.
29. T.F.L. No. 29, Eagle Lake Sawmills Ltd.
30. T.F.L. No. 30, Sinclair Spruce Lumber Co. Ltd.
31. T.F.L. No. 31, Upper Fraser Spruce Mills Ltd.
32. T.F.L. No. 32, Vernon Box & Pine Lumber Co. Ltd.
33. T.F.L. No. 33, Shuswap Timbers Ltd.
34. T.F.L. No. 34, Church Sawmills Ltd.
35. T.F.L. No. 35, B. C. Interior Sawmills Ltd.
36. T.F.L. No. 36, F. & R. Logging Co. Ltd.
37. T.F.L. No. 37, Canadian Forest Products Ltd.
BRITISH COLUMBIA
DEPARTMENT OF LANDS AND FORESTS
HONOURABLE R. G. WILLISTON, MINISTER
Scale
40 30 20 10 0 40 80 120 160 MILES
STATUS OF SUSTAINED-YIELD FORESTRY PROGRAMME
as at
31 DECEMBER 1960
Y U K O N
N.W.T.
ALBERTA
PACIFIC OCEAN
U.S.A.
QUEEN CHARLOTTE SOUND
DIXON ENTRANCE
HECATE STRAIT
Prince Rupert
Kitimat
Terrace
Smithers
Prince George
Dawson Creek
Fort St. John
Fort Nelson
Williams Lake
Kamloops
Vernon
Kelowna
Penticton
Nelson
Cranbrook
Kaslo
Revelstoke
Victoria
Nanaimo
Port Alberni
Courtenay
Vancouver
Chilliwack
Bellingham
Spokane
Calgary

PUBLIC INFORMATION AND EDUCATION

The extreme fire situation in the Kamloops and Nelson Forest Districts during the summer climaxed a busy and productive year for the Division.

In all categories of work except in the field of printing, activities increased over the previous year in an attempt to meet the rising demand for forestry information from all segments of the public.

COMMUNICATION MEDIA

Photography and Motion-picture Production

During the year the laboratory processed and printed 173 black-and-white rolls for other divisions. The photographic staff produced 387 large-format negatives and 79 rolls in black-and-white, 53 large-format negatives and 23 rolls in colour. Eight hundred and forty-six black-and-white negatives, 143 colour negatives, and 94 colour slides were added to file.

A total of 10,846 black-and-white prints was produced, an increase of 1,157 over 1959. Approximately 2,500 of these prints were supplied to the press and periodicals for use with news and feature articles, an increase of 1,000 over 1959. Seven hundred and fifty-one prints were supplied on request to delegates on the post Fifth World Forestry Congress tour in British Columbia.

Colour motion-picture footage, 35-mm. slides, plus colour and black-and-white negatives were obtained of aircraft water-bombing demonstrations at Vancouver, Cassidy, and Kamloops airports. Later, complete photographic coverage was given to early tests of the Martin Mars flying tanker, involving some 400 feet of colour movie film and numerous still photographs.

Photographic coverage was provided at the peak of the fire season in the Kamloops Forest District. As a direct result, 141 black-and-white and 68 colour negatives were added to file. During this coverage, field processing was used on some occasions to rush newsworthy pictures to metropolitan newspapers and local press. A special 300 feet of black-and-white 16-mm. motion-picture film was shot for CBUT, Vancouver, and used extensively in newscasts. Over 800 feet of 16-mm. colour footage was shot for stock footage and use in future Forest Service productions. The Ontario Forestry Association requested prints on all phases of the fire situation for distribution to eastern television stations, and were consequently supplied with ninety-seven Balops.

In motion-picture production, 3,000 feet of 16-mm. colour film was shot mainly in September and October, to be used in a film on logging damage. Work continues on this film at year's end.

Early in the year, 500 feet of colour film was obtained of seed-processing at the Duncan nursery seed extractory.

Art Work

This year eighty-eight exhibit or mural-size photographs were produced. Art work, which totalled 157 drawings, paintings, or layouts, was supplied for twenty-one major projects, including a display featuring a large relief map of British Columbia for use at the Fifth World Forestry Congress in Seattle. New covers were designed for several Forest Service publications and final layout done on two new fire-prevention decals. Title cards and art work were supplied for two motion-picture and four television productions. A combination of art work and photographs was supplied on request to Life magazine.

Filmstrips

No filmstrips were produced during 1960, but 276 black-and-white 35-mm. slides were made from material in three strips produced earlier. A colour filmstrip for the Reforestation Division neared completion at the end of the year.

Commercial Theatres

For the sixth consecutive year a 35-mm. forest-protection trailer was produced by the section and circulated throughout commercial theatres in the Province outside of the general Vancouver City and Vancouver Island areas, which were covered by a similar item on television.

Film Library

During the year the film library made 749 individual film loans, with a total viewing audience of 165,340 persons, an increase of some 42,000 over 1959. Besides the usual loans to various parts of Canada, films were sent as far south as Mexico City and as far east in the United States as Illinois. In addition, the five subjects on continuous loan to British Columbia House, London, England, received good circulation.

Loans were extended to two television stations, reporting a total viewing audience of 26,000.

The library started the year with ninety-two individual titles; two were withdrawn during the year and five new subjects added, making a total of ninety-five films available for loan at the end of 1960 (*see* Table 55 of Appendix).

Divisional officers presented forty-five film-lecture programmes to organizations within the Province during the year, not counting school tour activities. Forest Service personnel used video projecting equipment on charge to the Division on 166 different occasions.

As a part of an in-service training programme, sixteen films from the library were shown to a total of 250 staff members during noon hours.

Publications and Printing

The 1959 Annual Report of the Forest Service was edited, synopsized, its printing supervised, and distributed.

The 1961 Forest Service calendar was redesigned to a new, more modern format featuring the theme " Integrated Use " in Harmony and distributed as usual to the forest industry and its associations, outdoor organizations, schools, and so forth. There is little doubt, from the reactions received, that the calendar is the most effective printed public relations medium available to the Service.

Other major printing projects during the year included the Research Review, to March, 1960, four issues of the Forest Protection Bulletin series, and two Research Notes (Nos. 35 and 36). A special Christmas edition of the Forest Service Newsletter was authorized and distributed throughout the Service. Two Forest Survey Notes (Nos. 4 and 5) were distributed through the facilities of this Division.

Eight new mimeographed items of broad informational value were produced and distributed throughout the Service in the programme to provide the field staffs with up-to-date factual information on forestry developments and policy.

Ten publications were reprinted during the year in order to keep up with the demand for forestry information. Thus funds for sorely needed new publications were not available.

A special booklet was issued for distribution to the delegates from the Fifth World Forestry Congress who visited British Columbia for a forestry information tour from September 12th to 16th, 1960.

Two new protection designs featuring the "Bertie Beaver" character, used extensively in Alberta, were added to the display-poster series during the year.

Radio and Television

Paid programming over television stations in the Province was introduced, on a trial basis, for the first time. Two stations—CBUT, Vancouver, and CFCR-TV, Kamloops—were selected to carry a twenty-second film short produced by the Division emphasizing the need for care with fire in the woods. In the Vancouver experiment, twenty-eight announcements were broadcast during the peak viewing period on Fridays and Saturdays. Each of the announcements had a reported viewing audience of more than 350,000 persons. In Kamloops twenty-six announcements were made at peak viewing time on Thursdays, Fridays, and Saturdays, each with a reported viewing audience of 6,600 individuals. Unquestionably, television supplies an increasingly important avenue for reaching a large segment of the public that would be otherwise overlooked.

The Division co-operated with television stations to a greater extent than ever before in the production of special programmes. Staff members participated in, or arranged for, more than twenty special-event programmes which had a total viewing time of 315 minutes. Video material such as photographs, 16-mm. film, and exhibits were also supplied in quantity to the various stations.

The standard radio forestry educational programme was carried over twenty-three radio stations. The series consisted of 715 fifteen-second standard flashes, 369 one-minute spot announcements, and 131 special fifteen-second hazard flashes. The material broadcast carried a forest fire-prevention theme and was written and scheduled by the Division.

Press and Periodicals

The demand for news and informational press releases, articles, and the supplying of background material to all communication media reached a level as high as 1958. Unquestionably the severity of the fire season during July and August was the principal cause.

Members of the Division were seconded to the Kamloops District at different times during the extreme situation in order to assist the District Forester in his relations with the news media. Extensive coverage on local, national, and international levels was obtained, with features appearing in such journals as Time and Life magazines.

Twenty-six formal weekly press releases on the fire situation were distributed from Victoria during the fire season, plus an indeterminate number of daily and twice-daily summaries of a more informal sort, both from Victoria and the district offices. Almost 23,000 column inches of highly competitive newspaper space were devoted to these releases in the eight daily newspapers checked. Many times this amount was produced by the newspapers themselves.

Radio and television featured the fire situation daily, both locally and nationally, and Divisional personnel took part in many of these programmes. The shortage of Divisional staff trained in news-media liaison work became particularly evident during this period.

In addition, the demand for special articles for periodicals on non-fire subjects reached its highest point for several years.

Signs and Exhibits

With the recent establishment of forest-closure zones in the Vancouver Forest District, an experimental sign was designed for erection where the zone boundaries cross public highways in the hope that such signs would assist in the administration of forest-closure regulations. Twelve test signs were constructed and placed in strategic locations throughout the district.

The demand for the Scotchlite "Prevent Forest Fires" sign still far exceeds production capabilities due to fund restrictions.

During the summer 114 locations of the roadway sign "Keep B.C. Green—Use Your Ashtray" were maintained. Coverage by this sign has been reduced to include only the prime sites on the paved highways of the Province.

The displaying of a special exhibit on forest genetics at five fall fairs, in the rotunda of the main Legislative Buildings, the Pacific National Exhibition, and the Western Forestry and Conservation Convention in Victoria brought favourable comments from the general public.

Numerous requests were received from Ranger personnel for ideas and materials regarding exhibits.

The Service's permanent exhibit at the Pacific National Exhibition was maintained with minor alterations.

A special display was designed and produced for use at the Fifth World Forestry Congress held in Seattle, Wash., in the fall. In addition, smaller displays of special interest to teachers were exhibited in various Teachers' Federation and Parent-Teacher conventions throughout the Province.

School Lectures

With the continued co-operation of the Department of Education, Divisional school lecturers, for the ninth consecutive year, were active. All forest districts, with the exception of the Prince Rupert District, received coverage (*see* Table 56 in Appendix). The total school audience of 41,497 was down 19,711 from the previous year, due, in part, to the growing diversity in the duties of the school lecturers. The school lecturers are now undertaking more and more district information activities each year.

The Service's standard school lecture programme is comprised of a twenty-minute talk dealing with the importance of the forest resources of the Province, followed by forty minutes of appropriate film subjects.

In addition, school lecturers presented thirty special programmes to such organizations as the Parent-Teacher Associations, career guidance sessions, and various service clubs.

LIBRARY

As the library is constantly expanding, it is finding lack of space an ever-greater problem. It has thus become necessary to be more selective about retaining publications. For example, the number of items placed in the section for discard after circulation shows a manifold increase over the last few years.

Books and pamphlets on subjects other than forestry—for example, geology, chemistry, photography—formerly grouped together by author, have now been classified by subject according to the Dewey decimal system.

The catalogue of books and reports in the Management Division was overhauled and a card index, both by author and subject, provided.

During the summer the librarian visited the Kamloops District library to review its development for the first time since it was set up.

Details of library work over the past ten years can be found in Table 57 in the Appendix.

CO-OPERATION

An outstanding degree of co-operation was received from all segments of the communication media—press, radio, television, periodicals, and so forth. Their support of the Service's information programme is again gratefully acknowledged.

The Department of Education's continued support of the school lecture tour has made this programme one of the more effective sponsored by the Service.

The Division, and the Service as a whole, continued to offer assistance to the Canadian Forestry Association (British Columbia Branch) in the organizing and implementation of Forest Conservation Week and the Annual Fire Control Courses.

For the third consecutive year a member of the Division conducted classes for the Canadian Girl Guide Association and assisted 175 Guides to obtain their woodsman's badge.

The Director assisted the Pacific Logging Congress and the Western Forestry and Conservation Association in the organization and operation of their press facilities during their annual conventions.

FOREST MANAGEMENT

GENERAL

The decline of log and lumber prices which began in the latter part of 1959 continued throughout 1960, with some stability apparently established at the end of the year.

Despite this situation, the total value of forest production reached $738,-360,000, thus setting a new high and exceeding the 1959 figure by $68,245,000.* Of this increase in value, lumber accounted for $56,700,000. Total lumber value was $380,600,000, representing 52 per cent of the total value of forest production. Pulp and paper products were next with a value of $242,925,000, or 33 per cent of total value. Plywood showed practically no change. The most significant change of value in the minor products was in poles and piling, for which the value, inclusive of minor quantities of mine-timbers, was $8,352,000, an increase of 72 per cent over the 1959 figure. This was the result of a heavy demand for these products during the year.

The total cut for the Province was 1,199,843 M cubic feet, or 7,074,486 M board-feet. All forest districts showed gains over the 1959 figures, but the increases for Kamloops and Prince George were relatively small. The most significant increase was shown by the Prince Rupert District. The cut for the Prince Rupert Coast was 63 per cent greater than in 1959, compared to a total Coast increase of 22 per cent. Volume increases for the Vancouver and Prince Rupert Coast Districts were 95,302 M cubic feet and 31,804 M cubic feet respectively. Total gain for the Interior districts combined was 23,592 M cubic feet or only 5 per cent.

A large part of the increased cut was due to the improvement in water-borne shipments, which were up from 1,197,653 M f.b.m. in 1959 to 1,675,351 M f.b.m. in 1960. The greatest increases in shipments were to the United Kingdom, United States, Africa, and Australia, in that order. They accounted for a volume of 1,491,653 M f.b.m., representing 89 per cent of total water-borne shipments and accounting for 95 per cent of the total increase in such shipments.

Douglas fir, hemlock, spruce, and cedar supplied 32, 23, 17, and 13 per cent of the total cut for the Province respectively. Douglas fir continued to be the leading species in the Interior, as did hemlock on the Coast.

The total cut from Crown lands amounted to 974,229 M cubic feet, or 81 per cent of the total cut for the Province. Of this, 598,251 M cubic feet or 61 per cent came from timber sales and 127,618 M cubic feet or 13 per cent from the Crown land portions of tree-farm licences. There was a significant increase in the proportion of the total cut taken from temporary private tenures other than timber sales (timber and pulp licences and leases), no doubt due to softening markets and the relatively low cost of such timber in comparison with stumpage on many timber sales.

During the year, 2,122 timber sales with a combined area of 767,351 acres and volume of 1,142,479 M cubic feet of saw-timber were cruised. While the number of sales declined in comparison with 1959, the total area and volume increased. This is partially the result of an increasing number of timber sales in the Interior being managed on a partial-cut basis. Also in the Interior, there is a trend toward somewhat longer-term sales, up to ten years in many sustained-yield units and public working circles. There were 2,138 timber sales awarded in 1960, having

* Using adjusted 1959 figure based on improved conversion factors (*see* Table 3 footnote in Appendix).

a total estimated value of $24,872,000. This is a decline of almost $5,000,000 from the 1959 figure, and unless general conditions improve substantially it will be reflected in reduced revenues for 1961.

Since 1953 the percentage of sales awarded with no competition has ranged from 87.4 per cent to 92.6 per cent. By sawlog volume, the range is from 71.7 per cent to 94.0 per cent. Of 1,843 auction sales in 1960, 90 per cent were non-competitive, compared to 87.4 per cent in 1959. By volume, they accounted for 78.6 per cent of the total sold, compared to 71.7 per cent in 1959.

At the year's end there were 6,815 active timber sales with a total area of 3,476,000 acres. There was a total of $15,284,000 held in security deposits, compared with $15,150,000 in 1959.

Of particular import during 1960 were two events in the Interior of the Province. First there was the establishment of a company by a group of sawmill operators in the Kamloops area for the purpose of providing chips from sawmill waste for use in a Coast pulp-mill. Substantial shipments of chips were made during the year. The second event was the first shipment of pulp in the month of December by the pulp-mill built at Castlegar by Celgar Limited. It is interesting to note that a large part of the increased cut from the Nelson District was the result of stock-piling pulpwood for this mill.

ADMINISTRATION OF MANAGED UNITS

The Province's sustained-yield management plans continued to develop with the approval and establishment of seven new public sustained-yield units.*

There are now seventy-two such areas managed by the Forest Service. In 1960 they provided a recorded cut of 385,000 M cubic feet, representing 83 per cent of their combined allowable annual cut and 32 per cent of the total cut for the Province.

Fifty-three of these units are now administered under the licensee priority system, which was referred to in last year's Report. Essentially this means that timber-sale applications in each managed area are accepted only from timber-sale licensees established in that area, and then only to replace expiring sales held by them. The objective is to achieve greater stabilty of operations within such areas. Under present timber-sale policy there is, of course, the possibility that the applicant may be outbid for the timber covered by his application.

An amendment to section 17 of the *Forest Act,* approved during the 1960 sitting of the Legislature, reduced the probability of competition on certain areas which, when approved for sustained-yield management, were seriously overcommitted.

Under this legislation where the existing timber sales in a management unit have a combined annual commitment exceeding 150 per cent of the allowable annual cut for the unit, it may be designated an emergency area by Order in Council for a period of one year.

In an emergency area the licensee of a timber sale having a replacement volume under the licensee priority system—that is, a valid and subsisting licence—has the option of electing sealed tender on timber-sale applications submitted by him and considered for award during the emergency period.

When sealed-tender procedure is elected and more than one tender is received, the applicant will have the opportunity of acquiring the sale by submitting a further tender within ten days, containing an offer not lower than the highest offer and

* Previously referred to as sustained-yield units and public working-circles.

matching the rate bid for each species or product on the highest tender submitted by any other holder of a valid and subsisting licence in the emergency area. If such further tender is not received from the applicant within ten days, the sale will be awarded to the party who submitted the highest offer.

When submitting applications for sealed-tender sales, the applicant is advised that the period of sale is limited to not more than four years, and the Forest Service reserves the right to keep the number of sales within reasonable limits. Any applications for periods greater than four years are disposed of by public auction. Also, if no request is received for sealed tender, disposal is by public auction and the foregoing procedure will not apply.

Soon after the legislation was approved, the Williams Lake Public Working Circle and the Lac la Hache Sustained-yield Unit were designated as emergency areas on April 14th, 1960, by Orders in Council. The Nicola Lake Sustained-yield Unit was designated an emergency area June 1st, 1960. All emergency areas to date have been in the Kamloops Forest District.

Of the forty-four timber sales sold in emergency areas during the year, twenty-three were by sealed tender and twenty-one by public auction. Of these, there was competition on one of the auction sales only. Indications are that this system has given established licensees an added measure of protection, thus providing greater stability of operations during the transition period leading to sustained yield.

One of the prerequisites of sustained-yield management is the sale of the allowable cut each year. It is also essential that the timber sold must be logged and not withheld from production indefinitely by one operator when others are anxious to acquire more timber. For this reason, it has been necessary to include minimum cut requirements in timber sales. A number of sales located in managed areas were cancelled during the year for non-compliance with minimum cut requirements of their contracts.

The continued construction of Forest Service roads into previously inaccessible areas of some managed units is enabling the Forest Service to disperse operators into high-priority stands—that is, stands which, because of their age and condition, should be harvested in preference to other younger and healthier stands in the region.

In review, a definite trend has been noted in most units toward consolidation of operations and more positive planning by individual operators in an effort to place their operations on a basis compatible with sustained-yield forest management.

MARKET PRICES AND STUMPAGE TRENDS

Lumber Prices

The selling price of dressed lumber f.o.b. car is compiled by the Department for five appraisal zones from data voluntarily supplied by co-operating mills. The downward price trend which started in mid-1959 continued. The market appeared to strengthen in the spring, but the seasonal price increase was not significant, and by midsummer its effect was lost. Selling prices now appear to have stabilized, but at a level sufficiently low that all but the most efficient operations must be close to the margin.

1960 Uncorrected Quarterly Average Dressed-lumber Prices (Interior)

Species	Jan.–Mar.		Apr.–June		July–Sept.		Oct.–Dec.	
	Basis, M B.M.	Average Price	Basis, M B.M.	Average Price	Basis, M B.M.	Average Price	Basis, M B.M.	Average Price
Fir-larch	119,983	$56.36	142,064	$58.07	167,079	$55.42	144,706	$51.29
Spruce	160,530	59.72	205,218	59.39	203,236	53.48	185,821	50.72
Cedar	5,312	57.15	8,029	57.25	5,985	56.40	4,451	49.70
White pine	6,069	93.37	5,251	94.82	5,658	89.85	5,328	92.39
Yellow pine	1,572	52.02	4,138	53.53	5,364	49.20	2,044	49.93

Log Prices

Log prices reported by the British Columbia Loggers' Association were generally lower than those being paid in the last quarter of 1959. The prices for all species except spruce and fir declined steadily throughout the year. The most significant price decline was for cedar, when the average price in 1960 last quarter was approximately $10 per thousand lower than that paid in the last quarter of 1959. Although cedar log prices are subject to violent fluctuation, the situation at year-end, with supply exceeding any effective open market demand, was the cause of a considerable amount of concern in the industry.

Spruce and fir prices increased, but by the last quarter had fallen below the last quarter 1959 level.

1960 Quarterly Average Log Prices per M B.M. (Lower Coast)

Species	Jan.–Mar.	Apr.–June	July–Sept.	Oct.–Dec.
Fir	$63.96	$64.71	$61.15	$56.55
Cedar	45.38	42.77	41.19	37.54
Hemlock	42.09	42.22	42.39	40.49
Balsam	39.85	39.01	39.07	36.73
Spruce	43.96	45.85	49.86	43.95
White pine	59.50	57.33	54.13	48.92

Stumpage Prices

The average bid price for all species was $3.55 per hundred cubic feet. The comparable figures for the years 1957, 1958, and 1959 are $2.98, $4.03, and $3.88.

The decrease relative to 1959 does not appear to reflect the decrease in average market value for logs and dressed lumber. Although the average price bid for all species except hemlock (which was unchanged) was lower in 1960 than in 1959, the full effect of the decline in selling-price levels has not yet been reflected into average stumpage. The decline in log prices did not occur until the third quarter, and average Coast stumpage rates reflect this to the extent that they are generally higher than in 1959. This tends to counter the effect of the more significant bid stumpage reduction for all Interior species.

For detailed figures *see* Tables 20 and 21 of the Appendix.

Sliding-scale Adjustments

The sliding-scale method of stumpage adjustment is now incorporated into all new timber-sale contracts, and all licensees have been given an opportunity to have provision for this method incorporated into their contracts. There were 383 upward

adjustments, which resulted from increase in the spruce and fir log prices, and 5,372 downward adjustments, which affected all species in all zones.

The sliding scale was designed to react to a market break such as has been experienced, and there is no question but that it has been a factor in making operation possible at present price levels.

Stumpage-appraisal Cost Studies

The field party attached to the Appraisals Section completed a mill study to review the conversion factor for cedar lumber, and their report, with its recommendation, that the average recovery for appraisal purposes be reduced from 7.0 to 6.4 board-feet lumber tally from 1 cubic foot log scale was approved.

A yarding-skidding time study is continuing on operations in the Interior Dry Belt.

A lumber-manufacturing cost survey was completed for the Southern Interior selling-price zone, and a similar study was started in the Prince George appraisal zone.

SILVICULTURE

The programme for 1960 included stand treatment, silvicultural studies, working-circle planning, and road location in both sustained-yield units and public working circles.

The main effort during the past year was centred on stand treatment. All districts were active in this field, and some 600 timber sales, principally in the Interior, received stand treatment. This involved the treatment of approximately 188,480 acres. This is a decrease of 19,048 acres from the previous year's production and is due to the severe nature of the 1960 fire season.

Stands are generally treated to attain either increment or natural regeneration or, in some cases, a combination of both increment and natural regeneration. The cutting methods which are most frequently employed are single-tree selection in the case of increment, and strips, groups, patches, or single seed-trees in the case of natural regeneration. Of the 188,480 acres treated, 19,834 were treated under single-tree selection; 98,285 acres were laid out in blocks, strips, or patches; and 70,361 acres were marked for either seed-tree groups or single selected seed-trees.

Although natural regeneration is dependent on several interrelated factors, a satisfactory seed-bed and a suitable seed source can be regarded as prime requisites. The preparation of a satisfactory seed-bed often requires either burning or scarification. The Forest Service has been employing scarification in certain types of stands since 1956. During 1960, scarification was carried out on 3,194 acres, an increase of 1,437 acres over the 1959 programme. This is due to work being initiated in the Nelson, Kamloops, and Prince Rupert Districts. Of the 3,194 acres, 1,353 acres were scarified as a result of provisions contained in timber-sale contracts.

Planting was again carried out in the Interior districts in co-operation with the Reforestation Division; however, a lack of suitable stock greatly hampered total production. In all, some 66,100 trees were planted, which is far below the 200,000 planted in 1959. Unfortunately, the 1960 cone-crop was for the most part a disappointment and only a small amount of cones was collected. Development of the small nurseries at Hixon, Telkwa, and Creston continued.

Among the many problems facing the silviculturist are the effects of utilization and logging on the prescribed treatment. These are continuing problems. However, a short motion-picture film is being produced on the effect of logging damage, which should assist in improving present damage levels. In this regard, the logging-

damage survey mentioned in the 1959 Report has been completed and is presently being analysed.

Continued progress has been made on the Lower Coast, both as regards second-growth management and improved stand treatment.

SCALING

Intensification of scaling supervision was continued in the Interior forest districts during the year, with greater emphasis being placed on check scaling. Without adequate control of scaling practice, there is certain to be a significant loss of revenue to the public.

Scaling examinations were held in all forest districts, and of 1,061 candidates, only 289 or 27 per cent were successful, which suggests the need for more instructional classes.

Mill checks and investigations resulted in several prosecutions under Part VIII of the *Forest Act*. Nine scaling licences were suspended and one licence cancelled.

With the initiation of pulp production in the Interior, it has become necessary to review scaling methods as they apply to small wood and other wood of low value. Apart from the relatively high cost of measuring this type of material, there are physical limitations which will require some modification to present procedures. A study of these problems is presently under way.

GRAZING

GENERAL CONDITIONS

In general, 1960 was a good year for the ranching industry. The winter of 1959/60 was mild, which was fortunate in view of the short hay-supply available, and only a few isolated distress situations developed, necessitating turnout before range was ready to use in the spring. Range readiness occurred at about the normal date in 1960, except in the southerly part of the Kamloops Grazing (Forest) District and the Peace River area, where ranges were about two weeks later than usual.

Abundant fall precipitation in 1959, followed by heavy winter snowfall and good growing conditions in 1960, resulted in a phenomenal forage production on all types of range throughout most of the northerly half of the range area. In contrast, the southerly part of the range country suffered from a light snow-pack, dry spring, and extreme heat and drought during July and August. This had an adverse effect on forage production, particularly on low-elevation ranges. In some parts of the south, numerous lakes and springs dried up, making stock distribution difficult, and in a few cases stock had to be removed from the range because of a shortage of water. The forage situation would have been considerably worse in the south had it not been for a good carry-over of soil moisture from the previous fall.

Stock came off the Crown range in the fall in generally good condition, even in the south. The only exceptions appeared to be where good live-stock and range management had not been practised.

Hay-crops varied from good in the north to light in the south. However, only in a few local areas which are totally dependent on dry farming does a serious shortage of hay exist, and hay is available for shipment in to these areas at fairly reasonable cost. Virtually all hay harvested was put up in good condition.

Ranch labour was in good supply, although often inexperienced. The chief difficulty was the shortage of capable stock-handlers and range-riders. The growing mechanization on ranches is reducing seasonal requirements considerably for unskilled labour for such activities as haying.

The devastating fire situation in the southerly part of the range country was of great concern to ranchers using forest range, but operations were not too seriously disrupted. In the Nicola Valley, considerable areas of open grassland were burned, which resulted in the loss of fall feed. These open ranges will recover quickly and permanently. However, the severe fires which occurred on forest ranges will have serious long-term effects.

Markets and Prices

Cattle prices were somewhat lower during most of 1960 than they were in 1959. However, prices strengthened considerably later in the year, during the heavy shipping period. This is the reverse of the usual situation. Weighted average prices received by cattlemen through the British Columbia Livestock Producers' Co-operative Association were $17.25 per hundredweight in 1960, only slightly below the $17.52 received in 1959. The prices for sheep and lambs shipped through the co-operative were also lower than the previous year.

Unlike two years ago, very few feeder cattle were shipped from British Columbia to the United States during 1960. The fact that the loss of this market has not affected prices more adversely is a matter of considerable satisfaction.

Live-stock Losses and Diseases

Poisonous range plants, particularly water hemlock and death camas, were responsible for some losses of cattle and sheep, respectively. Timber milk vetch caused some trouble in certain areas. Some losses of both sheep and cattle were attributed to bears. Highway and hunting accidents continued to take their toll of stock. However, losses on railroads appeared to be less than in recent years.

Vibriosis, a reproductive disease of cattle, is resulting in a growing demand for individual range allotments and breeding pastures, as well as other adjustments in range-use patterns. This situation is greatly complicating the allocation and management of Crown range in some areas.

RANGE MANAGEMENT

As grazing and other uses of the range lands increase, more intensive management is required. Otherwise, this valuable resource will become depleted, to the detriment of the live-stock industry, game populations, watershed values, and recreational features alike.

During 1960 further progress was made in several areas toward bringing range turnout dates more in line with range readiness. Range-readiness studies were commenced in two Ranger districts where basic information is lacking.

Range-productivity studies were intensified and extended. Further vegetation-control techniques were also applied on a trial basis to find ways of improving forage production. The Canada Range Experimental Farm at Kamloops provided technical direction and laboratory services required for this work, as well as taking an active part in the field.

Plans were completed for the establishment of a multiple-use demonstration area involving some 5,000 acres of typical forest range in the East Kootenay Valley. Preparations for fencing and the application of intensive forest- and range-management techniques are well advanced.

In the Peace River District, forage-improvement work was commenced on a modest scale on two areas. This work involved mainly clearing, breaking, and seeding. Some spraying trials were also carried out.

Range Surveys

Due mainly to the heavy fire season, the range survey programme was considerably reduced in 1960. A total of 340,000 acres was covered, as follows:—

Location	Acres
Kettle River Stock Range (resurvey)	140,000
Alexandria Stock Range	200,000
Total	340,000

From 1945 to 1960 a total of 9,739,885 acres has been covered by range surveys or resurveys necessary to keep range inventory information up to date.

Extensive reconnaissances were also carried out in several areas, the largest covering 169,000 acres in the Peace River District as a basis for selecting additional areas for pasture development.

Range Improvements

During the year $56,549.32 was spent from the Range Improvement Fund. In addition, material to the value of $3,188.70 was on hand at the commencement of 1960. The following work was completed:—

Two stock-bridges	$450.00
Eleven cattle-guards	2,315.67
Twenty-two drift-fences	9,433.43
Three experimental plots	137.36
Five holding-grounds	610.79
Two meadow improvements	275.00
One mud-hole fence	200.00
One pasture development	1,338.48
Thirty stock-trails	8,542.50
Twenty-four water developments	2,063.19
Range seeding	10,326.76
Wild-horse disposal	147.50
Machinery and equipment (purchase)	211.93
Maintenance and operation of equipment	703.79
Material on hand but not assigned to projects	11,439.90
Supervision, surveys, and technical studies	11,541.72

In addition to these costs, considerable contributions of labour were made by permittees to a number of the projects involved. Authority was also extended to permittees to construct and maintain, entirely at their own expense, five breeding-pastures, two cattle-guards, five corrals, fifteen drift-fences, two holding-grounds, one horse pasture, and one stock-trail.

Range seeding was a major feature of the improvement programme in 1960. A total of 35,450 pounds of grass and legume seed was sown, compared to 17,150 pounds in 1959. Seeding of logged areas was at about the same level as the previous year. The large increase was used on areas devastated by forest fires. The seeding of grass on fire access roads, guards, and severely burned areas is necessary to help control erosion and inhibit the invasion of undesirable weeds and brush, as well as restore forage values. The 1960 fire situation resulted in extremely large areas requiring seeding. Unfortunately, a shortage of funds available for this vital rehabilitation work, combined with adverse flying conditions during the proper fall seeding season, resulted in only a part of the necessary work being completed. However, some of the most critical areas received attention, and additional seed has been placed in storage to extend the programme immediately weather conditions permit next spring.

Steel-rail decks installed on cattle-guards on a trial basis in 1958 and 1959 have proven successful, and a regular programme of installing steel decks was therefore instituted in 1960.

All of the Kamloops Grazing District and most of the Nelson Grazing District were closed to horses during the winter of 1959/60 to prevent damaging grazing. Most horse-owners co-operated, and only forty animals were removed from Crown range by horse-disposal licensees. Only a few wild horses remain on the Crown range at the present time.

Peace River Pastures

For the first time, special funds were voted by the Legislature in 1960 for pasture-development work in the Peace River District. The work completed included 20 miles of fencing, eleven stock-watering dugouts, and 28 miles of combined fire-guards and trails. In addition, 88 acres were cleared, broken, and seeded. Another 73 acres were brushed out and piled preparatory to breaking and seeding.

CO-OPERATION

There are now fifty-four live-stock associations approved under the *Grazing Act,* one new association being approved during the year. Relations with these organizations were excellent. Close contact was also maintained with the British Columbia Beef Cattle Growers' Association and the British Columbia Sheep Breeders' Co-operative Association in matters relating to the whole industry.

Excellent co-operation was also received from the British Columbia Livestock Producers' Co-operative Association, the producer-owned marketing agency, in supplying live-stock price figures necessary for the sliding scale of grazing fees.

A total of 124 association meetings was reported, and Forest Service officers attended 117 of these. Twelve meetings were held with other live-stock and technical groups during the year.

Close liaison was maintained with other Provincial Government agencies dealing with matters pertaining to the Crown range. The Canada Range Experimental Farm at Kamloops, which is responsible for basic range research in British Columbia, extended valuable assistance on a variety of technical matters. The Canada Experimental Farm at Beaverlodge, Alta., also undertook technical studies on the pilot pasture developments in the Peace River District, The Indian Affairs Branch, Canada Department of Citizenship and Immigration, assisted greatly in dealing with Indian use of Crown range.

ADMINISTRATION

The drastic fire situation which occurred over a major part of the range country interfered with range administration to a considerable extent. Rangers in the affected areas could give little attention to grazing work during the critical period. In addition, grazing personnel had to be diverted from their normal work at the height of the emergency. This situation, combined with the continually increasing work load, resulted in much necessary field work being postponed. The range survey programme suffered most in this respect.

The increased pasture-development programme in the Peace River area, together with the growing need for range administration in other parts of the Prince George Grazing (Forest) District, necessitated the full-time assignment of a Grazing Officer to that district in 1960. The need for the establishment of further pastures in the Peace River area was carefully examined, and five areas were selected and placed under reserve for future development.

The native Indian people are showing a growing awareness of the need for range management and the value of protecting their grazing privileges through compliance with the *Grazing Act.* During the year many Indians obtained grazing permits for the first time. Indian participation in live-stock association affairs also increased.

Continuing the trend of the last few years, a large number of ranches changed hands during 1960. The fact that most of the purchasers are from outside this Province and are completely unfamiliar with our physical conditions and range practices adds considerably to the administrative problem. Also, in many cases the new owners do not take up full-time residence, making contacts difficult.

Continuing land alienations in the range country are greatly complicating range administration. Not only is land withdrawn from use as Crown range, but, in many cases, range units become completely unmanageable owing to the development of complicated ownership patterns. To the extent that land alienations result in higher land use, they are justified. However, in many cases marginal-quality

land acquired for farming and grazing purposes remains unfenced and undeveloped. From the range-management standpoint at least, careful over-all land-use planning is a growing necessity.

Grazing and Hay Permits

This year, 1,726 grazing permits were issued, authorizing the depasturing of 127,148 cattle, 4,504 horses, and 19,460 sheep on Crown range. This represents an increase of forty-three permits over 1959. Cattle numbers were up 2,723 head and horses 127 head over the previous year. Sheep numbers declined by 1,144 head. (*See* Table 58 in Appendix.)

A total of 182 hay-cutting permits was issued authorizing the harvesting of 2,027.5 tons of hay from Crown range, an increase of eighteen permits and 612.5 tons over 1959.

Grazing and Hay-cutting Fees

Grazing fees per head per month for 1960 were 17 cents for cattle, 3.5 cents for sheep, and 21.25 cents for horses. This represents an increase of 2 cents per head per month for cattle, .5 cent per head per month for sheep, and 2.5 cents per head per month for horses. Hay-cutting fees remained at $1 per ton.

Total billings for grazing and hay-cutting fees were up from the 1959 level due to both increased fees and the larger numbers of stock on Crown range. Billings exceeded collections, resulting in larger " outstandings " at the end of the year. (*See* Table 59 in Appendix.)

Live-stock Counts

To ensure that actual grazing use was in line with permitted use, an extensive cattle counting programme was carried out in the Kamloops Grazing District during the winter months at the beginning of the year. Also, a large-scale count of cattle being moved from spring to summer range was undertaken in one area. These counts revealed a number of discrepancies, which were corrected by appropriate action.

ENGINEERING SERVICES

ENGINEERING SECTION

In addition to route reconnaissance, road location and construction, the 1960 engineering programme included work on many projects connected with the day-to-day operations of the Service. This work involved the maintenance of 259 miles of previously constructed road, the operation of highway and marine transport units moving Porta-buildings, heavy equipment, and other materials to Forest Service installations throughout the Province and, when requested, providing general professional engineering assistance for other branches of the Service.

Continued emphasis was placed on development planning, and extensive field and office investigations were undertaken to provide engineering data essential to the management of several large forest areas.

Work proceeded on the forest-development road system, and location surveys were carried out on a number of roads required primarily for fire protection and administrative purposes.

Forest-road Programme, 1960

Project	Regulation Unit	Reconnaissance	Location	Construction
Vancouver Forest District		Miles	Miles	Miles
Artlish River	Kyuquot P.W.C.	9	------	------
Chilliwack River F.D.R.	Chilliwack P.W.C.	------	------	2.0
Kingcome River F.D.R.	Broughton P.W.C.	------	9.6	2.5
Port Hardy F.D.R.	Cape Scott P.W.C.	------	------	1.5
Soo River F.D.R.	Soo S.Y.U.	------	4.5	------
Prince Rupert Forest District				
Chapman Lake F.D.R.	Smithers P.W.C.	------	23.6	------
Kitlope and Kimsquit Rivers	Dean S.Y.U. and V.C.L.	85	------	------
Morice River F.D.R.	Morice S.Y.U.	------	16.9	------
McDonell Lake F.D.R.	Smithers P.W.C.	------	18.6	------
Upper Babine	Babine P.W.C.	45	------	------
Upper Kitimat Road	Kitimat S.Y.U.	------	11.8	------
Williams Creek	Terrace S.Y.U.	11	------	------
Prince George Forest District				
Aleza Lake F.D.R.	Aleza Lake Experiment Station	------	------	2.0
Mountain Creek F.D.R.	Moberly S.Y.U.	------	12.9	------
Naver-Ahbau F.D.R.	Naver P.W.C. and Big Valley S.Y.U.	------	------	11.8
Purden Lake F.D.R.	Purden Lake P.W.C. and Longworth S.Y.U.	------	33.2	------
Swift River F.D.R.	Cottonwood P.W.C.	------	------	7.5
Tzenzaicut Road	Narcosli S.Y.U.	25	25.1	------
Upper Bowron River F.D.R.	Longworth S.Y.U.	------	10.3	------
Wapiti River		250	------	------
Willow River F.D.R.	Willow River P.W.C.	------	------	4.5
Kamloops Forest District				
Ashnola River		60	------	------
Cariboo and Mitchell Rivers	Quesnel Lake P.W.C.	90	------	------
East Barriere River	Barriere P.W.C.	22	------	------
Hendrix Creek F.D.R.	Lac la Hache S.Y.U.	------	------	8.7
Horsefly River F.D.R.	Quesnel Lake P.W.C.	------	19.6	------
Kwoiek Creek F.D.R.	Botanie S.Y.U.	------	15.8	------
McGillivray Lake F.D.R.	Niskonlith P.W.C.	------	22.5	------
North Barriere River	Barriere P.W.C.	55	------	------
Seymour River		35	------	------
Slok Creek F.D.R.	Yalakom S.Y.U.	------	24.5	2.0

F.D.R.=Forest-development road.
P.W.C.=Public working circle.
S.Y.U.=Sustained-yield unit.
V.C.L.=Vacant Crown land.

Forest-road Programme, 1960—Continued

Project	Regulation Unit	Reconnaissance	Location	Construction
Nelson Forest District		Miles	Miles	Miles
Alkolkolex River	Arrowhead P.W.C.	25	-------	-------
Bench Creek	Edgewood P.W.C.	22	-------	-------
Horsethief Creek F.D.R.	Windermere P.W.C.	-------	11.6	-------
Lodgepole F.D.R.	Flathead S.Y.U.	-------	-------	7.5
West Slocan	Slocan P.W.C.	17	-------	-------
White River F.D.R.	Upper Kootenay P.W.C.	-------	18.1	17.3
Totals, 1960 programme		751	278.6	67.3
Previous works		2,239	711.4	282.3
Totals, forest-road programme, 1950/60		2,990	990.0	349.6

F.D.R.=Forest-development road.
P.W.C.=Public working circle.
S.Y.U.=Sustained-yield unit.
V.C.L.=Vacant Crown land.

Development Planning

During 1960 increasing emphasis was placed on area study and the analyses of broad development requirements. Four field crews carried out area studies and route reconnaissance in fourteen forest areas encompassing some 3,460,000 acres of productive forest lands with current recoverable mature volume of 2 billion cubic feet.

The 1960 field season was highlighted by the use of a Forest Service launch as mobile crew accommodation and the use of a "jet boat" for transportation on the turbulent Coast rivers. This craft, a modified river-boat hull powered by a Dowty turbo-jet propulsion unit, proved very successful on this type of operation.

In the Vancouver Forest District the development of the Artlish River valley was investigated. In the Prince Rupert District the valleys of Williams Creek, Kimsquit River, Kitlope River, and an area tributary to the northerly end of Babine Lake were studied. Initial investigations in the drainage of the Wapiti River system and tributary areas and a route reconnaissance of the Tzenzaicut Forest Road were completed in the Prince George District. The drainages of the East Barriere River, North Barriere River, Cariboo and Mitchell Rivers, Seymour River, and the Ashnola River, all in the Kamloops District, were reconnoitred. In the Nelson District, drainages in the Slocan, Edgewood, and Arrowhead Public Working Circles were studied.

Road Location

Road location was completed on 278 miles of forest road during the 1960 field season. Some additional engineering was undertaken during the fire season to provide access routes to major fires.

In the Vancouver Forest District, the Kingcome River and Soo River road locations were extended. Location work in the Prince Rupert Forest District included the completion of the Morice–Owen Forest Road and the start of the Chapman Lake and McDonell Lake road systems. The Upper Kitimat River Forest Road was located to the Kite Burn for operator construction. Location work was initiated on the Upper Bowron and Purden Lake Forest Roads, and the Mountain Creek and Tzenzaicut Road locations were extended in the Prince George Forest District. In the Kamloops Forest District, the Horsefly Lake and McGillivray Lake road systems were extended, and the Slok Creek and Kwoiek Creek Forest Roads were located. The Horsethief and White-Rock Creek roads in the Nelson Forest District were extended.

Simplified survey and design procedures were again used on roads required primarily for forest administration and protection. These procedures, which pro-

vide minimum ground and map controls, have resulted in an increase in mileage of location within the funds allotted.

Construction

Unusually fine construction weather prevailed during June and July, and, despite a deterioration of conditions during the latter half of the construction season, the 1959 record production figures were very nearly equalled. During 1960, 67 miles of road were constructed, involving clearing 331 acres, grubbing 500 acres, the movement of 1,100,000 cubic yards of common excavation and 22,500 cubic yards of solid rock, and the installation of 12,200 lineal feet of culvert pipe.

Initial construction requirements were completed on the Willow River, Swift River, Hendrix Creek, and Kingcome River Forest-development Roads, while work continued on the Naver-Ahbau, Aleza Lake, White River, Lodgepole, Chilliwack River, and Port Hardy projects. In November, construction started on the Slok Creek Forest-development Road.

Although the bridge-construction programme was considerably reduced from the previous year, two permanent timber bridges and two local-material bridges of significant size were built. One permanent bridge over Slesse Creek on the Chilliwack Forest-development Road has a two-lane deck with 72-foot glue-laminated girders resting on concrete piers. The other permanent bridge is a single-lane 40-foot span on pile bents crossing the Swift River in the Cottonwood Public Working Circle. The two local-material bridges, crossing the Atlatzi River and Meers Creek on the Kingcome River Forest-development Road, consist of log spans resting on pile bents and rock-filled cribs.

General Engineering

Bridge designs were completed for crossings of Slesse Creek on the Chilliwack Forest-development Road, Quatse River on the Port Hardy Forest-development Road, White River on the White River Forest-development Road, and Willow River on the Naver-Ahbau Forest-development Road, all of the creosoted glue-laminated girder type. Log bridges were designed for Atlatzi River and Meers Creek on the Kingcome River Forest-development Road and North Lodgepole Creek on the Lodgepole Forest-development Road. The latter design was also adapted to a crossing of the East White River.

Preliminary designs and estimates were made for two crossings of the Soo River on the Soo River Forest-development Road, the Tsulquate River on the Port Hardy Forest-development Road, and several smaller streams. A study of log-dump and booming-ground facilities was undertaken to determine the most suitable types of installation for Forest Service haul-roads terminating at tidewater.

The soils technicians handled a record volume of laboratory classification tests, made some auger borings and penetration soundings of a problem slide area and some frost-boil areas, and carried out several gravel-pit investigations.

Experimental work was also undertaken with portable seismic equipment for determination of depth to rock.

Among other projects undertaken were the preliminary design of a pressure-treated prefabricated wood lookout tower, contract supervision on the construction of docking facilities at Echo Bay Ranger Station, and the design of a free-standing pile breakwater at the Forest Service Marine Station.

MECHANICAL SECTION

A check of the table following will show that standard passenger-car purchases continue to decrease in number, whereas there is an increase in the purchase of small cars, which includes a few of the compact class.

Since a number of the small cars have been in service for three years, it can now be reported that their operation to date has been satisfactory, and experience has shown that they do negotiate inferior roads and adverse grades just as well as the larger or standard models.

The acquisition of a number of half-ton trucks equipped with heavy-duty rear bumper and step-plate combinations, 6.50 x 16 tube-type tires, four-speed transmissions, and limited-slip differentials has reduced transportation problems in many areas. However, as logging operations penetrate to higher elevations and into areas more difficult of access, the need for more four-wheel-drive equipment continues.

The ten light-weight portable tankers mentioned in the 1959 Report were augmented by another twenty-five this year. Very satisfactory reports have been received concerning their usefulness, and they are rapidly displacing the older type of pumper unit which was permanently mounted on a 1-ton truck.

The 1960 season provided a severe test of fire-fighting equipment, especially in the Kamloops and Nelson Districts. All equipment generally performed well, and, in particular, the latest types of high-pressure centrifugal pumps received praise from all concerned. The use of a tandem arrangement for reaching high elevations was reported from one area only. In that particular case a four-stage relay using some of the older lower-pressure displacement pumps was replaced by two modern high-pressure medium-volume centrifugal pumps which operated with less supervision and gave a much more reliable performance.

One of two muskeg tractors purchased for use in cruising and fire-fighting duties in the Peace River District.

Two Calgary-built muskeg tractors were put into operation in the Peace River District and gave a good account of themselves during fire-fighting periods in otherwise inaccessible areas. They were also useful for timber cruising in areas which were beyond the limits of four-wheel-drive trucks.

It is rarely possible to obtain road-grading machinery on a rental basis, and for this reason the problem of maintaining the ever-increasing mileage of access roads was met in the Nelson District by the addition of an all-wheel-drive, all-wheel-steer, tandem-axle grader in the 100-horsepower class and a smaller single-axle maintainer of approximately 50 horsepower rating.

The Engineering Section added two of the larger modern tractors, and two tractors of lesser horse-power were acquired for forest-protection purposes in the Prince George and Kamloops Districts.

One out-of-the-ordinary piece of equipment acquired during the year was a used electric (battery-powered) fork lift-truck which was obtained from the Queen's Printer. The unit was sent to the Forest Service Marine Station and arrived just in time to be of valuable assistance during the busy days of the fire season. This unit saved many hours of manual labour in loading and unloading trucks and in moving and stacking equipment as it entered and left the premises.

Forest Service Mechanical Equipment

Type	Total Units, Jan. 1, 1960	Removed from Service	New Purchases	Total Units, Dec. 31, 1960
Sedans	48	8	----	40
Suburbans, station wagons, and sedan deliveries	89	5	14	98
Small-type passenger-vehicles	25	3	8	30
Panel deliveries	64	5	5	64
Four-wheel-drive passenger types	70	10	25	85
Four-wheel-drive ¾-ton pick-ups, etc.	237	27	38	248
Power-wagons	21	2	1	20
½-ton pick-ups	142	21	7	128
¾-ton pick-ups	40	8	14	46
14,000–24,000 G.V.W. trucks (2, 3, and 4 tons)	54	2	1	53
25,000–40,000 G.V.W. trucks (heavy duty)	5	1	1	5
Fire-fighting tank-trucks	9	4	----	5
Total vehicles	804	96	114	822
Tractors	38	4	4	38
Graders	16	2	2	16
Scrapers—self-propelled	4	----	----	4
Shovels—power	2	----	----	2
Loaders—self-propelled	1	----	----	1
Outboard motors	350	26	38	362
Fire-pumps—all types	715	3	105	817
Fire-pumps—portable tanker	10	----	25	35
High-pressure Bean fire-fighting units	34	----	----	34
Borate mixer pumps	2	----	----	2
Chain saws	364	38	49	375
Lighting plants	89	2	5	92
Snow-sedan—propeller-driven	1	----	----	1
Speeders—railway	20	----	----	20
Trailers—low-bed and high-bed	9	----	1	10
Trailers—dwelling, bunk-house, etc.	124	1	16	139
Trailers—miscellaneous	161	1	17	177
Air-compressors	4	----	----	4
Rock drills—gas-powered	6	----	3	9
Muskeg and snow tractors (personnel carriers)	5	----	3	8
Yarders	1	----	----	1
Crushing plants	1	----	----	1
Mechanical wheelbarrows	22	----	----	22
Welders	9	----	----	9
Cement-mixers	6	----	----	6
Augers—power, planting	3	----	----	3
Fork lift-truck—electric	----	----	1	1

Preventive maintenance practices advocated and followed by the Mechanical Section, together with the various phases of instructional work carried out by the mechanical supervisors, gave evidence of its value during the past summer when equipment was tested to ultimate limits. Verbal reports from Ranger staffs and district headquarters showed satisfaction with the general use and availability of their mechanical equipment, and the fall inspections showed vehicles, pumps, outboard motors, etc., to be in good average condition.

Lectures on the subject of fire-pumps and fire-hose on behalf of the Canadian Forestry Association were given at Vancouver and Penticton by the Assistant Mechanical Superintendent and the Mechanical Superintendent respectively.

BUILDING DESIGN AND CONSTRUCTION

The major projects undertaken this year were the construction of the Smithers warehouse and the design and construction of the Ranger Station buildings at Dawson Creek. The accommodation in both instances was designed for multi-use purposes. At Dawson Creek the main-floor office is used by the Ranger and staff, and the lower floor is available for cruising-crew use or other functions. The warehouse accommodation consists of a district headquarters fire-fighting reserve, as well as the Ranger's cache and heated two-stall garage. Loft space is also available for both Ranger and district storage. The Smithers warehouse was modified during construction to provide office accommodation, and now houses the Ranger staff and warehouse, silvicultural staff and warehouse, carpenter-shop and headquarters fire-fighting tool reserve. In both locations the materials used to finish the interiors and exteriors of the buildings will do much to minimize maintenance costs and still present a pleasing and distinctive appearance.

A start was made on a proposed development for the Research Division at the Aleza Lake Ranger Station. Foundations were poured for an eight-man bunkhouse, and erection of a prefabricated simulated-log building is proceeding. The deviation from ordinary frame construction will blend well with the setting in a forest, and some of the problems and costs associated with building at a remote site will be avoided. The design of water-supply and electrical distribution systems for this site are also being undertaken.

A significant number of the projects handled during the year can be classified as improvements and renovations to existing facilities. Modernization of older buildings and some enlargement to provide for staff increases must keep pace with increasing emphasis on forest management and protection.

The two fibreglass lookouts erected in 1959 have proven to be quite satisfactory as far as cost, durability, and liveability are concerned. Serious consideration is now being given to adopting this type, with slight modifications, for use on towers. Further, the construction of larger buildings with fibreglass panels is being investigated, with a view to using this material when access to the building-site is costly.

A number of buildings of standard Ranger station design were constructed during the year, and a list of these, showing the construction agency and progress, is appended. The usual number of miscellaneous-design jobs were completed for various divisions.

The following trailers were designed and (or) constructed during the year:

Trailer Type	For Use by—	Forest District
28′ bunk-house	Project crew	Vancouver.
14′ living	,, ,,	Prince Rupert.
18′ living	,, ,,	Kamloops.
18′ living	,, ,,	Nelson.
22′ graderman's	,, ,,	Prince George.
14′ silviculture	,, ,,	Nelson.

Building Construction Undertaken during 1960

Location	Project	Construction Agency	Stage of Construction
Carry-over from 1959/60			
Aleza Lake	Development plan	Forest Service	Completed.
Chetwynd	Office and stores building	Forest Service	Completed.
Duncan	Freezer and cold-storage building	Forest Service	Completed.
Echo Bay	Floats and wharf	Contract	Completed.
Likely	Boat-house and ways	Forest Service	Completed.
Smithers	Office and warehouse	Forest Service	Completed.
Programme for 1960/61			
Smithers Landing	Boat-house and ways	Forest Service	Completed.
Tofino	Office building	Forest Service	Completed.
Prince George	Carpenter-shop and storage building	Forest Service	Completed.
Golden	Four-car garage	Forest Service	Completed.
Lardeau	Four-car garage	Forest Service	Completed.
Vancouver	Ranger School domestic-water line	Forest Service	Design completed.
Lillooet	Trailer camp	Forest Service	Completed.
Port Hardy	Trailer camp	Forest Service	Work proceeding.
Various points	Porta-buildings (five)	Forest Service	Work proceeding.
Lund	Float addition	Forest Service	Work proceeding.
Nukko Lake	Moving and renovations to residence and office	Forest Service	Completed.
Vanderhoof	Addition to office	Forest Service	Work proceeding.
Summit Lake	Sewage lagoon	Forest Service	Completed.
Ootsa Lake	Boat-house and ways	Forest Service	Work proceeding.
Aleza Lake	Residence	Forest Service	Work proceeding.
Red Willow	Residence and office warehouse	Forest Service	Completed.
Kamloops	Bunk-house	Forest Service	Work proceeding.
Vancouver	Breakwater at Forest Service Marine Station	Forest Service	Design completed.
Cowichan Lake	Workshop	Forest Service	Completed.
Duncan	Soil-shed	Forest Service	Design completed.
Chilliwack River	Four-car garage	Forest Service	Design completed.
Boston Bar	Residence	Forest Service	Design proceeding.
Chilliwack River	Irrigation systems	Forest Service	Completed.
Prince Rupert	Additions to headquarters office	Forest Service	Completed.
Mesachie Lake	Electrical distribution system	Contract	Completed.
Aleza Lake	Eight-man bunk-house	Forest Service	Work proceeding.
Dawson Creek	Office and warehouse	Forest Service	Completed.

Marine Design

The major effort of the year was the planning of the 60-ton 66-foot vessel "Hecate Ranger" as a replacement for one of the older Coastal work boats. The design of this wooden vessel, the hull of which will be built under contract, incorporates many up-to-date uses of forest products, including glue lamination, plywood, and pressure preservative treatment to demonstrate the continuing advantages of wood as a boat- and ship-building material.

A 40-ton-capacity equipment raft was designed for the transportation of the heaviest equipment used in the construction of forest-development roads. The "bolt-together" feature of this unusual craft will facilitate transportation and initial assembly in the field following pressure preservative treatment of the components, in addition to making its transportation to inland lakes possible.

In answer to the continuing need for reliable shallow-draught river-boat transportation, no time has been lost in applying the newly available hydraulic jet reaction propulsion system to the familiar 30-foot river-boat. A modified 26-foot version was used with convincing effect on a forest-development road reconnaissance during the late summer when, despite falling river-levels, it was possible for the crew to penetrate far beyond the navigable limits imposed by an outboard motor's underwater appendages.

Small wooden-craft design and selection continued on a replacement basis, with some aluminum, plastic, and inflatable types being chosen for special applications, such as air-lifting, car-top transport, or where acute maintenance problems exist.

As a result of close liaison between this Section and the Attorney-General's Department, a number of fibreglass boats varying from 10 to 15 feet in length were built to Forest Service requirements by the inmates of Oakalla Prison Farm under the direction of that Department's Correction Division as part of its rehabilitation programme.

FOREST SERVICE MARINE STATION

At the height of the fire season the Forest Service Marine Station was used as an assembly point for materials being shipped to the districts. Seventeen truck-loads were dispatched from the station. Trucks varied from the 5-ton type, though the van type, to full semi-trailer. Three of the latter were used. Engineering Services trucks hauled eight loads to Kamloops.

Major items dispatched were 206,500 feet of 1.5-inch hose, 43,800 feet of 1-inch hose, 85 fire-pumps, 200 tents and flies, 800 ground sheets, 2,300 blankets, 1,300 safety-hats, 350 " jerry " cans, 900 back-pack tanks, hundreds of axes, shovels, Pulaskis, mess kits, first-aid kits, and a host of other articles.

The emergency effort mentioned above delayed to some extent the regular programme of work. Nevertheless, production was maintained at a normal level for the year.

Marine Work

The marine ways were occupied sixty-two times during the year. Sixty launch overhauls were completed, of which thirty-two were of a major nature. Ninety small craft, comprised of outboard cruisers, river-boats, rowboats, and ships' dinghies, were repaired or rebuilt. The 50-foot landing-craft L.C. No. 5 was rebuilt and repowered. The prefabricated float and gangway, together with materials for the approach ramp to be installed at the Echo Bay Ranger Station, were parcelled and dispatched to the building-site via scow towed by the M.V. " Forest Surveyor."

A portion of the crew was assigned to new construction throughout the year. The 40-foot Ranger launch " Forest Dispatcher " was completed and formally launched on June 22nd. The 27-foot " Sylva " was also completed and will be put into operation on Babine Lake after the spring break-up. The 46- by 22-foot take-apart equipment raft mentioned under " Marine Design " was built and will be ready for the 1961 road-construction season. Thirteen river-boats of conventional design and a 26-foot jet-propelled craft for use on particularly fast shallow rivers were constructed. Finally, ten fibreglass boats, ranging up to 16 feet in length and produced under arrangement at Oakalla Prison, were fitted out, numbered, and shipped from the Marine Station to scattered destinations throughout the Province.

Prefabrication and Carpenter-shop

Principal production of the subsection consisted of nineteen lookout buildings, which were prefabricated, together with eighteen sets of furniture to be used therein. Fifty-eight pieces of standard office furniture and ten special-design units were also constructed. Other items manufactured included over 100 signs of various types and more than 400 boxes and crates for pumps, outboard motors, power-saws, etc.

The trailer construction and repair programme commenced a few years ago was continued. Five trailers and Porta-buildings were renovated, and five new 38-foot Porta-buildings are presently under construction.

Machine-shop

The machine-shop completed over 350 overhauls on pumps, outboards, power-saws, lighting plants, and other equipment. Two hundred and twenty-five new units were tested, numbered, crated, and shipped to various points. Over 3,000 pieces of pump and hose accessories and various marine fittings were machined. Twenty-five new portable tanker units were assembled and shipped. Eighteen fire-finders were built.

RADIO SECTION

The purchase of radio equipment during the year reached an all-time high due to the number of extra portables needed for fire-fighting in the Kamloops and Nelson Districts. While the fire season interfered badly with propagation surveys, several important repeaters were completed, and the Coast very high frequency (V.H.F.) system is now connected through to Kamloops.

New transmitting units purchased during 1960 totalled 307, and nine were written off during the same period, making a net increase of 298 units.

Radio Purchases and Write-offs, 1960

Model B A.M. portable	70	
Ranger station 80-watt A.M.	3	
Marine 80-watt A.M.	1	
Mobile A.M.	8	
Total purchases, A.M.		82
Model H23-10 F.M. portable	157	
Ranger station 60-watt F.M.	29	
Ranger station 30-watt F.M.	11	
Repeaters 50-watt F.M.	9	
Mobile F.M.	19	
Total purchases, F.M.		225
Total purchases, all types		307
Written off during year		9
Net increase, 1960		298

The Department of Transport regulation requiring Forest Service personnel in charge of motor-vessels to qualify for the restricted radio-telephone certificate is being more rigidly enforced. Several of these certificates were issued to Forest

Service staff during 1960, but represent only a small percentage of those required to qualify.

In the Prince Rupert District no V.H.F. repeaters were established, and, therefore, the signal path between Prince Rupert and Burns Lake remains entirely dependent on atmospheric conditions. A start was made toward connecting the above points with V.H.F. by the purchase of sufficient equipment to supply all Ranger stations lying along the main route. These units were installed and are ready to supply greatly improved communication to some eighteen lookouts in the spring. At the same time, the Department of Highways commenced construction of the Houston repeater in the late autumn, and this site will be shared by the Forest Service and will connect Smithers to Burns Lake, a first step in completing the connection to Prince Rupert. Atmospheric conditions generally during the year were average, with bad sun-spot blackout occurring on the district frequency sufficiently often to underline the need for a higher frequency to be used in conjunction with the present channel.

In the Prince George area, V.H.F. was established as the main means of communication from Quesnel to Fort St. John, and east to west between Aleza Lake and Fort Fraser, this being accomplished by tying Forest Service units into the Pacific Great Eastern microwave chain. Microwave now carries all north and south radio traffic, with Forest Service units tapping the microwave chain to disseminate signals to Prince George and all Ranger stations within range. East-west communication is not within range and is therefore carried by Forest Service repeaters, the two networks being tied together at Prince George. The construction of the Fraser Mountain repeater in the spring was a joint effort of this Service, the Department of Highways, the Royal Canadian Mounted Police, and the British Columbia Power Commission, from the initial clearing of a right-of-way to the completed power-line, the site now being shared by all agencies. While the traditional uncertainty of A.M. transmission in the northern areas has been largely overcome by the new V.H.F. system, there remain isolated locations, and fires occur far beyond the reach of V.H.F. which must continue to rely on A.M. Fire communication during the past summer was adequate due to the addition of a good supply of A.M. portables, but it was evident that insufficient units were on hand for a really severe fire season in this district.

The extreme fire situation in the Kamloops District created the need for emergency expansion of forest-protection communication. While A.M. performed well within its limits of overcrowded frequencies and the uncertainty of transmitting conditions, the trend was toward the use of V.H.F., particularly on large fires. V.H.F. portables were found to be invaluable for ground-to-ground contact within a fire area, and particularly from air to ground for the guidance of water bombers and "bird dog" aircraft. The technique of establishing temporary battery-operated repeaters to suit the needs of a particular fire was used successfully on several occasions and will almost certainly be an important feature of fire-fighting in the future. With all Ranger stations except five now on the V.H.F. circuit, Lytton was connected to Kamloops headquarters by a battery repeater during the latter half of the fire season. Attempts to expand the administrative network by bringing the remaining A.M. Ranger stations within the reach of V.H.F. repeaters were unsuccessful, but experimental work with repeaters during the autumn make it probable that the remaining Ranger districts will be using V.H.F. within the next two years.

Fire portables were acquired in greatly increased numbers to meet the Nelson fire emergency, and some fixed station equipment, both V.H.F. and A.M., was purchased for installation in Ranger stations not previously equipped with V.H.F. or still using the obsolete P.A.C. unit. V.H.F. portables were used for fire com-

munication to a greater extent than in the past, but due to the mountainous nature of the country the A.M. portable is still the main fire communication tool. Preliminary surveys were carried out with the object of bringing into the main V.H.F. circuit those locations previously out of range, and it is hoped that Kaslo, Lardeau, Slocan City, and New Denver will be in operation in the near future. A new repeater at Brisco completed during the summer provided V.H.F. reliability to Spillimacheen and Golden for the first time.

In the Vancouver District, the area between Hope and Boston Bar was provided with two new repeaters, and good communication between these points and from lookouts and V.H.F. mobiles was obtained for the first time, A.M. having proved useless over the distances concerned. The new repeaters are at present temporary and for use during the period of hazard only, but permanence will be achieved before the next fire season. Port Moody and Mission Ranger Stations, previously out of range of the Mount Bruce repeater, were brought into normal operation late in the year. Special attention was given to fire communication, and a considerable improvement noted as the result of closer supervision given to fire-base station installation. Experimental use of 25-watt generator-powered fire-base stations proved successful in difficult locations where the low-powered portable proved insufficient. Purchase of several 25-watt units for fire use only was planned for the next fire season.

The Victoria technical staff early in the spring completed Fraser Mountain repeater and installed the units which now work into the Pacific Great Eastern microwave system between Quesnel and Fort St. John. Temporary installation of a second repeater at Timothy Mountain was made with the object of testing the proposed V.H.F. circuit between Victoria and Prince George, a permanent set-up being impossible due to lack of sufficient power at Timothy. While the test proved successful, interference problems at Timothy must be eliminated before the Victoria-Prince George circuit is put into operation. During the period of extreme hazard, Victoria technicians assisted with district maintenance, but later constructed the new repeater at Blackwell Mountain in Manning Park, completing V.H.F. connections to Kamloops. The success of the faster, more reliable circuit was very marked in that Kamloops, which at one time was the worst A.M. circuit in British Columbia, can now be contacted instantly and with no variation of the signal induced by atmospheric disturbances. Other Victoria work included the Hope-Boston Bar and Brisco V.H.F. installations, improvement of unsatisfactory circuits, location-testing for repeater coverage, laboratory experimental construction, and maintenance of both V.H.F. and A.M. on Vancouver Island.

FOREST PROTECTION

WEATHER

The outstanding feature of the weather during the 1960 fire season was the rapid build-up of fire danger throughout the southern districts during the first half of July as a result of deficient rainfall during the previous month. This rainfall deficiency was most marked in the south-western section of the Kamloops District, where total amounts for the seven-month period April to October came to less than 3 inches, or something less than half of the normal amount for this period.

The snow cover at the beginning of the fire season was generally less than normal throughout British Columbia, with near-record minimum water content reported from the Okanagan snow courses.

Weather throughout April was generally unsettled, except for brief periods of sunny weather near the beginning and end of the month, resulting in above normal rainfall along the outer Coast and below normal values elsewhere. Temperatures and sunshine were close to normal, and the only spring hazard occurred late in the month over the Prince Rupert District and that section of the Prince George District east of the Continental Divide.

Cool Pacific air throughout May kept temperatures near or below normal, with deficient sunshine everywhere. Rainfall was heavy except over the south-western part of the Kamloops District and over the northern part of the Prince Rupert District, where the spacing of even light rains prevented the development of any degree of fire danger. A late fall of wet snow at the end of the third week of May along the east slopes of the Continental Divide was from 1 to 3 feet deep in some areas.

In June the storm track across the northern half of the Province brought above normal rains to the west slopes of the Coast Mountains and eastern part of the Kamloops and Prince George Districts, with much below normal rainfall reported elsewhere. Again, favourable spacing of light rains and normal temperature and sunshine prevented the development of any serious fire danger even with rainfall in some areas less than 10 per cent of normal.

By July the effect of the Pacific storms was confined to the extreme northern Coast. Over most of the Province rainfall was less than 50 per cent of normal, with many stations in the southern part of the Vancouver and Kamloops Districts reporting no rain during the month. Warm sunny weather combined with deficient rainfall earlier in the season to give an unusually rapid build-up of fire danger in most areas throughout the first half of the month. An electrical storm over the Nelson District and eastern section of the Kamloops District on July 13th and 14th found even the slow-drying fuels in an extremely inflammable state, setting some 600 fires. Fire danger continued to increase throughout the Province, reaching a peak about the end of the month which was well into the extreme range over the Southern Interior districts.

Fire danger moderated somewhat about the beginning of August, but there was no major relief until an abrupt change in the weather pattern about mid-month brought widespread rains. Electrical storms over the two northern districts at intervals throughout the first half of August found fuels there much less inflammable, although trouble was experienced locally in the Babine Lake-Stuart Lake area and in the Chetwynd region. Rainfall during the last half of the month brought the totals for August to above normal values everywhere except in the south-western part of the Kamloops District.

A return to drier conditions in September over the southern half of the Province gave ideal slash-burning conditions in the Vancouver District, and maintained the fire danger at a serious level throughout parts of the Southern Interior until mid-October.

FIRES

Occurence and Causes

The total of 4,113 forest fires in 1960 was only seven fires less than the record year of 1958. Fire occurrence reached its peak during July, when 50 per cent of the total number of fires occurred, compared to the ten-year average of 32 per cent occurrence during that month.

Relating fire causes to the ten-year average shows the 14-per-cent increase in fires caused by operating railways as the greatest increase of any category during 1960. Lightning-caused fires were up 3.8 per cent over the ten-year average, while encouraging decreases of 5.6 and 3 per cent were registered by smoker- and industrial-caused fires respectively. (*See* Table 45 in Appendix.)

Forest District	Fire Occurrence during Ten-year Period 1951–60	Percentage of All B.C.
Vancouver	8,485	38.4
Prince Rupert	1,087	4.9
Prince George	2,248	10.2
Kamloops	6,446	29.2
Nelson	3,811	17.3
Totals	22,077	100.0

Cost of Fire-fighting

Fire-suppression activities cost $4,797,418, which is very close to the final cost of the record year of 1958. The extreme hazard conditions in the Nelson, Kamloops, and Prince George Districts, as described in the foregoing weather report, provided a ready tinder-box for the July and August lightning fires which started in the inaccessible parts of these districts. This unfortunate combination of circumstances resulted in large fires which accounted for 69 per cent of the burned-over acreage and 68 per cent of total fire-fighting costs. (*See* Tables 37, 50, and 52 of the Appendix for further details.)

Damage

Although the 285,820 acres burned over in 1960 were 25 per cent less than the ten-year average, the value of damage sustained by forest-cover was 230 per cent above the average of $3,725,361. Almost twice the average area of merchantable timber was burned, which, together with a higher unit value of stumpage destroyed, accounted for the large increase in the damage figure. (*See* Table 49, Parts I and II, of the Appendix.)

FIRE-CONTROL PLANNING AND RESEARCH

Fire Atlas and Statistics Ledgers

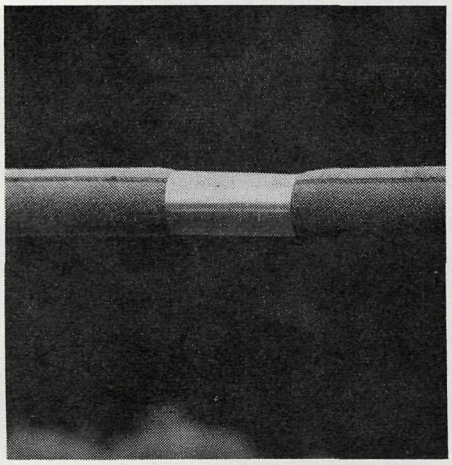
The Provincial fire atlas has been brought up to date, and the fire statistics ledgers and fire classification atlas are currently being brought up to date. With suitable base maps now available, the fire classification atlas has been put on a standard 2-mile map base, using the standard reference-map index.

FORESTRY-HOSE SLEEVE-MENDER

Picture A

Picture B

Picture C



Picture D

A break or split in fire-hose at a critical moment can be the cause of a serious loss in damage to the forest and excessive, additional fire-suppression costs. For many years the Forest Service equipped pump tool-boxes with electric tape for emergency repairs of hose in the field. This is no longer necessary. The metal sleeve-mender developed by the Ontario Forest Service has become standard equipment in British Columbia and has proven very satisfactory. Splits up to 1.5 inches in length are successfully mended with a 3.5-inch sleeve.

Pictures above illustrate: A. Approximately ¾-inch break in hose. B. Pressure released and sleeve-mender placed over break. C. Sleeve-mender in position. D. Repair job completed, hose under pressure.

After the fire is over, hose leaks are marked for permanent repair during the winter. This is done by vulcanizing a patch over the break, a method developed in the Vancouver Forest District. One district reports having salvaged 22,700 feet and another, 12,000 feet of hose in one season by the vulcanizing method.

Visibility Mapping and Lookout Photography

Thirteen points were visibility-mapped, of which eight were recommended as primary lookout points and two recommended as secondaries.

Standard panoramic lookout photographs were taken on forty points—ten at new lookout sites and thirty at established lookout points—as part of the sustained programme of keeping these photograph sets periodically renewed.

A helicopter was made available to the two-man crew in the Peace River area and was found very applicable to this type of work. It saved considerable travel-time and permitted quick action to take advantage of breaks in the weather, thus proving more economical in the long run.

Fuel-moisture Sticks

A total of 672 sets of these " hazard sticks " were distributed in 1960, with the forest industry absorbing 434 of this number. Acknowledgment is made of the kiln and weighing facilities and assistance provided by the Forest Products Laboratory at the University of British Columbia.

Protection Access Roads

Approximately 23 miles of fire-protection " ridge " access road was constructed between Arrow Creek and Hallmark Creek, in the Creston Ranger District. Connection was made to a logging-road at the south end of the ridge. Work will be continued in this area next year, extending west to Duck Creek roads. Further investigation is planned of possibilities of extending to the north toward the west fork of the Upper Goat River.

Snag-falling Projects

Three snag-falling contracts, comprising a total area of 4,925 acres, were awarded in 1960, all in Vancouver Forest District.

Air-photo Mosaics

The 1960 programme was essentially concerned with further extension of air-mosaic coverage of Vancouver Island, using contact-size B.C. Land Service air photographs.

With new high-level R.C.A.F. photos now available for the formerly void area between 118°–121° west and 49°–50° north, additional mosaics can now be prepared for this area.

Card Recording of Fire Data

Coincident with the 1960 revision of fire report forms, pertinent forest-fire data will henceforth be recorded on mechanical tabulation cards for reference and research purposes.

FIRE-WEATHER RECORDS AND INVESTIGATIONS

A basic fire-weather network of twelve representative stations has been set up in the Kamloops Forest District. The weather-instrument checker spent ten days in that district.

The fire-danger tables developed for Northern Alberta were tested in three adjacent Ranger districts of the Prince George Forest District and were found to give very satisfactory results. Experimental use of the Alberta East Slope tables

in the Vancouver Forest District was less successful. New tables based on field work during the previous three seasons are being developed by the Federal Forest Research Division and are expected to be available next season. With the establishment of a Federal fire research group at Victoria, co-ordination in the field of fire-weather studies is being developed.

The relationship between build-up class as indicated at Mount Benson Lookout and fires on Vancouver Island for the ten-year period 1950 to 1959 is given in the following table:—

Build-up Class	*Nil*	Low	Moderate	High	Extreme
8 a.m. wind speed at Mount Benson less than 15 m.p.h.—					
Days in class	137	236	214	174	102
Fires in class	53 (39)	183 (78)	235 (110)	286 (164)	207 (203)
Fires reaching 10 acres	0 (0)	8 (3)	10 (5)	12 (7)	12 (12)
8 a.m. wind speed at Mount Benson 15 m.p.h. or more—					
Days in class	66	105	97	47	18
Fires in class	27 (41)	71 (68)	134 (138)	99 (210)	46 (256)
Fires reaching 10 acres	0 (0)	3 (3)	13 (13)	9 (19)	5 (28)

Figures in parentheses give the number of fires to be expected per hundred days in each build-up class.

During 1960, lectures on fire weather were presented at the Forest Service Ranger School, the University of British Columbia, and the Southern Interior Fire Control Course at Penticton. The Division's meteorologist participated in the course on Forestry Meteorology presented by the Federal Forestry Research Division at Petawawa. A paper on the application of evaporation to forestry has been prepared for presentation at the forthcoming symposium on evaporation.

The usually abrupt ending of periods of intense drying over the southern Coastal area is of particular significance. A number of these cases occurring during the past decade are being investigated in relation to the location of the " thermal trough " and other observed features of the daily weather map which are associated with the sudden eastward motion of this trough.

During the peak of the fire season in the Kamloops Forest District, it was possible to spend one week in the area, mostly on the Dean fire in the Merritt Ranger District, in order to study the problems of getting maximum use of weather information in the suppression of large fires. As a result of subsequent investigations of the behaviour of this and other fires, it appears that much of the work that has been done in the field of aviation meteorology on the subject of air-flow over mountains can be applied with good results, if it can be made available to the fire superintendent.

FIRE-SUPPRESSION CREWS

A total of 253 fires was attended by sixteen suppression crews of ten men each located in hazardous areas throughout the Province. Even with the hazard as critical as experienced in 1960, 77 per cent of the fires fought by these crews were held to a size less than 1 acre. Only 6 per cent of the fires they fought exceeded 50 acres.

Analysis of Suppression-crew Fire-fighting Activities, 1960

Size of Fire When Attacked	Number of Fires	Subsequent Spread (by Number of Fires)				
		¼ Acre or Less	Over ¼ Acre to 1 Acre	Over 1 Acre to 5 Acres	Over 5 Acres to 50 Acres	Over 50 Acres
Spot (up to ¼ acre)	171	161	5	4	1	----
Over ¼ acre and up to 1 acre	34	----	28	6	----	----
Over 1 acre and up to 5 acres	32	----	----	19	10	3
Over 5 acres and up to 50 acres	12	----	----	----	4	8
Over 50 acres	4	----	----	----	----	4
Totals	253	161	33	29	15	15

AIRCRAFT

Protection and fire-suppression flying was expanded considerably over past years. Under the continuing contract with Pacific Western Airlines Limited, and under a new contract with Cariboo Air Charter Limited, a total flying-time of 2,822 hours for fixed-wing aircraft was logged.

Three helicopters logged a total of 874 hours of contract flying. Of this total, 444 hours were expended in the vast inaccessible timbered areas of the Peace River region.

Contract Flying, Fixed-wing Aircraft, 1960

Forest District	Base	Type of Aeroplane	Hours Flown
Vancouver	Vancouver	Beaver	344
Prince Rupert	Prince Rupert	Beaver	377
Prince George	Prince George	Beaver and Super Cub	1,034
Kamloops	Kamloops	Beaver (2)	544
Nelson	Nelson	Beaver	523
Total			2,822

Contract Flying, Helicopters, 1960

Forest District	Base	Type of Helicopter	Hours Flown
Vancouver	Vancouver	Hiller 12-E	64
Prince Rupert	Prince Rupert	Hiller 12-E	132
Prince George	Peace River and Prince George	Bell G-2 and Hiller 12-E	444
Kamloops	Kamloops	Hiller 12-E	234
Nelson	*Nil*	*Nil*	*Nil*
Total			874

The severity of the 1960 fire season and the large number of resulting lightning-caused fires called for an expanded use of aircraft, both fixed and rotary wing, in strictly fire-suppression roles. For this purpose, a total of 3,551 hours of fixed-wing flying was utilized, including 696 hours spent in transportation of fire-fighters, supplies, and equipment, and 2,126 hours water bombing. Helicopters on fire duty logged 214 hours on fire reconnaissance and 1,548 hours transporting men and supplies, for a total of 1,762 hours.

More than half of the water-bombing time was devoted to dropping bentonite slurry. This additive to the water dropped on fires reduces the evaporation rate of water and, of course, increases the effective life of water as a fire-control agent. However, the addition of bentonite reduces the pay load of water by about 10 to 15

per cent. There are other additives now being marketed which are being proven to be more effective than either bentonite or borate, and which do not reduce the effective volume of water that can be transported.

Use of Fixed-wing Aircraft in Fire-fighting, 1960

Forest District	Reconnaissance		Transportation of Men and Supplies		Water Bombing		Total	
	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost
Vancouver	6	$297	15	$766	7	$6,162	28	$7,225
Prince Rupert	21	1,562	91	7,000	.....	.....	112	8,562
Prince George	207	11,970	299	21,038	119	17,129	625	50,137
Kamloops	259	19,909	176	13,607	1,497	230,162	1,932	263,678
Nelson	236	11,293	115	11,450	503	113,292	854	136,035
Totals	729	$45,031	696	$53,861	2,126	$366,745	3,551	$465,637

Use of Helicopters in Fire-fighting, 1960

Forest District	Reconnaissance		Transportation of Men and Supplies		Water Bombing		Total	
	Hours	Cost	Hours	Cost	Hours	Cost	Hours	Cost
Vancouver	12	$1,269	161	$16,936	.....	.....	173	$18,205
Prince Rupert	1	84	26	2,720	.....	.....	27	2,804
Prince George	39	4,233	261	33,700	.....	.....	300	37,933
Kamloops	56	4,280	449	53,950	.....	.....	505	58,230
Nelson	106	12,447	651	76,886	.....	.....	757	89,333
Totals	214	$22,313	1,548	$184,192	.....	.....	1,762	$206,505

ROADS AND TRAILS

All classes of road constructed and maintained for forest-protection purposes now exceed 2,000 miles for the entire Province. Trail access is diminishing slightly as some trails are converted into four-wheel-drive roads.

Construction of Protection Roads and Trails, 1960

	Light	Medium	Heavy	Total
	Miles	Miles	Miles	Miles
New road construction	15.1	68.6	170.6	254.3
Road maintenance	949.0	611.0	189.8	1,749.8
Total road construction and maintenance	964.1	679.6	360.4	2,004.1
New trail construction	3.5	81.5	81.0	166.0
Trail maintenance	379.7	210.6	58.7	649.0
Total trail construction and maintenance	383.2	292.1	139.7	815.0

SLASH-DISPOSAL AND SNAG-FALLING

This proved to be an advantageous year for slash-burning in the Vancouver District. Since there were no extended interruptions to logging, as had been the case in 1958 and 1959, operators were able to carry out plans more or less according to schedule, and thereby were able to have designated areas ready for slash-burning at the first favourable break in the weather.

In late August over 4 inches of rain were recorded in Vancouver and the Fraser Valley, with like amounts over the rest of the Vancouver Forest District.

Slash-burning was started immediately thereafter, and weather conditions were such that slash-burning could be continued over a much longer period than usual, with a consequently greater than average area burned over.

In addition to slash-disposal on current logging, the increased acreage burned is partly due to cleaning up 1958 and 1959 slash which could not be disposed of at that time, and is also partly due to slash-burning requirements in areas previously exempt.

One significant statistic is that the acreage broadcast-burned exceeds the acreage spot-burned. This is partly due to the current practices on some tree-farm licences of broadcast burning to ensure prompt natural regeneration in pulp-salvage areas. Experience seems to indicate that broadcast burning is necessary to keep many such areas productive, and to prevent invasion by brush and non-commercial cover. (For statistical data on slash-disposal and snag-falling in Vancouver District, *see* Tables 39 to 43, inclusive, in the Appendix.)

In addition to the snag-falling done by the logging industry, Protection Division felled 6,145 acres of snags under contract in the Vancouver Forest District, and Reforestation Division crews felled snags on 6,306 acres, of which 2,581 acres were in Southern Interior areas.

FIRE-LAW ENFORCEMENT

In spite of a very heavy fire season, information was laid in only forty-two instances, as compared with a ten-year average of sixty. Thirty-five convictions were obtained, against two cases dismissed. Five cases were still pending disposal at year's end. As a rare event in the history of the Forest Service, two arson convictions were secured. Further information is given in Table 53 of the Appendix.

FOREST CLOSURES

The prolonged rainless period in the southern portion of the Province precipitated sixty-six forest closures. General closures were ordered in the Bella Coola area of the Prince Rupert Forest District and in five zones of the Vancouver Forest District. In the Prince George Forest District, one recreational closure was ordered in the southern portion of the Peace River area, while six recreational and one restricted-travel closure was ordered in the Kamloops Forest District. The remaining fifty-two closures were recreational, in the Nelson Forest District.

Forest Closures, 1960

Area	Forest District	Type of Closure	Effective Date	Termination Date
Horsefly Lake–Quesnel Lake Road	Kamloops	Restricted travel	April 7	August 19
Area No. 10—Little Slocan River	Nelson	Recreational	July 7	August 22
Area No. 11—Tiger, Cambridge, Gorge, Ryan, McAlister, and Casino Creeks	Nelson	Recreational	July 14	August 22
Area No. 13 — Blueberry, Poupore, Sullivan, Johnson, Murphy, McNally, Hanna, and Topping Creeks	Nelson	Recreational	July 14	August 22
Area No. 28—Arrowpark Creek	Nelson	Recreational	July 14	August 22
Area No. 38—Slewiskin Creek	Nelson	Recreational	July 14	August 22
Area No. 40—Big Sheep Creek	Nelson	Recreational	July 14	August 22
Area No. 43—Ladybird and Norns (Pass) Creeks	Nelson	Recreational	July 14	August 22
Area No. 46—Kuskanax Creek	Nelson	Recreational	July 14	August 22
Area No. 47—Nakusp and Fitzstubbs Creeks	Nelson	Recreational	July 14	August 22
Area No. 48—Caribou and Burton Creeks	Nelson	Recreational	July 14	August 22
Area No. 26—Wilson Creek	Nelson	Recreational	July 15	August 22

Forest Closures, 1960—Continued

Area	Forest District	Type of Closure	Effective Date	Termination Date
Area No. 29—Boundary Creek	Nelson	Recreational	July 15	August 22
Area No. 32—Ingram Creek	Nelson	Recreational	July 15	August 22
Area No. 37—Conkle, Ed James, Johnstone, and Jolly Creeks	Nelson	Recreational	July 15	August 22
Area No. 50—Between Westkettle and Kettle Rivers north of Westbridge	Nelson	Recreational	July 15	August 22
Area No. K 1—Nashwhite (Siwash) Creek	Kamloops	Recreational	July 15	August 4
Area No. K 2—Whiteman Creek	Kamloops	Recreational	July 15	August 4
Area No. K 3—Shorts Creek	Kamloops	Recreational	July 15	August 4
Area No. K 4—Lambly Creek	Kamloops	Recreational	July 15	August 4
Area No. 3—Lamb Creek	Nelson	Recreational	July 18	August 22
Area No. 16—St. Mary River	Nelson	Recreational	July 18	August 22
Area No. 41—Spillimacheen River	Nelson	Recreational	July 18	August 22
Area No. 9—Lemon Creek	Nelson	Recreational	July 18	August 22
Area No. 44—Whatshan River	Nelson	Recreational	July 18	August 22
Area No. 53—Perry Creek	Nelson	Recreational	July 18	August 22
Area No. 57—Main Kettle River	Nelson	Recreational	July 18	August 22
Area No. 7—Five Mile and Anderson Creeks	Nelson	Recreational	July 18	August 22
Area No. 14—Granby River	Nelson	Recreational	July 18	August 22
Area No. 23—Alexander Creek	Nelson	Recreational	July 18	August 22
Area No. 31—Wild Horse Creek	Nelson	Recreational	July 18	August 22
Area No. 36—Bull River	Nelson	Recreational	July 18	August 22
Area No. 52—Moyie River	Nelson	Recreational	July 18	August 22
Area No. 15—Crawford Creek	Nelson	Recreational	July 20	August 22
Area No. 19—Big and Little Sand Creeks	Nelson	Recreational	July 20	August 22
Area No. 21—Woodbury, Krao, Cedar, and Lendrum Creeks	Nelson	Recreational	July 20	August 22
Area No. 24—Hartley Creek	Nelson	Recreational	July 20	August 22
Area No. 25—Elk and Fording Rivers	Nelson	Recreational	July 20	August 22
Area No. 30—Boundary Creek (Creston Ranger District)	Nelson	Recreational	July 20	August 22
Area No. 33 — Stony, Sundown, and Sunrise Creeks, and part of Yahk River	Nelson	Recreational	July 20	August 22
Area No. 39—Gray Creek	Nelson	Recreational	July 20	August 22
Area No. 54—Gold Creek	Nelson	Recreational	July 20	August 22
Area No. 55—Wigwam River	Nelson	Recreational	July 20	August 22
Area No. 56—Flathead River	Nelson	Recreational	July 20	August 22
Area No. 1—Sheep Creek	Nelson	Recreational	July 22	August 22
Area No. 2—Erie Creek	Nelson	Recreational	July 22	August 22
Area No. 6—Hidden Creek	Nelson	Recreational	July 22	August 22
Area No. 12—South Fork of Salmo River	Nelson	Recreational	July 22	August 22
Area No. 22—Hawkins Creek	Nelson	Recreational	July 22	August 22
Area No. 17—Pend d'Oreille River	Nelson	Recreational	July 22	August 22
Area No. 58—Smokey, Falls, Garrity, and Smallwood (Bear) Creeks	Nelson	Recreational	July 22	August 22
Area No. 27—Goat River	Nelson	Recreational	July 26	August 22
Area No. 35—Hazel Creek	Nelson	Recreational	July 26	August 22
Area No. 42—Sullivan Creek	Nelson	Recreational	July 26	August 22
Area No. 59—Kid Creek	Nelson	Recreational	July 26	August 22
Area No. K 10—Oyama Creek	Kamloops	Recreational	July 26	August 4
Area No. 45—Sanca Creek watershed	Nelson	Recreational	July 29	August 22
Area No. 60—Boundary Creek	Nelson	Recreational	July 29	August 22
Area No. K 11—Penticton and Ellis Creeks	Kamloops	Recreational	July 30	August 4
Zone 1—Vancouver Island	Vancouver	General	August 9	August 15
Zone 9—Vancouver Mainland	Vancouver	General	August 9	August 15
Bella Coola and Necleetsconnay Rivers	Pr. Rupert	General	August 10	August 15
South portion of Peace River District	Pr. George	Recreational	August 11	August 24
Zone 7—Mainland	Vancouver	General	August 11	August 15
Zone 8—Mainland	Vancouver	General	August 11	August 15
Zone 10—Mainland	Vancouver	General	August 11	August 15

RANGER SCHOOL

GENERAL

The eleventh class, consisting of twenty-one men, graduated in December, 1960. The twelfth class will commence January 9th, 1961.

A two-day trial course at the Marine Station in the operation of launches was conducted in December. There were no major changes in the curriculum, but the work of revising courses was continued.

Subjects covered during the year were as follows:—

Second Term, Eleventh Class, Spring, 1960

Subject	Days Allotted
Management Policies and Procedure	15
Preliminary Fire Organization	10
Scaling	14
Construction	3
Appraisals	5
Public Speaking	3
Mechanical Course	10
Public Relations	1
Game Commission	0.5
Examinations, visitors, and field-trips	5.5
Total days	67

Typing, 4 to 5 p.m. two days per week.

Third Term, Eleventh Class, Fall, 1960

Subject	Days Allotted
Fire Suppression	14
Mensuration	15
Vancouver Island trip	4
Photogrammetry	3
Business English	4
Silviculture	9
Ranger District Organization	7
Personnel Management	1
Grazing	1
Examinations, visitors, and field-trips	5
Total days	63

Typing, 4 to 5 p.m. two days per week.
First aid, 8 to 10 p.m. one evening per week.

EXTRA COURSES

A five-day course for lookoutmen followed the spring term. Eight men completed the course and were appointed to stations in the Vancouver Forest District.

School facilities were used for two weeks in April by the Department of Recreation and Conservation for an in-service training course. There was an average of thirty-six in attendance.

The instructional staff also participated in the Forest Protection Committee courses sponsored by the Canadian Forestry Association and in lectures at the University of British Columbia and to other groups.

Assistance was also given the Kamloops Forest District in conducting a course for lookoutmen in that district.

ACKNOWLEDGMENTS

Thanks are due to speakers and lecturers provided by the following agencies: Department of Recreation and Conservation; Air Division of the British Columbia Land Service; Civil Service Commission; University of British Columbia; Forests Products Laboratory; MacMillan, Bloedel and Powell River Ltd.; Forestal Forestry and Engineering; British Columbia Forest Products Limited; as well as lecturers from other divisions and districts of the Forest Service.

To British Columbia Forest Products Limited, particularly Mr. G. Burch, go sincere thanks for the co-operation shown the school at all times in the interests of good forestry.

PERSONNEL

ORGANIZATION

Following the major organizational changes of the previous year, no further changes were made in 1960. At the same time, the need for greater emphasis on certain aspects of the work was recognized. The increasing number of public sustained-yield units requiring administrative supervision called for the addition of a forester to the appropriate section in each of the five district offices. Two foresters were added to the Research Division to strengthen the forest genetics research programme. In the Interior districts, a junior assistant was added to the Scaling Section to permit increased field instruction and inspection by the Inspectors of Licensed Scalers.

SERVICES

There was a marked increase in volume of the usual functions of personnel administration carried out by the Personnel Office. A record number of applications for employment were handled. Substantial changes in the Sick and Holiday Leave Regulations and the introduction of a group life insurance policy required implementation, and an increasing proportion of time was devoted to matters of organizing for safety and accident prevention.

The high standard of employee relations within the Forest Service continued, as evidenced by the fact that only one formal grievance was presented during the year. Two new associations of specialized employees representing the B.C. Government group of professional agrologists and of professional foresters announced their formation. This brought to five the number of associations involving Forest Service personnel, the earlier three being the comprehensive B.C. Government Employees' Association, the B.C. Official Scalers' Association, and the Society of British Columbia Forest Officers representing, primarily, Forest Rangers in the Vancouver Forest District. The Personnel Office maintained co-operative relations with these groups through meetings, correspondence, and review of briefs submitted.

Vocation day programmes are becoming increasingly popular at high schools throughout the Province, and numerous Forest Service officers took part.

COMMUNICATIONS AND TRAINING

Ranger meetings were held in the spring at Prince George and Prince Rupert. The Personnel Officer attended both meetings and, in total, spent 21 per cent of his time in field contacts away from Victoria headquarters. The District Foresters' meeting planned for January was cancelled for reasons of economy, but a Management meeting and Scaling meeting were held, followed by a meeting of Protection Officers after the very heavy fire season.

With respect to employee morale, there is still a lack of communication and information at the field-staff level aggravated by the widely scattered and sometimes isolated location of personnel. The Forest Service news-letter, formerly a monthly bulletin, served a very useful personnel function in carrying news and information of divisional and district activities related both to forestry and personnel, but was again restricted this year to a single Christmas edition. Nevertheless, this lack was partly alleviated when the Civil Service Commission commenced publishing a monthly Civil Service news-letter.

The Civil Service Commission called two interdepartmental meetings of Personnel Officers during the year. The meetings were intended for instruction and

discussion of new or amended policies and proved a worth-while sounding-board for departmental opinions on such things as new leave regulations, recruitment problems, entrance examinations, and promotional panels.

In the field of training, two members of the Forest Service, an engineer and a principal clerk from the Victoria offices, were selected for the fifth class of the Executive Development Training Plan sponsored by the Government through the University of British Columbia. An engineer, a forester, and the Personnel Officer graduated with the second class. Arrangements were made for limited attendance at training sessions, such as the Camp Management Training Conference of the British Columbia Loggers' Association, the Industrial First Aid Attendants' Conference, the Workmen's Compensation Board " Project Igniter " lecture demonstrations on fire, the British Columbia Safety Council Provincial Safety Conference. Forest Service officers instructed at the Canadian Forestry Association Fire Control Course, a Right-of-way Agents' meeting of the Department of Highways, and numerous locally organized programmes. A Lands Department surveys officer conducted an instruction tour on aerial photographs through the Prince Rupert Ranger districts. The Prince George, Prince Rupert, and Nelson Forest Districts and the Surveys and Engineering Services Divisions set up formal safety and accident-prevention committees. Various in-service training programmes were continued, such as Lookout and Assistant Ranger schools, first-aid schools, and field training courses organized by the districts and divisions concerned. In Victoria, during the winter, a series of noon movies on forestry and related subjects were shown primarily for the information of office staffs.

ESTABLISHMENT, RECRUITMENT, AND STAFF TURNOVER

The permanent Civil Service establishment approved for the Forest Service by the Legislative Assembly for the fiscal year commencing April 1st, 1960, was 832, equal to the previous year. Early in the year this was increased by Order in Council to 839 by the addition of seven foresters for Working Circle administration and Research. Reflecting the increased forest activity in the Province during the year, sufficient additional funds were also made available to increase the number of continuously employed field staff, primarily Assistant Rangers, cruising and silviculture crewmen, by some eighty-four. At the same time the number of seasonally employed personnel dropped by forty.

During 1960 seventy-one persons received Civil Service appointments and seventy-five left the permanent service. One twenty-five-year service badge was earned. There were five retirements during the year. Forty-eight transfers of permanent staff took place. Ten graduate foresters and four engineers left the Service, and fourteen foresters and four engineers were hired, including eight forestry graduates from the University of British Columbia.

Turnover of Civil Service appointed staff, including permanent and full-time casual staff, averaged 13.4 per cent, up slightly over the previous year. Prince Rupert District suffered the greatest disruption, with a 51.4-per-cent turnover of office staff and an over-all average of 22.9 per cent. Nelson was the lowest, with 10 per cent office staff turnover and 6 per cent turnover of total staff. Amongst professional employees, there was a 6.7-per-cent turnover, which is 75 per cent higher than last year, while technical staff turnover rose from 3.1 per cent in 1959 to 4.8 per cent in 1960. Total office staff turnover was down but still remained at the high figure of 25.6 per cent. Sixty per cent of the office staff are female, but this group comprises 85 per cent of the office turnover. There was a reduction in all groups of the number of persons who stated their reason for leaving was for better

salary and over half indicated personal and other miscellaneous reasons, such as further education. Seven men were lost in fatal accidents on the job. A survey party of four drowned in a boating accident, two fire-fighters were killed by falling snags on the fire-line, and a water-bomber pilot died when his plane crashed. In the matter of discipline amongst permanent staff or during probationary periods, no releases by Order in Council were necessary, and action was restricted to one disciplinary suspension for breach of safety regulations and withholding of six annual merit increases.

Over 600 written applications for employment, the highest on record, were handled in the Personnel Office alone, apart from many others handled through divisional and district offices. In addition to the usual reclassification examinations, special written examinations were held for one promotional position, and oral examinations at panel interviews were employed in filling seven other positions. The Personnel Officer and Assistant also participated in making selections for 156 other Civil Service positions. At the annual spring examinations for Assistant Rangers, 150 candidates sat, of whom thirty-one passed. As there were only seventeen vacancies for Assistant Rangers and there were a large number of previously qualified men still in the service at lesser classifications, the examinations were held in the Vancouver, Prince George, and Prince Rupert Districts only. At the end of December twenty-one trained men graduated from the Forest Service Ranger School and occupied positions throughout the Province as Deputy Rangers, Stand Examination Officers, and Cruising Supervisor.

CLASSIFICATIONS, SALARIES, AND WORKING CONDITIONS

No important changes were made during the year in the Civil Service classification system affecting Forest Service employees. Minor revisions were made in the specifications for various positions in line with current practice.

Numerous individual position classification reviews were carried out. Of the sixty submitted to the Civil Service Commission, forty-four were approved, fourteen rejected, and two were undecided at the end of the year.

Effective April 1st, a salary revision with increases from 4 to 7 per cent was granted, affecting professional grades up to the Assistant Chief Forester level. Adjustments for the Ranger Supervisors' group and Assistant Radio Superintendent, reported as agreed upon in last year's Report, did not materialize. Toward the year-end a submission was made to the Civil Service Commission concerning a number of categories that were most obviously falling out of line. For the first time in over ten years, the Forest Service carried an appeal to a final hearing of the Civil Service Commission. The appeal was with respect to the salary rating of Forest Agrologists relative to other Agriculturists in the Government Service, and was lost.

The major changes in working conditions were the revision in Sick Leave Regulations, cancelling sick leave with pay entitlement during the first six months of employment, but increasing the rate of accumulation of sick-leave credits thereafter, and the increases in holiday-leave benefits after five, fifteen, and twenty years of service. The introduction of a Government group life insurance scheme covering most full-time employees was well received. At the same time, unemployment insurance coverage was restricted to day-rate and non-continuous staff. Within the Forest Service, restrictions in budget required a drastic curtailment of the issuing and replacement of uniforms and a restriction of their use. Similarly, there was a restriction in conditions governing transfers of employees and the limits of expenses and assistance which could be granted.

There was a marked increase in concern and activity for safety and accident prevention throughout the Service. The accident-frequency rate (cases involving

over three days' time-loss per million man-hours) excluding fire-fighters was 16.1 and including fire-fighters was 20.2 for the Forest Service. Safety committees became active in all forest districts and at Victoria headquarters. Tests were conducted on various types of life-jackets in use in the Service, and the least efficient were discarded. Marine safety equipment inspection reports were devised for Mechanical Superintendents inspecting watercraft. Surveys of accident causes were begun, and safety bulletins, suggestions, and revised instructions increased in circulation.

ACCOUNTING

FISCAL

The financial tables included in the Appendix to this Report reveal a substantial increase in Forest Service business during 1960. The increases in some phases are remarkable, considering the unfavourable market conditions reportedly experienced by the industry during most of the year and the hampering effect of yet another record fire season.

A record volume of timber was scaled (*see* Tables 6 to 9 in Appendix), and this was reflected in the total of charges against logging operations (*see* Table 31), which increased by 20 per cent to $32,964,679, the highest total since 1956. Although all forest districts showed some increase in charges, the Vancouver and Prince Rupert Districts accounted for almost 75 per cent of the over-all Provincial increase, with the latter topping its 1959 total by 48 per cent.

Direct Forest Service revenue collections increased to $30,523,579, a record calendar-year total and 13.7 per cent greater than that of 1959. Timber-sale stumpage, which comprises the bulk of the revenue, was $26,374,420, up 14.2 per cent, and the other timber-sales items of rentals and fees, cruising, and advertising increased accordingly. Timber royalty continued an upward trend begun in 1959 and the total of $2,281,028 represented an increase of 20.6 per cent. This was apparently due to a larger volume of cutting on royalty-bearing lands in the Prince Rupert District (Coast). Rentals and fees on timber licences, berths, and leases showed little change, except for an increase of 9 per cent in the latter. These tenures are no longer issued and terminate as they become fully logged. Grazing permits and fees again increased substantially, being up 17 per cent to $101,240, due to a further increase in fees, which are based on live-stock prices received by the producers the previous year. Collections of forest-protection tax totalled $456,491, a drop of 10.6 per cent from the previous year. This was due to late billing of the tax on Crown-granted areas, and payments of these accounts should be received early in the new calendar year. The total of miscellaneous revenue collected was almost identical with that for 1959, at $121,461.

ADMINISTRATION

In the headquarters Accounts Office, the effect of the record fire season was felt in the Expenditure Section, and accounting for fire-suppression expenditures was not fully completed by the end of the year. The growth in normal business kept the other sections fully occupied with sliding-scale stumpage price adjustments, due to lumber-market price fluctuations, continuing to be a major part of the work of the Timber Sales Records Section.

Internal audit and procedural inspection visits to district offices were carried out on a normal basis, and investigators from the Comptroller's office maintained a full schedule of mill-records checks, as well as undertaking cost studies for Management Division.

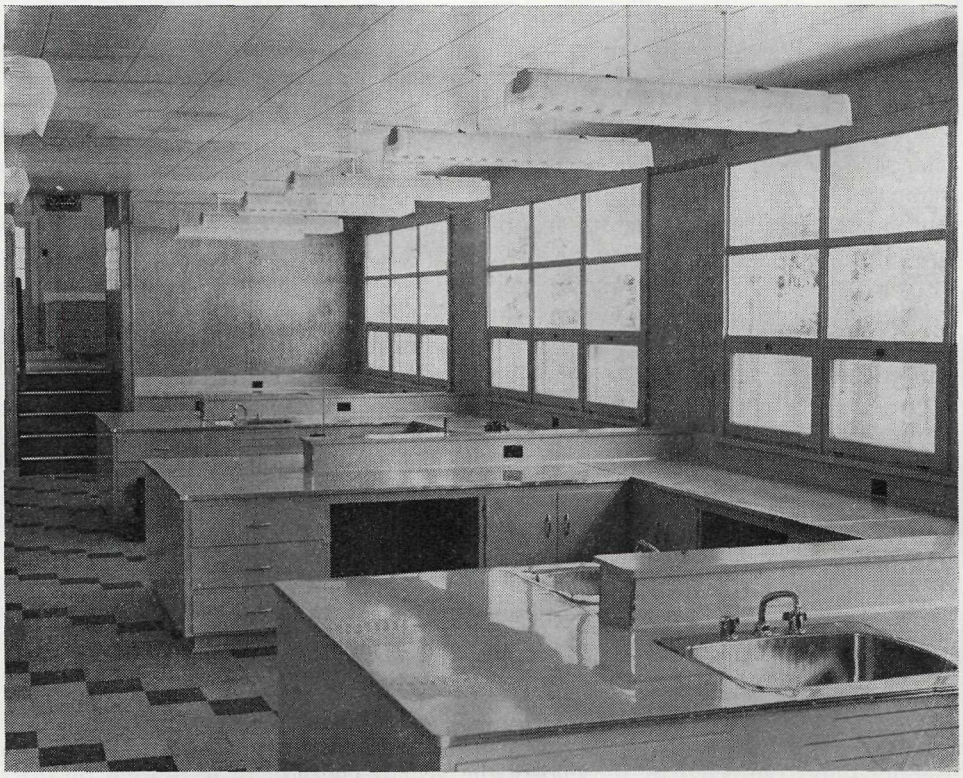
In spite of the increase in total revenue, the collection situation was influenced by the continued " tight money " financing problems of marginal operators and slow liquidation of inventories in some sections of the industry. Lumber prices declined toward the latter half of the year, and the lumber-market outlook was uncertain at the year's end.

Log-salvage activity was unchanged from 1959, there being 277 active permits as at December 31st.

FOREST ENTOMOLOGY AND PATHOLOGY*

As of October, 1960, the staff of the Forest Biology Division officially became the Forest Entomology and Pathology Branch of the new Canada Department of Forestry. The organization of the Branch in British Columbia remains unchanged for the time being.

During the year, construction of a new field laboratory was completed at the Cowichan Lake Experiment Station. The building is designed for use by the Forest Research Branch and Forest Entomology and Pathology Branch, Canada Department of Forestry.



Interior view of new field laboratory at Cowichan Lake Forest Experiment Station.

A co-operative study to prepare an ecological classification for white pine forests in the Interior was continued. This study, sponsored by the Forest Entomology and Pathology Branch, was carried out under the direction of Mr. V. J. Krajina, Department of Biology and Botany, University of British Columbia.

FOREST INSECT AND DISEASE CONDITIONS

The year was characterized by a large number of outbreaks of defoliating insects on the Coast, some of them of an unusual nature, and a generally low level of insect activity in the Interior. Collections of forest-disease specimens during 1960 totalled 2,049. Included in the number were eight fungi listed for the first

* Prepared by R. R. Lejeune, Forest Entomology and Pathology Branch, Victoria, B.C., Canada Department of Forestry.

time in the forest-disease herbarium and three fungi recognized as having a more extensive host range or geographical distribution than previously recorded. Under the weather conditions encountered, foliage diseases flourished and were reported generally at above average infection levels.

The one-year-cycle spruce budworm remained at a low level in the Vancouver District. The population increased in the area between Kitimat and Terrace, but the outlook for 1961 indicates decreased activity there.

The current two-year-cycle spruce budworm outbreak is the most extensive recorded to date in Central British Columbia. Its focal point is the Babine Lake area, and from there it extends east, west, and north into the Prince George and Prince Rupert Forest Districts. The area affected now exceeds 7,600,000 acres, but a decline in the population is expected in 1961.

The black-headed budworm decreased to a low level on the Queen Charlotte Islands during midsummer of 1960. The general outlook for 1961 is for low populations on the Queen Charlotte Islands, Vancouver Island, and the Coastal Mainland.

An unusually intense outbreak of the saddle-backed looper occurred on some 14,000 acres of hemlock and balsam at Kitimat in 1960. Surveys indicate that there is a potential for a high population in 1961.

The green-striped forest looper has not been regarded as a threat to western hemlock but, in 1960, no less than thirty-seven severe infestations, ranging in size from 35 to 6,300 acres each and totalling about 26,000 acres in all, were detected on the west coast of Vancouver Island. Surveys indicate that defoliation probably will not be as severe in 1961.

The known range of the balsam woolly aphid was again extended in the Howe Sound-North Vancouver area. Four foreign species of predators were released, and further introductions are planned for 1961.

Fairly heavy larval populations of the pine butterfly were present in MacMillan Park and surrounding stands. About a twofold increase in numbers is predicted for 1961. This is not expected to cause severe damage to second-growth stands, but any weakening of trees in about 1,700 acres of overmature decadent stands may predispose them to attack by bark-beetles and wood-borers.

The western hemlock looper was more abundant than usual in the Coastal forests, but defoliation was light and is not expected to be severe in 1961. In the Interior, populations increased along the Big Bend Highway and North Thompson River.

The great number of red-topped Douglas fir appearing in the Interior in 1960 indicated that an upsurge of the Douglas fir beetle had taken place in 1959. In the most heavily attacked areas there was a four-to six-fold increase in red-topped trees in 1960 compared with 1959.

The mountain pine beetle continued to attack lodgepole, white, and ponderosa pine in most areas infested in 1959 but, in general, populations were not epidemic. However, heavy white pine mortality was observed on the Lower Mainland and Vancouver Island.

Needle-blight of pine, caused by *Elytroderma deformans,* continued to intensify in yellow pine stands for the third consecutive year, and mortality in the suppressed crown classes was noted on permanent sample-plots. The incidence of Douglas fir needle-cast, caused by *Rhabdocline pseudotsugæ,* continued at outbreak level in the Canal Flats-Invermere Christmas-tree holdings. Ink-spot disease of trembling aspen, caused by *Ciboronia seaveri,* reached epidemic proportions in Tweedsmuir Park and near Prince George. Needle-cast of larch, caused by *Hypodermella laricis,* was severe in the Kettle Valley and Upper Arrow Lake regions.

A *Melamspora* rust, believed to be an introduced species, was found on ponderosa pine seedlings in an experimental seed-bed in the Prince Rupert Forest District. All infected seedlings were destroyed. Willow blight, an introduced disease caused by *Fusicladium saliciperdum,* was reported in Vancouver. This is the first record of reoccurrence of the disease since 1941.

Twenty additional plantations of exotic forest tree species were brought to the attention of the laboratory during the year, and observations on nine plantations were discontinued. This brings the total number registered and under periodic observation to 168. White mottled rot, caused by *Ganoderma applanatum,* was reported for the first time on Scots pine, and a high incidence of *Armillaria mellea* root-rot was reported in several hybrid poplar plantations.

Late damping-off developed to endemic levels at Quinsam and Green Timbers forest nurseries. At Duncan, however, the situation was more serious, with losses averaging approximately 30 per cent.

CONTROL OPERATIONS AND EXPERIMENTS

Studies were initiated in forest-disease control with the assignment of a research officer to this field. Initial studies have been directed to an appraisal of the translocation and persistence of several anti-fungal antibiotics in Douglas fir and to the experimental control of Douglas fir needle-cast.

The Forest Entomology and Pathology Branch was responsible for assessing several insect-control operations during 1960. The largest was the spraying of some 30,000 acres of forest land for control of the black-headed budworm on the Queen Charlotte Islands. This project was undertaken by the British Columbia Loggers' Association, with financial assistance from the British Columbia Government. An innovation was the use of a weaker solution of DDT (one-quarter pound per acre), which reduced harmful side effects to fish and fish-food organisms but at the same time appeared to give adequate control of the budworm.

Field experiments conducted with a bacterial insecticide, *Bacillus thuringiensis,* against the black-headed budworm were of particular interest. The 1960 trials included both small-scale hand-spraying experiments and spray applied by aircraft over selected plots. They demonstrated that black-headed budworm can be killed with *B. thuringiensis* dosages that are within the range of practicability for aerial spraying. It is anticipated that the usefulness of the material can be improved with better formulation and application techniques. If it can be developed for commercial application, it could find wide use in areas sensitive to the adverse side effects of conventional insecticides.

About 1,800 acres of forest around Kitimat were sprayed with DDT for control of the saddle-backed looper. Although the spraying apparently did not kill many insects, observations indicate that a considerable amount of foliage was saved by slowing down their feeding.

The British Columbia Forest Service treated about 250,000 cubic feet of logs to eliminate a hazard presented by large populations of the Alaska spruce beetle, near Hay Lake in the Central Interior. The treatments were judged to be successful.

A new development, pioneered by the British Columbia Loggers' Association, is the spraying of log-booms by helicopter for their protection from ambrosia beetle attack. A considerable volume of logs on Cowichan Lake was successfully treated during 1960.

RESEARCH PROJECTS

Insects

Research was continued on the following: Ambrosia-beetles, Douglas fir beetle, Douglas fir needle-miners, cone and seed insects, insect bioclimatology, insect diseases, wood-borers in fire-killed timber, timber-infesting insects, the poplar and willow borer, and life-histories of important defoliating insects. New work was started on the Sitka spruce weevil, aimed essentially at determining the seriousness of the problem under various site conditions and developing methods of control. New problems brought to the attention of the laboratory were terminal damage to leaders of young Douglas fir on Vancouver Island and Sitka spruce on the Queen Charlotte Islands. These are being investigated. While some of the damage can be attributed to insects, it is suspected that other factors may be more important.

Diseases of Immature Forests

Studies of the distribution of disease within Douglas fir plantations were continued on Vancouver Island, with a re-examination of plots in the Robertson River area and with a further analysis of data from the three study areas enumerated to date. Studies of Poria root-rot of Douglas fir were reopened; major emphasis during the year was placed on the evaluation of the susceptibility of western hemlock and on the development of a satisfactory method of artificial tree infection. A preliminary survey was initiated to develop sampling methods appropriate to the appraisal of Douglas fir root-rot. Investigations of pole blight of western white pine were continued. Major emphasis during the year was placed on an evaluation of the occurrence and severity of pole blight in relation to ecological conditions. Preliminary analyses were completed on seventy-five plots. Artificial drought shelters and weather records were maintained in experimental areas in the Arrow Lakes region. Investigation of a canker disease in native and exotic *Populus* spp. was continued, and factors affecting adventitious rooting were examined.

Diseases of Mature Forests

A study initiated in 1959 to assess the importance of logging scars in Douglas fir as avenues of entrance for wood-destroying and wood-staining fungi was continued. Sample areas were established in the Cariboo, Okanagan, and East Kootenay drainage systems. Data derived from an earlier study of deterioration in wind-damaged spruce-balsam forests were analysed and a report prepared for publication.

PUBLICATIONS

Publications distributed during the year included:—

Chapman, J. A., and E. D. A. Dyer: Seasonal Flight Activity of the Ambrosia Beetle *Trypodendron lineatum* (Oliv.), for 1959, near Parksville, B.C. Proc. Ent. Soc. B.C. 57:30–34. 1960.

Molnar, A. C., and R. G. McMinn: The Origin of Basal Scars in the British Columbia Interior White Pine Type. For. Chron. 36(1):50–60. 1960.

McBride, C. F., and J. M. Kinghorn: Lumber Degrade Caused by Ambrosia Beetles. B.C. Lumberman 44(7):40–52. 1960.

Ross, D. A.: Damage by Long-horned Wood Borers in Fire-killed White Spruce, Central British Columbia. For. Chron. 36:355–361. 1960.

Parker, A. K., and A. L. S. Johnson: Decay Associated with Logging Injury to Spruce and Balsam in the Prince George Region of British Columbia. For. Chron. 36:30–45. 1960.

In addition, five multigraphed reports were prepared for regional distribution. These refer to forest-disease sampling studies on Douglas fir plantations; to a programme of blister-rust resistance testing of western white pine; to fungi associated with previously unrecorded frost damage; to the collection of fungi in the Victoria herbarium; and to the development of a population sampling method for the two-year-cycle spruce budworm. Several articles of local or topical interest were published in the Forest Entomology and Pathology Branch bi-monthly progress report.

PERSONNEL DIRECTORY, 1961

VICTORIA HEADQUARTERS

R. G. McKee - - - - - - - - - Deputy Minister of Forests.
F. S. McKinnon - - - - - - - - - - - - Chief Forester.
L. F. Swannell - - - - - - Assistant Chief Forester i/c Operations Branch.
J. S. Stokes - - - - - - - Assistant Chief Forester i/c Planning Branch.

Staff Division Heads:

Cooper, C. - - - - - - - - - - - - - Forest Counsel.
Hicks, W. V. - - - - - - - - - Departmental Comptroller.
Monk, D. R. - - - - - - - - - Director, Public Information.
Williams, W. J. - - - - - - - - - - - - Personnel Officer.

Operations Branch Division Heads:

Forse, H. B. - - - - - - - - Forester i/c Protection Division.
Greggor, R. D. - - - - - - Forester i/c Engineering Services Division.
Hughes, W. G. - - - - - - - Forester i/c Management Division.
Pendray, W. C. - - - - - - - - - Director, Grazing Division.
Robinson, E. W. - - - - - - - Forester i/c Forest Ranger School.

Planning Branch Division Heads:

Pogue, H. M. - - - - - - - Forester i/c Working Plans Division.
Young, W. E. L. - - - - - - Forester i/c Surveys and Inventory Division.
Silburn, G. - - - - - - - - - Forester i/c Reforestation Division.
Spilsbury, R. H. - - - - - - - - Forester i/c Research Division.

FOREST DISTRICTS

Vancouver District

I. T. Cameron - - - - - - - - - - - - District Forester.
Boulton, L. B. B. - - - - - - - - - - Assistant District Forester.

Forest Rangers:

Carr, W. S. (Chilliwack); McDaniel, R. W. (Hope); Wilson, R. (Harrison Lake); Webster, J. B. (Mission); Mudge, M. H. (Port Moody); Henderson, J. E. (Squamish); Chamberlin, L. D. (Sechelt); Thomas, R. W. (Madeira Park); Hollinshead, S. B. (Powell River); Norbirg, H. (Lund); Gill, D. E. (Thurston Bay East); Donnelly, R. W. (Thurston Bay West); Bertram, G. D. (Chatham Channel); pending appointment (Echo Bay); Howard, W. (Alert Bay); Sykes, S. J. (Port Hardy); Ormond, L. D. D. (Campbell River); Antonelli, M. W. (Courtenay); Glassford, R. J. (Parksville); Haley, K. (Nanaimo); McKinnon, C. G. (Duncan); Lorentsen, L. H. (Ganges); Jones, R. W. (Langford); Morley, K. A. (Lake Cowichan); Brooks, F. T. (Alberni); McArthur, E. J. (Tofino); Carradice, J. H. (Pemberton).

Prince Rupert District

J. R. Johnston - - - - - - - - - - - - District Forester.
Lehrle, L. W. W. - - - - - - - - - - Assistant District Forester.

Forest Rangers:

Brooks, T. (Ocean Falls); Gorley, O. (Queen Charlotte City); Brooks, R. L. (Prince Rupert); Lindstrom, W. C. (Terrace); Antonenko, J. (Kitwanga); Petty, A. P. (Hazelton); Mould, J. (Smithers); Clay, W. D. (Telkwa); Berard, R. K. (Houston); Kullander, M. O. (Pendleton Bay); Mastin, T. J. (Burns Lake); Hawkins, R. M. (Bella Coola); Pement, A. T. (Southbank); Hamilton, H. D. (Atlin); Crosby, D. N. (Topley).

Prince George District

A. H. Dixon - District Forester.
Bennett, C. E. - Assistant District Forester.

Forest Rangers:

French, C. L. (McBride); Rohn, C. (Penny); Meents, G. E. (Prince George); Magee, K. W. (Prince George); Northrup, K. A. (Fort St. James); Mitchell, B. A. (Quesnel); Barbour, H. T. (Dawson Creek); Keefe, R. R. (Aleza Lake); Graham, G. W. (Vanderhoof); Cosens, A. S. (Fort St. John); Baker, F. M. (Fort Fraser); Waller, T. G. (Summit Lake); Thornton, S. H. (Quesnel); Flynn, D. M. (Prince George); Hamblin, R. A. (Hixon); Pearce, F. (Quesnel); Angly, R. B. (Quesnel); McQueen, L. (Chetwynd).

Kamloops District

W. C. Phillips - District Forester.
McRae, N. A. - Assistant District Forester.

Forest Rangers:

Hopkins, H. V. (Lumby); Williams, R. V. (Birch Island); Bailey, J. D. (Barriere); Hill, A. F. (Kamloops (S.)); Paquette, O. (Chase); Gibson, C. L. (Salmon Arm); Jones, G. G. (Sicamous); Cameron, A. G. (Lillooet); Kuly, A. (Vernon); Scotte, E. L. (Penticton); Dearing, J. H. (Princeton); Robertson, C. E. (Clinton); Hamilton, T. J. (Williams Lake); Monteith, M. E. (Alexis Creek); Hewlett, H. C. (Kelowna); Noble, J. O. (Ashcroft); DeWitt, D. O. (Merritt); Bodman, G. F. (Blue River); Collins, B. G. (Enderby); Janning, H. A. W. (100 Mile (N.)); Weinard, J. P. (Kamloops (N.)); Wittner, D. J. (Horsefly); Ashton, L. (100 Mile (S.)).

Nelson District

P. Young - District Forester.
Bruce, J. B. - Assistant District Forester.

Forest Rangers:

Taft, L. G. (Invermere); Humphrey, J. L. (Fernie); Anderson, S. E. (Golden); Gierl, J. B. (Cranbrook (E.)); Ross, A. I. (Creston); Stilwell, L. E. (Kaslo); Benwell, W. G. (Lardeau); Robinson, R. E. (Nelson); Jupp, C. C. (New Denver); Raven, J. H. (Nakusp); Wood, H. R. (Castlegar); Reid, E. W. (Grand Forks); Uphill, W. T. (Kettle Valley); Cartwright, G. M. (Canal Flats); Allin, G. G. (Arrowhead); Haggart, W. D. (Edgewood); Hesketh, F. G. (Elko); Reaney, R. J. (Spillimacheen); Bailey, J. F. (Cranbrook (W.)); Ivens, J. H. (Beaverdell); Webster, G. R. (Slocan City); Jackson, R. C. (Revelstoke).

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(1) DISTRIBUTION OF PERSONNEL, 1960

Personnel	Vancouver	Prince Rupert	Prince George	Kamloops	Nelson	Victoria	Total
Continuously Employed							
Deputy Minister, Chief Forester, and Assistant Chief Foresters	------	------	------	------	------	4	4
Division Foresters	------	------	------	------	------	8	8
Directors of Grazing and Public Information	------	------	------	------	------	2	2
Forest Counsel and Personnel Officers	------	------	------	------	------	3	3
District Foresters and Assistant District Foresters	2	2	2	2	2	------	10
Foresters and Foresters-in-training	12	9	12	13	10	92	148
Agrologists and Agrologists-in-training	------	------	1	5	2	2	10
Engineers and Engineers-in-training	------	------	------	------	------	30	30
Forest Protection Officers	3	2	1	1	2	3	12
Supervisors of Rangers	3	2	3	3	3	------	14
Rangers—Grades 1 and 2	33	18	26	29	26	------	132
Superintendent of Scaling and Assistants	11	2	3	3	2	------	21
Scalers, Official	72	1	------	------	------	------	73
Scalers, Official, temporary	43	------	------	2	------	------	45
Comptroller, Accountant, and Audit Assistants	------	------	------	------	------	7	7
Engineering, Mechanical and Radio	4	3	4	4	4	66	85
Technical Forest and Public Information Assistants	6	8	6	14	9	12	55
Reforestation, Research, and Survey Assistants	------	1	------	------	------	81	82
Nursery Superintendents	------	------	------	------	------	4	4
Draughtsmen and Mapping Assistants	6	5	5	5	4	28	53
Clerks, Stenographers, and Messengers	103	29	32	30	22	113	329
Superintendent and Foremen, Forest Service Marine Station	------	------	------	------	------	6	6
Mechanics, Carpenters, and Technicians	------	------	4	------	------	39	43
Launch Crewmen	18	5	------	------	------	4	27
Assistant and Acting Rangers	36	31	37	47	46	------	197
Dispatchers	18	9	11	18	10	------	66
Cruisers, Compassmen, and Silviculture Crewmen	27	32	68	61	20	------	208
Truck, Tractor, and Equipment Operators	------	1	4	------	2	7	14
Foremen	------	------	3	------	------	14	17
Miscellaneous	1	2	3	1	2	30	39
Totals, continuous personnel	398	162	225	238	166	555	1,744
Seasonally Employed							
Assistant and Acting Rangers	17	4	8	5	------	------	34
Patrolmen	------	1	3	3	12	------	19
Lookoutmen	37	19	28	34	41	------	159
Dispatchers, Radio Operators, and Clerks	7	2	3	3	11	------	26
Fire-suppression Crewmen	60	------	4	60	34	------	158
Reforestation—Snag-fallers, Planters, etc.	------	------	------	------	------	266	266
Cruisers and Compassmen	------	------	------	------	3	------	3
Truck, Tractor, and Equipment Operators	4	4	2	6	7	34	57
Student and Survey Assistants and Engineering Aides	------	------	------	------	------	127	127
Silviculture Crewmen	------	------	------	------	------	------	------
Foremen	13	3	1	------	4	13	34
Miscellaneous	24	16	24	2	9	118	193
Totals, seasonal personnel	162	49	73	113	121	558	1,076
Totals, all personnel	560	211	298	351	287	1,113	2,820

(2)

SUMMARY OF PLANTING, 1951–60

Year	Experimental		Forest Service on Crown Land		Private Companies		Community Forests		Private Plantings and Farm Wood-lots		Total	
	Trees in Thousands	Acres	Trees in Thousands	Acres	Trees in Thousands	Acres	Trees in Thousands	Acres	Trees in Thousands	Acres	Trees in Thousands	Acres
Coast												
1960	1.6	1.0	135.5	317.0	6,207.3	17,099.0[1]	105.5	319.0	61.1	56.0	6,511.0	17,792.0
1959	44.3	65.0	812.2	1,417.0	6,191.3	14,444.0	100.0	177.0	281.5	715.0	7,429.3	16,818.0
1958	24.6	20.0	862.9	895.0	6,849.8	13,566.0	38.0	60.0	64.5	69.0	7,839.8	14,610.0
1957	11.7	13.0	294.0	435.0	2,978.4	7,409.0	8.0	9.0	50.9	65.0	3,343.0	7,931.0
1956	30.6	29.0	954.3	1,682.0	1,410.7	3,501.0	1.2	2.0	73.8	120.0	2,470.6	5,334.0
1955	5.4	10.0	2,179.2	3,415.0	4,485.9	7,021.0	40.0	15.0	114.2	135.0	6,824.7	10,596.0
1954	27.5	30.0	5,679.0	7,135.0	3,268.0	4,982.0	59.5	36.0	107.7	104.0	9,141.7	12,287.0
1953	28.5	33.0	2,377.0	2,860.0	2,740.1	3,808.0	25.0	31.0	21.0	6.0	5,191.6	6,738.0
1952	8.1	5.0	4,228.4	4,865.0	1,664.2	2,065.0	137.4	210.0	40.9	15.0	6,079.0	7,160.0
1951	12.0	20.0	5,733.9	6,070.0	1,808.0	2,235.0	110.0	130.0	31.2	25.0	7,695.1	8,480.0
Previously planted	728.7	636.7	63,025.1	76,940.0	10,116.4	12,596.3	361.0	372.0	179.0	137.0	74,410.2	90,682.0
Totals to date	923.0	862.7	86,281.5	106,031.0	47,720.1	88,726.3	985.6	1,361.0	1,025.8	1,447.0	136,936.0	198,428.0
Interior												
1960	61.6	92.0	135.5	277.0	24.3	24.0	.....	.....	.....	.....	221.4	393.0
1959	9.6	32.5	767.9	1,287.0	82.9	116.0	.....	.....	9.2	12.0	869.6	1,447.5
1958	3.8	5.5	471.5	633.0	92.2	196.0	.....	.....	2.4	3.0	569.9	837.5
1957	8.6	12.0	160.0	204.0	101.4	184.0	.....	.....	27.1	22.0	297.1	422.0
1956	35.1	41.5	193.8	251.5	131.5	230.0	.....	.....	13.3	15.0	373.7	538.0
1955	1.5	1.0	215.8	335.0	81.0	117.0	.....	.....	12.2	14.0	310.5	467.0
1954	5.6	8.0	590.9	1,007.0	94.0	109.0	.....	.....	7.5	10.0	698.0	1,134.0
1953	2.0	3.0	282.3	284.0	35.0	47.0	.....	.....	10.3	17.0	329.6	351.0
1952	27.0	47.0	167.2	295.0	2.0	2.0	.....	.....	3.1	4.0	199.3	348.0
1951	56.5	78.0	0.2	.....	.....	.....	0.5	.....	1.2	1.0	58.4	79.0
Previously planted	27.2	30.0	.....	.....	.....	.....	.....	.....	0.1	.....	27.3	30.0
Totals to date	238.5	350.5	2,985.1	4,573.5	644.3	1,025.0	0.5	.....	86.4	98.0	3,954.8	6,047.0
All planted to date	1,161.5	1,213.2	89,266.6	110,604.5	48,364.4	89,751.3	986.1	1,361.0	1,112.2	1,545.0	140,890.8	204,475.0
All planted this year	63.2	93.0	271.0	594.0	6,231.6	17,123.0	105.5	319.0	61.1	56.0	6,732.4	18,185.0

[1] The Forest Service planted 1,261,750 trees on 2,293 acres of private lands under reforestation agreements (*Forest Act*, section 166).

(3) ESTIMATED VALUE OF PRODUCTION, INCLUDING LOADING AND FREIGHT WITHIN THE PROVINCE, 1951–60

Product	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Ten-year Average, 1951–60
Lumber	$278,904,266	$280,006,490	$279,979,507	$270,109,948	$348,264,190	$328,262,772	$275,373,764	$225,626,861	[1]$323,900,000	[1]$380,600,000	$299,102,780
Pulp and paper	135,167,761	129,238,520	135,871,797	156,178,180	166,902,992	176,295,267	177,431,513	190,750,417	234,529,000	242,925,000	174,529,045
Shingles	32,537,442	23,878,880	26,700,153	28,077,416	29,488,730	24,407,817	18,421,952	19,546,449	19,769,000	18,692,000	24,151,984
Boxes	4,062,133	2,367,450	1,810,376	1,481,051	1,374,984	647,112	1,089,400	854,922	704,000	847,000	1,523,843
Plywood	34,500,000	36,572,000	45,240,000	53,000,000	68,000,000	80,000,000	71,845,000	90.000,000	75,500,000	75,760,000	63,041,700
Piles, poles, and mine-timber	5,805,745	9,540,340	8,646,611	5,087,052	6,283,909	9,301,902	12,834,152	5,686,592	4,854,000	8,352,000	7,639,230
Cordwood, fence-posts, and lagging	2,349,720	2,675,870	2,581,806	2,282,996	1,447,950	1,391,960	919,538	765,270	669,000	725,000	1,580,911
Ties, railway	633,089	963,200	669,007	445,777	306,625	615,491	1,068,280	296,919	202,000	162,000	536,239
Additional value contributed by the wood-using industry	2,812,500	2,530,000	2,530,000	2,530,000	2,530,000	2,750,000	2,500,000	2,200,000	2,700,000	2,200,000	2,528,250
Laths and other miscellaneous products	1,994,340	2,164,660	2,688,007	1,845,901	1,595,900	1,306,988	986,082	757,058	1,226,000	885,000	1,544,993
Logs exported	4,981,597	5,401,410	4,514,777	5,918,306	4,413,508	2,342,700	1,343,090	474,520	1,243,000	1,711,000	3,234,391
Pulpwood exported	99,375	236,900	37,296	85,716	480	----------	----------	----------	----------	----------	45,977
Wood-chips exported	----------	----------	----------	----------	----------	----------	6,875,000	4,854,232	3,126,000	3,579,000	1,843,423
Christmas trees	939,390	912,700	999,159	968,047	1,085,045	1,258,443	1,126,918	964,985	1,689,000	1,916,000	1,185,969
Cascara bark	20,572	18,130	20,160	12,393	5,249	6,511	14,880	9,202	4,000	6,000	11,709
Totals	$504,807,930	$496,506,550	$512,288,656	$528,022,783	$631,699,562	$628,586,963	$571,829,569	$542,787,427	[1]$670,115,000	$738,360,000	$582,400,444

[1] These figures do not agree with those presented in the 1959 Report, as the estimated value of lumber has been recomputed using improved conversion factors, as used in the 1960 estimates, in calculating that part of the total log scale used in the manufacture of pulp and paper.

(4) PAPER PRODUCTION (IN TONS), 1951–60

Product	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Ten-year Average, 1951–60
Newsprint	385,172	428,832	501,083	536,656	560,993	595,717	583,850	608,743	831,355	901,037	593,344
Other papers	99,409	92,777	96,853	110,461	127,880	112,299	157,872	200,406	214,479	188,119	140,055

In addition to 955,258 tons of pulp manufactured into paper in the Province, 1,089,999 tons were shipped out of the Province during the year.

(5) WATER-BORNE LUMBER TRADE (IN M B.M.), 1951–60

Destination	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Ten-year Average, 1951–60
Eastern Canada	----------	----------	6,708	5,670	3,037	4,917	2,102	5,482	10,481	9,680	4,808
Australia	93,566	36,060	89,658	115,464	137,308	99,829	87,213	98,808	80,115	113,536	95,156
New Zealand	13,311	7,839	6,036	13,465	12,588	14,097	11,030	8,397	5,212	6,689	9,866
South America	2,067	2,164	3,924	648	5,756	16,541	25,503	8,816	10,178	7,743	8,334
China, Hong Kong, and Formosa	21,382	7,915	9,206	3,599	1,909	1,275	1,256	597	509	867	4,851
Japan and Korea	101	82	23,742	8,216	10,725	5,852	3,713	999	7,614	1,607	6,265
United Kingdom and Continent	763,267	772,527	502,814	697,298	611,451	320,293	385,237	337,959	267,363	521,774	517,998
Africa	94,412	52,344	123,064	145,308	188,567	145,132	181,560	139,523	94,598	142,293	130,680
India	7,396	1,029	16,695	4,397	1,745	416	468	3,372	27,581	9,793	7,289
United States	71,316	229,809	542,472	509,661	345,694	283,834	275,452	602,427	595,170	714,050	416,988
Hawaiian Islands	11,353	9,558	7,577	4,998	12,715	13,183	7,668	3,166	2,133	7,755	8,011
West Indies	9,669	3,404	12,235	12,062	10,516	11,599	12,085	13,492	8,478	10,796	10,434
South Sea Islands	9,917	8,538	8,563	8,402	16,140	15,339	8,147	11,841	8,068	13,414	10,837
Central America	762	463	269	29,192	33,788	41,937	49,885	51,842	62,826	67,022	33,799
Arabia and Israel	22,426	498	2,191	2,368	1,320	1,394	5,766	213	1,340	1,681	3,920
Belgium	(1)	2,390	8,951	4,977	3,121	2,628	5,095	10,790	4,080	21,937	6,397
France	1,672	1,172	1,382	2,950	2,845	3,191	4,110	3,265	3,184	9,883	3,365
Germany	291	73	105	15	732	177	169	22	----------	1,062	265
Holland	(1)	1,217	4,524	4,123	4,042	3,802	3,552	6,091	4,569	6,272	3,819
Italy	1,221	637	1,084	2,284	4,349	3,007	6,530	4,560	2,805	5,363	3,184
Foreign, unclassified	13,335	10,107	20,217	4,674	3,603	1,221	2,363	2,681	1,333	2,068	6,160
Belgium and Holland	7,720	----------	----------	----------	----------	----------	----------	----------	----------	----------	772
Denmark, Norway, and Sweden	1,107	227	247	175	109	----------	14	18	16	66	198
Totals	1,146,291	1,148,053	1,391,664	1,579,946	1,412,060	989,664	1,078,918	1,314,361	1,197,653	1,675,351	1,293,396

[1] Belgium and Holland combined in 1951.

TOTAL AMOUNT OF TIMBER SCALED IN BRITISH COLUMBIA DURING YEARS 1959 AND 1960 IN F.B.M.

(6A) (All products converted to f.b.m.)

Forest District	1959	1960	Gain
Vancouver	3,143,091,743	3,714,901,737	571,809,994
Prince Rupert (Coast)	303,615,925	494,439,437	190,823,512
Totals, Coast	3,446,707,668	4,209,341,174	762,633,506
Prince Rupert (Interior)	226,334,064	272,053,975	45,719,911
Prince George	839,661,106	860,650,212	20,989,106
Kamloops	1,130,756,141	1,136,419,442	5,663,301
Nelson	532,738,310	596,020,872	63,282,562
Totals, Interior	2,729,489,621	2,865,144,501	135,654,880
Grand totals	6,176,197,289	7,074,485,675	898,288,386

TOTAL AMOUNT OF TIMBER SCALED IN BRITISH COLUMBIA DURING YEARS 1959 AND 1960 IN CUBIC FEET

(6B) (Conversion factor: Coast—6 f.b.m.=1 cu. ft.; Interior—5.75 f.b.m.=1 cu. ft.)
(All products converted to cubic feet.)

Forest District	1959	1960	Gain
Vancouver	523,848,624	619,150,289	95,301,665
Prince Rupert (Coast)	50,602,654	82,406,573	31,803,919
Totals, Coast	574,451,278	701,556,862	127,105,584
Prince Rupert (Interior)	39,362,446	47,313,735	7,951,289
Prince George	146,028,018	149,678,297	3,650,279
Kamloops	196,653,242	197,638,164	984,922
Nelson	92,650,141	103,655,804	11,005,663
Totals, Interior	474,693,847	498,286,000	23,592,153
Grand totals	1,049,145,125	1,199,842,862	150,697,737

(7A)

SPECIES CUT, ALL PRODUCTS, 1960, IN F.B.M.

Forest District	Fir	Cedar	Spruce	Lodgepole Pine	Hemlock	Balsam	White Pine	Yellow Pine	Cypress	Larch	Hardwoods	Cottonwood	Total
Vancouver	1,135,778,707	730,499,276	63,201,301	183,280	1,255,535,120	464,817,635	21,144,530	796,630	34,284,503		4,295,617	4,365,138	3,714,901,737
Prince Rupert (C.)	43,685,881	77,764,600	144,072,442	501,892	195,362,027	13,634,124			4,206,820		28,151	15,183,500	494,439,437
Totals, Coast	1,179,464,588	808,263,876	207,273,743	685,172	1,450,897,147	478,451,759	21,144,530	796,630	38,491,323		4,323,768	19,548,638	4,209,341,174
Prince Rupert (I.)	972	16,347,679	89,737,872	55,820,831	73,150,735	35,497,265			62,807		92,498	1,343,316	272,053,975
Prince George	134,072,956	1,474,931	549,978,783	156,776,771	16,077	17,326,407	15,300			937	704,718	283,332	860,650,212
Kamloops	826,419,363	15,380,084	161,656,711	36,302,131	17,747,563	17,049,419	11,359,864	28,444,521		21,501,925	414,302	143,559	1,136,419,442
Nelson	147,877,994	70,178,672	150,010,921	15,522,280	80,268,320	14,514,991	18,010,984	8,695,916		90,230,650	206,907	503,237	596,020,872
Totals, Interior	1,108,371,285	103,381,366	951,384,287	264,422,013	171,182,695	84,388,082	29,386,148	37,140,437	62,807	111,733,512	1,418,425	2,273,444	2,865,144,501
Grand totals	2,287,835,873	911,645,242	1,158,658,030	265,107,185	1,622,079,842	562,839,841	50,530,678	37,937,067	38,554,130	111,733,512	5,742,193	21,822,082	7,074,485,675

(7B)

SPECIES CUT, ALL PRODUCTS, 1960, IN CUBIC FEET

(Conversion factor: Coast—6 f.b.m.=1 cu. ft.; Interior—5.75 f.b.m.=1 cu. ft.)

Forest District	Fir	Cedar	Spruce	Lodgepole Pine	Hemlock	Balsam	White Pine	Yellow Pine	Cypress	Larch	Hardwoods	Cottonwood	Total
Vancouver	189,296,451	121,749,879	10,533,550	30,547	209,255,853	77,469,606	3,524,088	132,772	5,714,084		715,936	727,523	619,150,289
Prince Rupert (C.)	7,280,980	12,960,767	24,012,074	83,649	32,560,338	2,272,354			701,136		4,692	2,530,583	82,406,573
Totals, Coast	196,577,431	134,710,646	34,545,624	114,196	241,816,191	79,741,960	3,524,088	132,772	6,415,220		720,628	3,258,106	701,556,862
Prince Rupert (I.)	169	2,843,074	15,606,586	9,707,971	12,721,867	6,173,438			10,923		16,087	233,620	47,313,735
Prince George	23,317,035	256,510	95,648,484	27,265,525	2,796	3,013,288	2,661			163	122,560	49,275	149,678,297
Kamloops	143,725,107	2,674,797	28,114,211	6,313,414	3,086,533	2,965,116	1,975,628	4,946,873		3,739,465	72,052	24,968	197,638,164
Nelson	25,717,912	12,204,987	26,088,856	2,699,527	13,959,708	2,524,346	3,132,345	1,512,333		15,692,287	35,984	87,519	103,655,804
Totals, Interior	192,760,223	17,979,368	165,458,137	45,986,437	29,770,904	14,676,188	5,110,634	6,459,206	10,923	19,431,915	246,683	395,382	498,286,000
Grand totals	389,337,654	152,690,014	200,003,761	46,100,633	271,587,095	94,418,148	8,634,722	6,591,978	6,426,143	19,431,915	967,311	3,653,488	1,199,842,862

TOTAL SCALE, ALL PRODUCTS, 1960, IN F.B.M. (SEGREGATED BY LAND STATUS AND FOREST DISTRICTS)

(8A)

Land Status	Vancouver	Prince Rupert (Coast)	Prince Rupert (Interior)	Prince George	Kamloops	Nelson	Total
Timber licences	830,599,800			7,776,109	4,662,495	43,474,222	886,512,626
Timber berths	114,515,543				18,849,512	22,452,300	155,817,355
Timber leases	114,310,612						114,310,612
Pulp leases	45,310,644	26,226,138					71,536,782
Pulp licences	18,372,975	76,636,027					95,009,002
Farm wood-lots	289,982		221,845	173,620	49,824	500	735,771
Timber sales	1,169,980,604	190,159,452	184,116,073	729,735,233	884,607,543	338,016,645	3,496,615,550
Pulp-timber sales		21,219,860					21,219,860
No mark visible	97,610,153						97,610,153
Tree-farm licences	353,121,225	123,253,908	75,627,711	59,138,008	39,283,908	103,227,018	753,651,778
Miscellaneous	4,806,207	7,607,968	2,646,010	14,588,582	8,075,324	4,158,247	41,882,338
Sub-totals, Crown lands	2,748,917,745	445,103,353	262,611,639	811,411,552	955,528,606	511,328,932	5,734,901,827
Federal lands	20,591,760	782,289	2,325,683		27,946,129	3,303,859	54,949,720
Crown grants—							
To 1887	793,106,898	74,459		762,555	37,358,594	2,676,045	833,978,551
1887–1906	59,311,275	9,997,922	122,710	781,132	15,873,622	43,762,468	129,849,129
1906–1914	19,361,903	6,335,233	1,437,686	5,442,012	28,396,070	11,581,116	72,554,020
1914 to date	73,612,156	32,146,181	5,556,257	42,252,961	71,316,421	23,368,452	248,252,428
Totals	3,714,901,737	494,439,437	272,053,975	860,650,212	1,136,419,442	596,020,872	7,074,485,675

TOTAL SCALE, ALL PRODUCTS, 1960, IN CUBIC FEET (SEGREGATED BY LAND STATUS AND FOREST DISTRICTS)

(8B)

(Conversion factor: Coast—6 f.b.m.=1 cu. ft.; Interior—5.75 f.b.m.=1 cu. ft.)

Land Status	Vancouver	Prince Rupert (Coast)	Prince Rupert (Interior)	Prince George	Kamloops	Nelson	Total
Timber licences	138,433,300			1,352,367	810,869	7,560,734	148,157,270
Timber berths	19,085,924				3,278,176	3,904,748	26,268,848
Timber leases	19,051,769						19,051,769
Pulp leases	7,551,774	4,371,023					11,922,797
Pulp licences	3,062,163	12,772,671					15,834,834
Farm wood-lots	48,330		38,582	30,195	8,665	87	125,859
Timber sales	194,996,767	31,693,242	32,020,186	126,910,475	153,844,790	58,785,503	598,250,963
Pulp-timber sales		3,536,643					3,536,643
No mark visible	16,268,359						16,268,359
Tree-farm licences	58,853,537	20,542,318	13,152,645	10,284,871	6,831,984	17,952,525	127,617,880
Miscellaneous	801,034	1,267,995	460,176	2,537,144	1,404,404	723,174	7,193,927
Sub-totals, Crown lands	458,152,957	74,183,892	45,671,589	141,115,052	166,178,888	88,926,771	974,229,149
Federal lands	3,431,960	130,382	404,467		4,860,196	574,584	9,401,589
Crown grants—							
To 1887	132,184,483	12,410		132,618	6,497,147	465,399	139,292,057
1887–1906	9,885,212	1,666,320	21,341	135,849	2,760,630	7,610,864	22,080,216
1906–1914	3,226,984	1,055,872	250,032	946,437	4,938,447	2,014,107	12,431,879
1914 to date	12,268,693	5,357,697	966,306	7,348,341	12,402,856	4,064,079	42,407,972
Totals	619,150,289	82,406,573	47,313,735	149,678,297	197,638,164	103,655,804	1,199,842,862

(9) TIMBER SCALED, BY MONTHS AND FOREST DISTRICTS, 1960

	January	February	March	April	May	June	July	August	September	October	November	December	Total
Vancouver—													
F.b.m.	126,405,816	91,878,575	119,904,942	120,235,672	145,350,551	159,848,958	123,788,833	81,892,455	105,196,773	144,020,231	135,963,565	115,686,634	1,470,173,005
Cubic feet	27,232,459	21,451,837	25,113,149	26,829,690	33,597,011	35,923,994	34,615,250	32,673,349	29,971,264	35,182,759	33,167,834	28,184,759	363,943,355
Lineal feet	618,248	499,876	450,512	755,491	594,943	634,275	1,335,014	944,036	754,839	1,139,374	1,002,827	642,065	9,371,500
Cords	7,058	3,892	5,495	4,667	5,150	8,520	3,838	7,157	3,941	2,719	6,029	10,277	68,743
Hewn ties	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Prince Rupert (C.)—													
F.b.m.	9,556,669	14,499,376	9,637,273	16,069,349	17,383,238	20,806,468	15,709,758	21,779,831	19,500,766	12,037,444	9,256,895	8,733,089	174,970,156
Cubic feet	1,659,029	3,824,395	3,151,260	2,846,251	4,248,813	4,230,763	4,273,364	7,820,081	6,193,889	5,410,501	5,124,081	4,207,785	52,990,212
Lineal feet	15,430	30,475	28,175	40,270	22,962	31,355	36,092	23,655	161,000	49,570	18,155	38,760	495,899
Cords	.....	.....	12	.....	8	30	62	.....	20	.....	.....	.....	132
Hewn ties	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Prince Rupert (I.)—													
F.b.m.	341,908	413,178	740,282	572,234	690,609	896,597	1,328,572	1,312,117	724,180	854,086	623,163	472,686	8,969,612
Cubic feet	3,192,642	7,039,694	6,872,458	5,634,751	3,284,863	1,811,760	2,734,814	3,062,595	4,022,825	2,309,745	2,342,305	2,009,078	44,317,530
Lineal feet	48,565	65,405	118,154	113,815	29,376	247,780	216,856	196,445	405,592	195,565	299,145	154,756	2,091,454
Cords	68	92	87	88	189	953	40	109	5	305	208	69	2,213
Hewn ties	2,561	2,243	9,654	2,399	3,908	10,595	3,437	.....	131	1,222	1,664	73	37,887
Prince George—													
F.b.m.	5,868,675	8,605,952	8,682,872	10,605,369	2,951,911	3,304,304	3,663,672	5,867,221	4,650,143	2,759,265	5,165,395	3,649,133	65,773,912
Cubic feet	12,593,058	28,436,024	27,982,035	25,424,184	7,950,939	1,431,708	2,422,086	6,640,045	6,032,222	5,844,101	5,745,452	6,128,328	136,630,182
Lineal feet	93,550	116,638	113,770	135,302	104,628	95,220	148,501	200,658	76,310	69,455	494,995	131,572	1,780,599
Cords	4	1,317	232	95	127	88	1,793	121	64	15	91	26	3,973
Hewn ties	109	7,437	1,620	4,118	18,636	423	11,145	4,791	7,359	.....	9,130	6,485	71,253
Kamloops—													
F.b.m.	15,293,128	12,860,404	16,278,666	12,470,397	9,161,652	11,684,294	17,142,803	13,513,102	14,894,030	12,335,170	11,448,984	11,577,436	158,660,066
Cubic feet	17,714,696	16,214,576	19,040,963	12,136,941	7,777,721	8,941,803	12,387,140	14,316,369	15,035,588	12,518,771	15,062,378	15,682,155	166,829,101
Lineal feet	455,549	306,367	71,475	362,455	62,445	289,740	231,556	997,598	186,071	1,298,467	439,643	444,025	5,145,391
Cords	647	492	243	495	484	643	354	1,218	713	1,456	819	158	7,722
Hewn ties	.....	478	.....	.....	.....	.....	.....	.....	.....	380	.....	.....	858
Nelson—													
F.b.m.	8,434,194	8,331,146	13,893,900	8,041,188	4,717,222	5,650,628	7,639,262	10,765,230	7,147,370	11,420,526	6,870,264	4,719,405	97,630,335
Cubic feet	6,260,500	6,536,661	8,229,707	6,119,723	3,603,147	3,860,116	4,776,155	7,577,261	8,239,865	9,524,741	9,333,719	8,916,047	82,977,642
Lineal feet	236,110	705,360	105,108	97,375	94,704	206,069	268,747	445,471	516,005	932,223	531,941	795,987	4,935,100
Cords	571	889	1,709	702	1,131	891	2,320	898	1,961	1,548	889	1,714	15,223
Hewn ties	.....	.....	.....	.....	443	263	.....	.....	.....	.....	297	.....	1,003
Totals—													
F.b.m.	165,900,390	136,588,631	169,137,935	167,994,209	180,255,183	202,191,249	169,272,900	135,129,956	152,113,262	183,426,722	169,328,266	144,838,383	1,976,177,086
Cubic feet	68,652,384	83,503,187	90,389,572	78,991,540	60,462,494	56,200,144	61,208,809	72,089,700	69,495,653	70,790,618	70,775,769	65,128,152	847,688,022
Lineal feet	1,467,452	1,724,121	887,194	1,504,708	909,058	1,504,439	2,236,766	2,807,863	2,099,817	3,684,654	2,786,706	2,207,165	23,819,943
Cords	8,348	6,682	7,778	6,047	7,089	11,125	8,407	9,503	6,704	6,043	8,036	12,244	98,006
Hewn ties	2,670	10,158	11,274	6,517	22,987	11,281	14,582	4,791	7,490	1,602	11,091	6,558	111,001

VOLUME OF WOOD REMOVED UNDER RELOGGING AT REDUCED ROYALTY AND STUMPAGE, 1951–60, IN THOUSAND CUBIC FEET

(10)

Year	Salvage Wood (M Cu. Ft.)	Year	Salvage Wood (M Cu. Ft.)
1951	420	1956	1,795
1952	732	1957	3,663
1953	1,053	1958	1,427
1954	1,888	1959	1,257
1955	1,209	1960	1,976

Ten-year average, 1951–60, 1,542 M cu. ft.

NUMBER OF ACRES MANAGED AND OPERATED UNDER APPROVED WORKING PLANS, 1951–60

(11)

Year	Tree-farm Licences		Christmas-tree Permits		Farm Wood-lots		Public Working Circles and Sustained-yield Units[1]		Total Acres
	Number	Productive Acres	Number	Productive Acres	Number	Productive Acres	Number	Productive Acres	
1951	10	1,953,754	135	47,250	3	452	----	----------	2,001,456
1952	13	2,071,918	145	49,986	5	727	----	----------	2,122,631
1953	14	2,158,898	163	64,835	20	4,571	24	5,649,162	7,877,466
1954	19	2,788,313	174	68,689	25	5,549	28	7,019,759	9,882,310
1955	23	4,685,492	209	72,603	29	6,455	33	9,328,447	14,092,997
1956	23	4,680,846	221	76,457	37	8,320	47	21,667,410	26,433,033
1957	23	4,871,237	283	80,651	44	10,488	58	28,820,776	33,783,152
1958	27	5,349,773	277	83,500	53	13,108	61	32,389,893	37,836,274
1959	36	5,851,979	279	83,210	50	12,059	64	34,606,543	40,553,791
1960	37	6,081,496	294	89,224	52	12,375	72	40,257,302	46,440,397
Ten-year average, 1951–60	23	4,049,371	218	71,641	32	7,410	39	17,973,929	22,102,351

[1] Approved public working circles and sustained-yield units.

(12) TOTAL SCALE OF ALL PRODUCTS FROM MANAGED LANDS, 1951–60

(In Table 8B, " tree-farm licences " includes only the cut from Crown lands within tree-farm licences. The cut from " other tenures " is shown under appropriate headings. In this table, all the cut from managed lands under regulation is combined.)

Year	Tree-farm Licences		Christmas-tree Permits		Farm Wood-lots		Public Working Circles and Sustained-yield Units		Total	
	Number	Cubic Feet	Number	Number of Trees	Number	Cubic Feet	Number	Cubic Feet	Number of Christmas Trees	Cubic Feet
1951	10	27,440,866	135	175,755	3	----------	----	----------	175,755	27,440,866
1952	13	33,532,810	145	195,803	5	232	----	----------	195,803	33,533,042
1953	14	40,442,745	163	267,182	20	17,497	24	89,731,000	267,182	130,191,242
1954	19	47,631,411	174	326,106	25	26,939	28	100,166,664	326,106	147,825,014
1955	23	69,715,422	209	301,319	29	64,482	33	115,091,229	301,319	184,871,133
1956	23	121,869,721	221	430,447	37	92,124	47	188,455,411	433,850[1]	310,425,826[2]
1957	23	125,622,175	283	498,286	44	70,116	58	207,892,534	500,786[3]	333,584,825
1958	27	144,260,543	277	408,874	53	139,396	61	254,809,622	411,574[4]	399,276,185[5]
1959	36	178,742,435	279	398,504	50	205,676	64	312,048,987	404,249[6]	490,997,098
1960	37	241,410,459	294	495,697	52	92,168	72	385,200,000	501,752[7]	626,702,627
Ten-year average, 1951–60	23	103,066,859	218	349,797	32	70,863	39	165,339,545	351,838	268,484,786

[1] Includes 3,403 Christmas trees cut on tree-farm licences and farm wood-lots.
[2] Includes 8,570 cubic feet cut from Christmas-tree permits.
[3] Includes 2,500 Christmas trees cut on tree-farm licences.
[4] Includes 2,700 Christmas trees cut on tree-farm licences.
[5] Includes 66,624 cubic feet cut from Christmas-tree permits.
[6] Includes 5,402 Christmas trees cut from tree-farm licences and 343 trees cut from farm wood-lots.
[7] Includes 6,055 Christmas trees cut from tree-farm licences.

(13) LOGGING INSPECTIONS, 1960

Forest District	Type of Tenure Operated				Number of Inspections
	Timber Sales	Hand-loggers' Licences	Leases, Licences, Crown Grants, and Pre-emptions	Total	
Vancouver	1,288	1	1,313	2,602	8,192
Prince Rupert	802	1	299	1,101	3,935
Prince George	1,879	----	1,493	3,372	5,572
Kamloops	2,118	----	1,411	3,529	4,858
Nelson	1,162	----	602	1,764	3,594
Totals, 1960	7,249	2	5,118	12,368	26,151
Totals, 1959	6,273	2	4,896	11,171	26,912
Totals, 1958	5,936	2	4,339	10,257	23,802
Totals, 1957	7,503	3	5,937	13,443	25,253
Totals, 1956	7,492	3	5,838	13,333	22,038
Totals, 1955	6,818	3	4,673	11,494	22,355
Totals, 1954	5,855	3	4,874	10,732	21,011
Totals, 1953	5,851	3	4,859	10,713	20,656
Totals, 1952	5,822	6	5,710	11,538	20,264
Totals, 1951	5,448	6	4,766	10,220	17,754
Ten-year average, 1951–60	6,425	3	5,101	11,527	22,620

(14)

TRESPASSES, 1960

Forest District	Number of Cases	Area Cut Over (Acres)	Quantity Cut									Number of Resulting Seizures	Assessment in Dollars
			Cubic Feet	Feet B.M.	Lineal Feet	Cords	Ties	Christmas Trees	Cedar Shakes, Car-stakes	Posts	Reserved Trees		
Vancouver	168	628	1,836,065	.....	25,795	124	.....	1,594	67,780	.....	.....	4	$111,242.00
Prince Rupert	70	320	367,878	.....	25,955	18	73	.....	85	.....	304	2	22,947.18
Prince George	116	1,142	459,477	.....	57,125	1,197	.....	.....	.....	900	834	3	31,715.96
Kamloops	114	2,001	621,780	.....	2,165	.....	.....	8,866	.....	.....	.....	1	65,263.42
Nelson	65	497	153,731	.....	18,380	.....	.....	1,238	.....	.....	1,564	1	9,326.09
Totals, 1960	533	4,588	3,438,931	.....	129,420	1,339	73	11,698	67,865	900	2,702	11	$240,494.65
Totals, 1959	627	6,668	2,841,015	.....	117,043	5,814	3,473	26,398	133,363	7,149	2,922	13	$221,192.64
Totals, 1958	513	6,435	4,100,971	.....	126,127	608	2,661	14,897	21,924	765	.....	13	$221,931.11
Totals, 1957	668	8,032	4,949,784	.....	386,520	6,545	2,071	7,666	664,569	22,814	.....	15	$380,057.83
Totals, 1956	630	7,744	5,692,862	.....	384,231	1,321	1,367	14,794	177,559	28,573	.....	5	$489,065.90
Totals, 1955	499	6,098	4,218,705	.....	458,426	1,607	963	14,100	66,975	5,607	.....	4	$212,183.49
Totals, 1954	463	5,910	4,373,368	.....	266,856	270	5,083	14,914	119,364	9,750	.....	7	$198,220.15
Totals, 1953	446	10,188	4,072,874	466,401	230,636	2,917	6,335	16,314	116,368	30,663	.....	4	$221,000.12
Totals, 1952	419	5,768	372,788	24,247,327	272,770	1,147	5,237	10,921	227,267	3,991	.....	13	$312,774.33
Totals, 1951	454	5,999	.....	24,545,775	159,064	1,779	20,976	28,121	.....	13,325	.....	41	$237,588.00
Ten-year average, 1951–60	525	6,743	3,784,589[1]	16,419,834[2]	253,109	2,335	4,824	15,982	159,525	12,354	2,812[3]	13	$273,450.82

[1] Cubic feet—nine-year average. [2] Feet b.m.—three-year average. [3] Reserved trees—two-year average.

(15) AREAS EXAMINED BY THE FOREST SERVICE FOR MISCELLANEOUS PURPOSES OF THE LAND ACT, 1960

Forest District	Applications for Hay and Grazing Leases		Applications for Foreshore Leases		Applications to Purchase		Miscellaneous		Total	
	Number	Acres	Number	Acres	Number	Acres	Number	Acres	Number	Acres
Vancouver	.....	.....	29	541	9	36	4	143	42	720
Prince Rupert	3	1,216	15	718	9	472	12	247	39	2,653
Totals	3	1,216	44	1,259	18	508	16	390	81	3,373

(16) CLASSIFICATION OF AREAS EXAMINED BY THE FOREST SERVICE, 1960

Forest District	Total Area	Agricultural Land	Non-agricultural Land	Merchantable-timber Land	Estimated Timber on Merchantable-timber Land
	Acres	Acres	Acres	Acres	M F.B.M.
Vancouver	720	95	625	6	20
Prince Rupert	2,653	182	2,471	97	973
Totals	3,373	277	3,096	103	993

(17) AREAS CRUISED FOR TIMBER SALES, 1960

Forest District	Number Cruised	Acreage	Saw-timber (M B.M.)	Pit-props, Poles, and Piles (Lin. Ft.)	Shingle-bolts and Cord-wood (Cords)	Railway-ties (No.)	Car-stakes, Posts, Shakes, etc. (No.)	Saw-timber (M C.F.)
Vancouver	625	110,367	.....	118,200	2,947	.....	284,250	291,095
Prince Rupert	272	67,178	.....	2,687,412	3,434	.....	21,490	110,966
Prince George	467	166,445	.....	744,700	20,214	13,809	75,900	301,063
Kamloops	532	279,048	.....	531,000	1,855	.....	255,205	312,868
Nelson	226	144,313	.....	4,726,302	600	.....	768,525	126,487
Totals, 1960	2,122	767,351	.....	8,807,614	29,050	13,809	1,405,370	1,142,479
Totals, 1959	2,317	681,550	.....	7,387,960	27,753	26,875	1,124,400	877,370
Totals, 1958	1,922	609,563	.....	8,772,888	24,316	34,430	1,146,719	890,285
Totals, 1957	2,582	781,748	.....	16,099,489	39,254	95,209	1,149,133	1,171,283
Totals, 1956	3,089	1,095,150	.....	13,981,856	44,287	128,432	1,916,510	1,273,970
Totals, 1955	3,354	1,077,986	.....	9,885,451	16,819	145,525	501,820	1,131,521
Totals, 1954	3,085	781,665	.....	10,532,164	76,859	76,310	1,127,346	697,421
Totals, 1953	2,579	719,234	.....	12,887,882	12,328	141,313	694,182	561,601
Totals, 1952	2,340	1,029,199	2,543,890	40,005,329	13,405	989,144	518,652	1,188,361
Totals, 1951	2,704	934,475	6,577,298	20,674,280	25,630	316,954	432,000	.....
Ten-year average, 1951–60	2,609	847,792	4,560,594	14,903,491	30,970	196,800	1,001,613	992,699

M B.M.—two-year average; M C.F.—nine-year average.

(18)

TIMBER-SALE RECORD, 1960

Forest District	Sales Made	Sales Closed	Total Sales Existing	Total Area (Acres)	Area Paying Forest-protection Tax (Acres)	Total 10-per-cent Deposits
Vancouver	571	637	1,850	612,073	568,199	$6,289,368.31
Prince Rupert	288	334	1,072	390,507	369,287	1,334,906.31
Prince George	367	491	1,177	643,816	582,917	2,061,265.70
Kamloops	375	469	1,898	1,182,367	1,159,422	3,573,669.06
Nelson	242	236	818	647,609	621,749	2,024,701.61
Totals	1,843	2,167	6,815	3,476,372	3,301,574	$15,283,910.99
Cash sales	295	.....	.....	.....	.....	.....
Total sales	2,138	.....	.....	.....	.....	.....

(19)

TIMBER SALES AWARDED BY FOREST DISTRICTS, 1960

Forest District	No. of Sales	Acreage	Saw-timber (Cu. Ft.)	Saw-timber (F.B.M.)	Poles and Piling (Lin. Ft.)	No. of Posts	No. of Cords	No. of Ties	No. of Christmas Trees	No. of Car-stakes	No. of Blasting-sticks	No. of Bean-poles	No. of Cedar Shakes	No. of Fence-rails	Estimated Revenue
Vancouver	575	95,077	190,426,300		304,800		3,349			500					$8,747,595.30
Prince Rupert	328	68,673	72,715,500		1,994,345		1,550		425	5,350					1,992,384.39
Prince George	437	143,655	180,122,451		851,634	38,196	1,910	32,849						1,370	5,678,028.30
Kamloops	486	185,285	147,515,481		703,440	82,750	13,669							500	5,293,106.36
Nelson	312	119,792	96,544,750		3,336,240	276,382	456			12,000			850,000		3,161,040.43
Totals, 1960	2,138	612,482	687,324,482		7,190,459	397,328	20,934	32,849	425	17,850			850,000	1,870	$24,872,154.78
Totals, 1959	2,160	642,682	739,347,750		5,795,626	1,295,896	13,088	45,580		7,000			162,000	400	$29,823,289.07
Totals, 1958	2,145	617,467	682,221,469		8,696,222	958,690	11,822	35,334	100	13,300			20,900	900	$20,517,298.67
Totals, 1957	2,544	655,310	617,155,900		12,743,369	1,116,375	16,659	165,210		10,500	3,000		80,330		$24,680,864.98
Totals, 1956	2,859	870,171	802,425,430		13,600,600	799,427	12,214	150,581		3,200			71,360		$55,943,757.66
Totals, 1955	3,378	923,230	764,812,540	8,356,000	10,765,982	757,890	22,590	156,077	300	1,000	45,000		110,400	1,951	$40,507,422.12
Totals, 1954	3,009	693,153	530,817,905		10,210,460	1,017,098	655,670	67,275	300	7,600	15,500		95,400	235	$18,938,049.78
Totals, 1953	2,881	605,450	461,100,000	446,200	22,090,812	795,235	22,580	196,144		6,810	12,000	500	9,100		$17,322,931.29
Totals, 1952	2,594	534,409	57,729,795	2,221,589,000	14,148,539	1,005,485	20,546	218,433	300	700			174,700		$23,584,741.49
Totals, 1951	2,962	605,511	5,000	2,806,195,000	12,812,383	615,153	25,783	296,932		2,150			313,250		$24,621,254.79
Ten-year average, 1951–60	2,667	675,987	534,294,027		11,805,445	875,858	82,189	136,442		7,011			188,744		$28,081,176.46

AVERAGE STUMPAGE PRICES AS BID, BY SPECIES AND FOREST DISTRICTS, ON SAW-TIMBER SOLD ON TIMBER SALES IN 1960, PER C C.F. LOG-SCALE

(20)

Forest District	Douglas Fir			Cedar			Spruce			Hemlock			Balsam		
	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.
Vancouver	38,949	$9.17	$2.00–32.60	40,391	$3.14	$2.40–14.00	8,270	$3.97	$1.70–11.10	56,983	$3.42	$1.40–17.30	39,687	$3.49	$1.00–11.50
Prince Rupert (C.)	1,429	6.05	1.30– 7.40	2,922	2.84	0.50– 6.80	8,368	2.84	0.75– 6.80	7,868	2.87	0.50– 5.10	2,868	2.26	0.50– 5.10
Prince Rupert (I.)	----------	------	----------	1,117	4.04	0.50– 7.30	16,296	2.38	0.75– 5.00	9,655	2.82	0.50– 5.80	5,564	1.59	0.50– 3.50
Prince George	9,409	3.85	0.75– 8.40	7	1.94	1.20– 2.60	129,975	3.33	0.75–12.10	1	2.10	2.10	7,742	1.57	0.70–20.20
Kamloops	70,844	4.51	0.60–18.10	2,875	1.47	0.25– 7.50	29,485	3.61	0.90–16.80	3,533	1.15	0.25– 5.60	3,897	1.98	0.25– 6.00
Nelson	21,109	3.12	0.75–15.10	11,144	1.82	0.25–10.10	30,118	3.33	0.75–10.30	7,230	1.61	0.25–10.10	5,418	2.08	0.25– 8.30
Totals for Province	141,740	$5.56	$0.60–32.60	58,456	$2.81	$0.25–14.00	222,512	$3.30	$0.75–16.80	85,270	$3.06	$0.25–17.30	65,176	$2.84	$0.25–20.20

Forest District	White Pine			Yellow Pine			Larch			Other Species			All Species		
	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.
Vancouver	777	$3.87	$3.40–16.30	----------	------	----------	----------	------	----------	5,246	$3.15	$0.85– 9.00	190,303	$4.57	$0.85–32.60
Prince Rupert (C.)	----------	------	----------	----------	------	----------	----------	------	----------	3,054	3.17	0.50– 5.40	26,509	2.99	0.50– 7.40
Prince Rupert (I.)	----------	------	----------	----------	------	----------	----------	------	----------	13,575	2.08	0.50– 5.70	46,207	2.33	0.50– 7.30
Prince George	480	6.10	6.10	----------	------	----------	----------	------	----------	32,509	2.06	0.70– 7.20	180,123	3.06	0.70–20.20
Kamloops	832	13.46	6.90–18.20	1,335	$5.47	$2.10– 9.00	3,018	$5.05	$2.40–10.50	31,696	1.38	0.50–12.50	147,515	3.52	0.25–18.20
Nelson	2,219	10.43	4.50–18.90	733	3.47	2.10– 7.70	13,487	4.34	0.75–10.80	5,086	3.28	0.70– 9.50	96,544	3.21	0.25–18.90
Totals for Province	4,308	$9.35	$3.40–18.90	2,068	$4.76	$2.10– 9.00	16,505	$4.47	$0.75–10.80	91,166	$1.99	$0.50–12.50	687,201	$3.55	$0.25–32.60

AVERAGE STUMPAGE PRICE RECEIVED, BY SPECIES AND FOREST DISTRICTS, ON SAW-TIMBER ON TREE-FARM LICENCE CUTTING PERMITS ISSUED IN 1960

(21)

Forest District	Douglas Fir			Cedar			Spruce			Hemlock			Balsam		
	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.
Vancouver	5,439	$8.81	$2.70–12.00	11,441	$2.98	$2.00– 5.90	2,281	$2.67	$2.40– 6.30	26,434	$2.41	$2.20– 4.30	12,264	$2.36	$2.00– 3.60
Prince Rupert	.....	.....	.....	932	2.29	1.80– 2.60	3,399	1.98	.70– 4.60	10,678	1.45	.50– 2.60	3,529	1.65	.50– 2.00
Prince George	2,238	2.94	1.90– 8.00	.....	.....	.....	7,765	2.66	.90– 4.50	.....	.....	.....	405	1.65	.60– 2.70
Kamloops	3,469	3.52	1.30– 6.80	36	3.16	2.10– 3.20	3,839	2.89	1.40– 6.80	84	2.79	1.60– 2.80	445	1.83	.90– 3.80
Nelson	3,701	3.63	2.00– 5.90	2,129	1.83	.25– 6.00	2,645	3.46	2.00– 5.60	2,338	0.95	.25– 3.50	212	2.17	.25– 3.40
Totals for Province	14,847	$5.40	$1.30–12.00	14,538	$2.77	$0.25– 6.00	19,929	2.70	$0.70– 6.80	39,534	$2.07	$0.25– 4.30	16,855	$2.18	$0.25– 3.80

Forest District	White Pine			Yellow Pine			Larch			Other Species			All Species		
	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.	Volume M C.F.	Price per C C.F.	Price Range per C C.F.
Vancouver	194	$6.53	$2.60– 8.70	.....	.....	.....	.....	.....	.....	197	$2.66	$2.20– 3.00	58,250	$3.15	$2.00–12.00
Prince Rupert	.....	.....	.....	.....	.....	.....	.....	.....	.....	515	2.34	1.60– 3.00	19,053	1.64	.50– 4.60
Prince George	.....	.....	.....	.....	.....	.....	.....	.....	.....	228	1.45	.60– 3.50	10,636	2.65	.60– 8.00
Kamloops	19	17.87	2.40–17.90	122	$1.73	$1.30– 5.40	364	$2.02	$1.90– 4.60	138	1.57	1.00– 4.90	8,516	3.05	.90–17.90
Nelson	714	14.54	11.20–15.90	115	4.80	1.80– 4.98	2,079	3.83	2.00– 5.90	219	2.76	1.50– 5.70	14,152	3.44	.25–15.90
Totals for Province	927	$12.93	$2.40–17.90	237	$3.25	$1.30– 5.40	2,443	$3.56	$1.90– 5.90	1,297	$2.22	$0.60– 5.70	110,607	$2.87	$0.25–17.90

(22)

TIMBER CUT FROM TIMBER SALES, 1960

Forest District	Board-feet	Lineal Feet	Cords	Ties	Posts	Christmas Trees	Hop-poles	Stakes and Sticks	Car-stakes	Blasting-sticks	Anchor-blocks	Shingle-shakes	Shake Blanks	Cubic Feet
Vancouver	57,724,355	497,192	1,609	.....	1,740	.....	35,800	.....	500	.....	.....	7,242,445	499,666	183,634,563
Prince Rupert (C.)	.....	176,824	132	.....	.....	532	.....	.....	.....	.....	.....	.....	.....	31,596,030
Prince Rupert (I.)	101,352	1,197,193	1,572	34,133	1,303	.....	.....	.....	3,556	.....	.....	.....	.....	31,076,185
Prince George	8,394,901	1,083,648	2,029	62,943	62,829	.....	.....	.....	.....	.....	.....	12,816	.....	124,334,092
Kamloops	17,282,379	3,586,783	3,364	478	115,000	.....	.....	.....	.....	.....	.....	68,004	.....	148,663,866
Nelson	11,499,561	2,524,280	365	85	324,124	396,821	.....	.....	.....	.....	.....	.....	144,824	55,273,933
Totals, 1960	95,002,548	9,065,920	9,071	97,639	504,996	397,353	35,800	.....	4,056	.....	.....	7,323,265	644,490	574,578,669
Totals, 1959	99,187,243	6,756,635	9,551	114,056	709,633	339,598	10,738	.....	2,448	.....	22	6,214,428	986,461	539,033,503
Totals, 1958	160,011,288	7,935,015	8,641	48,419	667,907	479,657	.....	.....	2,298	.....	18	3,546,527	922,900	441,192,089
Totals, 1957	281,403,429	25,475,664	44,489	304,329	844,246	562,658	3,360	9,335	11,640	.....	.....	11,618,566	3,890,503	392,306,642
Totals, 1956	501,950,576	11,426,509	13,529	308,076	607,528	268,945	.....	.....	1,954	.....	.....	5,943,124	1,040,496	423,459,495
Totals, 1955	707,975,332	10,646,201	19,839	158,748	712,813	313,820	.....	.....	3,971	45,000	610	5,966,313	1,196,178	360,046,248
Totals, 1954	1,072,985,534	9,249,681	15,214	241,579	773,939	234,277	42,632	1,225,534	1,204	15,000	107	4,030,698	1,262,058	208,475,224
Totals, 1953	1,593,812,300	14,671,961	14,961	345,513	1,209,211	208,070	254,330	908,250	3,266	12,500	340	4,753,434	783,450	74,251,388
Totals, 1952	1,853,359,728	15,463,269	14,861	390,598	1,168,309	177,329	42,834	1,223,775	1,190	12,000	925	3,505,899	729,817	828,089
Totals, 1951	1,761,852,867	8,794,979	15,682	276,688	1,018,336	1,025	.....	690,200	2,550	.....	.....	3,008,663	1,092,737	2,440
Ten-year average, 1951–60	812,754,084	11,948,583	16,584	228,565	821,692	298,273	38,969	405,709	3,458	8,450	202	5,591,092	1,254,909	301,417,379

(23) SAW AND SHINGLE MILLS OF THE PROVINCE, 1960

Forest District	Operating				Shut Down			
	Sawmills		Shingle-mills		Sawmills		Shingle-mills	
	Number	Estimated Eight-hour Daily Capacity, M B.F.	Number	Estimated Eight-hour Daily Capacity, M B.F.	Number	Estimated Eight-hour Daily Capacity, M B.F.	Number	Estimated Eight-hour Daily Capacity, M B.F.
Vancouver	206	8,107	37	923	80	378	12	69
Prince Rupert	269	1,978	------	------	144	835	------	------
Prince George	621	7,856	------	------	160	1,102	------	------
Kamloops	574	7,817	3	16	72	413	2	11
Nelson	268	3,674	4	11	102	653	3	13
Totals, 1960	1,938	29,432	44	950	558	3,381	17	93
Totals, 1959	2,005	28,280	65	1,138	587	3,975	6	23
Totals, 1958	2,010	27,694	56	1,141	586	4,007	9	37
Totals, 1957	2,255	26,752	58	1,390	514	3,124	10	121
Totals, 1956	2,435	29,080	66	1,381	390	2,013	8	15
Totals, 1955	2,489	28,016	72	1,804	404	2,285	3	19
Totals, 1954	2,346	25,602	57	1,108	367	2,281	13	22
Totals, 1953	2,413	23,300	59	1,121	286	2,186	12	47
Totals, 1952	2,223	23,433	59	1,173	332	2,092	24	117
Totals, 1951	2,100	21,748	60	1,169	294	1,474	16	78
Ten-year average, 1951–60	2,221	26,334	60	1,237	432	2,682	12	57

(24) EXPORT OF LOGS (IN F.B.M.), 1960

Species	Grade No. 1	Grade No. 2	Grade No. 3	Ungraded	Fuel-logs	Total
Fir	536,018	2,833,863	1,219,482	------	758,869	5,348,232
Cedar	528,498	961,266	1,749,118	------	------	3,238,882
Spruce	------	29,843	261,660	------	------	291,503
Hemlock	111,383	1,127,117	16,270,577	------	14,735	17,523,812
Balsam	------	------	------	11,805,282	116,656	11,921,938
White pine	576	1,026	3,908	------	------	5,510
Cypress	200,640	281,969	704,878	------	------	1,187,487
Hardwood	------	------	------	137	------	137
Cottonwood	14,688	116,314	662,707	------	------	793,709
Totals, 1960	1,391,803	5,351,398	20,872,330	11,805,419	890,260	40,311,210[1]
Totals, 1959	486,685	2,601,653	19,608,208	3,999,901	1,839,030	28,535,477
Totals, 1958	734,991	3,727,452	16,164,689	3,715,124	3,762,411	28,104,667
Totals, 1957	524,180	3,987,443	22,016,291	5,625,910	3,421,354	35,575,178
Totals, 1956	183,859	2,933,129	27,433,037	12,929,722	3,530,479	47,010,226
Totals, 1955	906,141	7,468,949	58,863,477	16,974,165	4,754,796	88,967,528
Totals, 1954	3,948,345	19,595,544	90,691,771	17,465,267	9,274,995	140,975,922
Totals, 1953	5,341,576	15,853,076	74,187,464	18,974,550	5,788,905	120,145,571
Totals, 1952	4,732,890	15,944,292	84,757,110	18,400,266	1,161,660	124,996,218
Totals, 1951	5,901,140	12,229,159	51,699,605	10,202,844	2,224,693	82,257,441
Ten-year average, 1951–60	2,415,161	8,969,210	46,629,398	12,009,317	3,664,858	73,687,944

[1] Of this total, 28,299,271 f.b.m. were exported from Crown-granted lands carrying the export privilege; 12,011,939 f.b.m. were exported under permit from other areas.

(25) SHIPMENTS OF POLES, PILING, MINE-PROPS, FENCE-POSTS, RAILWAY-TIES, ETC., 1960

Forest District and Product	Quantity Exported	Approximate Value, F.O.B.	Where Marketed		
			United States	Canada	Other Countries
Vancouver—					
Poles ... lin. ft.	4,955,336	$1,867,337.43	4,238,304	437,279	279,753
Piling ... ,,	2,525,501	587,470.84	12,630	491,075	2,021,796
Stakes and sticks ... ,,	388,474	11,654.22	388,474	...	...
Fence-posts ... pieces	6,188	2,005.69	2,553	3,635	...
Cedar shakes ... ,,	23,939,259	1,595,940.00	23,716,100	112,909	110,250
Christmas trees ... ,,	42,216	12,664.80	42,216	...	...
Prince Rupert—					
Poles and piling ... lin. ft.	2,539,307	962,202.26	1,523,584	1,015,723	...
Boom-sticks ... f.b.m.	236,799	9,471.96	...	236,799	...
Prince George—					
Poles ... lin. ft.	392,450	112,766.75	36,675	355,775	...
Piling ... ,,	31,235	7,808.75	...	31,235	...
Fence-posts ... pieces	58,958	14,739.50	...	58,958	...
Hewn ties ... ,,	45,852	75,655.80	248	45,604	...
Kamloops—					
Poles ... lin. ft.	3,433,695	1,098,782.40	1,556,400	1,877,295	...
Poles and piling ... ,,	520,879	130,219.75	151,804	369,075	...
Fence-posts ... cords	1,447	57,880.00	...	1,447	...
Christmas trees ... pieces	919,487	551,692.20	919,144	343	...
Nelson—					
Poles ... lin. ft.	71,790	22,255.00	11,945	59,845	...
Poles and piling ... ,,	2,632,010	1,538,621.00	1,540,485	1,091,525	...
Corral-rails ... ,,	116,770	2,335.00	...	116,770	...
Orchard-props ... ,,	210,600	4,212.00	210,600	...	...
Mine-timbers ... ,,	134,761	7,409.00	...	134,761	...
Mine-props ... cords	401	5,614.00	...	401	...
Cordwood ... ,,	39	422.00	...	39	...
Fence-posts ... ,,	5,555	322,190.00	1,368	4,187	...
Hewn ties ... pieces	1,300	2,210.00	...	1,300	...
Christmas trees ... ,,	1,483,804	934,797.00	1,330,973	152,831	...
Total value, 1960	...	$9,938,357.35	...	...	...
Total value, 1959	...	7,074,807.59	...	...	...

(26) SUMMARY OF EXPORT OF MINOR PRODUCTS, 1960

Product	Volume	Value	Per Cent of Total Value
Poles ... lin. ft.	8,853,271	$3,101,141.58	31.2038
Piling ... ,,	2,556,736	595,279.59	5.9897
Other poles and piling ... ,,	5,692,196	2,631,043.01	26.4736
Mine-timbers ... ,,	134,761	7,409.00	.0745
Corral-rails ... ,,	116,700	2,335.00	.0235
Stakes and sticks ... ,,	388,474	11,654.22	.1173
Orchard-props ... ,,	210,600	4,212.00	.0424
Boom-sticks ... f.b.m.	236,799	9,471.96	.0953
Fence-posts ... pieces	65,146	16,745.19	.1685
Cedar shakes ... ,,	23,939,259	1,595,940.00	16.0584
Christmas trees ... ,,	2,445,507	1,499,154.00	15.0845
Hewn ties ... ,,	47,152	77,865.80	.7835
Cordwood ... cords	39	422.00	.0042
Fence-posts ... ,,	7,002	380,070.00	3.8243
Mine-props ... ,,	401	5,614.00	.0565
Total value	...	$9,938,357.35	100.0000

(27) TIMBER MARKS ISSUED, 1951–60

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Ten-year Average, 1951–60
Old Crown grants	1,062	696	381	528	609	480	320	215	299	315	491
Crown grants, 1887–1906	269	201	134	175	218	207	108	93	103	115	162
Crown grants, 1906–1914	218	204	136	160	171	172	97	93	125	123	150
Section 55, *Forest Act*	714	538	409	485	653	655	460	362	524	517	532
Stumpage reservations	108	62	95	69	95	82	59	89	108	116	88
Pre-emptions under sections 28 and 29, *Land Act*	3	8	10	1	2	6	1	-------	-------	1	3
Timber berths	6	7	3	1	10	10	7	7	9	4	6
Indian reserves	41	13	24	30	31	46	23	9	21	15	25
Timber sales	2,962	2,594	2,881	2,786	3,130	2,859	2,239	1,900	1,926	2,136	2,541
Hand-loggers	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------
Special marks and rights-of-way	73	98	63	44	43	71	74	80	85	113	74
Pulp leases	-------	6	3	1	6	1	1	7	1	1	3
Pulp licences	2	1	-------	-------	-------	-------	-------	-------	-------	-------	-------
Totals	5,458	4,428	4,139	4,280	4,968	4,589	3,389	2,855	3,201	3,456	4,076
Transfers and changes of marks	1,086	983	744	780	867	873	615	598	669	794	801

(28) CROWN-GRANTED TIMBER LANDS PAYING FOREST-PROTECTION TAX AS COMPILED FROM TAXATION RECORDS, 1951–60

Year	Acreage Assessed as Timber Land	Coast		Interior	
		Logged	Timber	Logged	Timber
		Acres	Acres	Acres	Acres
1960	500,837	139,651	213,465	77,347	70,374
1959	502,001	125,883	238,285	71,509	66,324
1958	698,470	133,100	271,717	194,640	99,013
1957	614,095	146,535	288,046	88,580	90,934
1956	723,103	205,503	389,396	64,606	63,598
1955	783,517	221,934	429,350	69,822	62,411
1954	801,983	236,350	429,037	69,416	67,180
1953	757,516	201,264	444,014	27,692	84,546
1952	718,284	203,249	433,496	29,418	52,121
1951	682,746	191,435	410,037	31,333	49,941

(29) ACREAGE OF TIMBER LAND BY ASSESSMENT DISTRICTS

District	Acres	District	Acres
Alberni	11,613	Nelson-Slocan	93,265
Comox	90,282	Prince George	640
Cowichan	90,306	Prince Rupert	10,823
Cranbrook	5,006	Princeton	2,887
Gulf Islands	1,313	Quesnel Forks	40
Kamloops	80	Revelstoke	33,653
Kettle River	752	Vancouver	4,004
Lillooet	9,309	Vernon	2,089
Nanaimo	110,333	Victoria	34,442

(30) FOREST REVENUE

	Twelve Months to Dec. 31, 1956	Twelve Months to Dec. 31, 1957	Twelve Months to Dec. 31, 1958	Twelve Months to Dec. 31, 1959	Twelve Months to Dec. 31, 1960	Ten-year Average, 1951–60
Timber-licence rentals and fees	$369,821.07	$365,193.26	$362,192.71	$362,825.25	$363,597.80	$372,078.77
Timber-berth rentals and fees	20,245.13	19,486.74	19,335.48	19,910.61	18,712.81	19,869.62
Timber-lease rentals and fees	72,036.75	70,455.47	70,780.38	70,094.39	76,493.46	65,735.42
Timber-sale rentals and fees	379,821.98	380,963.43	425,867.87	435,589.31	452,788.69	306,692.53
Timber-sale stumpage	26,335,715.53	26,327,150.06	21,355,873.18	23,092,737.28	26,374,420.04	19,303,018.73
Timber-sale cruising and advertising	255,916.89	245,542.40	225,790.42	252,985.19	277,345.73	203,487.46
Timber royalties	2,069,424.19	1,838,162.25	1,719,957.61	1,890,590.96	2,281,028.09	2,053,546.65
Grazing permits and fees	79,247.61	69,041.15	73,093.16	86,506.29	101,240.36	88,854.11
Forest-protection tax	364,388.20	459,312.26	500,914.85	510,661.47	456,491.27	
Miscellaneous	141,478.88	156,060.04	132,917.72	121,287.96	121,461.72	104,982.08
Totals	$30,088,096.23	$29,931,367.06	$24,886,723.38	$26,843,188.71	$30,523,579.97	$22,518,265.37

(31)

AMOUNTS CHARGED AGAINST LOGGING OPERATIONS, 1960

District	Royalty	Seizure Expenses	Government Scaling Expenses	Scaling Fund		Stumpage	Rentals, Cruising, Advertising, Transfer Fees	Forest Reserve Account Timber	Silviculture Fund	Forest Development Fund	Total
				Scaling Expenses	Scaling Fees						
Vancouver	$1,691,536.07	$374.71	$3,372.38	$228,240.25	$1,135,104.56	$11,495,864.44	$334,964.70			$6,285.55	$14,895,742.66
Prince Rupert	334,633.48	203.57	1,832.10	20,199.90	123,900.13	2,265,399.94	133,070.63			12,876.59	2,892,116.34
Prince George	82,631.39		1,322.50			4,217,706.98	195,143.12			178,651.82	4,675,455.81
Kamloops	138,948.11	495.88	1,983.52			6,782,982.96	258,819.64			45,141.21	7,228,371.32
Nelson	136,671.50	205.20	934.78			2,902,439.08	181,356.18			51,386.36	3,272,993.10
Totals, 1960	$2,384,420.55	$1,279.36	$9,445.28	$248,440.15	$1,259,004.69	$27,664,393.40	$1,103,354.27			$294,341.53	$32,964,679.23
Totals, 1959	$1,883,849.42	$1,430.54	$8,890.85	$208,296.71	$1,013,297.52	$23,129,628.91	$1,020,645.57			$198,716.67	$27,464,756.19
Totals, 1958	$1,656,522.86	$3,877.67	$9,842.45	$169,517.28	$788,929.53	$20,385,679.74	$970,108.77			$139,091.73	$24,123,570.03
Totals, 1957	$1,888,013.14	$3,715.55	$12,215.30	$212,273.83	$909,138.97	$26,163,387.79	$939,036.10			$131,384.09	$30,259,164.77
Totals, 1956	$2,153,863.65	$810.22	$11,196.98	$216,050.36	$779,104.15	$28,828,870.26	$915,277.46		$316,796.43	$182,552.57	$33,404,522.08
Totals, 1955	$2,352,634.46	$765.88	$10,258.85	$176,151.17	$452,171.32	$19,950,410.73	$817,677.77		$891,076.65	$71,861.56	$24,723,018.39
Totals, 1954	$2,234,308.99	$1,393.07	$9,291.03	$144,589.21	$556,779.39	$14,596,633.95	$586,983.41		$1,163,596.44	$32,785.07	$19,326,360.56
Totals, 1953	$2,261,183.39	$1,134.99	$8,578.30	$126,613.32	$552,705.46	$14,961,152.26	$453,745.79		$1,066,676.88	$22,501.38	$19,454,291.77
Totals, 1952	$2,097,011.42	$2,075.40	$10,043.93	$119,689.20	$555,735.85	$14,950,895.47	$421,924.48	$12,008.53	$153,752.26	$8,871.32	$18,332,007.86
Totals, 1951	$2,269,348.68	$720.21	$4,889.37	$103,302.87	$444,068.21	$10,151,067.98	$358,394.68	$33,986.75	$93,127.15		$13,458,905.90
Ten-year average, 1951–60	$2,118,115.66	$1,720.29	$9,465.23	$172,492.41	$731,093.51	$20,078,212.05	$758,714.83				$24,351,127.68

(32) AMOUNTS CHARGED AGAINST LOGGING OPERATIONS, FISCAL YEAR 1959/60

District	Royalty	Seizure Expenses	Government Scale Expenses	Scaling Fund		Stumpage	Rentals, Cruising, Advertising, Transfer Fees	Silviculture Fund	Forest Reserve Account	Forest Development Fund	Total
				Expenses	Fees						
Vancouver	$1,554,101.08	$217.50	$1,419.02	$208,940.59	$1,023,461.49	$9,497,562.94	$335,729.63			$100.16	$12,621,532.41
Prince Rupert	216,264.31	103.15	968.84	13,292.84	73,561.19	1,828,327.52	111,154.43			9,953.87	2,253,626.15
Prince George	69,516.37		1,323.00			4,709,653.39	184,431.05			160,322.18	5,125,245.99
Kamloops	139,107.55	944.90	3,809.95			6,964,550.77	240,893.06			43,018.11	7,392,324.34
Nelson	111,100.66	228.24	1,058.88			2,972,702.50	155,180.43			63,148.84	3,303,419.55
Totals, 1959/60	$2,090,089.97	$1,493.79	$8,579.69	$222,233.43	$1,097,022.68	$25,972,797.12	$1,027,388.60			$276,543.16	$30,696,148.44
Totals, 1958/59	$1,724,335.77	$1,907.33	$8,371.39	$189,733.59	$857,356.03	$21,039,523.86	$980,609.33			$139,682.23	$24,941,519.53
Totals, 1957/58	$1,876,624.77	$5,652.05	$12,765.99	$200,348.04	$890,547.82	$24,860,333.41	$930,780.33			$137,679.66	$28,914,732.07
Totals, 1956/57	$2,100,595.60	$980.14	$11,837.04	$223,110.65	$825,245.69	$29,544,636.65	$917,775.18			$176,767.56	$33,800,948.51
Totals, 1955/56	$2,283,321.72	$781.20	$9,797.16	$176,432.52	$461,466.54	$21,285,022.76	$903,301.94	$1,114,131.62		$115,441.08	$26,349,696.54
Totals, 1954/55	$2,316,736.11	$740.25	$10,465.61	$151,213.86	$550,878.38	$15,774,317.46	$609,994.41	$1,018,909.39		$46,371.75	$20,479,627.22
Totals, 1953/54	$2,151,985.58	$1,620.06	$7,862.82	$123,420.80	$523,584.39	$13,672,473.41	$408,143.52	$1,077,446.47			$17,966,537.05
Totals, 1952/53	$2,094,496.37	$2,042.15	$10,734.56	$118,794.61	$525,391.14	$15,175,379.22	$289,757.89	$381,467.62	$8,991.41		$18,607,054.97
Totals, 1951/52	$2,316,222.37	$856.75	$5,179.84	$110,524.80	$527,790.82	$11,596,883.33	$261,783.40	[1]$6,025.17	$37,003.87		$14,850,220.01
Totals, 1950/51	$2,569,193.76	$756.14	$4,872.85	$108,594.65	$399,834.04	$7,021,098.74	$265,649.10	$663,475.85			$11,033,475.13
Ten-year average, 1950/51 to 1959/60	$2,152,360.20	$1,722.99	$9,046.70	$162,440.69	$665,911.75	$18,594,246.60	$659,518.37				$22,763,995.95

[1] Credit.

(33A) FOREST REVENUE, FISCAL YEAR 1959/60

		Ten-year Average
Timber-licence rentals and fees	$375,363.14	$377,623.77
Timber-berth rentals and fees	19,910.61	18,259.01
Timber-lease rentals and fees	72,261.04	62,298.60
Timber-sale rentals and fees	429,771.97	269,324.81
Timber-sale stumpage	24,759,105.35	16,791,994.06
Timber-sale cruising and advertising	262,980.20	178,114.73
Timber royalties	2,010,667.56	2,135,328.82
Grazing permits and fees	89,266.13	77,709.89
Forest-protection tax	490,913.68	(1)
Miscellaneous	127,177.63	93,675.63
	$28,637,417.31	$20,004,329.32
Taxation from Crown-granted timber lands (*Taxation Act*)	402,126.38	541,242.80
Taxation collected under authority of *Esquimalt and Nanaimo Railway Belt Land Tax Act*	682,143.15	804,794.46
Taxation collected on forest land (*Taxation Act*)	303,730.78	(2)
Taxation collected on tree-farm land (*Taxation Act*)	134,986.86	(3)
	$30,160,404.48	----------

[1] Formerly credited to Forest Protection Fund.
[2] Collection of this tax has been authorized only during the last six fiscal years.
[3] Collection of this tax has been authorized only during the last seven fiscal years.

(33B) FOREST REVENUE BY FISCAL YEARS, 1950/51 TO 1959/60

Fiscal Year	Direct Forest Revenue	Taxation from Crown-granted Lands	Taxation Collected under Taxation Act	Taxation Collected under Authority of E. & N. Railway Belt Land Tax Act	Total
1959/60	$28,637,417.31	$402,126.38	$438,717.64	$682,143.15	$30,160,404.48
1958/59	25,081,815.59	516,669.53	764,224.24	738,039.35	27,100,748.71
1957/58	29,054,657.56	597,118.52	883,674.75	1,060,884.36	31,596,335.19
1956/57	31,240,260.37	675,079.21	685,611.49	1,147,535.38	33,748,486.45
1955/56	23,867,705.50	681,503.26	532,010.00	940,632.27	26,021,851.03
1954/55	19,130,835.31	621,527.16	518,648.74	879,822.00	21,150,833.21
1953/54	17,578,625.58	612,865.29	----------	863,116.21	19,054,607.08
1952/53	18,016,025.17	588,821.78	----------	418,395.59	19,023,242.54
1951/52	13,703,715.41	484,475.51	----------	972,156.13	15,160,347.05
1950/51	10,089,884.69	440,213.07	----------	345,220.16	10,875,317.92

(34) FOREST SERVICE EXPENDITURES, FISCAL YEAR 1959/60[1]

Forest District	Salaries	Expenses	Total
Vancouver	$581,062.51	$180,560.89	$761,623.40
Prince Rupert	387,043.94	112,153.18	499,197.12
Prince George	454,602.12	117,228.66	571,830.78
Kamloops	578,823.11	133,016.38	711,839.49
Nelson	469,291.12	97,164.75	566,455.87
Victoria	229,276.50	330,388.25	559,664.75
Totals	$2,700,099.30	$970,512.11	$3,670,611.41
Reforestation and forest nursery			445,935.33
Forest management			468,789.06
Forest research			175,952.37
Public information and education			102,570.84
Forest Ranger School			97,971.26
Grant to Canadian Forestry Association			10,000.00
Office furniture and fixtures			28,129.98
Silviculture			1,342,268.45
Engineering services			892,791.67
Forest protection			2,812,740.44
Forest surveys			1,017,297.66
Grazing Range Improvement Fund[2]			56,506.73
Forest-development roads			2,118,674.90
Fire suppression			861,176.46
Forestry administration buildings and property			77,284.37
			$14,178,700.93

[1] True gross expenditures.
[2] Statement provided in Table 36.

(35) SCALING FUND

Deficit, April 1st, 1959	$257,948.73
Collections, fiscal year 1959/60	1,284,798.23
	$1,026,849.50
Expenditures, fiscal year 1959/60	1,190,913.00
Deficit, March 31st, 1960	$164,063.50
Collections, nine months, April to December, 1960	1,105,588.10
	$941,524.60
Expenditures, nine months, April to December, 1960	914,937.63
Balance, December 31st, 1960 (credit)	$26,586.97

(36) GRAZING RANGE IMPROVEMENT FUND

Balance, April 1st, 1959 (credit)	$7,747.72
Government contribution (section 14, *Grazing Act*)	35,959.60
	$43,707.32
Expenditures, fiscal year 1959/60	56,506.73
Deficit, March 31st, 1960	$12,799.41
Government contribution (section 14, *Grazing Act*)	44,633.07
	$31,833.66
Expenditures, April 1st, 1960, to December 31st, 1960	38,503.12
Deficit, December 31st, 1960	$6,669.46

(37) FOREST-PROTECTION EXPENDITURE BY THE FOREST SERVICE FOR TWELVE MONTHS ENDED MARCH 31ST, 1960

District	Salaries and Expenses		Tools and Equipment		Fires	Improvements	Aircraft	Planning and Research	Hazard Reduction	Uniforms	Miscellaneous	Total
	Permanent	Temporary	New	Maintenance and Operation								
Vancouver	$3,521.23	$298,274.79	$1,558.03	$34,547.87	$131,145.81	$33,368.99	$31,709.42	.....	.....	.....	$1,099.95	$535,226.09
Prince Rupert	2,873.83	148,140.66	2,086.75	51,316.59	58,123.52	38,471.29	23,882.82	.....	.....	.....	2,500.36	327,395.82
Prince George	4,100.33	187,708.80	2,409.76	68,354.34	128,676.88	107,346.58	45,419.43	.....	.....	.....	2,644.10	546,660.22
Kamloops	4,518.71	315,718.37	2,043.04	62,360.80	225,738.72	116,807.05	51,570.05	.....	.....	.....	2,491.06	781,247.80
Nelson	5,826.39	303,328.43	2,166.14	54,158.88	233,120.84	90,311.58	39,874.43	.....	.....	.....	3,265.99	732,052.68
Victoria	1,941.77	14,974.63	406,691.20	22,639.96	84,370.69	49,753.34	35,531.13	$31,009.35	$66,794.76	$6,167.05	31,460.41	751,334.29
Totals	$22,782.26	$1,268,145.68	$416,954.92	$293,378.44	$861,176.46	$436,058.83	$227,987.28	$31,009.35	$66,794.76	$6,167.05	$43,461.87	$3,673,916.90

(38) REPORTED APPROXIMATE EXPENDITURE IN FOREST PROTECTION BY OTHER AGENCIES, 1960

Forest District	Expenditures				
	Patrols and Fire Prevention	Tools and Equipment	Fires	Improvements	Total
Vancouver	$108,697	$421,747	$165,698	$69,972	$766,114
Prince Rupert	50,469	31,530	14,985	47,400	144,384
Prince George	32,000	13,000	12,420	140,000	197,420
Kamloops	57,341	49,605	61,903	123,000	291,849
Nelson	40,000	53,800	227,700	27,140	348,640
Totals	$288,507	$569,682	$482,706	$407,512	$1,748,407
Ten-year average, 1951–60	$287,073	$418,864	$374,200	$249,732	$1,329,869

(39) SUMMARY OF SNAG-FALLING, 1960, VANCOUVER FOREST DISTRICT

		Acres
Total area logged, 1960		76,958
Logged in small exempted operations[1]	637	
Assessed for non-compliance, less 1,028 acres subsequently felled	900	
		1,537
Balance logged acres snagged, 1960		75,421
Snags felled 1960 by Forest Service Protection Division		6,145
Snags felled 1960 by Forest Service Reforestation Division		6,306
Total area snagged, 1960		87,872

[1] Exemption granted under subsection (3) of section 113, *Forest Act.*

(40) SUMMARY OF LOGGING SLASH CREATED, 1960, VANCOUVER FOREST DISTRICT

		Acres
Total area logged, 1960		76,958
Area covered by full hazard reports	42,552	
Covered by snag reports but exempted from slash-disposal[1]	29,694	
Covered by acreage reports only (exempted from slash and snag disposal)[2]	637	
		72,883
Slash created and not reported in 1960		4,075

[1] Includes 4,323 acres reported exempt on slash-burn reports.
[2] Exemption granted under subsection (3) of section 113, *Forest Act.*

(41) ACREAGE ANALYSIS OF SLASH-DISPOSAL REQUIRED, 1960, VANCOUVER FOREST DISTRICT

	Acres of Slash		
	Prior to 1960	1960[1]	Total
Broadcast burning	7,860	8,404	16,264
Spot burning	13,197	13,091	26,288
Totals	21,057	21,495	42,552

1960 reports not recommending slash-disposal	29,694	
1960 slash on very small operations exempted without special examination	637	
		30,331
Total area of slash dealt with, 1960		72,883

[1] Above table does not include the estimated 4,075 acres (*see* Table 42) created too late to be dealt with in 1960.

(42) ANALYSIS OF PROGRESS IN SLASH-DISPOSAL, 1960, VANCOUVER FOREST DISTRICT

	Acres
Total disposal required (*see* Table 41)	42,552

	Acres of Slash			
Type of Disposal	Prior to 1960	1960	Total	
Spring broadcast burning	228	161	389	
Spring spot burning	811	.....	811	
Fall broadcast burning	14,699	11,326	26,025	
Fall spot burning	14,451	7,087	21,538	
Total burning completed	30,189	18,574	48,763	
Burning by accidental fires			782	
Lopping, scattering, land-clearing, etc.			.....	
Total				49,545
Balance reported slash not yet abated				.....
Slash created, 1960—acres assessed				.....
Plus slash created too late to be dealt with, 1960				4,075
Total area of slash carried over to 1961 for disposition[1]				4,075

[1] Does not show the acreage instructed in 1960 to be extended or assessed in 1961.
Actual area burned in spring spot burning, 27 acres.
Actual area burned in fall spot burning, 2,166 acres.
The above figures do not include 1959 slash-burn reports received too late for inclusion in 1960 Annual Report, 991 acres.

(43) SUMMARY OF SLASH-BURN DAMAGE AND COSTS, 1960, VANCOUVER FOREST DISTRICT

Total acres of forest-cover burned in slash fires, 1960	487
Net damage to forest-cover	$13,330.50
Net damage to cut products	8,488.00
Net damage to equipment and property	*Nil*
Total damage	$21,818.50

Cost of Slash-burning as Reported by Operators

	Total Cost	Acres	Cost per M B.F.	Cost per Acre
(*a*) Spring broadcast burning	$3,264.70	389	$0.21	$8.39
(*b*) Spring spot burning	1,615.00	811	.06	1.99
(*c*) Fall broadcast burning	139,073.30	26,025	.13	5.34
(*d*) Fall spot burning	88,829.63	21,538	.14	4.12

(*a*) and (*c*) based on volume of 40 M b.f. per acre.
(*b*) and (*d*) based on volume of 30 M b.f. per acre.

(44) FIRE OCCURRENCES BY MONTHS, 1960

Forest District	March	April	May	June	July	August	September	October	Total	Per Cent
Vancouver	1	4	64	256	918	391	198	34	1,866	45.4
Prince Rupert	.....	24	15	3	15	76	7	.....	140	3.4
Prince George	11	45	34	17	72	143	5	2	329	8.0
Kamloops	5	48	39	83	700	185	65	32	1,157	28.1
Nelson	6	9	11	51	349	146	29	20	621	15.1
Totals	23	130	163	410	2,054	941	304	88	4,113	100.0
Per cent	0.5	3.2	4.0	10.0	49.9	22.9	7.4	2.1	100.0	
Ten-year average, 1951–60	26	89	388	248	704	520	189	44	2,208	.....
Per cent	1.2	4.0	17.6	11.2	31.9	23.5	8.6	2.0	100.0	.....

(45) NUMBER AND CAUSES OF FOREST FIRES, 1960

Forest District	Lightning	Recreational (Campers, Hunters, Fishermen, etc.)	Railroads Operating	Smokers	Brush-burning (Not Railway or Right-of-way Clearing)	Range-burning	Road and Power-, Telephone-, and Pipe-line Construction	Industrial Operations (Logging, etc.)	Incendiary	Miscellaneous Known Causes	Unknown Causes	Total	Per Cent of Total Fires in Province
Vancouver	26	74	1,487	75	32	.....	11	28	.....	107	26	1,866	45.4
Prince Rupert	64	16	2	10	6	10	1	19	1	9	2	140	3.4
Prince George	165	40	11	13	18	33	8	19	3	15	4	329	8.0
Kamloops	594	70	120	121	15	44	9	54	20	97	13	1,157	28.1
Nelson	317	41	103	38	11	.....	7	17	30	43	14	621	15.1
Totals	1,166	241	1,723	257	82	87	36	137	54	271	59	4,113	100.0
Per cent	28.4	5.9	41.9	6.2	2.0	2.1	0.9	3.3	1.3	6.6	1.4	100.0	.....
Ten-year average, 1951–60	544	215	609	261	88	55	28	136	29	195	48	2,208	.....
Per cent	24.6	9.7	27.6	11.8	4.0	2.5	1.3	6.2	1.3	8.8	2.2	100.0	.....

(46) NUMBER AND CAUSES OF FOREST FIRES FOR THE LAST TEN YEARS

Causes	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Total
Lightning	574	431	597	116	418	497	307	1,150	184	1,166	5,440
Recreational (campers, hunters, fishermen, etc.)	228	298	174	157	195	214	170	296	172	241	2,145
Railroads operating	211	255	184	118	206	1,090	455	1,224	624	1,723	6,090
Smokers	354	349	171	120	206	281	182	478	211	257	2,609
Brush-burning (not railway or right-of-way clearing)	128	140	47	63	47	112	65	120	75	82	879
Range-burning	19	15	7	3	2	47	48	131	190	87	549
Road and power-, telephone-, and pipe-line construction	20	17	10	11	24	73	46	18	30	36	285
Industrial operations (logging, etc.)	133	114	83	64	89	183	107	246	204	137	1,360
Incendiary	28	37	10	12	15	27	22	53	34	54	292
Miscellaneous known causes	186	222	109	79	132	213	172	310	253	271	1,947
Unknown causes	42	36	28	21	50	73	45	94	33	59	481
Totals	1,923	1,914	1,420	764	1,384	2,810	1,619	4,120	2,010	4,113	22,077

(47)

FIRES CLASSIFIED BY SIZE AND DAMAGE, 1960

Forest District	Total Fires		Under ¼ Acre			¼ to 10 Acres			Over 10 to 500 Acres			Over 500 Acres in Extent			Damage		
	Number	Per Cent of Total Fires in Province	Number	Per Cent of Total Fires in District	Per Cent of Total Fires in This Class	Number	Per Cent of Total Fires in District	Per Cent of Total Fires in This Class	Number	Per Cent of Total Fires in District	Per Cent of Total Fires in This Class	Number	Per Cent of Total Fires in District	Per Cent of Total Fires in This Class	Under $100	Between $100 and $1,000	Over $1,000
Vancouver	1,866	45.4	1,734	92.9	58.7	115	6.2	14.2	16	0.9	6.0	1	0.0	1.2	1,839	9	18
Prince Rupert	140	3.4	82	58.6	2.8	42	30.0	5.2	16	11.4	6.0	.....	0.0	0.0	121	10	9
Prince George	329	8.0	164	49.9	5.6	79	24.0	9.7	62	18.8	23.3	24	7.3	28.6	269	29	31
Kamloops	1,157	28.1	562	48.6	19.0	435	37.6	53.7	124	10.7	46.6	36	3.1	42.8	1,042	64	51
Nelson	621	15.1	411	66.2	13.9	139	22.4	17.2	48	7.7	18.1	23	3.7	27.4	554	28	39
Totals	4,113	100.0	2,953	.....	100.0	810	.....	100.0	266	.....	100.0	84	.....	100.0	3,825	140	148
Per cent	100.0	.....	71.8	.....	.....	19.7	.....	.....	6.5	.....	.....	2.0	.....	.....	93.0	3.4	3.6
Ten-year average, 1951–60	2,208	.....	1,458	.....	.....	506	.....	.....	188	.....	.....	56	.....	.....	2,020	98	90
Per cent	100.0	.....	66.0	.....	.....	22.9	.....	.....	8.5	.....	.....	2.6	.....	.....	91.5	4.4	4.1

(48) DAMAGE TO PROPERTY OTHER THAN FORESTS, 1960[1]

Forest District	Forest Products Cut, Logs, Lumber, etc.	Buildings	Railway, Logging, and Sawmill Equipment	Miscellaneous	Total	Per Cent of Total
Vancouver	$44,784.00	$6,870.00	$96,645.00	$9,339.00	$157,638.00	52.6
Prince Rupert	6,200.00	7,175.00	55,930.00	3,000.00	72,305.00	24.1
Prince George	1,260.00	1,625.00	----------	----------	2,885.00	1.0
Kamloops	2,149.00	6,460.00	10,350.00	1,646.00	20,605.00	6.9
Nelson	----------	15,250.00	----------	30,974.00	46,224.00	15.4
Totals	$54,393.00	$37,380.00	$162,925.00	$44,959.00	$299,657.00	100.0
Per cent	18.1	12.5	54.4	15.0	100.0	--------
Ten-year average, 1951–60	$144,447.00	$30,593.00	$234,990.00	$31,798.00	$441,828.00	--------
Per cent	32.7	6.9	53.2	7.2	100.0	--------

[1] Does not include intentional slash-burns. (For this item *see* page 110.)

(49) DAMAGE TO FOREST-COVER CAUSED BY FOREST FIRES, 1960—PART I[1]

	Merchantable Timber				Immature Timber	
Forest District	Net Area Killed	Total Volume Killed	Salvable Volume of Timber Killed	Net Stumpage Loss	Net Area Killed	Present Value
	Acres	M Cu. Ft.	M Cu. Ft.	$	Acres	$
Vancouver	1,198	296	71	12,512	462	63,810
Prince Rupert	119	180	44	3,927	556	14,408
Prince George	37,946	53,882	8,482	1,504,020	10,539	223,384
Kamloops	32,756	39,852	16,040	650,571	9,720	152,824
Nelson	18,100	28,083	15,373	318,976	23,909	427,058
Totals	90,119	122,293	40,010	2,490,006	45,186	881,484
Per cent	31.5	100.0	32.7	66.8	15.8	23.7
Ten-year average, 1951–60	46,074	59,890	19,957	757,700	44,191	701,294
Per cent	12.0	100.0	33.3	46.3	11.6	42.8

[1] Does not include intentional slash-burns. (For this item *see* page 110.)

(49) DAMAGE TO FOREST-COVER CAUSED BY FOREST FIRES, 1960—PART II[1]

Forest District	Not Satisfactorily Restocked				Non-commercial Cover		Grazing or Pasture Land		Non-productive Sites		Grand Totals		
	Logged, Not Burned	Logged and Burned	Old Burn (Not Logged)	Damage	Area Burned	Damage	Area Burned	Damage	Area Burned	Damage	Area	Quantity	Damage
	Acres	Acres	Acres	$	Acres	$	Acres	$	Acres	$	Acres	M Cu. Ft.	$
Vancouver	782	402	1,986	66,527	2,760	686	5	.....	415	102	8,010	296	143,637
Prince Rupert	101	.....	3	1,199	458	115	7	.....	121	21	1,365	180	19,670
Prince George	1,515	88	3,122	33,610	29,832	7,005	7,911	393	6,992	1,749	97,945	53,882	1,770,161
Kamloops	8,967	39	2,179	132,407	34,812	8,604	8,182	610	6,921	3,713	103,576	39,852	948,729
Nelson	4,416	.....	3,756	91,453	15,599	3,503	581	38	8,563	2,136	74,924	28,083	843,164
Totals	15,781	529	11,046	325,196	83,461	19,913	16,686	1,041	23,012	7,721	285,820	122,293	3,725,361
Per cent	5.5	0.2	3.9	8.7	29.2	0.6	5.8	0.0	8.1	0.2	100.0	100.0	100.0
Ten-year average, 1951–60	7,804	2,734	29,505	117,301	164,903	41,965	10,728	745	77,086	17,390	383,025	59,890	1,636,395
Per cent	2.0	0.7	7.7	7.2	43.1	2.6	2.8	0.0	20.1	1.1	100.0	100.0	100.0

[1] Does not include intentional slash-burns. (For this item *see* page 110.)

(50) FIRE CAUSES, AREA BURNED, FOREST SERVICE COST, AND TOTAL DAMAGE, 1960

Causes	Fire Causes		Area Burned		Forest Service Cost		Total Damage	
	Number	Per Cent	Acres	Per Cent	Cost	Per Cent	Value	Per Cent
Lightning	1,166	28.4	197,080	68.9	$3,244,898	67.6	$2,808,611	69.8
Recreational (campers, hunters, fishermen, etc.)	241	5.9	9,912	3.5	112,925	2.4	243,314	6.0
Railroads operating	1,723	41.9	3,312	1.2	107,556	2.2	22,292	0.6
Smokers	257	6.2	4,926	1.7	135,965	2.8	60,654	1.5
Brush-burning (not railway or right-of-way clearing)	82	2.0	11,522	4.0	262,187	5.5	20,960	0.5
Range-burning	87	2.1	13,749	4.8	12,962	0.3	3,790	0.1
Road and power-, telephone-, and pipe-line construction	36	0.9	1,863	0.6	21,001	0.4	30,182	0.8
Industrial operations (logging, etc.)	137	3.3	29,923	10.5	662,643	13.8	589,534	14.6
Incendiary	54	1.3	876	0.3	51,164	1.1	28,638	0.7
Miscellaneous known causes	271	6.6	9,040	3.2	140,164	2.9	188,501	4.7
Unknown causes	59	1.4	3,617	1.3	45,953	1.0	28,542	0.7
Totals	4,113	100.0	285,820	100.0	$4,797,418	100.0	$4,025,018	100.0

(51) COMPARISON OF DAMAGE CAUSED BY FOREST FIRES IN LAST TEN YEARS

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Total, Ten Years
Total number of fires	1,923	1,914	1,420	764	1,384	2,810	1,619	4,120	2,010	4,113	22,077
Area burned (acres)	420,954	152,406	38,645	10,309	46,694	469,648	66,724	2,065,423	273,631	285,820	3,830,254
Standing timber destroyed or damaged (M cu. ft.)	49,244	46,460	1,385	531	886	10,192	1,278	358,149	8,481	122,293	598,899
Amount salvable (M cu. ft.)	31,206	21,524	780	196	269	4,564	391	98,517	2,110	40,010	199,567
Damage to forests	$1,417,975	$498,775	$145,957	$43,329	$90,971	$1,058,469	$123,032	$7,917,235	$1,342,849	$3,725,361	$16,363,953
Damage to other forms of property	1,535,125	492,344	114,693	131,554	64,153	372,803	130,204	408,183	869,569	299,657	4,418,285
Total damage	$2,953,100	$991,119	$260,650	$174,883	$155,124	$1,431,272	$253,236	$8,325,418	$2,212,418	$4,025,018	$20,782,238

(52) FIRES CLASSIFIED BY FOREST DISTRICT, PLACE OF ORIGIN, AND COST PER FIRE OF FIRE-FIGHTING, 1960

Forest District	Total Fires	Total Forest Service Cost			Extinguished without Cost			Cost Money to Extinguish							
		Dollars	Per Cent	Average Expenditure per Cost-Fire (Dollars)	Number	Per Cent of Total Fires in District	Per Cent of Total Fires in Province	Number	Per Cent of Total Fires in District	Per Cent of Total Fires in Province	Cost less than $100 per Fire	Cost $100 to $1,000 per Fire	Cost over $1,000 to $5,000 per Fire	Cost over $5,000 to $10,000 per Fire	Cost over $10,000 per Fire
Vancouver	1,866	102,748	2.2	815.46	1,596	85.5	38.8	270	14.5	6.6	169	74	16	6	5
Prince Rupert	140	60,466	1.3	107.98	56	40.0	1.4	84	60.0	2.0	39	34	5	5	1
Prince George	329	503,954	10.5	2,229.88	103	31.3	2.5	226	68.7	5.5	100	80	30	8	8
Kamloops	1,157	2,828,068	58.9	4,701.13	420	36.3	10.2	737	63.7	17.9	323	234	113	20	47
Nelson	621	1,302,182	27.1	3,994.42	137	22.1	3.3	484	77.9	11.8	261	144	37	16	26
Totals	4,113	4,797,418[1]	100.0	3,596.27	2,312	.....	56.2	1,801	.....	43.8	892	566	201	55	87
Per Cent	100.0	.....	.....	.....	56.2	.....	.....	43.8	.....	.....	21.7	13.8	4.9	1.3	2.1
Ten-year average, 1951–60	2,208	1,305,996	.....	.....	1,169	.....	.....	1,039	.....	.....	610	299	83	17	30
Per Cent	100.0	.....	.....	.....	52.9	.....	.....	47.1	.....	.....	27.6	13.5	3.8	0.8	1.4

[1] Cost correct to date. Subject to later revision.
Cost to other parties (764 cost-fires), $482,706. Cost to Forest Service (1,334 cost-fires), $4,797,418.
Detailed final costs are published one year in arrears in the table " Forest Protection Expenditures " in each Annual Report.

(53)

PROSECUTIONS, 1960

Forest District	Information Laid	Burning without Permit	Refusing to Render Assistance in Fire-fighting	Contravening a Forest Closure	Failing to Maintain Proper Fire-protection Equipment	Failing to Control and Extinguish Fire	Failing to Fall Snags and Remove Debris in Accordance with Regulations	Arson	Miscellaneous Offences	Fines		Served Sentence in Jail	Suspended Sentence	Cases Dismissed	Cases Pending	Cases Withdrawn
										Number	Amount					
Vancouver	16	6	9	—	1	—	—	—	—	9	$260	1	—	1	5	—
Prince Rupert	2	2	—	—	—	—	—	—	—	2	50	—	—	—	—	—
Prince George	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kamloops	15	4	9	—	—	—	—	2	—	13	610	2	—	—	—	—
Nelson	9	4	4	1	—	—	—	—	—	8	200	—	—	1	—	—
Totals	42	16	22	1	1	—	—	2	—	32	$1,120	3	—	2	5	—
Ten-year average, 1951–60	60	20	15	13	7	3	1	—	1	52	$1,595	1	2	3	1	1

(54) ENROLMENT AT RANGER SCHOOL, 1960

Forest District	Forest Assistants	Rangers	Acting Rangers	Assistant Rangers	Clerks	Total	Graduations
Vancouver	—	—	—	4	—	4	—
Prince Rupert	—	—	—	2	—	2	—
Prince George	4	—	—	2	—	6	—
Kamloops	—	—	—	5	—	5	—
Nelson	—	—	—	4	—	4	—
Attendance, 1960	4	—	—	17	—	21	21
Attendance, 1959	4	—	—	17	—	21	—
Attendance, 1959	—	—	—	21	—	21	21
Attendance, 1958	—	—	—	21	—	21	—
Attendance, 1957	4	—	—	26	—	30	30
Attendance, 1956	4	—	—	26	—	30	—
Attendance, 1956	3	—	—	18	—	21	21
Attendance, 1955	3	—	—	18	—	21	—
Attendance, 1954	—	—	—	20	—	20	20
Attendance, 1953	—	—	—	21	—	21	—
Attendance, 1953	—	—	—	20	—	20	20
Attendance, 1952	—	—	—	20	—	20	—
Attendance, 1951	—	3	3	15	—	21	21
Attendance, 1950	—	3	3	15	—	21	21
Attendance, 1949	—	3	2	16	—	21	—
Attendance, 1948	—	4	2	12	2	20	20
Attendance, 1947	—	8	—	12	—	20	20
Attendance, 1946	—	2	9	9	—	20	20

NOTE.—Commencing with the class of 1949/50, each class takes one and one-half years to complete the course.

(55)

MOTION-PICTURE LIBRARY, 1951–60

Stock Records

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Films in library at January 1st	75	74	77	80	64	71	78	80	83	92
Films withdrawn during year	8	3	.....	24	2	3	.....	1	10	2
New films added during year	7	6	3	8	9	10	2	4	19	5
Films in library at December 31st	74	77	80	64	71	78	80	83	92	95
Films used during year	71	72	79	64	70	80	79	84	83	96

Circulation Records

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
Number of loans made during year	461	492	490	422	429	413	455	604	468	374
Number of film loans during year (one film loaned one time)	1,057	1,218	1,158	1,474	1,280	1,743	1,758	1,253	1,454	749
Number of showings during year	2,943	2,764	2,288	2,664	1,998	1,909	1,956	1,775	1,622	1,217
Number of audiences—										
Adults	13,542	13,655	12,640	12,333	14,353	14,537	18,983	10,330	17,329	12,277
Children	264,245[1]	157,085[2]	118,622[2]	102,013[1]	131,844[1]	157,086[1]	86,829[1]	69,316[1]	54,429[1]	90,658
Mixed	26,706	59,182	43,099	54,069	41,340	42,587	38,143	42,938	51,421	62,405
Totals	304,493[1]	234,396[2]	174,367[2]	168,415[1]	187,537[1]	218,275[1]	148,124[1]	126,216[1]	123,179[1]	165,340[1]

[1] Including attendances of lecture tour of two school lecturers.
[2] Including attendances of lecture tour of three school lecturers.

Leased Films, 1960

Title	Number of Showings	Number in Audience			
		Adult	Children	Mixed	Total
I'm No Fool with Fire	167	442	21,233	.....	21,675

(56)

SUMMARY OF COVERAGE BY SCHOOL LECTURERS, 1951–60

Forest District	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	Total
Vancouver—											
Number of school visits	288	79	163	140	203	232	10	176	108	117	1,516
Number of lectures given	341	79	176	206	352	419	11	237	162	145	2,128
Attendance	63,245	9,809	29,568	21,168	56,760	67,962	871	29,606	35,082	30,380	344,451
Kamloops—											
Number of school visits	60	122	43	5	.....	39	71	.....	47	48	435
Number of lectures given	66	122	56	5	.....	49	86	.....	49	54	487
Attendance	4,438	18,075	10,249	188	.....	5,731	10,046	.....	5,420	5,203	59,350
Nelson—											
Number of school visits	23	51	150	67	.....	.....	42	.....	62	36	431
Number of lectures given	23	51	201	88	.....	.....	60	.....	75	59	557
Attendance	3,011	4,608	22,684	12,668	.....	.....	7,002	.....	9,972	5,094	65,039
Prince George—											
Number of school visits	47	72	59	25	.....	.....	66	.....	76	5	350
Number of lectures given	49	72	63	26	.....	.....	75	.....	82	5	372
Attendance	1,864	5,028	2,913	1,343	.....	.....	5,671	.....	5,600	820	23,239
Prince Rupert—											
Number of school visits	.....	19	21	.....	.....	.....	.....	.....	21	.....	61
Number of lectures given	.....	19	32	.....	.....	.....	.....	.....	25	.....	76
Attendance	.....	1,602	2,860	.....	.....	.....	.....	.....	5,135	.....	9,597
All districts—											
Number of school visits	418	343	436	237	203	271	189	176	314	206	2,793
Number of lectures given	479	343	528	325	352	468	232	237	393	263	3,620
Total attendance	72,558	39,122	68,274	35,367	56,760	73,693	23,590	29,606	61,209	41,497	501,676

(57)

FOREST SERVICE LIBRARY, 1951–60

Classification	Items Catalogued and Indexed										Ten-year Average, 1951–60
	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	
Bound volumes	23	9	41	62	55	37	45	48	43	39	40
Government reports and bulletins	101	122	484	246	190	179	266	177	142	123	204
Other bulletins and reports	152	337	90	92	94	170	109	159	165	200	157
Periodicals	110	115	111	124	136	151	155	133	130	115	128
Serials[1]	.....	.....	66	127	141	177	214	230	302	274	.....
References indexed	2,650	2,203	1,800	932	1,090	1,321	1,417	1,139	1,502	999	1,505

[1] Before 1953, included with periodicals, bulletins, and reports.

(58)

GRAZING PERMITS ISSUED

District	Number of Permits Issued	Number of Stock under Permit		
		Cattle	Horses	Sheep
Kamloops	1,168	108,847	3,134	18,165
Nelson	445	15,005	1,146	1,295
Prince George	113	3,296	224	.....
Totals, 1960	1,726	127,148	4,504	19,460
Totals, 1959	1,683	124,425	4,377	20,604
Totals, 1958	1,571	122,489	4,169	20,927
Totals, 1957	1,640	128,978	3,886	20,693
Totals, 1956	1,776	127,182	3,667	22,310
Totals, 1955	1,705	121,284	3,575	22,560
Totals, 1954	1,750	111,767	3,738	24,909
Totals, 1953	1,730	108,894	4,133	23,172
Totals, 1952	1,621	104,610	4,040	23,565
Totals, 1951	1,561	100,082	4,350	22,282

(59)

GRAZING FEES BILLED AND COLLECTED

Year	Fees Billed	Fees Collected[1]	Outstanding, Dec. 31
1960	$102,631.52	$99,636.71	$21,412.43
1959	91,636.13	84,595.04	18,417.62
1958	69,986.23	71,726.71	11,376.53
1957	67,593.88	68,131.94	13,117.01
1956	76,155.51	79,247.61	13,655.07
1955	76,061.32	75,250.32	16,577.24
1954	80,191.97	85,043.96	15,766.24
1953	95,088.64	102,460.00	20,618.23
1952	125,495.09	110,731.32	27,989.59
1951	108,400.14	106,161.36	13,225.82

[1] Includes statutory penalties.

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