PROVINCE OF BRITISH COLUMBIA

DEPARTMENT OF RECREATION AND CONSERVATION

HON. W. K. KIERNAN, *Minister* LLOYD BROOKS, *Acting Deputy Minister*

REPORT OF THE

Department of Recreation and Conservation

containing the reports of the

GENERAL ADMINISTRATION, FISH AND WILDLIFE BRANCH, PROVINCIAL PARKS BRANCH, BRITISH COLUMBIA PROVINCIAL MUSEUM, AND COMMERCIAL FISHERIES BRANCH

Year Ended December 31

1971

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1972

VICTORIA, BRITISH COLUMBIA, JUNE 30, 1972

To Colonel the Honourable JOHN R. NICHOLSON, P.C., O.B.E., Q.C., LL.D.,
Lieutenant-Governor of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

Herewith I beg respectfully to submit the Annual Report of the Department of Recreation and Conservation for the year ended December 31, 1971.

W. K. KIERNAN
Minister of Recreation and Conservation

VICTORIA, BRITISH COLUMBIA, JUNE 29, 1972

The Honourable W. K. Kiernan,
Minister of Recreation and Conservation.

SIR: I have the honour to submit the Annual Report of the Department of Recreation and Conservation for the year ended December 31, 1971.

LLOYD BROOKS
Acting Deputy Minister of Recreation and Conservation

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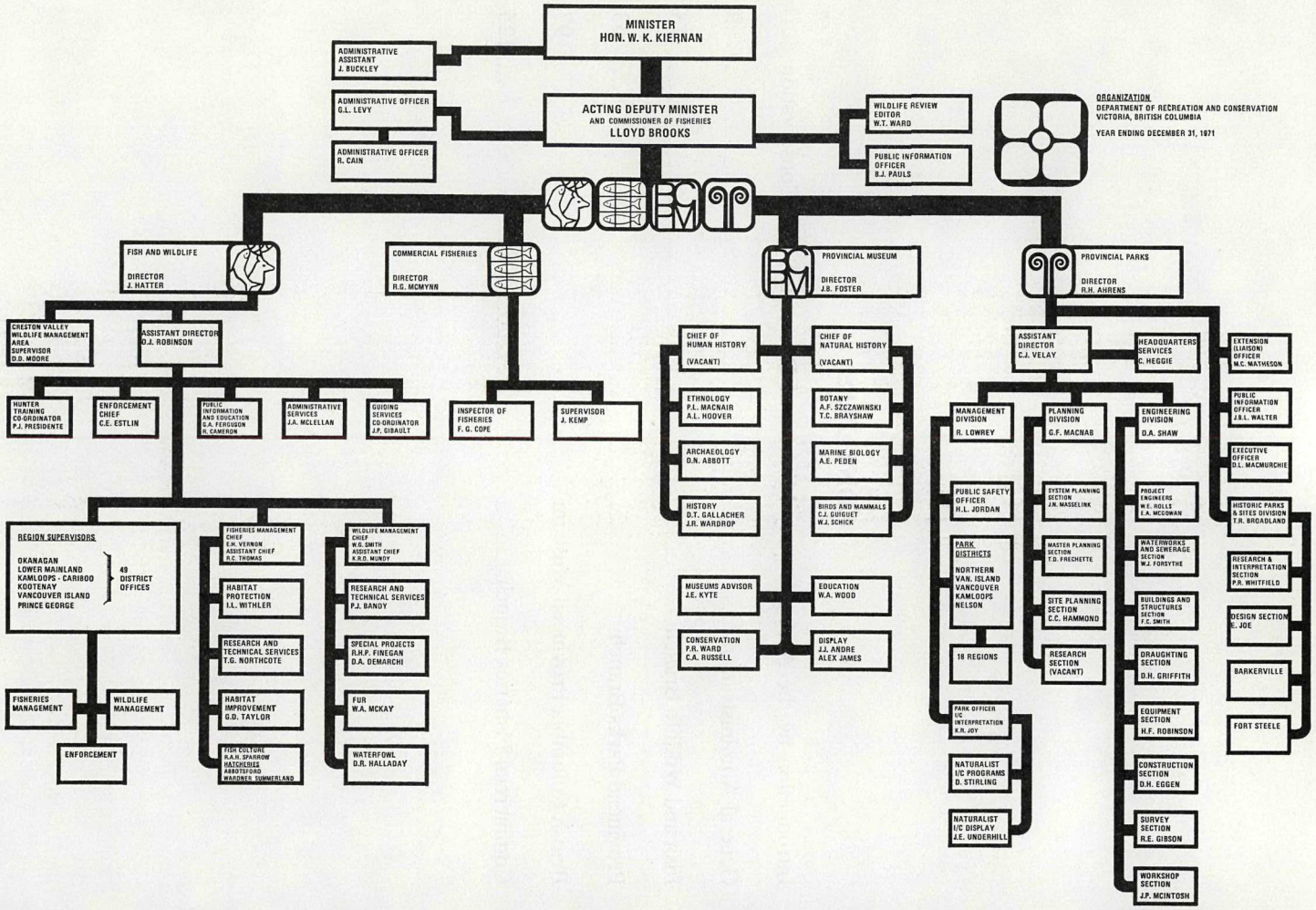
MINISTER
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PUBLIC INFORMATION OFFICER B.J. PAULS
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DEPARTMENT OF RECREATION AND CONSERVATION
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YEAR ENDING DECEMBER 31, 1971
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REGION SUPERVISORS
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LOWER MAINLAND
KAMLOOPS - CARIBOO
KOOTENAY
VANCOUVER ISLAND
PRINCE GEORGE
49 DISTRICT OFFICES
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WILDLIFE MANAGEMENT
ENFORCEMENT
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NORTHERN
VAN. ISLAND
VANCOUVER
KAMLOOPS
NELSON
18 REGIONS
PARK OFFICER I/C INTERPRETATION K.R. JOY
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NATURALIST I/C DISPLAY J.E. UNDERHILL
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SURVEY SECTION R.E. GIBSON
WORKSHOP SECTION J.P. MCINTOSH

Report of the Department of Recreation and Conservation, 1971

LLOYD BROOKS, ACTING DEPUTY MINISTER AND COMMISSIONER OF FISHERIES

INTRODUCTION

The increased emphasis on an integrated approach to resources management throughout the Province, and the general concern over environmental quality by citizens, by industry, and by related resource agencies, Federal and Provincial, has added a new and demanding dimension to the work of this Department. The increased tempo is reflected in all branches, but the brunt of the action has been borne by the Fish and Wildlife Branch through increased involvement with Environment and Land Use Committee task forces, through a stepped-up interdepartmental resources referral system and through requests from the public in general.

The regional offices bore much of this load as their specialists were increasingly sought, both by industry and by government, for committee work and for special reports aimed at maximizing fish and wildlife in the face of increasing demands on our natural resources. The co-operation of industry has been encouraging, with but few exceptions, and the close working association developing with Federal and Provincial resource agencies has been most gratifying. However, there is concern over the limited capacity of the Branch to meet the new challenges. Evidence is clear that we must increase our capability, particularly in the area of inventory of fish and wildlife and of their habitat requirements. This is the key to effective response to the demands for more and more information on the best means of managing the increasingly appreciated but more threatened fish and wildlife values of this Province.

Historic Parks continued their increasing popularity, reflecting the concern and fascination of our citizens for the early beginnings of this Province. The highlight event in this Centennial Year was the visit of the Queen and Prince Philip to Fort Steele Historic Park.

The programme of acquisition of key park potentials continued with the two major additions being the prime shoreline of Mabel Lake in the Okanagan and Brandywine Falls near Squamish. Under agreement with the Federal Government, shared-cost acquisitions of private lands in Phase I of the West Coast National Park continued satisfactorily.

The Provincial Museum's activities were highlighted by the acquisition of several important collections, and by the largest archæological programme ever carried out in this Province. This was concentrated mainly within Provincial park lands and was made possible by the Accelerated Park Development Fund.

Phase I, the historical section of Project 70, neared completion, and is expected to be open to the public by July 1972. Project 70 is a four-phase major exhibit plan which will eventually occupy two full floors of the museum. It is aimed at increasing the public's understanding of our environment and our heritage. Very high standards of display and interpretation are being aimed for, resulting in exhibits of outstanding quality. Although support funding has been forthcoming from a number of commercial firms this, along with the annual appropriation, has not

been sufficient to stay on schedule, hence our one million annual visitors are on occasion suffering a certain loss of quality of experience through overcrowding.

The education programme of the museum made significant progress as evidenced by the participation of some 20,000 students. Their interest was enhanced by the effective use of drama. There was also an important emphasis on the involvement of Indian peoples as teachers and guides in museum programmes.

This year also saw a rapid emergence of many local museums throughout British Columbia under the impetus of Centennial programmes, but receiving much technical assistance and general guidance from the museum's extension service.

Commercial Fisheries Branch activities focus mainly on the improvement of several aspects of the shellfish industry. A new licensing system was introduced for oyster growers and, in co-operation with Federal Government, further cost and efficiency analysis was made of the oyster depuration plant at Ladysmith.

A number of cost-shared projects were carried out with Federal Government having their objective of expanding or updating various aspects of the fisheries industry. These included mechanical harvesting of razor clams, development of raft culture for oysters, and aquatic plant studies.

There was important involvement as part of a Federal-industry team in negotiation with the United States on an equitable balancing of the salmon harvest between the two countries. These are continuing and could have a profound effect on the future salmon industry.

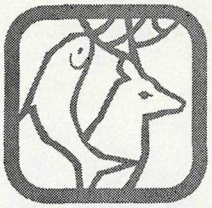
Our Departmental information and education services played a vital role in responding to increasing public awareness on environmental matters, particularly as related to the specific responsibilities of the Department.

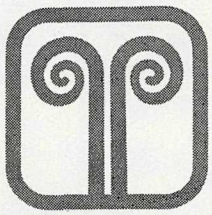
The Departmental magazine, *Wildlife Review,* continues to elicit a popular response, but is currently reviewing its role in relation to the broad scope of this Department relative to environmental matters.

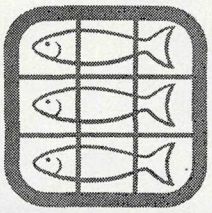
H. G. McWILLIAMS

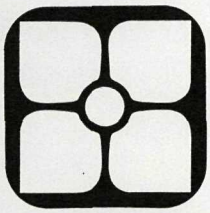
Mr. McWilliams retired as Deputy Minister of the Department on June 30, 1971, after 36 years of varied service with the Provincial Government. His many friends and associates wish him a long and happy retirement.

General Administration









Department of Recreation and Conservation

GENERAL ADMINISTRATION

General Administration consists of the Deputy Minister's Office, the attached Public Information Officer, and the Accounts and Personnel Office.

The staff of General Administration work closely with all branches, and the Department of Travel Industry, in such Departmental matters as putting policy into effect, office and work facilities, personnel and finance. General Administration is also responsible for the processing and handling of all subscriptions to *Wildlife Review*.

The General Administration office assumes more work every year as the responsibilities of the Department of Recreation and Conservation become greater.

The Personnel Section of General Administration processed 107 requisitions to the Civil Service Commission for the purpose of obtaining new and replacement positions for all Branches of the Department.

This section also processed 106 Civil Service Commission requisitions for the Department of Travel Industry.

Two employees in this Department completed the one-year Basic Public Administration Course and two others were selected for the 1971/72 course. Four employees in the Department received 25-year continuous-service awards.

The Prime Minister's Award for Safety Achievement was awarded to this Department for decreasing its accident-frequency rate.

Regular meetings are held with employees of the Parks Branch and the Fish and Wildlife Branch for the purpose of reviewing personnel accidents and seeking methods of improving safety.

EXECUTIVE ASSISTANT TO THE MINISTER

In August the Department entered a new field: That of improving or conserving the environment through the removal of abandoned and derelict motor-vehicles and other scrap materials from along our roadsides and from our recreational areas.

Where transportation costs have been low, salvage operators from the private sector have done a fair job in removing this type of litter. In outlying areas the hulks remained, as the cost of removal in their present form made transportation to market uneconomical. The transportation problem could be reduced by compacting the vehicles to less than one-third of their original volume, allowing more vehicles to be carried per load, thereby reducing shipping costs.

With this in mind, the Department moved forward with Project S A M, the name being derived from the first letter of each of its three objectives: Salvage old car bodies, assemble at suitable collection depots, and manufacture into smelter feed. Two field units were placed in operation. Each consists of a mobile autobody compactor, two front-end loaders, a highway tractor and trailer, and other related equipment.

A staff of nine was recruited from within the Government Service, with A. J. Heatherington, formerly the Parks Branch Regional Supervisor at Alouette, transferring to Project S A M as its Supervisor.

Derelict automobiles are compacted with this machine as part of the operations of Project S A M. The compacted vehicles are shipped to a shredding plant where the crushed scrap is converted into smelter feed.

In August the first field unit commenced operating on Vancouver Island and the second field unit joined the programme in Quesnel in mid-October. In the short period of operation prior to the end of December 2,000 derelict car bodies were compacted at 11 sites in the Regional District of Alberni-Clayoquot and an additional 1,000 were processed in the Courtenay-Comox area. While the first unit was crushing a total of 3,200 vehicles on Vancouver Island, the second unit had compacted in a somewhat shorter period 1,200 vehicles in Quesnel, 150 Mile House, 100 Mile House, Clinton, Cache Creek, and Brocklehurst.

The compacted vehicles will be transported to a shredding plant presently under construction in Richmond; conversion of the crushed scrap into smelter feed, for which there is a local market, will commence by August 15, 1972. Prior to the introduction of this programme, the very limited market for unprocessed automotive scrap was outside the Province and was subject to the supply and demand of the off-shore export market.

It is estimated that at the end of the year there were about 100,000 abandoned vehicles within the Province, and that additionally about 40,000 vehicles are taken off the road each year.

It is expected that when fully operative the project will:

(1) Remove eyesores from our roadsides and recreational areas;

(2) Conserve natural resources through the recycling process; and

(3) Provide additional employment (through establishment of the shredder plant) in a secondary industry within the Province.

PUBLIC INFORMATION AND EDUCATION

The Public Information Officer of the Department of Recreation and Conservation has as his primary duty various writing and editing assignments for *Beautiful British Columbia* magazine (Department of Travel Industry). His secondary duties are to carry out certain projects and routine duties as determined by the Minister.

During 1971 the interests of the general public in environmental matters, demonstrated in demands upon the office for information concerning all aspects of the outdoors, reached an unprecedented volume.

The most noteworthy project was the arranging for publicity for the annual Anti-Litter Week in May. A sampling of coverage indicated that at least 2,628 column inches of newspaper space were used to reproduce articles and photographs on the campaign which had been written and produced by the Public Information Officer.

The Public Information Officer continued to serve as a member and secretary of the *Beautiful British Columbia* magazine executive, the Resource Use Information Committee (a subcommittee of the Environment and Land Use Committee), and the *Wildlife Review* advisory board.

Studies initiated in December 1970, at the request of the Minister to determine what changes in organization might be necessary to improve public information and education services in the Department were still proceeding.

WILDLIFE REVIEW

Wildlife Review magazine, published quarterly since October 1954, moved from sponsorship by the Fish and Wildlife Branch and became a Departmental publication under the Deputy Minister in 1968. This change came about because of the ever-widening involvement of the magazine in the total field of conservation education, and the need for coverage of matters concerning the whole Department.

A close examination of the magazine's function, and an analysis of its basic purposes was undertaken in the fall of 1971. It was felt that the magazine had greater possibilities than had yet been attained; that its past successes could be improved upon, and that ways should be found to introduce this magazine to an even wider audience.

Proposals to change the name to one that more clearly defined the wide scope of modern conservation and ecological concern were made. Readers were invited to send in their comments and suggestions, both as to content of the magazine and for their thoughts on a new name for the publication.

At the end of the year, no new name that seemed suitable as a replacement had been discovered. In the meantime, reorganization of the operation of the magazine is taking place with the aim of making it even more effective than it has been in the past.

Fish and
Wildlife
Branch

Department of Recreation and Conservation

FISH AND WILDLIFE BRANCH

J. HATTER, DIRECTOR

The past year has been another period of intense activity for the Fish and Wildlife Branch. It is evident that as our economy and our population expands the demands on recreational hunting and fishing will continue to increase. At the same time there is no indication that pressures on the fish and wildlife resources of this Province will level off in the near future. Industrial developments, pollution, and other effects associated with economic growth continue to be of major concern to fish and wildlife managers and now occupy a major proportion of the time and expenditure of the Fish and Wildlife Branch.

The public concern for environmental protection which has increased dramatically in the past two years has added to the work load of the Branch. Many of the current environmental problems require the attention and judgment of ecologists who understand how animal life is affected by changes in the environment and, in turn, of how fish and wildlife habitat problems reflect on the quality of the environment as a whole. The Fish and Wildlife Branch is one of the few Provincial Government agencies with such expertise. In the past few years professional staff have, of necessity, had to devote an increasing amount of time to advising industry and other Government agencies, whose policies affect the environment, the ecological consequences of impending decisions or suggested policies. Activities of this sort undertaken in 1971 included:

The Study Committee of the Canada-British Columbia Okanagan Basin Agreement, a two-million-dollar enterprise which has as its objective the development of "a comprehensive framework plan for the development and management of water resources for the social betterment and economic growth in the Okanagan Basin."

The Advisory Group to the International Joint Commission, formed to review the ecological consequences of further hydro-electric development on the Skagit River.

The Ecology Committee of the Fraser River Flood Control Programme formed to administer a $300,000 review of environmental benefits and disbenefits of proposals for upstream storage on the Fraser River for flood control and power development (System E).

The Environmental and Land Use Technical Sub-Committee, a permanent Provincial interagency group concerned with developing methods of integrating the interests of diverse resource users.

The Fisheries Committee of the British Columbia Energy Board formed to review fisheries problems associated with development of hydro-electric power sources in the Province.

The Pesticide Committee which reviews on a continuing basis all proposals for application of pesticides in the Province.

The Surface Mine Rehabilitation Committee which reviews on a continuing basis all proposals for surface mining in the Province.

As well as this partial list of formal headquarters committee functions, there exist a multitude of additional liaison and planning arrangements, both permanent and *ad hoc* at all levels of Branch organization.

In addition to matters of environmental protection originating out of the new ecological conscience, there is a growing desire for more quality in hunting and fishing experience. Fly-fishing-only regulations, restricted big-game seasons, and a trend toward landowner-hunter agreements to limit public access are examples of this and each of these creates new demands for the fisheries and wildlife managers.

The image of the hunter is steadily improving as more extensive training and licensing programmes emphasize the quality of the hunting experience. Even so, it is becoming increasingly evident that hunters will not be able to continue to enjoy the freedom they have been accustomed to in the past in respect to hunting over private agricultural lands. In heavily populated areas the trend is toward a new type of landowner-club arrangement that will restrict entry and provide better protection to the landowner. Unless private landowners in such areas as the Fraser Valley derive benefit from wildlife and hunting on their land, even restricted entry will likely cease to exist. If, for example, upland hunting is to be maintained indefinitely, close to our major population centres, it will likely be through a system based upon or a modification of the European method of restricted entry upon a stable land pattern. Intensive management and propagation of certain species of game birds such as pheasants, is a further component of this system.

All of these processes spell a continuing diversification and commitment on the part of the Fish and Wildlife Branch technical staff. But unless our efforts increase in proportion to the increased pressures on both fish and wildlife and their habitat, it is unlikely that they will survive to provide for future generations the pleasure it has afforded many of us in the past.

In-service Training

British Columbia Institute of Technology

A programme of in-service training for field staff was designed by the British Columbia Institute of Technology and the Fish and Wildlife Branch in an effort to increase effectiveness and capability in resource-management work. This programme was conducted by the Extension Division of BCIT and involved courses on statistics, mathematics, ecology, resource measurement, report writing, wildlife and fisheries management, and map and photo interpretation. The schedule required 120 hours attendance at BCIT as well as home-study assignments.

Twenty-one staff members completed this programme in 1971.

Vancouver Police Training Academy

In addition to BCIT, another in-service training programme in basic law enforcement was designed and instituted by the Vancouver Police Academy and the Fish and Wildlife Branch. This programme was conducted by the Vancouver Police Academy and involved courses on Canadian Court systems, powers of arrest and search, preparing case summaries, interrogation, statements and warnings, squad drill, deportment and public relations, law, communications, statutes, giving evidence in Court, admissibility of evidence.

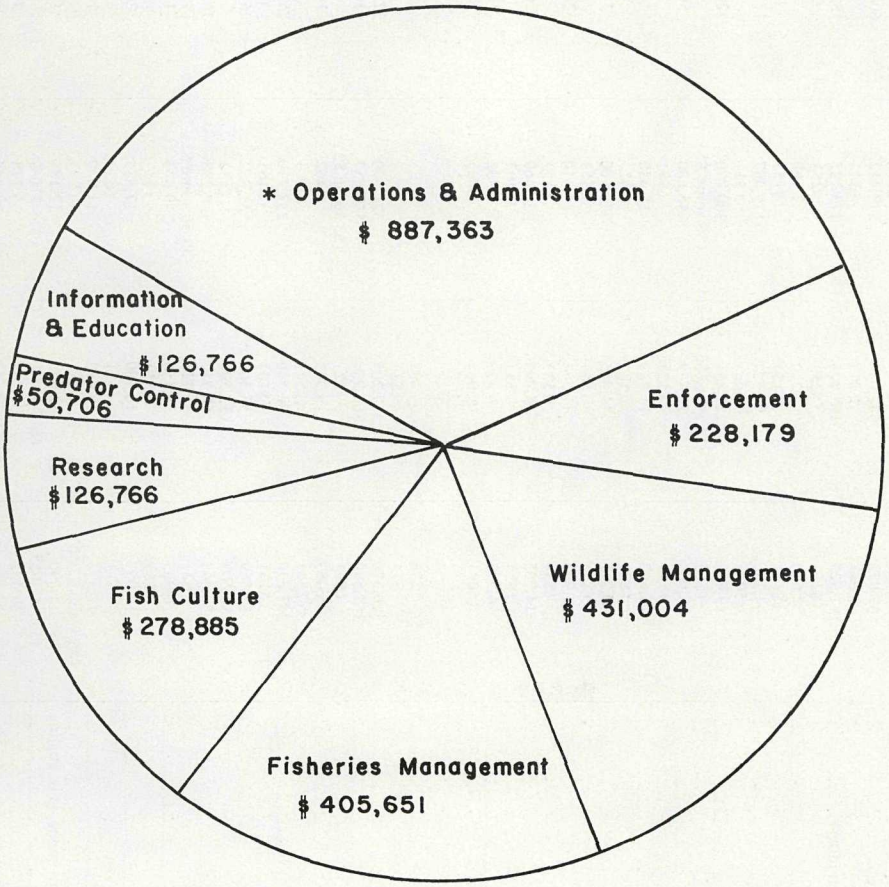
Forty staff members attended in two courses held during 1971.

Diving

In the interests of diving safety, a two-day refresher and certification course was offered for Branch employees who are frequently called upon to dive with self-contained underwater breathing apparatus. The course quickly reviewed regular diving theories and techniques, and tested the participants' ability to perform under difficult conditions. Tasks involved ascents without air from 50 feet, diving in complete darkness, and diving with malfunctioning equipment.

Eight staff members took the course and five received National Association of Underwater Instructors certification following its completion.

FISH AND WILDLIFE BRANCH
EXPENDITURE BY FUNCTION
1970 - 71



TOTAL EXPENDITURE $2,535,320

* Includes: All field and Headquarters administration, clerical and adminstrative support staff and functions such as office management, trapper and guide management, enforcement administration, operational planning and application, and inter-agency referrals, etc.

Revenue by Source

	1966/67	1967/68	1968/69	1969/70	1970/71
	$	$	$	$	$
Resident hunting licence	537,872	572,084	579,412	604,906	623,988
	($4)	($4)	($4)	($4)	($4)
Nonresident hunting licence (other than Canadian)	161,525	165,975	173,725	182,800	179,450
	($25)	($25)	($25)	($25)	($25)
Nonresident hunting licence (Canadian)	2,610	2,220	2,160	1,995	1,995
	($15)	($15)	($15)	($15)	($15)
Deer-tag licence	94,186	98,704	179,387	173,544	177,581
	(50c)	(50c)	($1)	($1)	($1)
Moose-tag licence	239,490	257,456	300,770	329,058	319,545
	($5)	($5 some $6)	($6 some $5)	($6)	($6)
Elk-tag licence	27,004	26,712	55,680	56,080	51,090
	($2)	($2)	($5)	($5)	($5)
Mountain goat-tag licence	15,692	15,344	15,420	14,938	14,751
	($2)	($2)	($2)	($2)	($2)
Mountain sheep-tag licence	10,215	11,025	12,180	12,280	12,985
	($5)	($5)	($5)	($5)	($5)
Caribou-tag licence	12,903	17,543	24,610	24,290	26,585
	($3)	($3)	($5)	($5)	($5)
Grizzy bear-tag licence	14,765	15,295	28,460	26,545	28,160
	($5)	($5)	($10)	($10)	($10)
Black bear-tag licence	4,573	6,227	7,882	8,136	8,970
	(50c)	(50c)	(50c)	(50c)	(50c)
Cougar-tag licence	----------	----------	----------	----------	1,795
					($5)
Nonresident game bird licence (Canadian)	276	438	----------	----------	----------
	($3)	($3)			
Big-game trophy fees (nonresident)	320,330	317,205	321,760	328,436	324,570
Resident angler's licence	361,590	367,934	550,667	610,128	639,552
	($2)	($2)	($3 some $2)	($3)	($3)
Resident steelhead angler's licence	5,067	9,707	9,462	10,856	10,700
	(25c)	(25c)	(25c)	(25c)	(25c)
Nonresident anglers	247,830	236,540	232,710	257,000	261,070
	($10)	($10)	($10)	($10)	($10)
Nonresident angler's licence (Canadian)	52,569	53,506	65,862	67,986	72,486
	($3.50)	($3.50)	($3)	($3)	($3)
Nonresident angler's (short term)	58,468	68,712	138,298	165,882	168,151
	($2)	($2)	($3.50 some $2)	($3.50)	($3.50)
Nonresident steelhead angler's licence	6,365	8,450	9,635	11,995	10,495
	($5)	($5)	($5)	($5)	($5)
Nonresident angler's licence (minor)	18,051	18,180	17,883	20,731	20,908
	($1)	($1)	($1)	($1)	($1)
Resident trapping licence	12,272	10,980	11,020	11,665	10,880
	($5 some $2.50)	($5)	($5)	($5)	($5)
Guide-outfitter, registered guides and small game and angling guides	11,390	12,050	12,185	12,405	29,400
	($15-$10-$5)	($15-$10-$5)	($15-$10-$5)	($15-$10-$5)	($50-$5-$15)
Resident fur trader's licence and royalty on fur	39,402	36,237	35,778	37,040	36,793
Fines imposed under the *Wildlife Act* and *Firearms Act*	24,158	22,672	29,645	31,094	35,282
Miscellaneous revenue	34,728[1]	13,907[1]	23,079[1]	18,049[1]	8,132
Subtotal	2,313,331	2,365,103	2,837,610	3,017,838	3,075,314
Less commissions on sale of licences	88,948	88,702	132,675	109,347	157,972
Totals	2,224,383	2,276,401	2,704,935	2,908,492	2,917,342

[1] Includes subscriptions to *Wildlife Review*.

FISHERIES MANAGEMENT

Participation in freshwater fishing continued to increase during the year. Resident angling licence sales increased about 5 per cent to 213,184, with slightly higher increases in licence sales to nonresidents. Studies completed during 1970 indicate that licence sales of this magnitude resulted in almost five million days of angling by the 332,296 licensed and 67,000 unlicensed (juvenile) anglers. Expenditures directly related to the pursuit of freshwater sport fish exceeded $55 million during the year.

Overcrowding of favoured fishing locations and the growing resentment of competition from nonresident anglers by residents of the Province indicate that provision of "resident only" angling waters may be necessary in the near future. Increasingly high exploitation of particularly valuable trophy-size steelhead populations will soon necessitate imposition of special quota fisheries to limit total catches.

Steelhead Fishery Survey

Steelhead anglers took 33,977 of these highly prized anadromous rainbow trout from the fresh waters of the Province during the 1970/71 season. Another 19,939 fish were caught and released.

Non-Canadian anglers took about 2,400 steelhead and about 400 were caught by residents of other provinces.

Steelhead anglers licences were purchased by 43,740 anglers, only 23,852 of whom actually fished for steelhead. Of these, 8,214 individuals succeeded in catching one or more steelhead for an average yearly catch of four fish for each successful angler. Fishermen spent 232,664 days angling for steelhead during the year.

The most productive river was the Vedder where 5,269 anglers fished 36,250 days for 3,060 steelhead kept and 1,209 released. Vancouver Island's Gold River was next with 1,752 fish kept and 1,239 released. Other important rivers in order of total catch were the Bulkley 1,725 (released 897), Thompson 1,673 (released 325), and Cowichan 1,543 (released 796).

Lake Inventory

During the summer of 1971, a total of 130 lakes throughout the Province were fully or partially surveyed by the single two-man survey crew. Heaviest emphasis was in the rapidly developing Cariboo-Coast region where 53 surveys were completed. Lakes surveyed in other regions were Kamloops, 26; Vancouver Island, 25; Northern region, 13; Kootenays, 11, and the Mainland Coast with 3. With many of the more urgent surveys now completed, emphasis is being placed on inventory of all waters within individual drainage systems. A publication has been prepared which summarizes all lake survey information gathered since surveys commenced in 1941.

Stream Surveys

A new programme of stream inventory was initiated in 1971. The inventory was carried out exclusively on Vancouver Island, and mainly on streams on the southern end of the Island. The information collected was recorded on 1:50,000 topographic maps, using a simple colour-coding system to indicate stream types.

Example of stream damage and obstruction to fish caused by past logging practices.

To a large extent survey work was directed toward smaller rivers and streams. Over 100 small streams that proved to be of some fisheries value were surveyed. Also some 30 major rivers were surveyed, of which the Cowichan, Nitinat, and Salmon River systems received a great deal of attention. Information obtained included flow variation, temperatures, locations of waterfalls, log jams, and species of fish present. Aerial surveys were also undertaken, two along the west coast ranging from Tofino to Muchalat Inlet and from Port Renfrew to Nitinat Lake, and a third up the White and Tsitika Rivers.

This information is essential in the evaluation of forest and land management problems and is also a good basis for future management and inventory work.

Habitat Protection

More noticeable in 1971 than in any previous year was the tendency for industrial development companies and departments of government to seek the advice of the Fish and Wildlife Branch on matters relating to protection of fish and wildlife species prior to beginning industrial developments or finalizing resource development decisions. This encouraging trend greatly facilitates the habitat protection function associated with such development and better ensures maintenance of fish populations at optimum levels. Specifically, some large forest industry and mining companies have sought Branch advice before logging, mining, or road building in new locations, and often have asked for a review of production plans on an annual basis. Within the Provincial Government the Department of Highways, Forest Service, and British Columbia Hydro and Power Authority have volunteered co-operation in many areas of design, construction, and development.

These progressive attitudes appear to be the result of the universal growing concern with environmental issues, direct public pressures, and the continuing programmes of persuasion and enforcement of the Fish and Wildlife Branch.

Dredge and fill operations—The increasing number of proposals to reclaim land, dredge and fill embayments, and create spoil land fills in shallow-water areas of the coastline and in inland waters is of particular concern to this Branch. In coastal areas, dredging and filling operations may upset migration patterns of fish moving to and from trout- and salmon-producing rivers, reduce the usefulness for young fish of the land-water interface, and disrupt intertidal spawning areas of salmon. In inland waters similar effects are experienced with resultant losses to fish and their habitat, with the added problem that favoured fishing locations may be lost in the filling process. Other species of wildlife such as waterfowl and furbearers, may similarly have their habitat destroyed in dredge-and-fill operations. During the year, the Branch was involved in investigations of several of these proposals. In coastal areas, these included a sanitary land fill at Alberni Inlet, port development at Squamish in Howe Sound and at Hardy Bay, and a shipping channel at Cowichan Bay. In inland waters, the Branch was successful in discouraging the filling of a favoured fishing area in the internationally famous Slocan Pool of Kootenay River. This proposal was part of a plan to dispose of waste rock and soil from the Kootenay Canal Project, a hydro-electric development designed to make use of waters presently unused by existing dams on Kootenay River downstream of Nelson.

Mining—The involvement of the Branch in the Advisory Committee on Reclamation of the Department of Mines and Petroleum Resources increased during the year as it has become a requirement that all exploration activity must be reviewed and receive approval prior to commencement, and because the tempo and extent of exploration have been increased. For example, base-metal deposits are now being mapped and developed in areas north and west of Smithers and Terrace, and coal fields are being explored in the vicinity of the Rocky Mountain Trench south and north of Chetwynd. Aside from normal consideration of exploration and mining proposals, the Branch has been effective in establishing reserves against mining at Chinaman Lake near Hudson's Hope and along a portion of Flathead River near Fernie. It has discovered and is attempting to correct an overlap of coal licences over a recreational reserve in the Elk Valley, and it has modified river crossing and exploration activities in Flathead Valley to protect fish and wildlife habitat.

The Branch has begun investigations of a proposal to divert a portion of the Elk River near Fernie to facilitate mining of coal from beneath the riverbed. At this time, it would appear that this major diversion proposal is inimical to maintenance of healthy fish populations in that river. In co-operation with regional staff, the Habitat Protection Section is planning and directing a continuing study of biological features of Elk River aimed at detecting changes related to local mining activities.

Reservoirs—September 1971 saw the completion of field investigations associated with Libby Dam and the soon-to-be created Lake Koocanusa. Data collected at the reservoir site are presently being compiled into a report which will describe anticipated effects of the dam and reservoir on the fisheries resource of Kootenay River and Kootenay Lake. At Mica Dam, reports of stranding of fish during occasional shutdowns of diversion tunnels caused hasty preparations for an attempt to rescue fish by seining during a tunnel closure in September. Investigation showed that only a few game fish were stranded, possibly because the closure occurred between normal migration periods. At the Kootenay canal project near Nelson, biologists from Water Resources Service and this Branch have begun co-operative studies of possible sport fisheries problems in the areas of the river to be affected. At other smaller domestic and irrigation water-storage sites in the Province, recom-

mendations for protection of sport fisheries and recreation were provided to the Water Resources Service for inclusion in water licences.

Road construction—Improved liaison with the Location Section of the Department of Highways during the past year has enabled this Branch to achieve several satisfactory solutions to impending highway encroachments on fish habitat. The Section reviewed and commented on the plans of a number of major projects, including the Sayward-Nimpkish Junction Highway, Highway 99 relocation north of Squamish, Highway 16 from Valemount to Terrace, and numerous minor construction projects throughout the Province. The excellent response received from the Department of Highways has been a highlight of our recent attempts to promote inter-Departmental co-operation in planning and development.

Liaison was also established with the Forest Engineering Division of British Columbia Forest Service, responsible for the construction and maintenance of forest logging-roads. The Fish and Wildlife Branch is now provided with plans and descriptions of all major proposed forest roads, and the opportunity exists for fish and wildlife managers to recommend alterations to proposed routes or methods of construction in order to protect fish and wildlife habitat.

Pollution research—Sumithion, or fenitrothion, is an organophosphate insecticide which is becoming popular as a pesticide spray for forest insects and mosquitos. Two field studies were conducted this year to document the effect of Sumithion on fish, fish food, and fish habitat. In addition, a three-year laboratory study of the action of Sumithion on fish behaviour was completed. The results were presented at the annual meeting of the Canadian Society of Zoologists held in St. John's, Newfoundland.

The increasing use of inland waters by pulp-mills has prompted a number of field and laboratory investigations as well as interagency studies with Federal Government officials. Tests have been performed to document the effects of a number of pulp-mills on the colour, odour, and foaming tendencies of receiving waters, and quality of fish flesh. Results have shown that the tainting of fish flesh by mill effluent is an area of particular concern, and further studies on this facet of pulp-mill operation are being undertaken in co-operation with the Fisheries Service of Canada, and the Fisheries Research Board of Canada.

Referral systems—Over 1,700 applications for water licences were processed by the Branch in 1971. The greatest number of these applications, by far, are of no immediate concern, but in several instances the Branch was able to request provision for fisheries maintenance flows in streams, provide for clearing of reservoirs, and require passage for fish past potential obstructions. An agreement has been reached between the Water Resources Service, British Columbia Hydro and Power Authority and the Branch wherein a minimum flow of 20 cubic feet per second of water will be provided to the Heber River from a dam which is used to divert water to the Campbell River.

Over 200 applications to the Pollution Control Branch for permits to dispose of wastes to water, land, or air have been reviewed by the Branch during the year. The Department of Mines and Petroleum Resources continues to provide notice of applications for placer-mining leases on the Fraser River drainage. In addition to the inclusion of fish protective requirements in many leases, the Branch was successful in acquiring a reserve against placer-mining on the south fork of the Quesnel River, from Likely to Drop Creek, a popular fishing area.

Renovations to the fisheries laboratory have been completed, and it is now equipped for bioassay work, as well as specific, short-term research.

Habitat Improvement

During 1971, construction and involvement in habitat-improvement projects increased slightly over 1970. Growing numbers of small and diverse types of projects were completed at the regional level. Many larger projects were continued or completed in conjunction with the Habitat Improvement Section.

Example of stream obstruction caused by beaver activity.

Projects included spawning-stream improvement through removal of obstructions caused by debris, logs, and beaver dams. Several diversion structures to improve water quality, and construction of small dams to increase and stabilize lake levels, were initiated and (or) completed. Improvements were completed at Eneas, Allendale, Ripley, Jewel, Chain, and Missezula Lakes (Okanagan Region); Craigflower Creek, Cat Stream, Hunts Creek, and Cameron River (Vancouver Island Region); Elgin Creek (Lower Mainland Region); and Paul Creek, Salmon Lake, and Heffley Creek (Kamloops Region).

Ripley Lake dam—A small concrete dam at the outlet has increased the average lake depth by 5 feet. This will greatly reduce the likelihood of fish die-offs due to lack of oxygenated water. The increased volume of the lake (about 20 per cent) will also afford more fish production in an area of the Province generally lacking in small lake fisheries. Downed and flooded timber has, and is being removed in conjunction with rod and gun clubs in the South Okanagan area.

Cameron River log jam obstruction—A large log jam was removed by personnel from MacMillan Bloedel's Northwest Bay Division (Vancouver Island) in conjunction with Branch staff. Fish migration was improved and flooding danger to large trees in adjacent Cathedral Grove reduced.

Salmon Lake diversion and flow control—A permanent, concrete flow-control structure was completed on a diversion ditch from Salmon River to Salmon Lake (Kamloops Region). The structure is designed to allow better control of inflowing

water, thereby reducing erosion and improving fish passage. The diverted water has effectively eliminated fish die-offs due to unoxygenated water during extreme summer and winter conditions in Salmon Lake.

Meadow Creek spawning channel—In 1971, progeny from the first channel spawning in 1967 returned as part of the kokanee spawning run to Meadow Creek System (Kootenay Lake Area). An estimated 977,000 fish entered the system, the largest number ever recorded (Table 1).

Table 1—Number of Kokanee Spawning in Meadow Creek System

Year	Estimated Below Channel	Channel	Estimated John Creek	Above Channel	Total
1967	192,624	197,878	24,000	189,480	606,282
1968	91,451	98,752	5,000	47,992	287,583
1969	156,300	121,238	2,500	127,842	407,380
1970	258,600	218,957	10,600	220,001	723,158
1971	504,000	143,262	67,000	262,926	977,188

Only 143,262 were allowed to spawn in the channel in 1971. Previous year's work indicated overspawning was occurring in most sections of the channel with a subsequent loss of eggs. Also, declining fry survival (Table 2) was related to a build-up of fines and silt in the specially prepared spawning gravels.

Table 2—Number of Kokanee Fry (in Millions) and per Cent Survival From the Egg Stage

Year	Channel	Per Cent Survival	Above Channel	Per Cent Survival
1968	5.36	25.7	3.21	16.1
1969	1.46	8.5	0.78	8.9
1970	1.98	11.5	2.78	17.1
1971	1.42	6.3	2.62	9.9

To increase fry survival in the channel, 50 per cent of the area was scarified in 1971, thereby removing bar formations and loosening and cleaning the gravel. With a reduced number of spawners and increased quality of the spawning environment, fry production should show a moderate increase in 1972. Assessment of alternatives for the control of fines and silt entering the spawning channel has occupied much of the Branch's engineering capability during the latter part of 1971.

Ruby Creek spawning channel—Since 1967, the artificially created outlet spawning channel of Ruby Lake near Sechelt has been modified to better accommodate fall spawning cutthroat trout. Distribution of spawners in the 300-foot channel was enhanced in 1971 by further placement of overhead cover and creation of an additional holding pool. Some experimental rearing areas adjacent to the channel were modified to assess early life-history requirements.

Spawning fish are repeatedly using similar spawning sites year after year. An understanding of this facet of cutthroat behaviour is important for any future enhancement of cutthroat environments. A total of 75 potential spawners (averaging 18 inches) descended the channel in the fall of 1971, compared to an estimated 15 spawners in 1968, 29 in 1969, and 38 in 1970.

Steep-pass fishway evaluations—Small portable fishways measuring 8 x 1.8 x 2.3 feet, and with internal baffles, were evaluated as devices for passing rainbow trout and kokanee over vertical obstructions. Rainbow trout (averaging 20 inches), under the limitations of installation, could negotiate an 8-foot fishway at slope angles of 12 to 25 degrees, discharge from 1 to 4 cubic feet per second and velocities from 2.5 to 4.5 feet per second. Spawning suckers and all trout less than 6 inches could not ascend if a jump of 8 to 12 inches was created at the mouth of the fishway.

Kokanee passage was tested over 8-, 16-, and 24-foot distances, at slope angles of 13.5 to 35 degrees, discharge of 1, 3, and 5 cubic feet per second, and velocities from 1.3 to 5.0 feet per second. Fish passage was best at angles less than 26 degrees and flows greater than 1 cubic foot per second. Fish (averaging 12 inches) ascended a vertical rise of 4.9 feet in 16 feet near the 90 per cent success level. Fifty per cent ascended a 30-degree slope and none a 35-degree slope over an 8-foot distance.

Eighty-three Creek spawning channel—Due to uncertain summer flow in Eighty-three Creek drainage system (near Green Lake in the Cariboo), the spawning channel was not operated in 1972. Evaluation continued, however, in the cleared and improved portion of the stream, with emphasis directed toward determining a maximum allowable spawning density. Over 900 adults entered the stream to spawn in 1971, compared to nearly 600 in 1969 and 1970. Only 365 fish were allowed to spawn and 60 were stripped for hatchery evaluation. The remaining fish either died naturally, were lost to predation, or entered Watch Creek (another intermittent inlet to Green Lake) to spawn (approximately 80–100). Anglers caught 35 tagged postspawners to late 1971.

Fry production (5.3 per cent) was less than in 1970 (8.4 per cent), but greater than pre-improvement in 1969 (1.3 per cent). Only a guaranteed minimum flow of 4 to 5 cubic feet per second during spawning in May, and 2 to 3 cubic feet per second until August will make the spawning channel a yearly production centre.

Over 500 willow and 1,000 native pine trees (2 years old) were planted over the spawning channel area to provide stabilization and streamside cover in the future. The entire area was seeded for the second time and the improved portion of stream fenced to prevent cattle and horse intrusion.

Chain Lake water-quality project—Attempts to improve water quality in Chain Lake near Princeton by diverting low-nutrient water from Shinish Creek met with limited success during 1970, largely due to a very dry summer. The project was repeated in the summer of 1971 as a co-operative venture between the Fisheries Research Section, the Habitat Improvement Section, the Okanagan Region, and property owners around the lake. Conditions were more promising as the lake appeared to be well flushed by heavy natural run-off during May and June and a sizeable discharge was introduced from Shinish Creek by a diversion channel. The Fisheries Research Section monitored conditions monthly in the lake from June to September. Algæ counts in June were lower than ever recorded previously, and no bloom occurred in 1971.

Lake rehabilitation—As a result of reduced algal conditions in Chain Lake (Okanagan Region), chemical rehabilitation to rid the lake of longnose suckers was completed by local Branch staff in conjunction with local property owners in September 1971. This treatment now completes the rehabilitation of the Osprey-Link-Chain Lake system with the latter to be stocked with rainbow trout next year following detoxification.

Miscellaneous—The inspection of permanent-barrier sites, stream surveys in the North Okanagan Lake area, interagency exchange of proposed improvement projects with the Federal Fisheries Service, and the transfer of the crustacean *Gammarus* (freshwater shrimp) as a food source to a rehabilitated lake constituted other areas of improvement work pursued by Regional and Headquarters staff.

Fish Culture Section

Permanent production hatcheries at Abbotsford, Summerland, and Wardner, one seasonal station at Loon Creek, and various supporting egg-collecting stations are operated by the Fish Culture Section of the Fish and Wildlife Branch. Included in this Section are the Biologist in charge of Fish Culture and the Superintendent of Hatcheries, both in Victoria; field staff consisting of 13 fish culturists, a supervisor of construction, and 22 seasonal employees including fish culturists, carpenters, labourers, and watchmen. Species cultured included brook trout, cutthroat (coastal and Yellowstone), kokanee, lake trout, rainbow, and steelhead. Eggs taken at the 16 egg-collecting stations were from the following species: Brook trout, cutthroat (coastal and Yellowstone), kokanee, and rainbow.

During 1971, F. H. Martin, Supervisor of Fraser Valley Hatchery, retired after 35 years of fish-culture service. D. L. Valin resigned to take a position in fish culture with the Department of Indian Affairs and Northern Development.

The release in 1971 of 4.7 million fish weighing 17,000 pounds was much less than the five-year average of 6.4 million (41,000 pounds) fish. This reduction resulted from a smaller stocking of "domestic" rainbow and brook trout as well as a considerable reduction in fish released from Summerland Hatchery due to a severe bacterial disease. Of the 354 lakes stocked with fish in 1971, 322 were planted with rainbow trout. The number and weight of each species liberated were as follows:

	Number	Pounds
Cutthroat (Yellowstone) trout	270,000	92
Brook trout	7,600	36
Kokanee	359,500	1,312
Rainbow trout	4,069,799	15,418
Steelhead	7,400	152
Totals	4,714,299	17,010

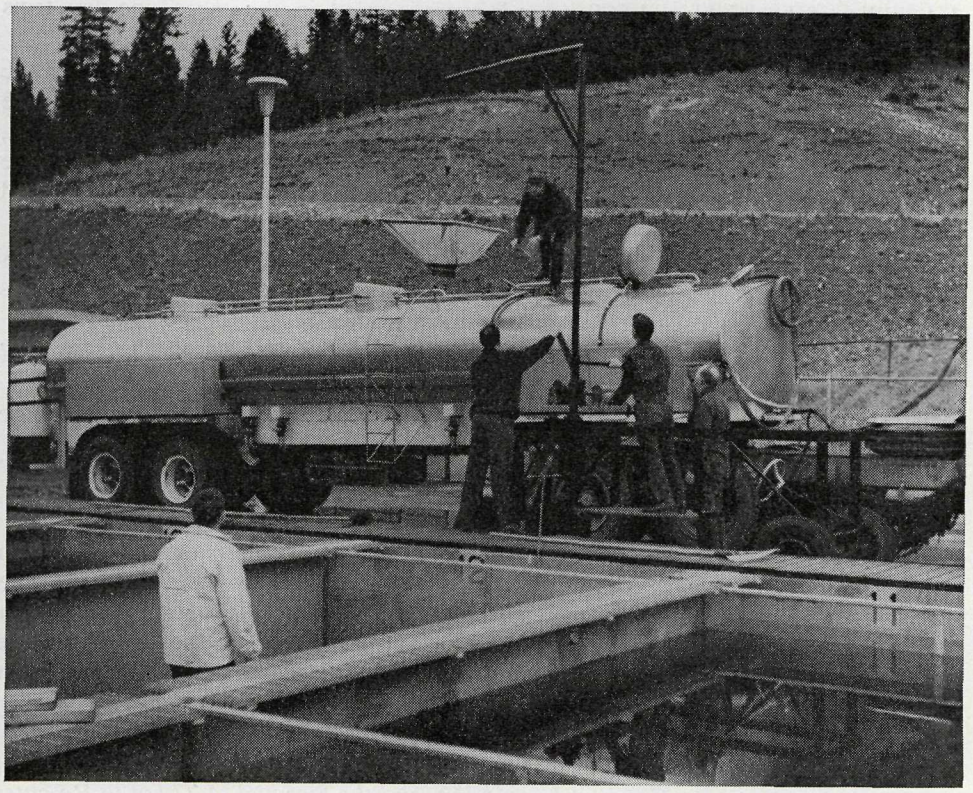
Approximately 18 million eggs of all species were collected at 16 temporary field stations and from brood stock at Kootenay Hatchery. Rainbow trout accounted for 14 million of the total eggs collected.

To avoid the serious hazard of introducing fish diseases from elsewhere, emphasis in recent years has been placed on a programme aimed at obtaining all eggs in British Columbia that are normally required in the Fish Culture Section. This year, reasonable numbers of brook trout and some "domestic" rainbow eggs were collected for the first time in many years. Also, more satisfactory collections of Yellowstone cutthroat were developed. A suitable supply of Coastal cutthroat still remains to be established before the Section can become self-sufficient for all species normally required in management.

As part of a co-operative exchange programme with the Ontario Department of Lands and Forests, about 1.5 million kokanee eggs were collected and shipped to Ontario. This was the final egg shipment in a long-term project to establish kokanee in the Great Lakes.

Duncan River and Wilkie Creek (Trout Lake) in the Kootenay were each planted with 2,000 rainbow, 1 year of age, and progeny of large Duncan River rainbow. This was part of a project to restore the number of large rainbow trout in these streams. Additional stocking of 2-year-old fish from 1970 eggs, as well as 1-year-old fish resulting from the 85,000 eggs collected in 1971, will be completed in 1972.

At the end of 1971, 35,000 steelhead were on hand at Fraser Valley Hatchery for eventual release as 1- and 2-year-old fish.



Hatchery-raised fish being loaded into 3,200-gallon oxygen-aerated tanker prior to planting.

During 1971, several large projects were completed with contracts issued by the Department of Public Works for construction associated with hatcheries. Larger and improved egg-incubation facilities, along with additional storage or warehouse space, was provided at Kootenay Hatchery. A modification of the Summerland egg-incubation room will enable staff to more precisely control water temperatures. At Fraser Valley Hatchery (Abbotsford), three circular ponds 16 feet in diameter, a pumphouse, and an aeration tower were constructed for rearing steelhead. The well pump and associated emergency power supply, along with all water-distribution piping to the circular ponds, were supplied by the Department of Public Works.

Other construction projects completed in 1971 by Fish Culture Staff included improvements to existing fish-collection facilities at Oyama, Pennask, Premier, and Swalwell (Beaver) Lakes with temporary installations provided at Aylmer (Starr) and Dugan Lakes. Improvements to the water distribution system and living-quarters at Loon Creek Hatchery, the covering and screening of part of the Sum-

merland spring water supply, and the construction of a laboratory at Summerland Hatchery were all completed in 1971.

All Summerland and Kootenay fish-rearing ponds were repainted using anti-fouling paint to prevent algæ growth. After six months of use it was evident that labour in pond cleaning was considerably reduced by this procedure.

Modifications to the 3,200-gallon trailer tank purchased in 1969 were finalized in early 1971. Fish were successfully transported to Loon Creek Hatchery from Kootenay Hatchery, a distance of 500 miles, in the spring and fall of 1971. About 1.4 million fish weighing 4,500 pounds were carried in the three one-day trips requiring only one fish culturist and a driver.

A programme team, composed of members from the Department of Public Works and Fish and Wildlife Branch, continued throughout the year to compile the statement of requirements for the new Fraser Valley Hatchery. At year-end, this programme was near completion and feasibility and design drawings will be underway in early 1972. Evaluation of water reconditioning systems will proceed simultaneously with design of other elements of the hatchery.

Research, started in 1969 to test the suitability of different trout diets, was continued in 1971. Evaluation of the two diets presently being tested in hatcheries is nearly complete, and evaluation of fish survival after release into two lakes commenced in 1971 with an examination of marked fish returning to the spawning streams.

Approximately 24,000 school children and adults visited Fish and Wildlife Branch hatcheries in 1971.

Fisheries Research and Technical Services

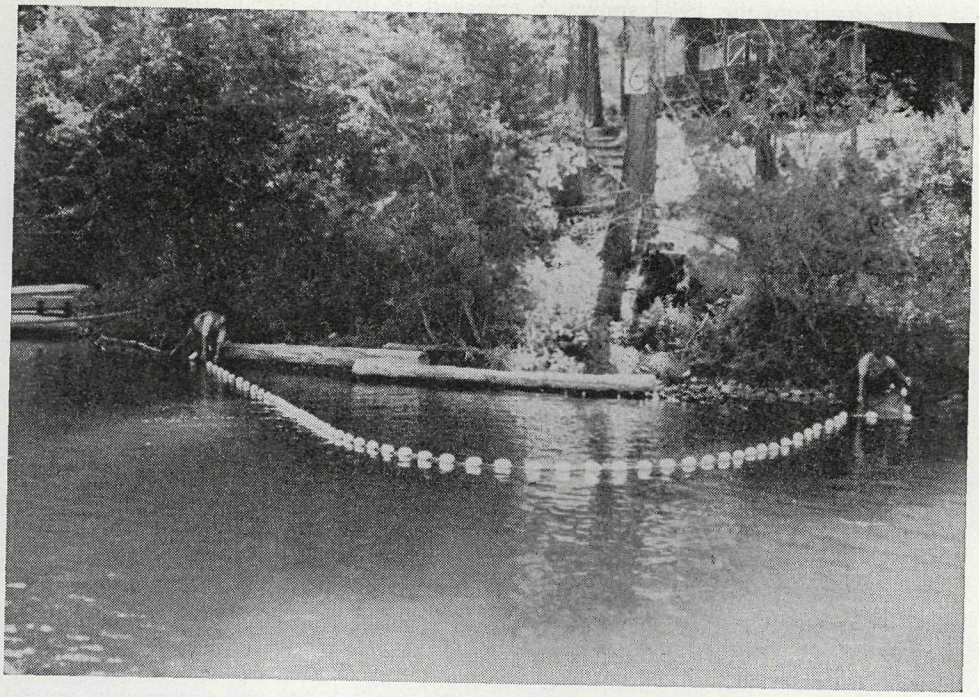
The major project of this Section, studies of the factors affecting the production of your rainbow trout, was continued at the Loon Lake system (near Clinton). The 1971 trout spawning run was somewhat later than usual and, although the smallest in the four recent years of study, not as low as on many years in the 1950's (Table 1). Postspawning survival has been variable, but perhaps somewhat higher in recent years compared to the 1950's.

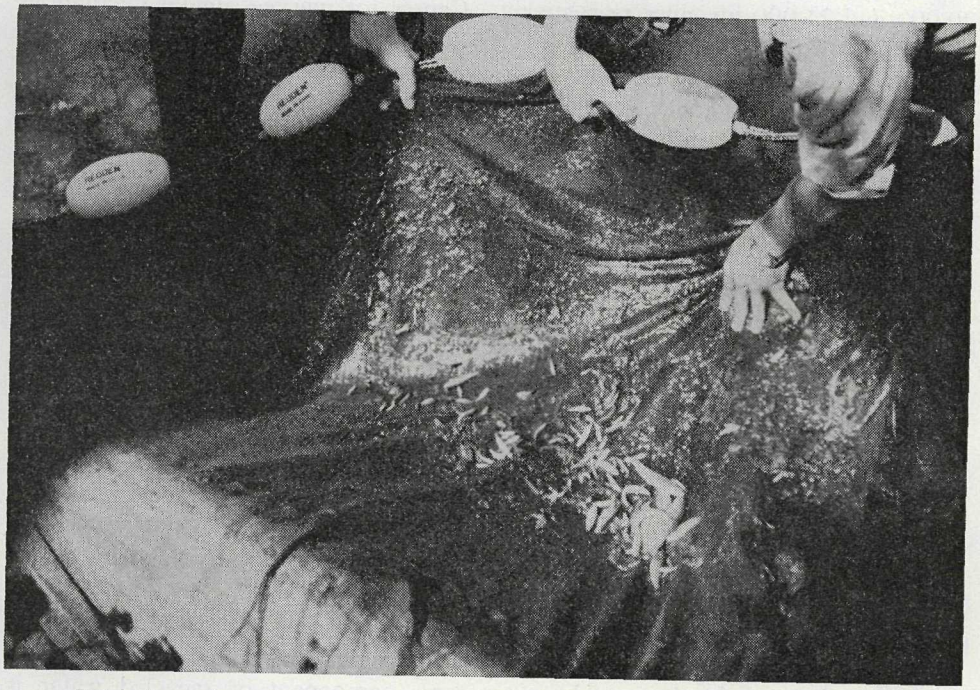
Table 1—Approximate Number (to Nearest Hundred) of Rainbow Trout Spawners Entering the Outlet Creek of Loon Lake, and the Survival of These to Re-enter the Lake.

	1953	1954	1955	1956	1968	1969	1970	1971
Number of spawners	4,600	7,900	3,200	4,800	8,800	11,400	13,700	7,400
Number surviving to re-enter lake	1,500	1,300	1,800	(?)	7,000	3,600	6,200	4,100
Per cent survival to lake	32	16	57	(?)	79	32	45	56

Females and males (three or more years old) in 1971 were similar in length to those in 1970, females averaging about 12 inches and males about 12.7. In contrast, females in 1953, 1954, and 1955 averaged 9.9, 9.7, and 10.1 inches respectively. Precocious males (2-year-olds averaging about 7 inches) in 1971 again comprised the majority of the male spawning population.

Egg survival was measured in different gravel types in the outlet creek itself and in experimental rearing boxes there. These data applied to spawning-site observations will give an estimate of total egg survival in the creek.





Retrieving a large beach seine at Loon Lake, part of a study to determine factors affecting early life of trout. Small trout shown are a few weeks old, the larger ones about 12 months.

The fry from the 1971 spawning emerged relatively late in the summer and consequently few grew to a sufficient size (about 1¾ inches) to migrate to the lake in their first year. The remainder will overwinter in the outlet and migrate later as one- or two-year-old juveniles.

Production of young to the lake in 1971 was the lowest in the recent four years of study, but in the same order of magnitude as in 1953 and 1954 (Table 2).

Table 2—Production of Young Trout (Numbers to Nearest Hundred) to Loon Lake From Its Outlet Creek

	1953	1954	1968	1969	1970	1971
Fry (0 year)	7,800	4,800	15,600	9,000	7,700	1,400
1-year-olds	9,700		15,400	20,600	10,000	12,800
2-year-olds	900	3,700	1,800	7,000	1,100	500
3-year-olds			300	1,000	-------	-------
Totals	18,400	8,500	33,100	37,600	18,800	14,700

An estimate of total recruitment to the lake from a single-year class is now available for 1968. From about 8,800 spawners (nearly 5,000 of which were females) that year, over 37,000 young trout were recruited to the lake as fry or one-, two-, and three-year-old juveniles. Because there apparently are very few two- or three-year-old juveniles overwintering in the outlet creek this year, additions to total recruits from these age components will be slight. Therefore, total recruitment from the 1969- and 1970-year classes probably will not greatly exceed 20,000 and 21,000 juveniles respectively. Causes for marked annual fluctuations in recruitment are being investigated.

Production of young rainbow trout from Loon inlet creek was estimated in 1971. About 25,000 adults spawned in this system and from these about 100,000 fry migrated downstream to the lake, roughly similar to numbers reported for the mid-1950's from this system. As in the outlet creek, adult trout spawning in the inlet are appreciably larger in size than those measured in the early mid-1950's.

The total angler catch of trout from Loon Lake was estimated to be about 60,000 fish in 1971, slightly higher than that of the previous year (about 56,000 fish).

Studies on the lake ecology of rainbow trout also were continued at Loon Lake in 1971. Distribution and dispersal of small trout were determined by purse-seining, tow-netting, beach-seining, and diver observation. Fry and yearlings that migrated into the lake this year moved only about half the distance up the lake. No young trout were caught offshore by any of the sampling methods used. Small fish were consistently found in the shallow onshore areas over the entire length of the lake. Diving observations indicated that juveniles were restricted to the littoral zone, and fry, when they first entered the lake, distributed themselves along the immediate shoreline in about 6 inches of water. Young trout in onshore waters fed on planktonic as well as benthic organisms.

Studies of hatchery operations and stocking methods were also continued. Recycling of hatchery water has been shown to increase disease susceptibility and mortality of fish held there. The most toxic component of recycled water is ammonia. Experiments were conducted at Summerland Hatchery to examine effects of ammonia and other metabolites on developing trout eggs. The highest build-up of ammonia occurred with the greatest volume of recycled water and the lowest

amounts with least recycling. Ammonia concentrations, however, were not sufficiently high to increase mortality of eggs or fry at the swim-up stage. A method developed elsewhere for quickly determining the amount of toxic un-ionized ammonia in water has been corrected and improved.

A co-operative study involving the Fisheries Service of the Department of the Environmental, Regional, and Fisheries Research personnel of the Fish and Wildlife Branch, the Forest Service, and a forest products company has been started on a watershed near Prince George. Lakes and streams in the watershed have good populations of sport fish as well as a spawning run of chinook salmon. The drainage basin has a high recreational potential that will be utilized by the outdoor recreationist as soon as road access is provided. Water quality and fish populations will be studied in logged and "control" areas to determine the effects of logging and road-building on the fishery resource.

The Research Section has been actively involved with planning of the Limnology Programme for the Canada-British Columbia Okanagan Basin Study as well as with field collection and analysis of fish data on the six main basin lakes. Information on relative abundance, distribution, growth, as well as pesticide and heavy-metal content of all species of fish has been obtained from samples taken at a series of stations on the lakes during the early spring, summer, and late autumn of 1971. Results will be compared with an earlier study on the lakes in the mid-1930's.

Limnological conditions (temperature, oxygen, transparency, algal density, etc.) have been monitored monthly at Chain Lake, near Princeton, to evaluate attempts to improve water quality conditions in the lake by diverting low-nutrient water into it from a nearby creek.

An extensive review and documentation have been made of the impact of man on Kootenay Lake and its salmonoids. In particular, the effects of mysid introduction and phosphate enrichment on the kokanee and trout populations were considered.

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WILDLIFE MANAGEMENT

Introduction

The adoption of new wildlife management objectives in 1971 has formed the basis for planning and establishing a more comprehensive approach to the management of wildlife in coming years. Briefly stated, management objectives include protection, management, information and education, and research as major endeavours. The new objectives have been designed to make wildlife management more responsive to social demands, and to provide a basis for a balanced approach to the management of wildlife.

Wildlife biologist staff are now engaged in the process of developing comprehensive management plans for the various species of animals found in the Province. The planning process includes, for the first time, the development of programmes for protection and management of nongame species, and greater recognition of ethical and æsthetic aspects of wildlife recreational use.

The growing public awareness and appreciation of the cultural, educational, scientific, and economic values of wildlife to society challenge traditional concepts of what wildlife values and uses should be. Such change in public thinking demands new approaches to the traditionally extractive management of the resource. In its newly found concern, this trend in public thinking about wildlife may jeapordize the legitimate interest of hunters to seek recreation in taking surplus wildlife. There remains a need for managers to satisfy all social needs and to develop programmes capable of achieving such ends. This is what is intended in revising wildlife management objectives.

Noteworthy gains in habitat protection were achieved in 1971, when for the first time wildlife managers sat down with foresters in co-operative efforts to develop forest management plans designed to protect wildlife from harmful effects of logging operations. This programme will develop on all public forest lands in the Province, providing a major vehicle for long-term land-use planning on Crown lands. Similar planning has been done in co-operation with private forest management firms on their own lands. The response of such firms is encouraging, and provides an opportunity for significant gains in the protection of wildlife habitat.

The involvement of the International Joint Commission in plans by Seattle City Power and Light Company to further flood the Skagit Valley in Canada resulted in the first comprehensive public hearing of a resource-development proposal in the Province. Public response to the International Joint Commission hearings in Bellingham and Vancouver belied opinions that the public is apathetic about recreational resources, and is an example of how instructive public opinion may be sought by resource management agencies. The advisory group to the International Joint Commission included a representative of the wildlife management staff, enabling full consideration of wildlife resource needs in relation to further storage within the Skagit Valley.

Continuing closure of rural lands to hunting in settled areas of the Province has seriously deprived the public of hunting opportunity close to home. Such closures under municipal, regional district, and Department of Recreation and Conservation jurisdiction often occur on lands having high wildlife production capabilities, and hunting potential, but which face difficult circumstances in the control of safe, free access for public hunting. This trend has now eliminated much of the potential waterfowl and farm-game hunting opportunity in the Province, particularly in the Okanagan, Lower Mainland, and Vancouver Island regions. There seems little possibility under existing management arrangements that free public

hunting can exist under such land-use situations, despite the wildlife resource capability that may remain. There is, therefore, an emerging need to create new institutional arrangements to preserve and enhance wildlife and wildlife-based recreation in settled areas of the Province. Such arrangements might include the development of wildlife resources by clubs and other private agencies, and through new initiatives by both Provincial and local governments to achieve such a purpose.

PROTECTION

Range Studies

The East Kootenay is one of the areas of the Province where natural wildlife populations are in conflict with domestic animals. As background information, using air photos and maps, it was determined that of the 1,800 square miles of the southern Rocky Mountain Trench, the major problems existed on 550 square miles found at lower elevations.

Winter ranges in the East Kootenay are extremely limited and overgrazed from a wildlife viewpoint. On the open rangeland (burned-over forests and native grassland) 87 per cent (217 square miles) was overgrazed and only 13 per cent (33 square miles) was not overgrazed. In the remaining 301 square miles of the region examined, immature conifer trees up to 40 years old were dominant. Forests of age 20 to 40 years dominated 85 per cent (255 square miles) of the winter ranges while the remaining 15 per cent was of forests up to 20 years old.

The low proportion of forests up to 20 years old compared to those of 20 to 40 years indicates that large forest fires have been largely eliminated from the region in the past two decades, thus the big-game winter ranges and the critical live-stock grazing ranges are not being perpetuated. The entire range conflicts are compounded when it is considered that the remaining burns are severely overgrazed.

The study dealt exclusively with the problem on forest lands; it did not document either the amount of land that was urbanized, cultivated, and otherwise alienated, or that occupied by highways, roads, and railroads. However, it did document the loss of big-game winter ranges due to the flooding of the Libby Reservoir.

The report confirmed that big-game winter ranges are a major limiting factor determining big-game population size. In the East Kootenays the carrying capacity of these finite areas is being drastically reduced by natural reforestation and overgrazing.

Some of the results that are available from this study are that cattle prefer the grassland and overgrazed burned areas and are recorded in the forest-types with less frequency.

Elk prefer the ungrazed burned areas and the immature forests; they, as with cattle, have a low preference for mature forests but, unlike cattle, have a low preference for grasslands. Deer, on the other hand, prefer the ungrazed burned areas and the mature forests. However deer, like cattle, have a low preference for the younger stands of forests. The results show that deer and elk are not compatible with cattle when the latter causes severe overgrazing. There is a varied preference to forests by deer, elk, and cattle and the logic of that will have to be studied more intensively.

The study will provide the much needed information on the distribution of ungulates by habitat-type. Such information will allow us the opportunity to reassess present wildlife-grazing problems and express management proposals which are related to the resource.

Pesticides

Monitoring of fish and wildlife was continued during 1971. A total of 493 analyses of 11 species of fish, 78 species of bird, and nine species of mammals were performed at the Provincial Pesticide Laboratory (British Columbia Department of Agriculture).

The highest pesticide residues reported in birds were 191 parts per million DDT derivatives and 24 parts per million Dieldrin from the liver of a bald eagle from Williams Lake. These levels are sufficiently high to indicate that pesticide poisoning was a contributory cause of death. Other high pesticide levels were discovered in seabirds from the Queen Charlotte Islands, where a rhinoceros auklet was found to contain 96 parts per million DDT derivatives in the fat and 2.5 parts per million mercury in the liver. Lead was also found in some birds, with a level of 2.5 parts per million in the liver of a Wilson warbler from Prince Rupert and 1.7 parts per million in the liver of a golden crowned sparrow from the same area.

In fish, the highest value recorded was 14.9 parts per million DDT derivatives in the muscle of trout from Okanagan Lake. This is an improvement on the findings for the previous year.

In mammals, the highest value recorded was in a harbour porpoise which contained 36.9 parts per million DDT derivatives and 3.3 parts per million Dieldrin in the liver. A harbour seal from the Queen Charlotte Islands contained 1.4 parts per million mercury in the liver.

Despite these findings the picture in British Columbia with regard to pesticide residues is an encouraging one. There is strict regulation by the Department of Agriculture of the use of persistent pesticides and many of the problems now being faced originate outside British Columbia. It is the condition of marine wildlife, which includes the Peale's peregrine falcon, which therefore gives the greatest cause for concern.

Included in pesticides are herbicides such as 2,4-D, 2,4,5-T, and Tordon. If misused these substances can cause considerable damage to fish and wildlife habitat. The Fish and Wildlife Branch has therefore been actively involved in reviewing, with other branches of government, all proposals for large scale use of herbicides. Where necessary, plans have been modified to provide a proper degree of protection for fish, wildlife, and their habitat.

Waterfowl

Major marshland developments are being worked on at Moberly Marsh north of Golden, Elizabeth, and Reed Lakes near Cranbrook, Duck Lake at Creston, Swan Lake near Vernon, and at Duck, Barber, and Woodward Islands, and the Serpentine Flats near Vancouver. Full development of these areas over the next three years will realize over 4,000 acres of valuable marshland for the recreation and enjoyment of residents of British Columbia.

A major activity has involved co-operation with regional districts, municipalities, private individuals, and various organizations to preserve valuable wetlands and the right of the public to enjoy and use the wildfowl resources associated with such habitat. Wetlands of particular concern have been associated with coastal estuaries which serve as vital habitat for most aquatic wildfowl, particularly waterfowl. These areas are particularly important to an abundant and varied population of waterfowl which each year migrate through or overwinter in British Columbia. Work is progressing slowly on the development of regional wildfowl management places which are primarily designed to serve as planning-conservation documents

for use by regional and municipal officials. Preliminary maps have been draughted to the second and near final stage for regional districts of the Fraser Valley and southeastern Vancouver Island.

These mallard and pintail ducks, in the heart of Delta Municipality, are among hundreds of thousands of migratory waterfowl which use the rich fields and marshes of the Fraser River every year.

Co-operative technical surveys were initiated in 1971 to determine the waterfowl production in various zones of British Columbia. The technique of survey which includes recording waterfowl use of wetlands within square metre sample areas, will continue to be refined over the next several years. Ultimately, the production of each species of waterfowl will be determined to provide a clearer guideline for the setting of hunting regulations.

Two projects concerned with the establishment of Canada goose flocks were initiated in 1971. Large Canada geese were taken as young flightless birds from wild and near wild populations and released into the Nimpkish Valley on north central Vancouver Island (22 birds) and near Pitt Lake in the Fraser Valley (50 birds). These birds are the first of several hundred which will be released to these areas over a period of from five to ten years. Ultimately, resident breeding populations will be established of up to 500 geese in the Nimpkish Valley and 5,000 geese in the Fraser Valley.

Through negotiation with the Legal Surveys Division of the Department of Lands, Forests, and Water Resources the metes and bounds description of the Creston Valley Wildlife Management Area was reviewed and revised to include certain additional lands lying adjacent to the existing boundary.

Raptorial Birds

In 1971 the inventory of breeding raptorial birds was continued. This activity was most intensive in the Queen Charlotte Islands with the Gulf and Vancouver Islands, and areas of the central Interior also being inventoried. Results of this activity have provided valuable insight into the general status of large raptors such as the bald eagle, the golden eagle, the peregrine falcon, and the prairie falcon. In

1972, study areas will be established within the dry Interior and on the Queen Charlotte Islands to enable intensive study of the productivity of the prairie and peregrine falcon respectively. Such study areas are necessary to improve present inventory techniques.

Humane Trapping

Early in the year the Branch became involved in pressures by individuals and organizations for the mandatory use of humane traps in British Columbia. Following communication with fur administrators in Ontario, Manitoba, and Saskatchewan, the Canadian Association for Humane Trapping, and the SPCA, financial support was authorized through the Minister of Recreation and Conservation for engineering studies now under way at McMaster and Guelph Universities, whereby an effective humane trap will hopefully be designed to replace the leg-hold trap.

Management

Hunter Sample

Each year since 1965, resident hunters have received and returned grizzly bear harvest questionnaires. Because of the complexity of double seasons (spring and fall) we were unable to subject the returns to the regular analysis available through the Data Processing Division. During 1971 the information was manually analyzed. This presented to Wildlife Managers for the first time, an estimate of the number of grizzly bears harvested annually by residents during the period 1965–70. The annual harvest by residents has been stable, averaging 178 bears per year. (Table I).

Table I—Summary of Game Harvests by Residents of British Columbia, 1965–70

Species	1965	1966	1967	1968	1969	1970
Deer	56,877	76,692	70,534	77,013	57,035	65,830
Moose	15,183	19,940	19,397	22,469	15,205	16,450
Elk	1,800	1,970	1,709	2,257	1,498	1,638
Caribou	521	798	1,191	830	854	949
Goat	1,967	1,762	1,577	1,661	1,557	1,386
Sheep	242	225	221	267	227	248
Grizzly bear	153	182	159	192	176	204
Pheasant	39,223	29,207	32,324	23,531	23,634	25,267
Grouse	621,162	508,514	978,485	623,979	807,229	948,142
Licensed hunters	134,448	134,351	143,048	145,052	151,653	153,424

The 1971 harvest by resident hunters will not be available until the spring of 1972. Based on the 1970 results, hunters were more successful even though wildlife populations were still below the 1968 levels and hunting seasons remained restricted.

The 1970 deer harvest was only 2 per cent below the six-year average of 67,330 animals (Table I). Although the 1969 harvest was 26 per cent below that of 1968 it was only 16 per cent below the six-year average. The moderate 1969/70 winter coupled with a shortened hunting season allowed continued slow recovery of deer herds to more normal levels.

Moose harvests appear to be stabilized following the upsurge in numbers associated with increased access and logging activity in the north central Interior. The increased access has made some local moose populations more susceptible to hunting. The regional wildlife managers have, by manipulating open season dates, brought about a better distribution of the harvest as well as shifting hunter demand to the more northern areas of the Province.

Elk harvests are still below the six-year average. The majority of British Columbia's elk hunting is in the East Kootenays where pressures other than hunting, are having a marked effect on elk populations. Reduced seasons have reduced harvests; however, shrinking habitat is the major threat to these animals.

A drastic decline in native grouse populations was expected in 1970 but contrary to these expectations, they experienced another excellent production year resulting in a harvest 27 per cent above the six-year average and only 3 per cent below the six-year high set in 1967 (Table I).

The Cache Creek checking station was operated by the Kamloops Region for the first time in 1971. The station operated 16 hours a day from September 4 to November 21, 1971. The station checked fewer resident hunters (down 8 per cent) and there was a decrease in deer; but moose, trophy big-game and nonresident hunters were up (Table II).

Table II—Cache Creek Checking Station Results, 1966–71

Species	1966	1967	1968	1969	1970	1971
Moose	7,264	7,258	6,661	5,336	5,153	5,412
Deer	3,008	3,635	2,678	2,761	2,540	1,783
Goat	197	183	163	148	65	96
Sheep	74	63	59	49	22	47
Black bear	138	121	209	135	118	225
Caribou	414	514	366	351	327	394
Elk	22	21	43	20	22	16
Waterfowl	7,265	6,720	6,298	6,967	3,779	3,484
Grouse	6,494	17,482	14,399	23,715	17,766	12,390
Residents	19,123	20,503	19,198	20,919	17,503	16,056
Nonresidents	4,093	4,106	3,908	3,610	2,909	3,017

Because of the guiding requirement it is not necessary to send harvest questionnaires to nonresident hunters. The guides are required by law to report their clients' success and these reports are summarized annually (Table III). As a further check, nonresidents are required to pay trophy fees before the animal is exported from the Province. Moose continued to be the most sought after game animal followed by caribou, mountain goat, and mountain sheep.

Table III—Big-game Harvests in British Columbia by Nonresident Hunters, 1960–70

Year	Licence Sales	Deer	Moose	Elk	Goat	Sheep	Caribou	Grizzly Bear	Black Bear
1960	3,767	407	1,649	145	445	192	217	153	190
1961	3,826	393	1,878	137	392	191	197	128	132
1962	4,370	435	2,047	176	433	214	270	184	206
1963	5,226	467	2,436	214	560	312	290	166	163
1964	5,265	427	2,512	178	439	271	331	193	183
1965	5,797	307	2,817	194	580	390	397	241	244
1966	6,635	352	3,266	184	692	376	578	212	250
1967	6,933	417	3,328	182	569	392	492	181	152
1968	7,093	383	3,285	205	621	415	611	268	368
1969	7,445	333	3,158	231	695	465	681	246	306
1970	7,311	335	3,175	198	607	438	742	230	290

Research

During the year, the Wildlife Research and Technical Services Division was moved from the University of British Columbia to Victoria. The loss of research time created by the move was compensated by the establishment of a closer working

relationship with other sections of the Branch. However, because of the move and a very restricted budget, only one new research project was initiated in 1971. Emphasis was thus placed upon the completion of a variety of research projects and the analysis of large quantities of ecological information obtained from bighorn sheep range studies.

A three-year study of the relationships between various logging practices, seral succession and the distribution and abundance of moose was initiated in 1971. Since large-scale pulp-harvesting programmes will profoundly affect moose in the Prince George region, this study is exceedingly important for the future management of both the forest and the wildlife resources. Assessment of the effects of clear cutting, patch logging, patch size, slash burning, reforestation, seral succession, and other forest practices will permit the modification of logging plans to enhance moose production. Furthermore, the results of this investigation will enable wildlife management to predict changes in the distribution and abundance of moose resulting from cutting plans. This knowledge and the ability to predict changes is essential for planning the moose-harvest programme of the future.

The combined investigations included in the East Kootenay big-game range studies have provided the most detailed and comprehensive ecological information available for any ranges in British Columbia. Although the analysis of all of the data collected from 1965 to the present is not yet complete, many of the facets of the study are almost complete. Reports dealing with the methods used in the study, and with the ecology, productivity, and management of five big-game winter ranges have been brought to various stages of completion. The chemical analysis of important range plants, revealing the forage quality of unfertilized and fertilized, has been completed and a suitable computer programme has been designed for this purpose. Similarly, mineral analyses were also completed in co-operation with the Canada Department of Agriculture. Partial analysis of the results indicate the existence of several mineral deficiencies which may affect wildlife. A study of the effects of dryland fertilization on the annual production of range forage shows some promising results for range improvement programmes. Forage yields were increased by up to 268 per cent while protein production was increased by up to 291 per cent.

The completion of the analyses and the preparation of reports was retarded by a lack of technical assistance and the need to participate in related and important activities of the Branch. However, completion of reports covering the most important areas of the East Kootenay range studies is expected in 1972.

Deer population studies received some attention during the year. The results of a computer simulation programme designed at the University of British Columbia, largely on Vancouver Island deer data, indicates that periodic harvests may produce a variety of benefits which cannot be obtained when deer are maximally harvested each year. Although simulation studies do not provide proof of the validity of the principle of periodic harvests, they do indicate that this management strategy should be field tested. The results of a continuous study of an exploited Vancouver Island deer population have been incorporated into an almost completed manuscript. In this study, hunting and seral succession were found to play almost indistinguishable roles in the decline of the population.

Simulation was also used in an attempt to assess the effects of different kill rates on the grizzly bear populations of northern British Columbia. The results of this study are inconclusive even though a workable simulation model was designed. This resulted from a lack of valid data and the consequential need to include several assumed mathematical relationships in the operation of the model. Although more refinements are essential to the proper function of the model, the available data

tentatively demonstrates a need to reduce the annual harvest of grizzly bears in that portion of the Province represented by the data.

A student research programme was continued throughout the year resulting in the completion of several studies initiated previously. One such management study evaluated some forest practices and forest characteristics in relation to deer use of logged and mature forests. Another completed study established the successional stages involved in the reforestation of an East Kootenay winter range, the rates of change and the effects on above-ground productivity of the Premier Ridge big game winter range. Both of these studies have provided practical management information which will help wildlife managers to predict alterations in wildlife production associated with changes in habitat. Student investigations nearing completion include a preliminary ecological study of stone sheep in northern British Columbia and a successful attempt to model an entire ecosystem in the East Kootenays. The latter will enable managers of forest, grazing, and wildlife resources to evaluate managerial decisions and to predict the effects of various strategies and tactics upon each and all of the renewable resources included in the system. Also nearing completion is an intensive study of the interaction between mule deer, cattle and bighorn sheep in the Ashnola region. This study is the basis for planning and integrating resource uses in the Ashnola River region.

The technical services provided to the Branch were almost as numerous as they were varied. Research staff have contributed in many ways to the planning of research and management programmes, to the Canada Land Inventory for both wildlife and recreation, and to agencies conducting studies of the effects of impoundments and strip mining on wildlife. In addition, hair and parasite identifications have been provided for enforcement and management staff.

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THE CRESTON VALLEY WILDLIFE MANAGEMENT AREA

Many agencies and a myriad of individuals contributed skills to make this year a most successful and rewarding one at the Creston Valley Wildlife Management Area.

This joint Federal-Provincial wildlife management project, with the assistance of Ducks Unlimited, concentrates on waterfowl production and management. Dr. J. Hatter and J. S. Tener, Director of the Canadian Wildlife Service, are the two members of the Management Authority. Advisors from the two organizations are more directly involved with the planning and field operation of the Area.

Full-time staff on the Area at Creston presently consists of the Supervisor, the Manager, who started with the Area in June, and a clerk. As many as 55 part-time personnel have been employed.

Funds for construction and maintenance are derived from both parent organizations as appropriated moneys and through grants to the Authority's Trust Fund. Ducks Unlimited contributes through construction projects, as do other organizations.

British Columbia Hydro and Power Authority completed the construction of 95 nesting islands in Duck Lake, south of the new 2-mile-long cross dyke. The nesting islands and the new dyke were planted with grasses for waterfowl nesting cover. The first nesting in the newly created nesting area is expected in the spring of 1972.

The new Duck Lake electric pumps, also installed by British Columbia Hydro, were operated continuously for 54 days. The old, permanent, diesel-powered pumps donated to the Area by the Duck Lake Dyking District were also run continuously for five weeks. The pumping is required to comply with an order of the International Joint Commission.

Ducks Unlimited continued work on the southernmost dyke in Leach Lake, one of the four major marshes making up the Area. They also completed an extensive dredging operation and built nearly 3.5 miles of access road.

Through Parks Branch assistance under Bill 12, considerable progress was made in the development of long-awaited Summit Creek Park, on the west side of the Area. A toilet building and water works were installed. A sani-station, entrance building and maintenance building are nearing completion.

The Area's new Administration Centre, designed and being built by the British Columbia Department of Public Works, was started in early November. By the end of the year, the shell and the waterworks were completed. The construction contract was awarded to a Creston firm which has employed as many as 18 men on the project.

The Department of Highways built the new mountain road to the Administration Centre. The Department also completed the new road to the southeast corner of Duck Lake.

Important regulations pursuant to the *Creston Valley Wildlife Management Area Act* were passed by Order in Council in March. Also passed by Order in Council were revisions bringing the Act's schedule up to date with the Area's present boundary.

Engineering plans for Corn Creek Marsh were completed. The design for the dyking system for Six Mile Slough was initiated by consulting engineers and the Area staff and advisors. A large winter-works programme was planned in conjunction with the Canadian Wildlife Service.

The maintenance of artificial nesting structures, the allocation of grazing privileges, and the enforcement of regulations were also part of the staff's duties. Informal guided tours of the Area for the many tourists and official visitors kept the staff busy during summer evenings and week-ends.

It is gratifying to note that as the physical development of the Area proceeds and as greater rapport is established with other users of the Area, there is a marked improvement in the community's acceptance of the Creston Valley Wildlife Management Area. The new park, the Administration Centre, dykes and access roads will surely create even greater public interest.

KAMLOOPS AND CARIBOO REGIONS

Resource Protection

Reports incorporating recommendations for protection of fish and wildlife were completed for all public sustained-yield units within the two regions. They deal primarily with key winter range and critical habitat and the steps that should be taken to provide maximum benefits for wildlife.

California bighorn sheep wintering above 7,000-foot level in the Shulaps Range near Lillooet.

Protection of foreshore of lakes for recreation and æsthetic appeal is an established procedure with 10 chains chosen as an adequate distance for most situations. Streams require special attention because the amount of precipitation, slope, and type of vegetation determine the potential damage.

Referrals of cutting plans allow for detailed recommendations on actual logging operations, and it is at this level that requests are made for mid-winter logging on winter range to provide browse, suggested road locations and bridges in preference to culverts, green strips along important streams, or other specific suggestions that may be unique to a particular area. Although the need for an integrated approach to resource utilization is steadily growing, we still haven't got through to the bulldozer operator or the man on the power saw. That must be an objective for the '70's.

Some 26 lakes and tributary streams within the Nehalliston Provincial Forest were surveyed, and this inventory will continue for another two or three years. Moreover, a number of lakes were checked near Bonaparte. With some knowledge of future logging extensions on the Bonaparte plateau, the region is attempting to catalogue information on lakes, streams, and winter range so that meaningful recommendations can be made when logging plans are referred to the region for comment.

With limited access the surveying of lakes and streams on the plateau is a slow and tiresome process with back-packing the only means of getting around. But initial data suggest most lakes are unproductive.

Management

Fisheries

A number of projects were started or completed to better understand and influence factors affecting abundance of some important species. Removal of debris from streams got under way, ably supported in many instances by members of local fish and game clubs. The purpose was to improve spawning conditions, thereby reducing the need for heavy stockings. Stream clearance will be an almost annual activity because there are so many areas needing this sort of attention.

A pile-line was dug in the lower end of Heffley Creek leading from a collecting box about 200 yards from the lake. The lower section of the creek goes dry in early August just as fry are emerging and most small trout are trapped in pools that soon dry up. The pipe-line will span the dry section and carry small trout safely to the lake.

A control structure was built on the stream diversion into Salmon Lake to regulate flow during spring run-off and thereby protect the channel. It was dug in 1966 to provide aerated water and a channel via which small trout could safely reach the lake. Frequent winter kills have been eliminated as well as a need for stocking. However, a controlled flow will reduce channel erosion which was substantial during May and June.

Many Interior lakes are used for water storage and resultant outlet dams prevent adults and fry from returning to the lake. Often they end up instead on fields or dry stream beds. Engineering studies were completed on a number of outlets and structures designed to prevent these downstream losses which, for some of our most important fisheries, are substantial.

Tagging of large rainbow in Little Horsefly River produced some valuable information on movements and origin of these fish.

The Dean River was surveyed to assess: (*a*) the effectiveness of headwaters closures for steelhead protection and, (*b*) feasibility of "green strips" to maintain water quality. Past logging methods on the lower Dean leave much to be desired, but improved resource liaison should provide better protection for the fishery.

All field personnel were involved in resource protection. The Regions worked closely with all Provincial agencies, especially the Forest Service, to minimize effects of logging on lakes, streams, and winter range. In addition, a close liaison with Federal Fisheries helps to curb industrial pollution affecting trout and salmon waters.

Public Awareness

The summer of 1971 created a public awareness of wildlife and the Branch through the abundance of black bear. With few berries in the hills, many bears decided to give civilization a whirl, much to the chagrin of ranchers, resort operators, and campers. While foraging for food they were often unwelcome guests and the Branch was constantly on call to protect families, property, and stock. Occasionally unco-operative bears had to be destroyed. This angered a lot of people and produced a fair amount of unfavourable news but the conflict between safety and sentiment is inevitable.

A résumé of fish culture in Region 3 over the past two decades was prepared and it becomes abundantly clear that few natural fisheries exist in this arid part of the Province. With few exceptions, most of the key fishing lakes are a result of improvement work and (or) annual stocking.

Wildlife

A start was made on grizzly inventory of Management Area 17 near Rivers Inlet. The bears concentrate along salmon streams in September and October and it is probable that the number of grizzly along these streams represents the main population for a substantial area. Track measurements and counts were made but this first effort was largely exploratory—getting to know what streams grizzly concentrate on and how fast a human can run when hotly pursued.

The Watch Lake grouse study was terminated after four years and data are presently being analysed. The purpose was to correlate grouse numbers with climate and insect abundance. Available food may be the main factor limiting chick survival. Results should enhance accuracy of predictions prior to opening of season.

We are participating in a study of deer-cattle relationships on the multi-use reserve north of Kamloops Lake with Grazing Division of the Forest Service and Federal Department of Agriculture. Because of involvement of the experimental station, it is possible to get some excellent data under controlled conditions which would be impossible otherwise.

General

While a few of the highlights have been mentioned, the main field of activity is protection of the fish and wildlife resource through enforcement of regulations, checking applications for land and water, curbing water pollution, and co-operating with other government agencies. This watchdog role, while only a part of total management, is in itself an awesome task.

PRINCE GEORGE REGION

During 1971 the northern region of the Fish and Wildlife Branch continued its programme of close liaison between government resource agencies and industries aimed at providing better communication at the regional level. Through this programme, a broader understanding and more unified approach to multiple resource use is being developed within those departments and industries involved in the harvesting and management of renewable resources, as well as in the extraction of nonrenewable resources.

In the field of interdepartmental co-operation, the largest single advance has involved stream protection during timber harvesting. To this end, a formal forestry-fishery referral system was established in the Prince George Region in late 1970 whereby timber sale harvesting licences, cutting permits, etc. are referred by the Forest Service to the Fish and Wildlife Branch and to the Federal Fisheries Service for comment and recommendations prior to harvesting. The referral system applies throughout the northern region which encompasses both the Prince George and Prince Rupert Forest Districts. Details have been worked out independently with the two forest districts involved so that differences in forest harvesting policy and methods between the two districts (one Coastal, one Interior) can be taken into account. Although many shortcomings still exist in the referral system it has, in its first year of operation, reduced habitat deterioration in many important fish-producing streams. The largest single difficulty with the system is the Branch's inability due to its limited and widely dispersed field staff to examine and assess the potential effects of the many timber-harvesting proposals in this geographically widespread area.

Other interdepartmental referrals such as placer-mining applications and pollution control permit applications have been somewhat improved during 1971. The majority of these have concerned the maintenance of acceptable water quality standards for aquatic life. However, considerable further improvement is required in this area; many operations are either not yet under permit or, if they are, have failed to report to what degree the Branch's recommendations have been acknowledged and put into effect.

In the field of mineral and petroleum extraction and exploration, negotiations involving environmental problems have been largely carried out with individual industrial firms. These negotiations have been effective and mutually beneficial with those companies which have recognized multiple resource values and have sincerely attempted to minimize environmental damage in their planning. Unfortunately many companies operating in northern British Columbia have not responded in this fashion. Unnecessary environmental degradation, particularly in the field of exploration, remains largely uncontrolled and a major threat to the maintenance of fish and wildlife habitat and recreational capability.

In the field of wildlife management, recent modifications to the moose hunting season appear to be stabilizing the harvest within the capabilities of the existing moose population in central British Columbia. However, the distribution of harvest continues to be disproportionally centred around main access routes. It is expected that this too can be improved upon in the near future when smaller management subunits may be introduced. A somewhat shorter season in central British Columbia has also diverted some of the hunting pressure into the northern part of the Province where moose populations are more dense and, except along main access routes, still underharvested.

One of the major problems in maintaining stable moose populations is the continuing loss of habitat to other forms of land use incompatible to moose production. This is particularly the case in valley bottoms which constitute critical winter range. With co-operation from other resources agencies, it is hoped that these losses can be held to a minimum in future.

The 1971 harvest of all other wildlife species in the northern region, with the exception of stone sheep and grizzly bear, appeared to be well within acceptable limits for existing populations. Both stone sheep and grizzly bear appear to be at or near maximum acceptable harvest levels in most areas and have possibly exceeded this limit in some locations. While both species are hunted as trophies, the impact upon stone sheep can be better controlled due to the selection for mature males. Future grizzly seasons will have to be more rigidly controlled.

The 1971 season was an exceptional one for nuisance black bear, presumably brought on by a combination of larger-than-average numbers and adverse climatic conditions. An estimated 600 black bear were either destroyed or removed from problem areas and several thousand complaints were answered in the northern region during June, July, and August.

Studies of mountain goat populations in west and east central British Columbia over the past two years have indicated that as yet they have successfully withstood hunting pressures. However, rapidly increasing road access to these populations could quickly lead to excessive exploitation if adequate controls are not applied. For this purpose, a temporary closure to hunting has been initiated in the Nass Range to allow the region sufficient opportunity to investigate the possibility of establishing harvest quotas for the general area. In this process, a goat refuge has been established in the Mount Priestly area of the Nass River region. This refuge is becoming readily accessible and affords an excellent opportunity for photographers and naturalists to pursue their form of recreation in a unique habitat.

Still in the planning phase for specialized management are (1) a number of wildlife management reserves in the Peace River area, (2) a multiple agency and forest industry plan to determine the best methods of removing timber, with minimum ecological disruption, from a previously virgin watershed in the Slim-Tumuch Lakes area east of Prince George, and (3) the establishment of "trophy" fishing areas in some lakes and streams where populations of exceptionally large or unique sports fish exist.

Enforcement activities have been increased to some degree in the northern region. The more numerous prosecutions in 1971 probably reflect the rapidly increasing local population, the greater mobility of the total population, and the increased hunting and fishing opportunities made available by improved access within the northern part of the Province. The first year of operation of a flying conservation officer had considerable effect in some of the previously inaccessible areas, particularly in identifying resource misuse problems. However, before these flights can be fully effective, some additional ground-based enforcement staff is required for the northwest portion of the region.

The single greatest requirement in the northern region is for accelerated inventory of both sports fish and wildlife and their respective critical habitat requirements. Although this inventory is continuously being carried out, the region's current capabilities cannot keep pace with the rapid advance of access, industrial development, and associated demands for the protection of recreational capabilities, particularly in the northeast part of the Province. It is essential that such information be gathered, made available, and applied if any real attempt to minimize degradation to fish and wildlife habitat is to be implemented in conjunction with resource development in northern British Columbia.

VANCOUVER ISLAND REGION

There was steady progress in the development of fisheries, wildlife, and enforcement programmes designed to achieve realization of the Branch's objectives on Vancouver Island.

The region demonstrated its willingness to respond to social needs in its wildlife management programme by providing special areas in which only buck deer could be hunted. The initiation of special patrols and concentration of enforcement personnel in areas of high hunter and fishermen use has improved enforcement efficiency and the fishery management section have concentrated on providing a stream inventory. Inter-resource co-operation has increased and the development of a working liaison with the Forest Service, regional districts, and the forest industry has provided the Branch for the first time an opportunity to effectively protect and manage fish and wildlife in this region.

Some of the regional research and habitat protection activities are as follows:

Annual meetings were held with most logging company divisions to discuss the companies development plans and how these may affect fish and game habitat. These meetings have helped greatly to improve communication and understanding and resolve problems before they occur. They are attended by industry personnel, Forest Service personnel, Department of Fisheries field officers and conservation officers, and biologists of this Branch.

A substantial section of timber was left along the Heber River by negotiation with the Forest Service to provide winter cover for elk.

For the first time, production of reports containing recommendations for the protection of fish and wildlife values in conjunction with logging of major watersheds were concluded before logging started; for example, the White River, Nahmint River, Cypre River, and Upper Gold River watershed reports.

Plans were developed to replant the denuded Ucona Valley elk range with forage species favourable to elk, to commence in early 1972.

An experiment in planting willow in an attempt to stabilize the delta of the Elk River, an important area of elk range which has been eroding as a result of the continual raising and lowering of Upper Campbell Lake, has commened.

Research into the various aspects of the life history of steelhead in the Big Qualicum River continued.

A Canada goose transplant programme was launched, by which it is hoped populations may be re-established at suitable Vancouver Island locations. A total of 22 subadults were set free in the Nimpkish Valley in the first attempt.

Detailed elk range investigations were initiated as a follow-up to the Canada Land Inventory. A two-man crew looked at elk range in various Vancouver Island locations (logged and unlogged and on both east and west coasts).

A deer winter-range study was started in co-operation with the University of British Columbia Forestry Faculty. This practical investigation will provide information on deer habitat requirements in mature and regenerating forests and thereby improve the quality of Branch input into cutting plans.

A research programme on the effects of log booms on fish and fish-food organisms on the bottom of Cowichan Lake was completed and the results have been summarized.

A complete census of native swans (largely trumpeters) wintering on Vancouver Island was completed.

Computer programmes designed to provide a more detailed analysis of deer age-class data collected at road checks were completed.

In addition to the habitat protection and research programmes listed above, Branch personnel were involved in manipulating the cropping of wildlife by adjusting seasons, based upon road checks, hunter samples, and other data as follows:

The elk season was closed on Vancouver Island. This action (necessary because of increasing evidence that hunting was adversely affecting some herds) may have been a retrograde step rather than an advance, since there is definitely a harvestable surplus of animals in many of the herds. A proper harvest system (perhaps some kind of permit system) may allow some hunting in the future.

The black brant season was cut back in an attempt to bring back wintering populations of this species.

Particularly gratifying was the first proof of successful breeding of sea otters in British Columbia since their reintroduction in 1969 and 1970. In connection with this transplant a film *The Way Back* was completed and received wide distribution. The film depicts this region's activities with regard to sea otters.

Despite progress toward our aims and objectives, many problems remain unsolved. We are still without an effective tool for measuring the social needs and desires of the public in relation to outdoor recreation. Our research programmes are inadequate to deal with management demands, especially in terms of supplying information to inter-resource committees. Inventory work is still incomplete, although much more information has been gathered within the last year. At the same time, destruction of fish and wildlife habitat continues, particularly in estuaries

and from the removal of deer and elk winter range. Slash and debris in streams, bank damage, erosion and sedimentation, and removal or destruction of streamside vegetation are further problems concerning fisheries.

Reported sightings indicate that sea otter are re-establishing themselves in the waters off Vancouver Island.

LOWER MAINLAND AND LOWER COAST REGION

Fisheries Management

The threat to the fresh-water resources, especially streams, in the Lower Mainland, is not that of the massive, obvious destructive forces of resource development such as mining or hydro developments, but of the relentless, accumulative effects of urbanization and population sprawl. In the Lower Mainland "progress" is slowly eroding away the base of fisheries management, the stream habitat, and alienating land previously used for access to fishing areas.

In the Lower Mainland the most highly regarded fishery resource values lie in the streams. Most fishable Lower Mainland lakes are of the "put and take" variety and, as a consequence, little water or fish-habitat management is necessary on the Lower Mainland lakes.

Any management or protective measures that have been undertaken on Lower Mainland lakes have been undertaken on lakes with "æsthetic potential" or on lakes that have a high or potentially high "biological potential."

Stream protection and stream management are most critical because stream habitat and its populations are not as plastic and resilient as those found in lakes. The streams that are usually most susceptible are the smaller, narrower streams with very small watershed drainage areas. The Surrey-Langley streams and the Sechelt streams are such.

These streams are most susceptible to defilement because they are near to or surrounded by incipient burgeoning population centres. As the immediate areas

have developed, the watersheds have deteriorated, the streamside vegetation has disappeared and in-stream habitat has deteriorated. This is especially true in the Surrey-Langley area.

Any plans to conserve, protect, or improve the above streams are at best patchwork. Municipal governments are not always concerned with protection of streams for fish within their jurisdictional areas. Regional districts may, some day, foster recognition of the problems inherent in managing small watersheds, but at present they are also unconcerned. Private landowners cannot be depended upon not to destroy stream environments on their property. The problem is that no single agency has been empowered to manage the stream, its productive capacity and its watershed. Unless such an approach is undertaken, the future of many smaller Lower Mainland streams is predictable.

Aside from the problems arising from private land ownership, especially riparian ownership, in 1971, the majority of problems arose from a lack of liaison between Fish and Wildlife Branch, Department of Highways, Forest Service, and land developers. Provincial governmental intra-agency liaison and understanding is improving. In the immediate future however, private land ownership in the areas referred to will supersede all other problems with respect to fisheries management.

Wildlife Management

Every form of animal has evolved to occupy a specific habitat type. When wild lands are modified by man in his relentless effort to make himself more comfortable and secure, the numbers and variety of wildlife diminish.

Despite the increased concern for environmental quality being shown by its residents, the Lower Mainland Region continues to suffer from habitat deterioration. This is particularly true in the choice agricultural lands near the mouth of the Fraser River. The estimated 2,000,000 to 3,000,000 waterfowl and shorebirds which traditionally stopover in the area during migration, and the resident pheasant population which is so dependent upon agricultural practices, constantly find less room for nesting, feeding, and escape. Similarly, urbanization and more efficient forestry practices are having long range effects upon forest-game populations.

The "conservation conscience" which has developed so profoundly in the Lower Mainland, as it has throughout North America, has imposed greater demands upon all environmental workers. It is natural that complaints of pollutions, habitat destruction, illegal hunting, and accidental wildlife losses should increase rapidly in the region which houses more than one-half of the Province's population. These demands often leave little time for staff specialists to work on preventative or planned management programmes.

Nevertheless, major achievements in securing reserves or co-operatively planned land-use developments with government, private, and municipal authorities were made in 1971.

Attention was focused on waterfowl protection, since this resource has considerable international as well as local significance. Here, co-operation was received from the Canadian Wildlife Service, Ducks Unlimited (Canada), various regional districts, and municipal planning officers.

Furthermore, major working agreements with the British Columbia Forest Service, and private foresters were continued and expanded. We are convinced that these endeavours will lead directly toward the acceptance of wildlife as a primary product of forest lands rather than an accidental by-product.

Specific achievements in 1971 can be listed as follows:

Waterfowl—active promotion at senior government levels, and investigation at the technical level, for waterfowl development of Duck, Barber, and Woodward Islands in the South Arm of the Fraser River.

—planning for development of the Serpentine marsh as a permanent waterfowl refuge, bird-production site, and animal population study area.

—transplant of 50 young Canada geese from Stanley Park to the Pitt River as an initial step in encouraging the species as a wild nester in the region.

—technical participation in planning the development of the Lulu Island foreshore, Boundary Bay, Canoe Pass, Reifel Refuge, and Burnaby Lake.

Big game—participation, with the Forest Service, in designing timber-harvesting programmes for the Soo, Yalakom, and Dewdney Public Sustained-yield Units, and for various tree-farm licences and timber sales.

—co-operation with the Forest Service and its Grazing Division is promoting a transplant of Rocky Mountain elk to the Lytton Mountain area (scheduled for autumn, 1972).

Inventory—expansion of a long-range aerial mountain goat inventory within the region.

—initiation of a coastal grizzly bear inventory along salmon-spawning streams in Bute and Toba Inlets.

—discovery of a small relict herd of California bighorn sheep wintering above 7,000 feet in the Shulaps Range, Lillooet District.

—assessment of deer-use of the proposed Moran Dam flood basin.

—routine spring inventory of key deer herds.

—reconnaissance of wildlife potential and habitat description in Kwoiek Creek, the Upper Stave and Upper Pitt Rivers.

OKANAGAN REGION

The increasing tempo of social awareness and of involvement with the wildlife resources of the region provided our staff of 12 with increasing work loads in all fields of endeavour. The quickening metabolism of interagency planning at all levels of government and with industry both have placed considerable stress upon the undertakings of the professional managers of our regional staff. These elements of growth, however rewarding in over-all gain in resource management, are sorely stretching our basic responsibilities to the fish and wildlife resources and the public.

In order to meet some of the challenges placed upon us by the public and other resource agencies alike, we were fortunate to add the services of a full-time fishery technician. This appointment has enabled our planning counsels to remain responsive to the demand. Additionally, the programme of engagement of special conservation officers to assist regular field officers with seasonal peak loads has had a noticeable effect on staff and public alike. The expectation by the public of higher levels of Branch servicing continues to grow and the demands for enforcement of regulations are still being met, due in no small part to the assistance rendered by these part-time Conservation Officers.

Climatic conditions were favourable for both wildlife and fisheries during the year. A very favourable snowpack in all quarters of the region (Management Areas 5, 6, 7, and 8) was beneficial to fisheries and their reproduction. Big-game populations, especially deer, recovered well from the relatively taxing winter of 1970/71 and in spite of some reduction in harvest opportunities, the hunting season was considered satisfactory. One species, the black bear, was forced by conditions still obscure to lower elevations and presented a threat to many urban communities

and agricultural areas. The magnitude of bear complaints by the public was shocking to our small staff which weathered the summer and fall periods without respite. It is obvious to all that more effective techniques for the management of black bear will have to be discussed for peak population years.

Fisheries Management

Okanagan Basin Agreement

This joint Federal-Provincial programme is investigating all problems associated with water quality and quantity in the Okanagan River Basin. Fisheries have been involved in two tasks, socio-economic and limnology.

Socio-economic:

Lake history—A report is being completed giving a brief description and history of each lake in the basin.

Angler census—This study was designed to estimate the number of anglers using each of the lakes in the basin each year. A summer student was employed to do the actual census, using a combination of both air and ground counting techniques.

The information from this study will be used for two purposes under two tasks:

Socio-economic—to gain a measure of recreation provided by these lakes;

Limnology—along with creel census data to determine the total number of fish removed from each lake in a year.

Lake history: This is an unofficial task in which regional fishery staff of the region will write a brief history and use description of each Lake in the basin.

Trout Creek: This was a pilot study in which an attempt was made to produce a plan by which to study a small watershed.

Regional Projects

Chain Lake rehabilitation—This highly accessible and heavily used lake is just downstream of Osprey and Link lakes which were rehabilitated in 1969, and when this lake is restocked will complete the rehabilitation of the entire system.

Jewel Lake—This lake is the second most heavily used lake in M.A. 8 (next to Christina). A dam was constructed by the Branch to maintain a constant level on the lake.

Stream clearance—A habitat improvement team of two men was in this region for four days to clear obstructions from spawning streams. In all, four spawning streams were cleared of debris.

Peachland Creek—This stream is one of the most important rainbow and kokanee spawning streams in the basin. By the efforts of two local rod and gun clubs, a number of weirs were built in the stream bed and gravel was added to improve the spawning potential of the stream.

Crater Lake—This is a small lake high in the Ashmola Valley. The lake is very shallow, over 90 per cent of its area, thus restricting fish to 10 per cent of the lake in winter. An agreement has been reached with the Water Rights Branch whereby they are designing a small dam to raise the level of this lake.

Forest Service—An unusual amount of time was spent inspecting logging operations in counsel to local forest rangers and conservation officers.

Oyama Lake—A major first occurred concerning the future development of this lake. The Forest Service called a meeting of all resource agencies that might be involved in the future development of Oyama lake. All representatives met and discussed such things as cabin development and access to this lake and then as a

group, made recommendations to the Forest Service. The Forest Service would then make up a 5-, 10-, 15-year management plan based on the composite recommendations.

British Columbia Hydro—In co-operation with Federal fisheries officers, a case was prepared on the damage caused by flushing the forebay of the Shuswap Falls Dam. Every second year British Columbia Hydro would flush the silt from the impoundment which would settle on the spawning beds just downstream, killing the ova and fry of salmon, trout, and whitefish while still in the gravel, as well as killing many of the adult fish in the immediate downstream area. British Columbia Hydro has agreed to try some different methods of removing the silt.

Water licences—Water licences for the storage of water to provide stable water levels or more water in a lake were obtained by the Branch for two lakes in the region, Jewel and Crater. In addition, a water licence was obtained for the remaining 6 cubic feet per second in Peachland Creek, one of the last remaining kokanee spawning streams in the Okanagan Basin. This is one of the few times the Branch has obtained a water licence for spawning kokanee, and the occasion constitutes an administrative breakthrough which will favour fishery management in the future.

Wildlife Management

Interdepartmental Co-operation

Increased recognition of wildlife and the Fish and Wildlife Branch by other agencies has probably been one of the year's highlights. Repeated meetings with Regional District Technical Planning Committees and frequent discussions with both Forest Service and Grazing Division have furthered the needs of wildlife in this region.

(1) The most obvious success this year was the granting by Crown Zellerbach with endorsement by the Forest Service, of a 3,000-acre reserve on grasslands in the Shorts Creek area. This critical range for California bighorns lies within Crown Zellerbach's Tree Farm Licence 9.

(2) An aerial survey and discussions with the Forest Service, Parks Branch, and Regional District staff enabled a reasonably consistent approach to further park development in the Ashnola.

(3) Following an elk release in M.A. 8, the Forest Service and Grazing Division, with our staff, met as a unified body at a public meeting to present the pros and cons of additional elk in the Granby watershed.

(4) Co-operation between the Forest Service and the Fish and Wildlife Branch has resulted in a programme of controlled burning on a deer winter range near Lumby, and modified logging practices on the Upper Shuswap moose winter range. This latter programme will ensure that winter cover will be left for moose.

(5) Discussions with the joint Federal-Provincial Okanagan Basin Study led to the engagement of a private consultant to conduct the wildlife aspects of the study.

Wildlife Investigations

Investigations into the needs of the Okanagan wildlife continue annually. Twenty deer were tagged during 1971 near Princeton, and we have now marked 35 deer. Tagged deer aid in describing migratory and mortality patterns. Sheep management research in the Ashnola area has shown the population is steady, although the lamb crop is declining. Cattle removal has allowed a continuing improvement of the lower grasslands but, as yet, there has been no numerical response in the sheep herd.

The long-term inventory of the deer winter ranges of the region reached a plateau of accomplishment with the production of maps of the region showing all known deer winter ranges. This invaluable information has been distributed to other government agencies and now provides the basis for intensive land management proposals for range improvement.

Investigation of Okanagan pheasant populations has been drastically curtailed, although the pheasant is still an important game bird. Pheasant habitat is virtually all privately owned and, with changing farm practices, and loss of agricultural and wild land to suburban development, areas of good pheasant habitat are rapidly dwindling. As a result, populations are declining.

Regulation Changes

Consumptive use of the wildlife resource is constantly re-examined in light of (*a*) social needs and (*b*) limitations or opportunities set by the animal populations themselves. This is best exemplified by deer herds in M.A. 8. A declining mule deer herd and a steady but difficult-to-hunt whitetail herd prompted a closure on antlerless mule deer and provided only a short antlered mule deer season. We allowed a second opening for whitetails only from mid-November to mid-December. The Ashnola subunit of M.A. 7 gave us the opportunity to extend an antlerless mule deer season. During most years limited access allows only a very light harvest in the Ashnola. Because spring ranges are heavily used by deer it was decided to extend the antlerless season from one week to four weeks in 1971 in order to increase the harvest. An unusually heavy, early snowfall pushed the deer onto accessible ranges and an acceptable harvest was taken in two weeks rather than the four weeks provided for, and the season was foreclosed on reaching the harvest quota.

Animal Releases

Hunters are constantly examining the possibilities of upgrading their hunting opportunities by the introduction of new species. The Armstrong and District Fish and Game Association imported some adult Merriam's turkeys, and they successfully raised about 75 young birds of which 50 were released near Armstrong. It remains to be seen whether or not these birds will survive in the North Okanagan.

Harvests

Generally, except for mule deer in Management Area 8 and native grouse throughout the region, harvests were higher this year than last.

Bighorn sheep—The ram harvest from the Vaseux and Ashnola herds was up from last year and we estimate there were 30 rams taken from the two herds.

Deer—Throughout most areas of the Okanagan, early November snows coincided with the antlerless season. As a result, deer were pushed onto their lower, accessible ranges and heavy harvests were recorded.

Pheasants—Hunting pressure has been declining for the past few years, but for those hunters who had access onto private lands in 1971 hunter success was better than last year.

Native grouse—Populations were down in all areas from last year, and harvest is estimated to be about 50 per cent of last year's.

Regional Protection Officer Activities

The all-embracing administrative function continues to grow and demand an ever-increasing commitment of time. This function, which includes writing reports, correspondence, issuing guides' and trappers' licences, answering public inquiries,

and clerical work attached to the processing of court cases, consumes an average of 30 per cent of all conservation officers' time.

Enforcement

Twenty per cent of conservation officer time was spent in field enforcement of various regulations. Programming of enforcement has been undertaken through an effort to measure activity initiated in the form of random night patrols.

Mounted patrols were utilized in the Ashnola area during opening of deer season and again during the sheep season. Such patrols perform the service of increasing levels of law observance and increasing contacts with the public in actual hunting situations. They also serve the purpose of giving regional people an opportunity to become acquainted with special species seasons in small areas. This will become increasingly necessary as more intensive management practices emerge.

The use of special conservation officers has increased our ability to utilize two-man patrols for night work, relief for regular conservation officers for days off and vacations, and for increased patrol activity in peak seasonal periods.

The installation of mobile radio sets in conservation officer vehicles has enhanced enforcement operations. It has also increased our daily contact and rapport with RCMP considerably and thus lent their support to our enforcement efforts.

KOOTENAY REGION

Wildlife Resource Protection

The wildlife resources of the Kootenay Region, like other regions of British Columbia are being affected by rapid human expansion. Wilderness species such as mountain caribou and grizzly bear are the most seriously affected by man's activities while specific populations of all forms of wildlife have come into conflict and have been reduced or eliminated.

The expansion of strip-mining for coal in the Elk Valley, massive hydro-electric projects and the extension of logging into middle- and high-elevation stands of mature timber is resulting in significant losses of wildlife habitat. Live-stock grazing on major big-game winter ranges coupled with rapid forest succession on previously logged and (or) burned areas in the East Kootenay continue to depress the wildlife populations dependent upon these ranges. Development of private lands for industrial and residential purposes also contribute to the problem by reducing the acreage available to live stock and wildlife.

Considerable progress toward an interdepartmental approach to resource management has been made through the Kootenay Resources Committee and the Technical Subcommittee on Environment and Land Use. Government Departments responsible for the management and use of land, water, and air are being made aware of the influence their decisions have on the wildlife resources. Closer liaison between departments with conflicting interests provides the opportunity for the Branch to suggest ways of minimizing harmful effects or increasing beneficial effects of certain types of resource extraction.

Wildlife populations do not recognize political boundaries and as the Kootenay Region borders three American states and one Canadian province, closer liaison is also required with neighbouring game agencies. The signing of the International Mountain Caribou Study Agreement by the Fish and Wildlife Branch and several American federal and state government departments was an important step in the direction of closer co-operation in wildlife management. The study which will be conducted through the University of Idaho, is designed to obtain important informa-

tion on the status, ecology, and requirements of the international mountain caribou herd of the Selkirk Mountains. The Agreement also involves financial support and representation of local and American sportsmen's organizations.

Wildlife Management

Increasing demands for wildlife, improved access and declining wildlife populations have resulted in major changes in hunting seasons within the past few years. Major changes in 1971 seasons included a fall grizzly closure, shortened cougar seasons, closure of mountain goats in the West Kootenay and the closure of antlerless elk in the East Kootenay. Programmes to monitor the results of these changes are presently inadequate, although general public reaction has been positive.

Bighorn sheep appear to be making a slow recovery following the 1964–67 die-offs. Counts of sheep have shown a gradual increase in almost all affected herds, while bighorn numbers in the unaffected areas have remained stable.

Transplants of elk from Banff National Park were made in the Christina Lake basin (Okanagan Region) and in the 36,000-acre Deer Park wildlife-management reserve on Lower Arrow Lake. The releases involved 50 elk at Christina Lake and 36 elk at Deer Park.

Detailed management plans were prepared for three of the four parcels of property owned by the Branch in the East Kootenay. General clean-up and rehabilitation of the properties were undertaken in 1971.

A committee representing sportsmen of the Trail district, the Forest Service Grazing Division and the Fish and Wildlife Branch was established to investigate land-use problems involving wildlife and live stock on Crown lands in the Pend d'Orielle of the West Kootenay.

Fish Habitat Protection

Mining—The Fish and Wildlife Branch, as a member of the Land-use Committee, has made several protection recommendations concerning further development of coal mining in the Elk Valley. Silt retention ponds and erosion-control have been emphasized at all strip-mining sites.

Reservoirs—A preliminary report and comments have been made concerning the continuing Kootenay Canal project, west of Nelson. Sport fishing data were collected on the Arrow Lakes Reservoir in order to evaluate effects of Hugh Keenleyside Dam. Continued surveillance of Kootenay Lake water quality continues as a follow-up of Duncan dam reservoir.

Fish Habitat Improvement

Fry production in the Meadow Creek spawning channel was determined at 6.3 per cent, the lowest production rate in four years operation. Siltation of the channel has reduced fry production and gravel cleaning operations took place in August of 1971 to improve fry survival.

The 1971 adult kokanee run moved into Meadow Creek in record numbers. Almost 1,000,000 fish entered the system, some 300,000 more than the previous record of 1970. The 1971 kokanee were the first returns from fish which spawned in the channel in 1967. Initial returns to the channel suggest high success of the artificial channel.

Fish Culture

Approximately 2,000 yearling rainbow trout were released back into the Duncan River (north end of Kootenay Lake). These fish are the progeny of the large rainbow trout captured in the Duncan River in 1970. Since no spawning habitat remains below the Duncan Dam, the Fish and Wildlife Branch has decided to collect the returning spawners and artificially raise the eggs. In the spring of 1971 some 27 fish ranging from 8 to 27 pounds were captured and stripped of eggs.

River Survey

A two-man summer survey crew spent two months on the Upper Elk River evaluating the fisheries resource and use of this system. An intensive study of the productivity of the Elk River was also conducted.

Kootenay Lake Fishery

Continued surveillance of this important sport fishery continued through 1971. Record catches for ling, kokanee, and large rainbow were noted in 1971, with total catch exceeding 100,000 fish.

WILDLIFE LAW ENFORCEMENT

Staff

Seventy-one conservation officers, senior conservation officers, and regional protection officers of the six regions comprise the uniformed field staff members most concerned with direct "people management." Eleven qualified persons of known experience were hired as temporary conservation officers to assist in seasonal and high-density enforcement situations.

Communications

Mobile radio communications have proven a most valuable aid, especially when conservation officer staff are linked with RCMP. As well as a new base station at Burnaby in 1971, four Okanagan conservation officers were provided with units of higher power than previously available. Units are now installed in vehicles of all conservation officers of the Lower Mainland Region, Vancouver Island Region, four in the Okanagan Region, one in the Kootenay Region, three in Kamloops Region, four in Prince George Region, and one in a leased floatplane.

Aircraft Patrol

Since May 1, 1971, a leased Cessna 180 floatplane has been utilized in northern British Columbia by the pilot-conservation officer. A new aircraft communications radio, necessary to improve flight safety, has worked well. This aircraft has greatly increased the mobility of the northern conservation officers, improved our public relations, and positively increased enforcement of angler-hunting-guiding regulations. The following table summarizes the results of utilization of the aircraft for eight months and reveals that 14 per cent of hunters contacted, 5.4 per cent of anglers, and 5 per cent of all persons contacted were in violation.

Utilization of Branch Aircraft

Flight days	74
Total persons contacted	946

Anglers—	
Resident	236
Nonresident	100
Violations	18
Warnings	9
Fish	848
Hunters—	
Resident	42
Nonresident	49
Violations	13
Warnings	15
Game	33
Air time (hours)	213.55
Aircraft observed—	
Canadian	66
United States	21
Aircraft checked—	
Canadian	25
United States	17
Guides	38
Trappers	4
Lodges and camps	71
Total violations	47
Total warnings	27

Helicopter Flight Reports

For the last three years a regulation under the *Wildlife Act* has required the pilot of a helicopter to submit by mail within seven days of his return from any flight for the transportation of persons for hunting, trapping, or nontidal angling, or the transportation of game or fish, a flight report on a specific form. A summary of these reports again reveals a small number of reports and the usual preponderance of use by our own residents.

Forms submitted	72
Hunters—	
Resident	121
Nonresident	47
Trappers	*Nil*
Anglers—	
Resident	6
Nonresident	4
Game transported	77
Fish transported	38

Game Transported

Moose—13 males, 6 females; caribou—5 males, 1 female; sheep—10; goat—28 males, 6 females; elk—3 males; deer—3 males; grizzly bear—1 male; black bear—1 male.

Fish Transported

Steelhead, 7; coho, 1; cutthroat, 8; Dolly Varden, 22.

Wildlife Sanctuaries and "No Shooting" Areas

During 1971, four wildlife sanctuaries were created under the *Wildlife Act* while four "No Shooting" Areas were provided by authority of the *Firearms Act.*

Hunting Casualties

Nonfirearms and Animal

One person (not hunting) killed by a bear which he may have surprised.

One juvenile (not hunting) killed by an emaciated cougar.

One hunter drowned.

One hunter succumbed to heart attack from over-exertion.

One person (not hunting) suffered an injured knee when frightened by a bear.

Firearms—"In which a person is injured by a hunting weapon outside the home and arising from the activity of hunting, including travel to and from the hunting field."

Eleven fatal—Self-inflicted when mounting horse, .308; son shot father, 30/06, action pending; father shot son, .270, action pending; husband play-aimed his rifle at wife in kitchen window, .303, licence cancelled; passenger checking loaded .22 in moving vehicle, driver prosecuted; juvenile rabbit hunter self-inflicted when stumbled, 30/30; two hunters (one killed and one seriously injured) in drifting boat mistaken for moose, 30/06, pending; juvenile grouse hunter shot by father, .22, pending; juvenile bear hunter self-inflicted when stumbled, 30/30; nonhunter, out of sight of deer hunter, 30/30, no charge or licence action; self-inflicted, crossing fence, .410.

Six serious injury—Partner mistaken for moose, 30/06, pending; juvenile mistaken for deer by juvenile brother, 44/40, prosecution and licence cancellation; victim after dark jumped from behind bush to scare partner, 12 gauge, prosecution and licence cancellation; partner fumbled unloading and shot victim in foot, 30/06, pending; duck hunter stumbled in brush and shot partner, 12 gauge, prosecution and licence cancellation.

One not serious injury—Ricochet by grouse hunt partner, .22, prosecution and licence cancellation.

Note—RCMP now request an eyesight exam and two of those involved as above were found "colour deficient."

Summary Firearms Hunting Casualties, 1968–71

Year	Fatal	Serious	Not Serious	Total	Rate per 100,000 Licences	Total Licences
1968	8	4	11	23	15.1	151,946
1969	8	11	12	31	19.5	158,672
1970	5	3	9	17	10.4	163,308
1971	11	6	1	18	10.9[1]	165,000[1]

[1] Estimated.

Comparison Note—Idaho State reports its rate per 100,000 licences in 1970 was 22.7, in 1969 it was 24.

LICENCE CANCELLATIONS

Hunting licences may be cancelled for cause under a provision of the *Wildlife Act.* Where the hunter training course is available, successful completion has been

a condition of reinstatement in addition to a time period of from one year to life. In 1971, 34 hunting licences were cancelled for violation while five were cancelled arising out of firearms hunting casualties.

Prosecutions

Some 712 cases were handled by the *Wildlife Act* and *Firearms Act* ticket system; this was 86 per cent of the total 1971 prosecutions. The balance comprises those offences (mostly Federal) which lack statutory provisions to utilize the ticket system.

The total number of prosecutions is down slightly from 1970; however, this is more than offset by the increase in total fines.

	Prosecutions		Fines		Most Frequent Violations	
	Convicted	Dismissed	Total	Average	Loaded Firearm in Motor-vehicle	Lack of Angler's Licence
					Per Cent	Per Cent
1968	762	9	29,645	38.90	35.0	19.0
1969	812	15	31,094	38.29	27.0	24.2
1970	834	12	35,282	42.30	27.9	29.4
1971	825	14	38,181	46.78	33.3	21.0

Junior Firearms Safety-training Programme

Since 1960 the Branch and the British Columbia Wildlife Federation have sponsored a training programme aimed specifically at educating juveniles in the safe handling of firearms and basic hunting safety. The following table indicates the reduced involvement of "under 18" shooters.

Shooter Age-group Comparison

	1957–61 Per Cent	1962–66 Per Cent	1967–71 Per Cent
Under 18	42	25.2	22.2
18–21	21	17.8	22.2
22–30	14	22.0	17.6
Over 30	23	35.0	38.0

Some 2,000 youngsters graduated from the junior programme during 1971. The members of rod and gun clubs who organized and acted as instructors of the junior programme deserve a vote of thanks.

PUBLIC INFORMATION AND EDUCATION

Information and education is entering a new era of public involvement. Growing concern for environmental deterioration is increasingly expressed as a concern for fish and wildlife, and as the condition of their immediate environment deteriorates, more people are looking to the integrity of natural systems and populations as a measure of the quality of life. Furthermore, the connection between wildlife habitat and human habitat means that the distress of wildlife indicates a threat to man's own security and survival.

The Fish and Wildlife Branch is increasingly recognized as the agency most involved in these issues and is being sought at both professional level and by a concerned general public. At the same time it is clear that the successful execution of Branch activities demands the attention and understanding of these same groups; we must reach co-operative solutions to mutual problems. These are all communication problems and the new objectives of the Information and Education Section.

Information Activities

Circulation of the Branch Monthly Activity Report has increased to 1,000 copies. This report goes to all newspapers, radio and television stations, all staff members, as well as to interested members of the public.

Twelve editions of the monthly newsletter were prepared for distribution.

Approximately 1,000 various types of inquiries and requests were attended to each month.

Many of our general information pamphlets were updated and several new ones created.

Several news releases were prepared each month covering Branch programmes, season openings, and other topics of current interest. These releases are sent to all radio and television stations and newspapers in the Province.

Promotional Activities

A public display and information booth was provided at the British Columbia Wildlife Federation Sport and Vacation Show, held in Vancouver during the first week of May.

A 16-mm colour and sound film entitled *To Catch a Trout* was produced illustrating the work of the fish culture section.

A considerable amount of footage has been taken throughout the Province for a new film being produced on the general activities of the Fish and Wildlife Branch. It is hoped this new film will be available for distribution by the summer of 1972. In addition, film is being compiled for use in further productions, television spots, and in educational programmes.

Through the co-operation of the Department of Education, 8,000 copies of classroom lessons, posters, and a booklet on general conservation topics were sent to schools in the Province during National Wildlife Week.

Lectures were given during a special travel counsellors' course sponsored by the Department of Travel Industry. These counsellors are from various regions of the Province.

Several hundred talks, slide presentations, and film showings were given by members of field and headquarters staff to various groups throughout the Province. The portable public information display panels and sample "skin" mounts of the upland game birds, migratory birds, hawks, owls, and eagles have been in continuous use at sport shows and by conservation officers in the six regions of the Province. Several other displays have been planned and are awaiting construction.

Hunter Training, Conservation, and Outdoor Safety Programme

1971 was a busy year for the programme as the evolution of the training course and the establishment of training classes throughout the Province continues.

A wide variety of organizations and educational institutions is now participating in the programme and this involvement is expected to increase in 1972. Instructor services are available at over 100 locations throughout British Columbia.

Sixteen instructor courses were completed in 1971, qualifying 238 instructors. The present complement of 750 instructors has now qualified 3,500 students, and there were 44 student courses in progress at the end of the year.

The Fish and Wildlife Branch was host to the seventh annual meeting of the Canadian Association of Hunter Training Safety Officers. The convention was held in Victoria. Attending delegates reported from the majority of provinces, State of Idaho, and Washington, D.C.

GUIDING INDUSTRY

The administration of the guiding industry in 1971 was highlighted with

(*a*) the appointment of J. P. Gibault as the Co-ordinator of Guiding Services;

(*b*) the issuance of the first Guide Outfitter Certificate, granting the holder thereof the exclusive right to guide for certain big-game animals within a described territory for a period of 15 years;

(*c*) the new schedule of fees for all classes of guide licences which came into effect on April 1, 1970;

(*d*) an amendment to the permit regulations, pursuant to the *Wildlife Act,* authorized the issuance of a permit to a guide outfitter to guide in an area other than his guiding territory; this permit authority created the flexibility required in administering the guiding industry, and created greater opportunities for guide outfitters to enlarge and enhance their operations.

The 1971 summary of guide hunter activity is not available at the time of writing but the results for 1970 are compiled and compared to those of previous years.

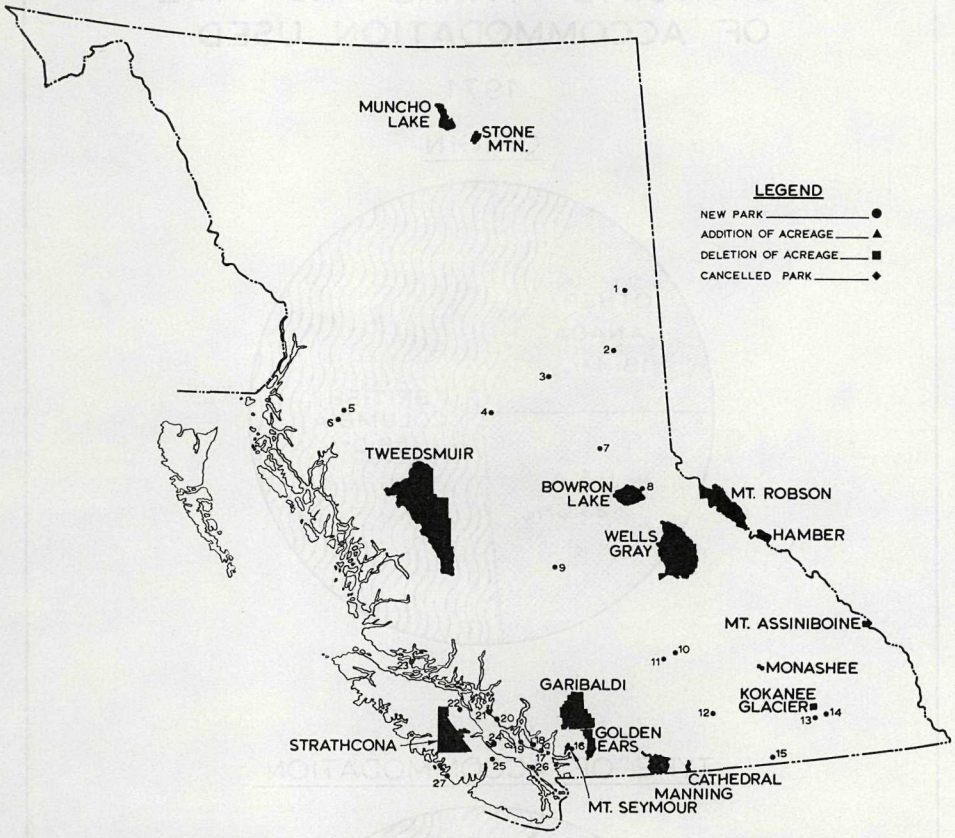
Summary of Guide Hunter Activity, 1967–70

Year	Guides	Assistants	Resident Hunters	Nonresident Hunters	Moose	Goat	Caribou	Deer	Sheep	Grizzly Bear	Black Bear	Elk	Cougar	Coyote	Wolf	Total Big-game Harvest	Per Cent Hunting Success
1967	696	722	195	5,976	3,328	569	492	417	392	181	152	182	21	9	31	5,774	94
1968	698	827	204	6,402	3,285	621	611	383	415	268	368	205	16	21	68	6,261	95
1969	652	874	190	6,518	3,158	695	681	333	465	246	306	231	29	5	48	6,197	94
1970	585	861	172	6,548	3,175	607	742	335	438	230	290	198	21	14	69	6,119	91

Provincial
Parks
Branch

Department of Recreation and Conservation

PARK SYSTEM
1971 ADDITIONS & DELETIONS

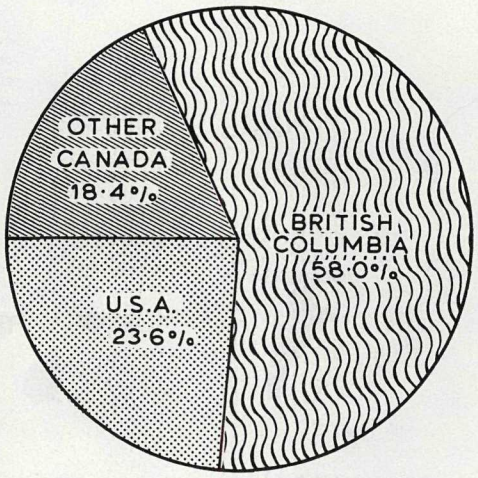


1.__FORT ST. JOHN HISTORIC PARK ●
2.__GWILLIM LAKE RECREATION AREA ●
3.__FORT McLEOD HISTORIC PARK ●
4.__STUART LAKE PARK ●
5.__LAKELSE LAKE PARK ▲
6.__KLEANZA CREEK PARK ■
7.__PURDEN LAKE PARK ●
8.__BOWRON LAKE PARK ▲
9.__WHITE PELICAN PARK ●
10.__PAUL LAKE PARK ▲
11.__MISSION FLATS PARK ■
12.__MISSION BEACH PARK ■
13.__KOKANEE CREEK PARK ▲
14.__PILOT BAY PARK ▲
15.__CHRISTINA LAKE PARK ●
16.__MOUNT SEYMOUR PARK ■
17.__CHASTER PARK ▲
18.__PORPOISE BAY PARK ●
19.__SMUGGLERS COVE MARINE PARK ●
20.__MYRTLE ROCKS PARK ▲
21.__COPELAND ISLANDS MARINE PARK ●
22.__ELK FALLS PARK ■
23.__ECHO BAY MARINE PARK ●
24.__HELLIWELL PARK ▲
25.__HORNE LAKE CAVES PARK ●
26.__DRUMBEG PARK ●
27.__WICKANNINISH BEACH PARK ◆

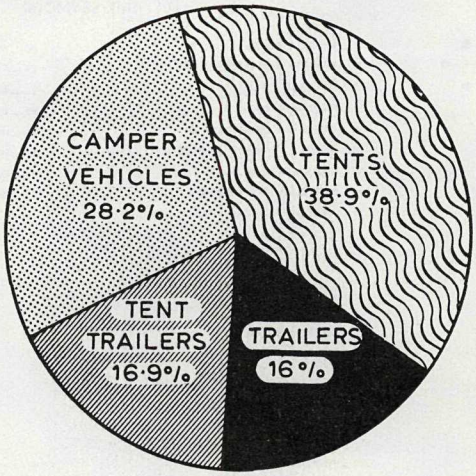
ORIGIN OF CAMPERS VISITING PROVINCIAL PARKS AND TYPE OF ACCOMMODATION USED

1971

ORIGIN



TYPE OF ACCOMMODATION



PROPOSED PARK SYMBOLS

FIRE-WOOD

WATER

CHANGE HOUSE

PICNICKING

AMPHITHEATRE

TENTING

CAMPING

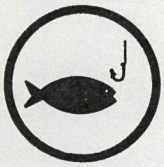
BOAT LAUNCH

SANI-STATION

TOILETS

PARKING

BOAT TRAILER PARKING


FISHING

NATURE TRAIL

HORSE-TRAIL

HIKING TRAIL

SKIING

SLEDDING

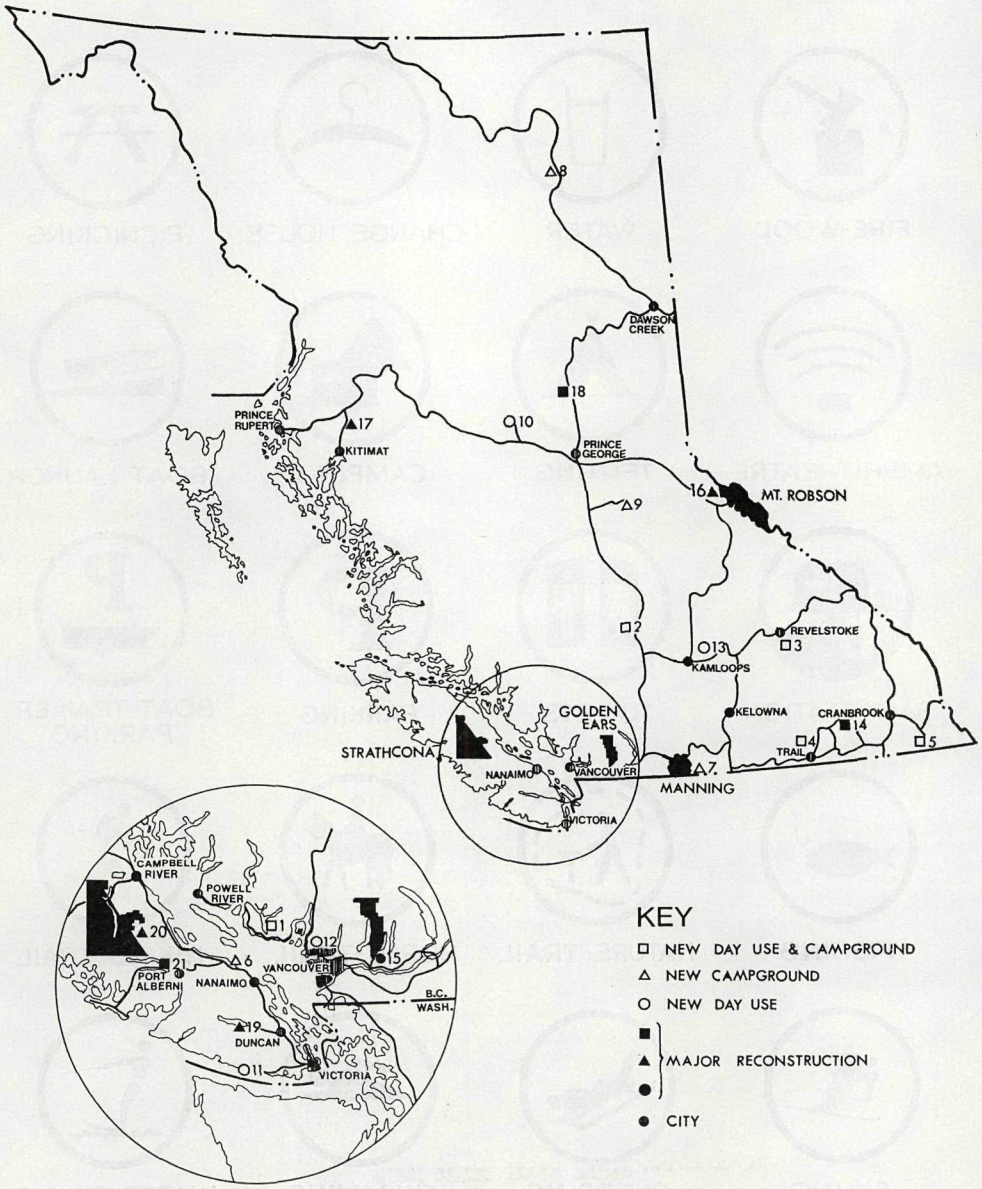
SWIMMING

WATER SKIING

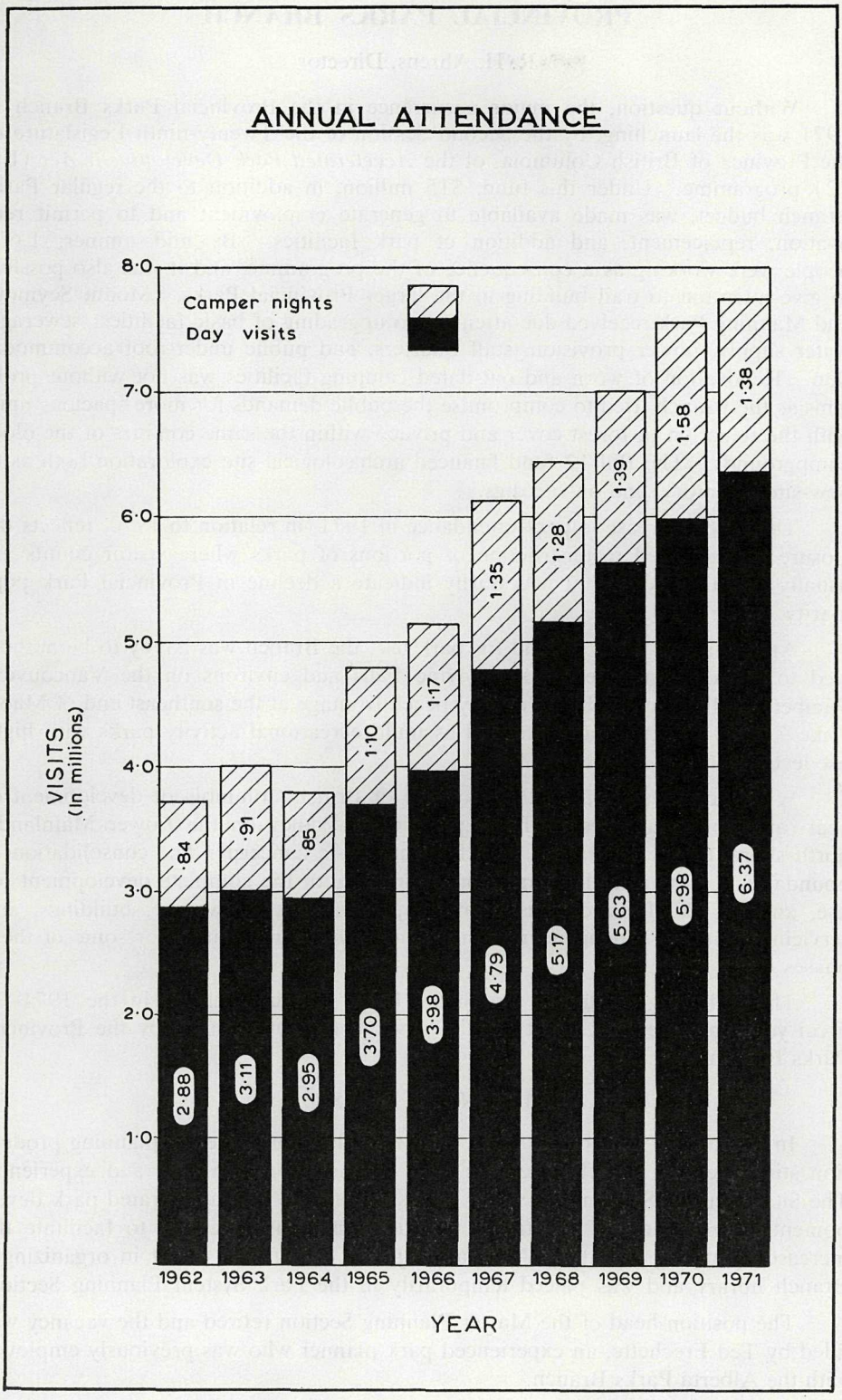
WINTER RECREATION AREA

CROSS-COUNTRY SKIING

PLANNED NEW PARK FACILITIES



1 PORPOISE BAY
2 BIG BAR LAKE
3 BLANKET CREEK
4 SYRINGA CREEK
5 LIBBY RESERVOIR
6 RATHTREVOR BEACH
7 LIGHTNING LAKES (MANNING PARK)
8 PROPHET RIVER
9 LOUHEE
10 PARRENS BEACH
11 CHINA BEACH
12 CYPRESS BOWL
13 PAUL LAKE
14 KOKANEE CREEK
15 GOLDEN EARS
16 ROBSON MEADOWS
17 LAKELSE
18 WHISKERS POINT
19 GORDON BAY
20 RALPH RIVER (STRATHCONA PARK)
21 SPROAT LAKE


ANNUAL ATTENDANCE
Camper nights
Day visits
VISITS
(In millions)
8·0
7·0
6·0
5·0
4·0
3·0
2·0
1·0
·84
·91
·85
1·10
1·17
1·35
1·28
1·39
1·58
1·38
2·88
3·11
2·95
3·70
3·98
4·79
5·17
5·63
5·98
6·37
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
YEAR

PROVINCIAL PARKS BRANCH

R. H. Ahrens, Director

Without question, the major occurrence in the Provincial Parks Branch in 1971 was the launching, by the Second Session of the Twenty-ninth Legislature of the Province of British Columbia, of the *Accelerated Park Development Act* (Bill 12) programme. Under this fund, $15 million, in addition to the regular Parks Branch budget, was made available to generate employment and to permit renovation, replacement, and addition of park facilities. By mid-summer, 1,600 people were working as a consequence of the programme, and it was also possible to give attention to trail building in the larger Provincial Parks. Mount Seymour and Manning Park received due attention to upgrading of basic facilities: sewerage, water supply, power provision, staff quarters, and public under-roof accommodation. Renovation of worn and out-dated camping facilities was not without problems as the Branch tried to compromise the public demands for more spacious units with the retention of forest cover and privacy within the same confines of the older campgrounds. The Bill 12 fund financed archæological-site exploration both as to new-site inventory, and on-site digs.

The slight increase in park attendance in 1971, in relation to 1970, reflects the closure for extended reconstruction of portions of parks where visitor counts are usually taken. It does not necessarily indicate a decline in Provincial Park popularity.

Among acquisitions of land for park use, the Branch was happy to be authorized to include purchase of Brandywine Falls and environs on the Vancouver–Pemberton Highway, and high quality beach frontage at the southeast end of Mabel Lake. Both properties are intended as multirecreational activity parks with high-use levels.

With the assumption by the Province of British Columbia of development of year-round park facilities in the Cypress Creek valley on the Lower Mainland's north shore, the Parks Branch launched into basic concerns: The consolidation of boundaries for the intended park, conceptualizing of the complete development for use, and design of basic transportation, power, water, sewerage, buildings, and servicing facilities. Independent consultants have been retained for some of these phases.

The following outline of Provincial Parks Branch activity, in the 1971–72 fiscal year, indicates a scale of activity never before undertaken by the Provincial Parks Branch.

PLANNING DIVISION

In addition to the normal work load, the added pressure for planning production stimulated by Bill 12 taxed the park planners for both time and experience. The Site Planning Section in particular was affected by this accelerated park development programme and additional planning staff was taken on to facilitate the increased planning demand. A librarian joined the staff to assist in organizing a Branch library and was placed temporarily in the Park System Planning Section.

The position head of the Master Planning Section retired and the vacancy was filled by Ted Frechette, an experienced park planner who was previously employed with the Alberta Parks Branch.

At the close of 1971 the Division was staffed as follows:

	Professional	Technical	Clerical	Total
Division Chief	1	----	----	1
Park System Planning	8	1	2	11
Master Planning	5	----	----	5
Site Planning	1	3	----	4
Vacancies	----	2	----	2
Totals	15	6	2	23

Park System Planning Section

(a) Parks Branch Library

Work on the organization of the Parks Branch library began June 1, with the hiring of Miss Elizabeth Woodworth, a recent graduate from the University of British Columbia. Since that time, approximately 300 new books, research reports and bibliographies, plus 20 new journal titles have arrived in the library. All ordering is now done through the librarian, who also catalogues incoming material and provides reference service for the collection when this is needed, either for the routine work of the office or for the specific requirements of oral and written presentations.

The library is composed of three main sections, including the books, which are catalogued according to the Dewey Decimal system; the reference section, which contains materials offering ready factual information on parks, forestry, and British Columbia; and the vertical pamphlet file, which is organized according to the United States Bureau of Outdoor Recreation's *Thesaurus of Outdoor Recreation Terms.* Some 400 books have been catalogued, and the library is receiving about 35 major journals plus another 55 news bulletins.

There have also been introduced a monthly accessions list, and systems for signing out books and recording journal holdings. The library's services have also been made available, not only to headquarters, but also to the field staff and other libraries, who receive materials through the mail. The first seven months of operation saw a steadily increasing rate of use by both headquarters and the field staff.

(b) West Coast National Park Project

The task of land acquisitions for the West Coast National Park Project continues. In the past year our Lands Officer has appraised and arranged settlements with 65 private owners for a total of $2 million. During 1971 all unencumbered Provincial Crown land in Phase I (Long Beach area), including Wickaninnish Beach Provincial Park (which was cancelled by Order in Council), was transferred to the Federal Government as part of the National Park. The campground is again in operation but under National Park supervision and management.

A further milestone during the year, which was accepted with mixed feelings by the local populace and others associated with the area, was the naming of the new park by Federal authorities. Pacific Rim National Park was formally named and dedicated at a ceremony on May 4, 1971, attended by H.R.H. Princess Anne during the occasion of the Royal Visit to Canada to celebrate British Columbia's Centennial year.

Discussion of the boundary of Part III of the National Park (West Coast Trail area) continued with recommendations and suggestions flooding in from various organizations and an interested public. Detailed studies of this area were

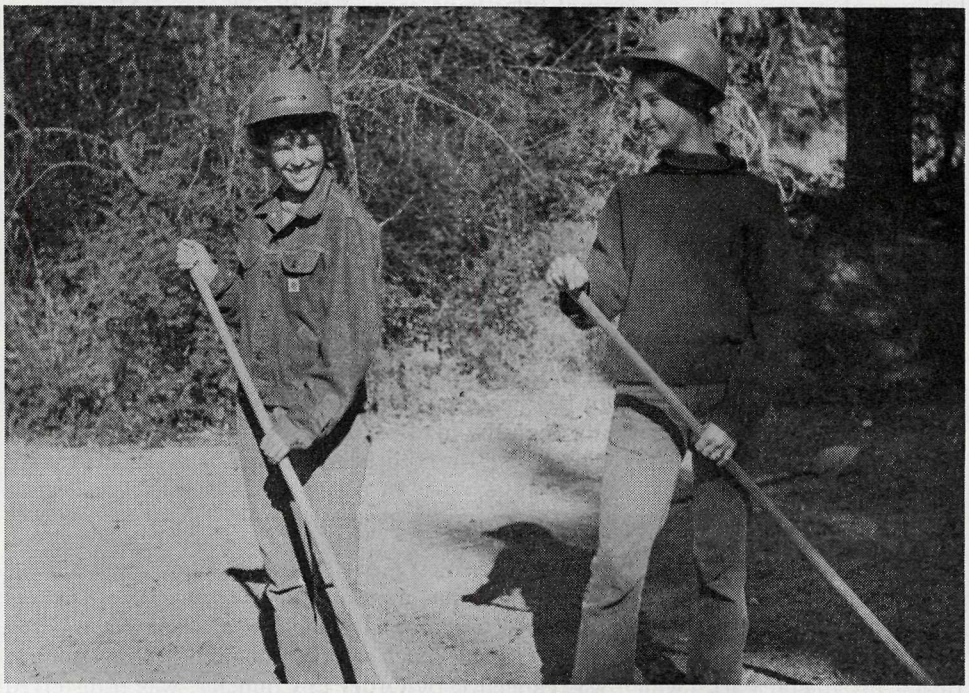
carried out during the year. In the latter part of 1971 a Provincial Parks Branch-Forest Service task force was formed to establish a mutually satisfactory boundary to present to the National Park Service for consideration.

The complicated and cumbersome system of providing the Federal Government's share of funds for land acquisition costs continued to hamper the Branch.

After 14 months of negotiation the Federal Government agreed with our recommendation to eliminate this problem by establishing an accountable advance system for providing Federal share of acquisition funds. At the time of writing we have verbal assurance that the new system has been approved by Federal Treasury.

(c) Bill 12 Trail Location

Two planners of the Park System Planning Section were appointed to coordinate the trail locations programme for construction and improvement under the Accelerated Park Development Programme (Bill 12). Eight university students were employed in the locating of 105 miles of new trails and the relocating of 72 miles of existing trails throughout the Provincial park system.



The Accelerated Park Development Programme (Bill 12) provided many opportunities for employment of young people of British Columbia. Among the many who worked at various jobs in parks in 1971 were Bonnie Lepage and Ellen McDonnell, seen engaged in campground maintenance at Kokanee Creek Provincial Park near Nelson.

The longest trail located will connect Manning Park to Cathedral Park, a distance of 30 miles. It also serves as an eastward extension of the Centennial Trail constructed in 1967 from Simon Fraser University to Manning Park. It is anticipated that eventually this trail will extend the full width of the Province.

Other new trails that were located include a 10-mile trail across the International Ridge, accessible from Cultus Lake Park; a 4-mile trail in Golden Ears Park, from Gold Creek to Alouette Mountain, to link up with the existing trail

from Mike Lake; a 10-mile trail in Tweedsmuir Park from the Atnarko River to Turner Lake; an 8-mile trail in Garibaldi Park from Cheakamus River to Helm Lake; a 20-mile trail in Wells Gray Park from Clearwater Lake to Murtle Lake via Kostal Lake; and a 5-mile trail in Bowron Lake Park up Wolverine Creek.

Improvements were made to the location of existing trails within Strathcona, Kokanee Glacier, Mount Assiniboine, and Mount Robson Provincial Parks.

(d) Fraser River Upstream Storage Study

Head of Park System Planning represents the Parks Branch on an ecology subcommittee of the Fraser River Joint Programme Committee which is presently updating the System E portion of the "Final Report of the Fraser River Board Flood Control and Hydro-electric Power in the Fraser River Basin." The objective of the ecology studies is to determine the benefits and disbenefits to uses of the resources other than power and flood control, of the proposed System E project. Parks Branch participation is restricted to the evaluation of present and projected social and economic outdoor recreational values of the affected areas in their present and possible flooded conditions. Particular attention is being given to the historic, archæologic and natural recreation resource values. Special emphasis is placed on the existing and potential park lands affected and an attempt is being made to define and qualify these values in economic terms which will permit their employment in current cost-benefit analysis procedures. The Parks Branch studies are closely integrated with those undertaken by the Fish and Wildlife Branch. These are being undertaken simultaneously by consulting firms.

(e) Provincial Park System Planning

The main function of the Park System Planning Section is twofold: to maintain a viable system of Provincial Parks by evaluating parkland potential and recommending same for addition or deletion to the park system; and to recommend interdepartmentally the reservation of Crown lands required in particular for public recreational use.

(*a*) Evaluation of potential park land. A number of areas located throughout the Province received considerable planning attention throughout the year. Those which received relatively intensive study are as follows:

(i) Mount Edziza Park proposal was completed and forwarded for Ministerial attention. Mineral reservation over the core area of the proposal was effected by Executive Council Order. Effective cooperative relationships were established with the mining industry in an effort to ensure that the park values of this magnificent volcanic area are preserved while adjacent ore deposits are being extracted.

Further progress on this park proposal is contingent upon resolving timber conflicts in the area. The original park proposal contains approximately 600,000 acres.

(ii) Trout Lake Park proposal southeast of Revelstoke was examined very intensively to evaluate its park potential. The area is unique in that it contains the spawning beds of the very large and well-known Kootenay Lake rainbow trout. This proposed park will contain approximately 1,100 acres.

(iii) St. Mary's alpine area west of Kimberley received further field examination and will be proposed for addition to the park system. This proposal contains approximately 20,000 acres.

(iv) Top of the World Park proposal east of Kimberley and encompassing approximately 20,000 acres was referred to the Technical Land Use Sub-Committee in the spring of the year to resolve timber-park resource-use conflicts. By the year's end this had not been resolved.

(v) Elk Lakes Park proposal at the headwaters of the Elk River in the East Kootenays was initiated as a result of field examination this year. The area may conflict somewhat with existing coal deposits but appears suited to multirecreational park use in a very scenic portion of the Rocky Mountains. The park proposal includes approximately 14,000 acres.

(vi) Bowron Lake Park proposed additions of the Wolverine, Betty Wendle, and upper Cariboo River watershed were examined jointly by Forest Service and Parks Branch staff. Timber and park resource-use potentials and conflicts have yet to be resolved.

(vii) The Redfern Lakes situated northwest of Fort St. John were examined to evaluate their Provincial park potential. Future park status is contingent on further examination of the contiguous big-game ranges. The lakes are presently reserved from alienation pending further studies.

(viii) Wokkpash Lake south of Stone Mountain Park was examined in relation to the park. Further studies are required to determine the Provincial park significance of this general area in relation to existing and proposed park areas.

(ix) Muncho Lake Park (Alaska Highway) was examined and found to require further field study to relocate the park boundaries to include significant big-game ranges and exclude superfluous park land.

(x) Williston Lake reservoir was examined and found to have very low Provincial park potential along most of its shoreline.

(xi) Brent Mountain Park proposal received further interdepartmental field study. The park proposal was waived in favour of a ski development.

(xii) The north end of Osoyoos Lake was examined for its ecological (semidesert) park value at the request of the Okanagan-Similkameen Park Society. Report assembly and presentation of this proposal was deferred to 1972 because of staff commitments.

(xiii) Chilliwack Lake received field examination. Proposals for two parks on this lake were actively being pursued at the year's end. At the south end a 3,000-acre parcel of land was dedicated in September as "Sapper Park" in recognition of the contribution to the development of British Columbia by the Sappers of the Royal Engineers; it will function as a northern portal to the U.S.A. North Cascades National Park. At the north end a 400-acre park is proposed to accommodate the demand for a mass-use water-oriented park in the Lower Mainland region.

(xiv) The Queen Charlotte Islands 1970 parkland reconnaissance report assembly received a great amount of planning time and attention.

(xv) The Marine Parks system in the Georgia Strait area received considerable planning attention; potential park areas were noted in the vicinity of Desolation Sound, Hardy Island, Quadra Island, and Cortes Island.

(*b*) Park land acquisitions and deletions. A number of outstanding properties were conclusively negotiated for park designation. The most notable among these are: 6,000 feet of prime frontage on Mabel Lake, Brandywine Falls (north of Squamish), Tamarac Lodge on Conkle Lake, a historic coal tipple near Ladysmith, and a private inholding in Tweedsmuir Park. Special mention should be made of the donation by the Alpine Club of Canada of their Lot 10552 in Mount Assiniboine Park.

	Area (in Acres)	
	Land	Water
Parks Established in 1971—		
Fort McLeod Historic Park (Class A, Category 2)	7.160	
Horne Lake Caves Park (Class A, Category 2)	71.000	
Fort St. John Historic Park (Class C Category 6)	5.000	
Echo Bay Marine Park (Class A, Category 6)	3.370	1.29
Porpoise Bay Park (Class A, Category 6)	150.000	
White Pelican Park (Class A, Category 1)	1,032.000	2,050.00
Christina Lake Park (Class A, Category 6)	15.650	
Drumbeg Park (Class A, Category 6)	50.000	
Smuggler Cove Marine Park (Class A, Category 6)	410.000	40.00
Purden Lake Park (Class A, Category 6)	349.000	
Stuart Lake Park (Class A, Category 6)	778.000	
Copeland Islands Marine Park (Class A, Category 5)	1,080.000	
Additions to Existing Parks—		
Lakelse Lake Park (Class A)	159.000	
Chaster Park (Class C, Category 6)		5.00
Pilot Bay Park (Class A)	120.000	
Bowron Lake Park (Class A)	6,850.000	
Kokanee Creek Park (Class A, Category 6)	185.700	
Myrtle Rocks Park (Class C)		7.70
Helliwell Park (Class A)	11.000	
Paul Lake Park (Class A)	301.000	
Deletions—		
Elk Falls Park (r/w)	5.500	
Kleanza Creek Park (B.C.H. & P. r/w)	0.269	
Mission Beach Park (road r/w)	0.280	
Mission Flats Park (Kamloops Pulp & Paper Co. exchange)	15.000	
Wickaninnish Beach Park (cancelled)	2,656.000	
Mount Seymour Park (r/w)	0.129	
Recreation Areas—		
Gwillim Lake Recreation area	22,700.000	

(*c*) Lands reserved for public recreational use. The Park System Planning Section has been instrumental in establishing and administering numerous general recreation reserves with co-operation of the Forest Service and Lands Service of the Department of Lands, Forests, and Water Resources. Interagency discussions concerning the fabrication of a new recreation land reserve terminology to replace the present faulty nomenclature were started but unfortunately not carried to fruition by the year's end.

Parks Branch records indicate that 2,700 recreational reserves of one type or another covering approximately 532,000 acres of Crown land were in effect on December 31, 1971. New reserves within Provincial Forest Reserves are the administrative responsibility of the Forest Service. On vacant Crown land the Parks Branch maintains an active interest.

Site Planning Section

Of the sections within the Planning Division, the responsibilities for Bill 12 fell most heavily on Site Planning. Plans for new campgrounds, day-use areas, and trails were initiated within this section. All proposals for renovation, revision, and expansion of existing park facilities were reviewed before being assigned to field staff.

In four parks, site plans for new facilities, including both campgrounds and day-use areas, were prepared. These were Porpoise Bay on Sechelt Inlet, Big Bar Lake near Clinton, and Syringa Creek and Blanket Creek, both on the Arrow Lakes reservoir.

Plans for new campgrounds were prepared for Lightning Lakes in Manning Park, Prophet River on the Alaska Highway, Louhee near Barkerville, and Rathtrevor Beach.

Plans for new day-use facilities were prepared for Parrens Beach on Stuart Lake, China Beach near Sooke, and Paul Lake near Kamloops.

Several parks received major renovations and expansion of facilities. Included were Kokanee Creek, Whiskers Point, Furlong Bay (Lakelse Lake Park), Gordon Bay, Yahk, Ralph River (Strathcona), Sproat Lake, Lac la Hache, Christina Lake, and Mount Robson.

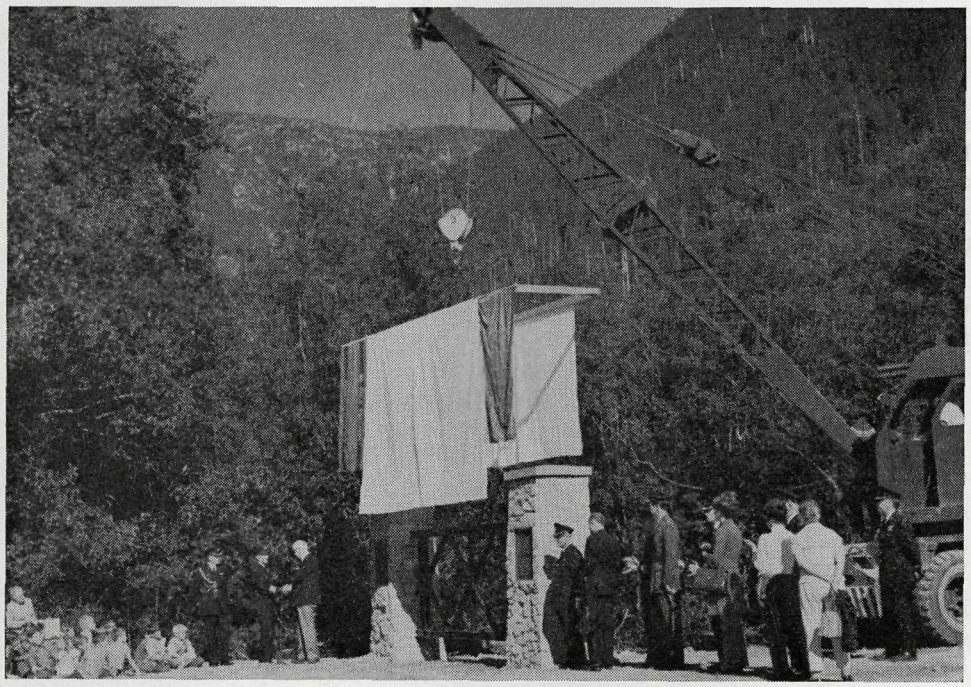
In Golden Ears Park, plans were prepared for a revised day-use area on Alouette Lake and an interpretation centre at Mike Lake. In Manning Park, consideration was given to a revised traffic pattern within the park townsite, new accommodations for both staff and park visitors, and proposed changes to the Gibson Pass ski area. On Mount Seymour ski-ing was reviewed and both ski lifts and slopes were recommended for improvements.

Site Planning was involved in discussions related to a building programme. Items completed included expanded food service, ski rental, and first-aid buildings on Mount Seymour. A programme of picnic shelters along the Alaska Highway was prepared. Still to be completed are criteria for location of picnic shelters, toilet buildings, and change houses.

Of concern to Site Planning was the organizing of topographic mapping assignments for the Engineering Division. Detailing these mapping needs involves extensive field work and an analysis of land status, access routes, and service requirements. Projects included Sasquatch Park, Buntzen Lake, Stuart Lake, Cypress Bowl, Shawnigan Lake, Gibson Pass, Koksilah River, Niskonlith Lake, Bridge Lake, Birkenhead Lake, Purden Lake, Big Bar Lake, and the Libby reservoir.

Special projects undertaken included the following:

(1) Sapper Park—The Canadian Armed Forces chose the south end of Chilliwack Lake as the site of their contribution to the British Columbia Centennial year. Site Planning assisted in road and bridge location and in preparing a plan for day-use facilities.



Colonel the Honourable J. R. Nicholson, Lieutenant-Governor of British Columbia, officiated in September at the dedication of Sapper Park located at the south end of Chilliwack Lake. Development work was carried out by engineering personnel from CFB Chilliwack and by 50 Field Squadron, Royal Engineers, who came out from England to participate in the project. The Lieutenant-Governor is shaking hands with Colonel J. Carr, Commanding Officer CFB Chilliwack, beside the memorial arch.

(2) A development plan for large-scale park facilities was prepared for an area of some 1,500 acres on Libby reservoir which will become a new Provincial park in 1972.

(3) Under Bill 12 an emphasis was placed on locating and constructing "back-country" trails and assistance was extended in producing a *Trails Standards Handbook* outlining location criteria and construction methods.

(4) Beginning in 1972, the Parks Branch will begin a programme of replacing printed signs with sign symbols. Some 22 of these symbols have been approved and are closely related to those being used on an international basis. Site Planning has co-ordinated this project and the first use of these symbols will be seen on roadside public information signs located at the entrance to the larger parks.

(5) Cypress Bowl became a major task for Site Planning in the latter part of the year. As the Master Planning concept for Cypress Park precipitated, details were required regarding locations of service buildings, ski lifts and runs. Of considerable concern was the matter

of traffic circulation as the site posed serious limitations for parking. Further work to finalize the site plan should be completed in early 1972.

(6) Within the system of Marine Parks, new wharves were planned for Keats Island and Newcastle Island.

Master Planning Section

Summer reconnaissance work was conducted in three areas of the Province and reconnaissance reports were prepared for the Ashnola Valley and Cathedral Park; the Eutsuk Nature Conservatory in Tweedsmuir Park; and the Murtle Lake, Clearwater-Azure Lakes, and Mahood Lake areas of Wells Gray Park. These reports are detailed resource- and visitor-use evaluations which will provide foundations for the Master Planning process.

The master plan for Mount Seymour Provincial Park was completed early in the year and a preliminary plan for Cypress Provincial Park was produced later in the year.

ENGINEERING DIVISION

Added to normal housekeeping duties and capital works, Bill 12 tested the Division's capacity. Professional staff tabled its design role and concentrated on project control and administration. The seven technical sections provided designs and direction for both contract and staff work with emphasis on the latter to stimulate direct Government employment. Department of Highways undertook 43 projects consisting mainly of paving contracts throughout the park system, road construction at Mount Seymour and Blanket Creek, and Cypress road location. The lack of trained staff within Engineering Division was compensated, in part, by the retention of 18 architectural and engineering firms on 47 projects.

More specifically, major areas of consulting assignment under Division control covered the following: Manning motel replacement, staff accommodation, development study, electric-power system and generating-station, waterworks and supply study, sewage collection and treatment plant, firehall design and warning system, landscape study, resident engineering services, and bridge foundations; Mount Seymour day-lodge addition, expanded first-aid facilities, new toilet building, central ticket office, ski-school building conversion, rope tow renovation, electric-power extension, and repairs, landscape study; and Cypress preliminary studies. Minor assignments were made for Golden Ears gravel crushing; Newcastle Island wharf and floats; Rathtrevor reservoir and pumping-station; trail-system suspension bridges and cable-car crossings for the Cheakamus, Robson, Atnarko, and Simpson Rivers; Plumper Cove wharf and floats; Paul Lake beach sanding; Lac Le Jeune water supply; Beaumont toilet-picnic building, and Mount Robson electrical and water supply systems.

In summary, external agencies were directly responsible for 32 per cent of Bill 12 with execution mainly by contract which completed about three-quarters of the programme. Internal means handled about 24 per cent, mainly by staff construction, with eight-tenths completion. On the assumption of a similar 1972 programme additional staff needs have been defined as two professional engineers and three technicians. A comprehensive study of space requirements was executed for a scheduled move to new quarters.

Waterworks and Sewerage Section

Besides assistance to consultants, this Section provided site investigation, feasibility studies, detailed design, specifications, materials supply, field supervision, contract control, and operational training for all waterworks and sewerage projects undertaken by Management Division, Construction Section, and Historic Parks.

In total, 23 new, expanded, and renovated water systems were undertaken, ranging from major to minor works and covering the full range of the technology: piping, valving, reservoirs, pumping-stations, control systems, well-lake-gravity supplies, power service, and irrigation. An additional 25 systems were researched, designs were initiated, and some were committed to serve deficient areas. Drilling contracts were released which produced 27 successful wells and four failures.

Plumbing detail and sewage-disposal designs were provided to serve the toilet-building programme. Sani-stations were added to three parks and five more were planned.

Buildings and Structures Section

Park Standards plans were prepared and distributed for repeatable small structures covering 39 toilet buildings, 12 change houses, four equipment sheds, and two picnic shelters. The first of these formed a major part of the pit-toilet replacement programme. In all, about 80 per cent were completed or committed by own-force means with the Section supplying site application and technical support.

Custom designs were prepared for 21 major units encompassing toilet-change houses, toilet buildings, picnic shelters, workshops, staff residences, and camp structures. Of these, five were undertaken by contract and four by staff. Division offices at Langford and Mount Seymour were renovated, preliminary designs were prepared for interpretation centres at Kokanee Creek and Alouette Lake, an initial proposal for the Manning Park motel was designed, a permanent residence design was completed for Bowron Lakes, and a kitchen-dining building was designed for Manning.

Prefabricated structures were researched, detailed, and requisitioned for 26 applications involving service buildings, staff accommodation, Bowron Lakes information centre, and Mount Robson youth-crew camp.

Draughting Section

Plan research, preparation, and distribution capacity expanded to meet the Bill 12 need with a staff of five serving the Branch. Peak demand was offset by contracting some of the overload to private firms. On-the-job training kept pace with output and was complemented by night school classes with the net result that a senior draughtsman is scheduled to move into the technician cadre.

To meet the heavy demand for topography and minimize field time, the Section became a key link between Planning Division and the Survey Section. In implementing this and other demands the chief draughtsman's role is approaching the status of a technical office manager. Currently the work load covers status maps, land-use designs, roads, earthworks, buildings, waterworks, sewerage, tourist maps, reports, publicity assignments, consultant records, reproduction services, and Park Standards amendments and circulation.

Workshop Section

Park furniture and equipment production increased three-fold over the previous year's under the impact of a double-shift system employing an average of 30 persons. More than 10,000 items were produced in 50 categories. This was aided

by the transfer of the Interpretation Section to new quarters, the addition of clerical staff to renovated offices, and the expansion of covered storage and work areas. Staff training aided the programme with emphasis on plastic, wood, carving, and metal practice.

In addition, about 50 off-yard jobs were handled, 1970/71 unit-cost study compiled, and 20 vehicles forming the headquarters pool were maintained and dispatched. Distribution of finished products was a major concern with a basic commercial-transport system augmented by Workshop and Construction Section trucking. Bill 12 achieved the maximum employment and production possible in the present location.

Equipment Section

This Section supplied essential expertise and vital liaison with consultant assignments, notably ski-tow and electrical generation projects at Mount Seymour, Manning, and Mount Robson. Its responsibility for Branch vehicle and equipment control was implemented by maintenance and operational direction, semiannual inspections and corrective action, specifications for new and replacement machinery, and operating-cost reports. Coupled to this was comprehensive liaison with suppliers covering specification conformance and warranty administration. Project SAM was aided by machine orders, delivery control, and technical direction to foremen and operators.

As the senior technician, the equipment superintendent was responsible for administration of the Mount Seymour-based headquarters of Engineering Division, which also served the Construction and Survey Sections. Clerical staff was increased, permanent offices constructed, and an additional equipment inspector added.

Survey Section

Apart from three outside assignments, all topographic mapping required for park planning and construction were produced by this Section. In all, 30 jobs were undertaken covering about 2,800 acres. To achieve this, a peak of 13 field crews employing 37 men was reached during summer, with a low of eight crews at the end of the year. A major effort was required to train staff and combat inclement weather.

In addition to this centralized Branch function, the Section supplied surveying for project control, boundary definition, earth-work estimates, road locations, and structural designs. Major assignments were: Blackwall road in Manning Park, Gold Creek road in Golden Ears Park, Clearwater Lake road in Wells Gray Park, Rathtrevor Beach Park retaining wall and counsel to the Department of Highways on the Mount Seymour road. An assistant supervisor was added to the Section headquarters staff in the face of the continuing work load.

Construction Section

About 24 projects were undertaken during the year with the Section sustaining the heaviest Bill 12 impact on supervisory staff. Starting with five, a peak of 14 was achieved for project supervisors and assistants. Maximum employment reached 380 by mid-summer of which 220 were students. Four large camps were established with three covering the summer and two in the winter. Continuing the growth of an integrated service to the Branch, the superintendent's office provided guidance for Management Division projects, distributed bulk-ordered materials and water-system supplies, and supplemented Workshop furniture delivery. An assistant superintendent was added and a permanent office-service yard complex implemented at Mount Seymour.

Specific field work executed by this Section is covered by the following summary:

The second season of the Young Men's Conservation Programme was terminated at Rathtrevor Beach in May with 35 candidates receiving training in park construction; which included the beach wall, parking-lots, bridges, trails, and buildings. A 50-man year-round camp at Golden Ears, with the assistance of local labour, extended the Gold Creek road, reconstructed the campground, improved the day-use area, constructed trails, built an equipment shed, and started six toilet buildings. The 100-man seasonal camp at Wells Gray improved 23 miles of road, reconstructed seven miles, aided Management Division's trail programmes, reconstructed Dawson Falls, Clearwater Lake, and Spahats Creek campgrounds, completed Clearwater River Park, and commenced essential waterworks. The 50-man seasonal camp at Mount Robson constructed the 94-unit Robson Meadows campground, reconstructed Lucerne-Robson River campgrounds, relocated Berg Lake trail, including bridgework, and built the headquarters service yard. The 40-man Rathtrevor Beach camp, assisted by local labour, began winter operation on a 100-unit campground, additional parking, paths, Englishman River reconstruction, and the China Creek water system.

Local labour and machine-rental projects were: campground reconstruction, a 50-unit addition, and Strathcona staff residence at Ralph River; 50-unit campground, Maclure Lake reconstruction, 26 new camp-sites, service yard, and a day-use area at Gordon Bay; 50-unit campground at Profit River, staff residences, change houses, and reconstruction of existing parks on the Alaska Highway; 62-unit campground, day-use area, and beach at Syringa Creek; 59-unit campground at Blanket Creek; initial access at Purden Lake; picnic clearing at Parrends Beach, and winter programme of access and campground construction at Libby reservoir.

VANCOUVER MANAGEMENT DISTRICT

In 1971, the Vancouver District benefited from the Bill 12 programme in that many new facilities were constructed and an extensive reconstruction programme to existing facilities commenced.

At Mount Seymour Park, the road was closed for a five-month period to facilitate the reconstruction of 4 miles of the access road. Other improvements included an extension to the day lodge, which, when completed, will provide a brown-bag room, nursery, ski rental, and information office. New ticket office, washroom, and first-aid buildings will be placed in service in early 1972. The V.O.C. cabin was relocated and when exterior and interior renovations are completed, the building will serve as the focal centre for the Mount Seymour Ski School. Major grooming and improvements to all ski slopes in the park have been carried out and electrification of the rope tows completed. A new hiking trail was constructed on the eastern portion of the park and it is hoped that this trail will also function as a safety trail to guide lost skiers or hikers back to a known point.

With the reopening of Mount Seymour Park on December 4, winter sports enthusiasts took advantage of the improved facilities and excellent ski-ing conditions. The popularity of Mount Seymour Park as a winter sports area for Vancouver residents is well confirmed with the recording of over 60,000 visits during the Christmas and New Year holiday period.

While many other parks recorded a slight decrease in camper use, Manning Park campgrounds displayed "campground full notices" on a daily basis throughout the major portion of the summer season. An extensive construction programme was undertaken at Manning Park. The improvements and additional facilities will assist

in alleviating the shortage of accommodation. A new 40-unit lodge-motel complex was constructed and should be in operation by April 1972. Work commenced on a new 100-unit campground in the Lightning Lakes area, and this will be a very popular facility for families wanting to spend several days in this area. Considerable works were undertaken in the sewerage and waterworks field with a new sewage collection and treatment plant being installed, and investigation of a new groundwater source commenced. Reconstruction of Coldspring, Nicolum, Emory Creek, Stemwinder, and Bromley campgrounds was completed. In keeping with the demand for more hiking trails, over 40 miles of trail were constructed. The major portion of the trail work was concentrated in providing a trail link between Manning Park and Cathedral Park. Accommodation for lodge personnel has been improved with the construction of a 10-unit girls' dormitory and four single-family residences.

A firehall is under construction, and when equipped with a pumper unit Manning Park will have a fully trained volunteer fire brigade unit. An extensive road construction programme resulted in the upper 5 miles of the Blackwall road being completed to subgrade, the lower 5 miles paved, and the first 2 miles of the Gibson Pass road paved. A bridge was added to the Lightning Lake narrows.

Golden Ears Park, one of the major camping and day-use parks of the Lower Mainland, is in the process of being reconstructed. When completed, the entire park will have been refurbished. During 1971, the 200-unit campground was renovated. Many of the camp-sites have been redesigned to accommodate recreational vehicles, with others designed for tents. Six new toilet buildings will replace the pit toilets. Additional day-use parking has been provided and relocation and renovation to the picnicking and beach facilities will continue throughout 1972. Work has been resumed on the access road to the Gold Creek area and when completed it will provide additional beach frontage on which much-needed day-use facilities can be constructed.

During the early part of the season Cultus Lake Park experienced several outbreaks of vandalism and rowdyism. Park staff assisted by our security officer, H. Jordan, moved quickly to suppress this type of activity, and with increased patrols, improvements to the camper registration system, amendments to the *Park Act* and regulations, vandalism and rowdyism were minimal for the remainder of the season. Campground facilities at Maple Bay and Entrance Bay were reconstructed; also included in this programme was the construction of five toilet buildings. Several miles of hiking and riding trails were completed with the major portion of the work taking place in the International Ridge Recreational Area. Work commenced in Sumas Mountain Park, and when completed will provide day-use facilities for picnicking and hiking. Parking lots and access roads at Bridal Falls, Sasquatch Park, and Cultus Lake Park were resurfaced and paved.

The Garibaldi region, located in the Squamish-Pemberton valley, continues to be popular to Vancouverites. Alice Lake Park, one of the most heavily used parks in this region, was the site of a major reconstruction programme. Ninety campsites were renovated; the entire road system, day-use parking-lots, and service area were resurfaced and paved. Three miles of hiking trail from Alice Lake to the Cheekye River were completed and several miles of existing trails upgraded. In the Black Tusk Nature Conservatory the emphasis was on trail work. Rehabilitation of the existing Meadow Trail continued and several miles of new trail were constructed to provide a well-marked route from the Black Tusk Meadows to Cheakamus Lake. A cable car was installed at the Cheakamus River, thus allow-

ing hikers to cross the river and utilize the existing Alta Lake–Cheakamus Lake trail. Additional day-use facilities were constructed at Murrin Park and a new picnic-site was built at Alta Lake.

Successful Youth-crew Programmes were carried out at Manning Park and Garibaldi Park. These young men contributed significantly to the construction and maintenance programmes in these parks.

In 1971 district staff were called upon to co-operate with the Department of Rehabilitation and Social Improvement and provide a work-training programme for 60 men. The programme was located at the proposed Cypress Bowl Provincial Park where the trainees were instructed in the use and care of various tools and equipment. Instruction was also given in slash burning, firefighting, falling, and barking. Because of winter conditions the training project has been moved to Buntzen Lake, where a major day-use facility will be constructed.

KAMLOOPS MANAGEMENT DISTRICT

The management function was subordinated to a considerable degree in order to assist with the implementation of the Accelerated Park Development Programme. Regional staff responded to the challenge and, while keeping control on perennial problems, such as vandalism, sanitary maintenance, and other strictly management chores, were able to accomplish much in the way of development and reconstruction.

Attendance for 1971 in the Kamloops District followed the trend of the rest of the Province, registering a slight over-all increase with continuing heavy pressure on Okanagan Region parks. Sun-Oka Beach, for instance, recorded 99,000 visitors during 1970 and 134,000 in 1971. Because of heavy use in the Okanagan, district camper-nights were only down 9 per cent, as compared with a 12.6-per-cent decrease for the Province.

The Okanagan Region got off to a good start on Bill 12, and through contracts arranged in co-operation with the Department of Highways laid 64,000 square yards of pavement. Two hundred camp- and picnic-sites were reconstructed, water systems modified, beaches improved, and storage buildings constructed throughout the region. Three concrete-block toilet buildings were built in Kickininee Park.

The Shuswap Region saw considerable activity, with emphasis being placed on updating water systems. Fifty new camp-sites were constructed at Lac Le Jeune and 17 picnic-sites at Paul Lake. Buildings included concrete-block toilet buildings in Shuswap Lake Park, and storage and service buildings throughout the region. Long-delayed maintenance work was undertaken on many regional buildings. One hundred and thirteen camp-sites and 25 picnic-sites were reconstructed, 2,500 feet of trail was reconstructed in various regional parks, and, through co-operation with the Department of Highways, 24,000 square yards of pavement was laid.

The Cariboo Region accomplished much of its anticipated programme with projects in most parks. In Skihist, Goldpan, and Lac la Hache, 168 camp-sites were reconstructed. A complete water system was installed at Lac la Hache and the water system at Skihist was extended. Through co-operation with the Department of Highways, 52,000 square yards of pavement was laid in Goldpan, Skihist, and Lac la Hache. Storage and toilet buildings are still under construction. The first stage in the development of a camp and picnic ground was initiated in Big Bar Lake Park.

Wells Gray regional staff assisted Engineering Division in an advisory capacity and assumed responsibility for a continuing trail programme involving 75 miles of trail.

NELSON MANAGEMENT DISTRICT

The *Accelerated Park Development Act* of 1971 provided an additional 150 jobs for students and nonstudents in the East and West Kootenay. At the same time this Act provided funds for the improvement of all parks in the Kootenays, for major extension of park facilities in both Kokanee Creek and Christina Lake Parks, and for the development of new Provincial Parks at Syringa Creek near Castlegar, and at Blanket Creek near Revelstoke.

At Kokanee Creek Park the new Sandspit campground will have 80 new campsites available for the 1972 season, all serviced with flush toilets. When complete this new campground will contain 110 sites. A location for the new nature interpretation building has been selected with the access road and parking lots constructed and ready for the final top-dressings. For the day-visitor a 300-car parking lot will be ready for use in the 1972 season providing access to more than 2,000 feet of sandy beach. A new two-ramp boat-launching facility also will be available.

Development of the Christina Lake picnic-site continued with a new 120-car parking lot constructed and paved, an additional 2,000 yards of sand placed on the beach, and a diving float constructed. Extensive landscaping was done in this park by the girls' landscaping crew.

Reconstruction occurred in most of the district parks. Lockhart Beach Park was totally rebuilt with new pump-out toilets installed. King George VI Park picnic-site was completely redesigned to give better water drainage and access to several group picnic-sites and new pump-out toilets. At Erie Creek Park all picnic-sites were moved to higher ground near the parking lot to escape annual flood damage. Champion Lakes Park beach had 3,300 yards of sand added, to double the useable beach area, and 34 new tables were permanently placed on the terraces above the beach. Beaver Creek Park had all its rough ground above and below the parking lot levelled, 7,000 yards of topsoil placed on the playfields, and the whole area raked and seeded by the girls' landscape crew. Stagleap and Nancy Greene Lake Parks had toilets converted to pump-outs. Wasa Lake Park had two new picnic terraces constructed, 300 feet of swampy shoreline filled for additional table-sites, a new swim float constructed, and 3,000 yards of sand spread on the beaches. Dry Gulch, Thunderhill, and Yahk Parks were totally reconstructed. Jimsmith Lake Park campground was brought up to standard. At Mount Fernie Park, 29 of the 45 camp-sites were reconstructed. Athalmer Beach received another 12,000 yards of fill to ready this site for a toilet building and picnic terrace.

The irrigation system for the Wasa Park picnic-sites is now complete with the installation of 112 sprinkler heads. Mount Fernie Park water system was installed in the campground with a storage tank and pumphouse erected for next season's use. Deep wells were drilled at Dry Gulch, Syringa Creek, and Christina Lake Parks. Another sani-station will be ready for public use next season at Champion Lakes Park.

Workshops extensions were completed at both Kokanee Creek and Wasa Lake Parks to provide space for storage and for the expanded table refinishing programme. A large equipment shed also was erected in the Wasa service yard for storage purposes.

The 1971 season saw a good start on hiking trails in the East and West Kootenays. A new trail now follows the Simpson River and Surprise Creek from Kootenay National Park via Ferro Pass into Mount Assiniboine Park. The youth crew at Assiniboine reconstructed 5 miles of trail from Cerulean Lake to Ferro Pass. In Kokanee Glacier Park the old Lemon Creek trail was reopened and a start made on the trail from the Joker Millsite to the Slocan Chief Cabin.

An expansion of the Youth Crew Programme into Mount Assiniboine Park gave the Branch the first opportunity to improve trails, erect toilets, and repair public shelters in this famous wilderness park. With the purchase of the Elizabeth Rummel property an ideal camp was made available for one of our youth crews. This camp proved to be one of the best experiences for the young men involved in our 1971 Youth Programme.

This past season saw the Alpine Club of Canada erect a public alpine shelter near the base of Mount Assiniboine. The club also will construct a large public shelter in Bugaboo Glacier Park during the 1972 season. Funds for the purchase of these building materials have been provided for by the Branch in exchange for the Alpine Club properties in Mount Assiniboine and Bugaboo Glacier Provincial Parks.

The Nelson District Office is now deeply involved with the Environment and Land-use Sub-Committee. A regional Kootenay Resource Committee, acting as an intersector committee, is assisting with the East Kootenay Land-use Study. Along with these interagency responsibilities the district officer is involved with technical committees of several regional districts and the Nancy Greene Recreational Area Advisory Committee.

NORTHERN DISTRICTS

As a result of the 1971 *Accelerated Park Development Act,* all regions in the Northern districts undertook considerable construction activity in all aspects of park development. Emphasis was placed on the reconstruction and renovation of existing facilities, as well as the expansion and completion of established parks. Minor emphasis was placed on the provision of maintenance and service facilities. As a result, the camping facilities, and day-use areas have been significantly increased. Supporting facilities such as water systems, public buildings, and servicing facilities have added considerably to the quality of the facilities throughout the entire district.

Reconstruction and Renovation

This aspect of the *Accelerated Park Development Act* occupied a good portion of the regional staff's efforts, with major projects undertaken in each region.

In the Bear Lake Region, the campgrounds at both Ten Mile Lake and Beaumont Parks were reconstructed. Kleanza Creek and Lakelse Lake picnic-site in the Lakelse Lake Region were also renovated. In the Peace-Liard Region, Charlie Lake, Moberly Lake, Kiskatinaw, Sudeten, and Spencer Tuck were redone. With respect to the Alaska Highway wayside rest areas, major renovations were undertaken at all sites except Liard River Hotsprings Park. Reconstruction efforts in Mount Robson Region were concentrated on Lucerne campground and Mount Robson campground. In addition, reconstruction works were undertaken on the Berg Lake Trail, and the view points. The Mount Robson Youth Crew Camp was also relocated from the Lucerne area to the Park Headquarters. A new camp was constructed and the old one removed. Reconstruction in the Bowron Lake Region included improvements in the campground. The emphasis was placed on improving the portages and camp-sites around the lake chain.

Expansion and Completion of Facilities

Expansion and completion of existing facilities also received considerable effort by regional forces.

In the Bear Lake Region, the major project was Whiskers Point Park. The area was expanded to 36 camp-sites, plus a 26-table day-use area. Boat launching facilities are also scheduled for completion in the spring. A service yard was also constructed. Expansion of facilities at Ten Mile Lake and Beaumont Parks were confined to the day-use area and day-use parking. In both cases, these facilities were roughed-out to double the present size. This work is scheduled for completion in the spring.

In the Lakelse Lake Region, the major project was Furlong Bay. The area was increased from 45 sites to 133. A service area was also constructed. At Maclure Lake, emphasis was placed on expansion, although some renovation was undertaken. The camping ground was increased by 26 units, and the day-use area and parking lot was doubled in size. A service yard was also constructed.

In the Peace-Liard Region, the day-use area at Moberly Lake was completed and a 30-table picnic terrace installed. At Charlie Lake, a 10-table picnic terrace and parking-lot was constructed. On the Alaska Highway, a 50-unit campground was constructed at Prophet River.

The major expansion project undertaken in the Mount Robson Region was the expansion of the Robson Meadows campground, from 33 to 127 sites. Service yards were also constructed at Mount Robson campground, and at Park Headquarters. Two suspension bridges over the Robson River on the Berg Lake trail were also constructed.

Only one project was undertaken in the Bowron Lakes Region. This consisted of the construction of a Visitor Information Centre-Nature House. This is a much welcomed and needed facility.

Buildings

The building programme in the Northern Districts was divided between public buildings and service buildings. Change houses were constructed at Whiskers Point, Moberly Lake, Maclure Lake, and Liard River Hotsprings. Summer maintenance staff accommodation buildings were erected at Ten Mile Lake, Beaumont, Bowron Lake, and Buckinghorse River. Additional units were purchased for erection at Furlong Bay, Pendleton Bay, Maclure Lake, and Mount Robson next spring. Similar buildings were purchased for the Alaska Highway. Three picnic shelters were also purchased for spring erection on the Alaska Highway. A storage building was erected at Lakelse Lake Regional Headquarters, and a similar building purchased for erection at Maclure Lake.

Waterworks and Sanitation

Waterworks received considerable attention throughout the district. All the sites along the Alaska Highway had wells drilled and hand-pumps installed. At Charlie Lake, the water system was extended to provide service to the entire campground. At Moberly Lake, a new well was drilled to augment the existing hand-pump, and a sani-station installed.

At Whiskers Point, a well was drilled and water-storage tank erected. All materials for installation in the spring have been purchased and are in storage for completion.

In Lakelse Lake Region, a well was drilled at Kleanza Creek. The water systems material for Furlong Bay and Macclure Lake were purchased and in storage for installation in the spring. The Mount Robson water system is also in a similar state.

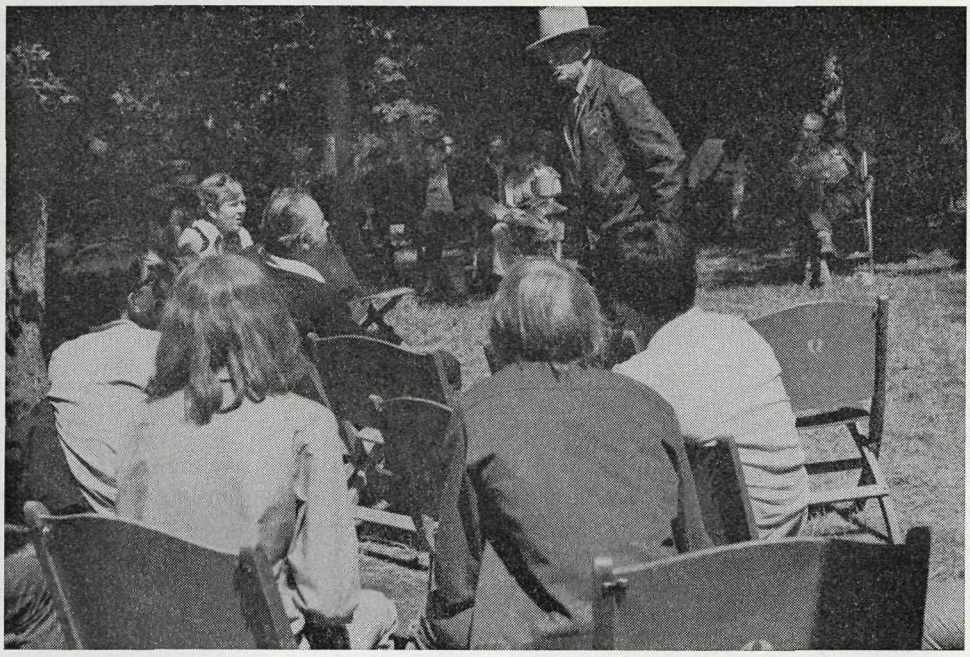
Paving

A considerable amount of paving was undertaken in the Northern Districts. Emphasis was placed on entrance roads and day-use parking lots. Only the Bear Lake and Lakelse Lake Regions had paving activity. In the Bear Lake Region, Ten Mile Lake, Beaumont and Bear Lake Parks were paved in part. The work included the entrance road and day-use parking lot at Bear Lake. At Beaumont and Ten Mile Lake similar works were undertaken, but the boat-launching ramps and boat-launch parking lots were also included.

At Lakelse Lake, the parking lot, boat-launching ramp and parking lot and one campground loop-road was paved. Lakelse Lake picnic-site was paved in its entirety, as was Kleanza Creek Park.

In addition to the numerous projects undertaken under the *Accelerated Park Development Act,* regional forces also managed to effectively attend to the more routine maintenance and operation duties.

Youth Crew camps also operated in Mount Robson Park and Crooked River Park. The planting programme, in conjunction with the British Columbia Forest Service nursery at Red Rock, was continued at Bear Lake and Beaumont Parks. Some 5,000 seedlings were planted in these areas. District staff also managed to assist Regional Districts and other interested groups in matters pertaining to outdoor recreation planning and development.



Park naturalist, Freeman King, addresses members of the Seventh International Seminar on the Administration of National Parks and Equivalent Reserves at Thomas S. Francis Provincial Park near Victoria.

VANCOUVER ISLAND MANAGEMENT DISTRICT

A major change in the administration of Provincial Parks on Vancouver Island occurred on April 1, 1971. Previous to that date, Vancouver Island comprised a single region in the Branch for the purposes of maintenance and operation. The

proliferation of parks on the Island, the growing complexity of the operation, and the increasing use of these parks by the public was proving a severe strain on the single region organization.

It was decided to split the single region into three regions which would, in turn, comprise the Vancouver Island Park District. These three regions, later named Strathcona, Arrowsmith, and Malahat, were created in the spring and supervisors appointed to them at that time.

Strathcona Region consists of the north end of Vancouver Island from a line approximately cutting across the Island at the Village of Bowser.

Arrowsmith Region contains that area south of a line at Bowser to one roughly cutting across the Island at Nanaimo.

Malahat Region comprises the balance of Vancouver Island from Nanaimo to its southern extremity, and includes the Gulf Islands.

Strathcona Region

In the interests of efficiency and smoothness of operation, it was decided that the new Regional Supervisor, Gordon Rathbone, would continued to administer his former region, Kokanee, in the Nelson District, until the fall, at which time he would transfer to Strathcona. In the meantime, an acting Regional Supervisor, Wesley Mickey, was appointed to administer Strathcona and implement the *Accelerated Park Development Act* (Bill 12).

The new works were carried forward with great despatch and resulted in a completely renovated park system in this region. All camp-sites in Miracle Beach Park were reconstructed and roads paved. The old changehouse-toilet building was replaced, new flush toilet buildings constructed and a large workshop placed under way. At Quinsam campground in Elk Falls Park all camp-sites were reconstructed, new service yard including workshop and summer staff house built, and roads paved. At Ralph River campground in Strathcona Park new camp-sites were constructed and a summer residence for the attendant built. Trail work was carried out in Forbidden Plateau and elsewhere in Strathcona Park; Fillongley Park on Denman Island was given a thorough cleaning, and a small parking lot was constructed and additional camp-sites were added.

In general the Provincial parks in Strathcona Region are in good shape with a much improved organizational structure to ensure a constantly improving service to the public.

Arrowsmith Region

The supervisor for this region, Charles Darkis, was formerly the supervisor for the entire Island. With the administrative change this year he has been able to devote full time to those numerous parks along the Alberni Highway which receive heavy public use. Extensive trail improvement has been carried out in Little Qualicum Falls Park and the entire park has been greatly improved. The youth crew camp at this park was most successful this year with good trail work being carried out again by the crew at Englishman River Falls Park and MacMillan Park. Extensive reconstruction to Sproat Lake Park, Little Qualicum Falls Park campground, Englishman River Falls Park campground and, hopefully, Cameron Lake picnic ground will occur this winter. This work will bring Arrowsmith Region parks up to the Provincial standard.

Work goes on apace at the new Rathtrevor Beach Park which has been under construction for several years while also under intensive public use. This perplexing situation has posed many problems of control which should end with park completion early in 1972.

Malahat Region

With the establishment of the new regions on Vancouver Island, D. M. Carruthers of the Wasa Region in the East Kootenay was transferred to the Malahat Region at the time of the implementation of the *Accelerated Park Development Act* (Bill 12).

The standard of park facilities in the majority of Malahat Region parks was greatly improved during 1971. At Goldstream Park, an enlarged service area and a new four-bay garage workshop are under construction as well as a five-bay heavy-equipment and storage shed; additionally 35 camp-sites were regravelled, the campground roads oiled, the picnic ground parking lot and sani-station roads paved, the gate-house completed, and signs, water posts, and barriers replaced where needed.

At Newcastle Island Marine Park, 200 feet of sea wall was constructed, the residence repaired and painted, the docks painted, the old youth crew kitchen dismantled, a new tractor shed built in the service area, and tenders called for the replacement of a dock and the positioning of 150 feet of new floats. Because of severe erosion problems at Petroglyph Park, 200 feet of chain link fence was placed along the petroglyph access trail and 500 feet of the trail paved. The petroglyph shelter was painted and the edges of the parking lot landscaped.

A residence is under construction in the new service area at Ivy Green Park and the beach area was seeded and landscaped. Fifty units were added to the existing 15-unit campground at Gordon Bay Park and the service area was enlarged.

A parking lot complete with barrier and a 4,500-foot trail encircling the lake at Spectacle Lake Park were constructed and the area adjacent to the parking lot landscaped and two pit toilets erected. At Matheson Lake Park, the parking lot was regraded, barriers constructed, the beach area landscaped, 600 feet of trail reconstructed, and 100 feet of trail to the pit toilets built. China Beach Park had 3,000 feet of trail cleared and gravelled.

Control of vehicular traffic at Montague Harbour Marine Park was improved with the erection of parking-lot barriers and grading. The power-line was extended to the service area, the day-use area refurbished, 24 mooring buoys installed, and a new ramp placed on the dock. At Sidney Spit Marine Park, 32 feet of stairs to provide access to the camp-ground were constructed, 12 mooring-buoys installed, the ramp painted, and, at the end of the year, a water system was under construction.

A complete redevelopment of Mouat Park was undertaken, enlarging campsites, widening roads, placing culverts, refurbishing of the day-use area, and replacing or renovating of fireplaces, number posts, signs, and table bases. At Bamberton Beach Park the residence were renovated, a pump-house building constructed in the service area, the campground pit toilets relocated, and to stop further erosion of the steep bank to the beach, 875 feet of chain-link fence installed.

PUBLIC SAFETY, ACCIDENT PREVENTION, AND YOUTH CREW PROGRAMME

Park Security

This past season, full-time night patrolmen were employed in some of the high-use parks where rowdyism had become a problem.

After a somewhat shaky start in May, and a spate of complaints from the camping public, security measures took hold. There was a significant drop in incidents, and complaints from the public ceased. Such incidents as did take place were dealt with quickly and decisively, and all-night disturbances and drinking parties were completely eliminated.

During mid-season there was an increase in thefts in parks, mostly of food and minor items of camping equipment. This is a difficult type of offense to combat, since campers habitually make little effort to protect their own property, and seldom if ever are the stolen articles identifiable.

There was a significant reduction in wilful damage to parks employing full-time patrolmen.

Gate-houses, with full camper registration, were operated in two parks. As well as providing good control of the campgrounds, and stopping over-crowding, this resulted in 100 per cent collection of camping fees.

Accident Prevention

Accident prevention was stressed throughout the year, with frequent on-the-job inspections by the Branch Public Safety Officer, and by the Civil Service Accident Prevention Inspector. There was only one serious accident and relatively few minor ones. The Department of Recreation and Conservation as a whole showed a 26 per cent improvement in the accident-prevention picture over the previous year, and was awarded the Prime Minister's Trophy in Safety Achievement.

Youth Crew Programme

There was little change this year in the make-up of the youth crews, except for the reduction of the Little Qualicum crew to 15 boys, and the increase of the Wasa crew to 30. This was to permit a more extensive alpine camp on Mount Assiniboine. In all we had 180 boys in 13 camps.

Considerable trail construction was accomplished and a good start made on a new camp at Mount Robson. Each camp had a well-rounded programme of sports, films, and talks, as well as trips to points of historic interest. The two alpine camps, at Mount Assiniboine and Black Tusk, were highly successful, and the boys fortunate enough to be there were most enthusiastic.

We came through the season without any serious accidents, and at the close, each camp held the usual ceremony, with certificates and group photographs being presented by the local Member of the Legislative Assembly or other dignitary. On the whole it is felt that 1971 was a successful year.

PUBLIC INFORMATION AND EDUCATION

The general public and interested groups and agencies from as far distant as Moscow, U.S.S.R., requested information about British Columbia's Provincial parks in 1971 at a rate far exceeding any previous year. General inquiries for folders and brochures were up 25.6 per cent over 1970, while requests requiring letters or memoranda in reply increased from an average of about three per day to five per day.

To provide the informational material requested, completely revised editions of British Columbia Provincial Marine Parks and Golden Ears Provincial Park folders and new Cultus Lake Provincial Park and Shuswap Lake Provincial Park folders were prepared and printed. In addition, a mimeographed leaflet describing Cathedral Provincial Park was made available, new Mount Robson Provincial Park and Strathcona Provincial Park folders came off the presses, and, with a few exceptions, all other information publications were revised and reprinted. Work was started on a new Alice Lake Provincial Park folder, on complete revisions of Mount Seymour Provincial Park, Kokanee Glacier Provincial Park, and Mount Assiniboine Provincial Park brochures, and work continued on a Tweedsmuir Provincial Park folder that was started in 1970.

The dissemination of information of Provincial parks was further enhanced with the readying of a portable display utilizing Langford workshop personnel and outside labour. This display, which depicts various aspects of Provincial parks, was exhibited at Nanaimo, Vernon, Vancouver, Burnaby, Richmond, Victoria, and Kamloops.

Broad segments of the population of British Columbia were made aware of the Provincial parks story through appearances by the Public Information Officer on outdoor-oriented programmes on Victoria and Vancouver cablevision stations. Special presentations were made to the annual Travel Counsellors' School in Vancouver and to a tourist advisors' course at Sicamous.

The media was kept informed of Provincial Parks Branch activities through news releases on a variety of subjects. Photographs and other materials were made available to feature writers in Canada and the United States.

In May, the Public Information Officer attended the dedication of Pacific Rim National Park by H.R.H. Princess Anne and in August he was cohost for the visit to British Columbia of the Seventh International Seminar on the Administration of National Parks and equivalent Reserves. During their three-day stay in the Province the delegates toured Provincial Parks on Vancouver Island and the Gulf Islands, and stayed overnight at Montague Harbour Provincial Marine Park on Galiano Island.

The annual meeting of the Vancouver Island Recreation Commission held at Sidney in February was attended by the Public Information Officer, who represented the Branch. He also worked closely with CFB Chilliwack personnel in assisting with the information requirements for the dedication ceremonies for "Sapper Park."

A teacher's convention held at Miracle Beach Provincial Park was attended by the Public Information Officer and he was a guest panelist at a "Careers Day" sponsored by the Victoria Chamber of Commerce and the British Columbia Forest Service at the Newcombe Auditorium.

Visits were made to parks in the Vancouver, Nelson, Kamloops, and Northern Districts, and the Vancouver Island Regions during the year and photographic records were made of Branch activities and park developments.

INTERPRETATION

Park naturalist and interpretive programmes expanded to service nine more parks in 1971 than in 1970. New funds under the *Accelerated Park Development Act* (Bill 12) enabled more naturalist services in four parks having established programmes. Eighteen new seasonal naturalist positions were created under Bill 12.

Increased expenditures for naturalist programmes created a demand for more display studio space. A new facility established to provide for greater nature-house display and interpretive sign production. Two additional artists were employed to assist in this work. The new building also provides storage for naturalist programme materials and equipment.

Bill 12 funds also enabled the construction of a visitor-information building at Bowron Lake Park. The structure will be a focal point for visitor education in the use of this wilderness park and will assist in the preservation of the park's unique natural values.

A visitor information service was initiated in the Black Tusk area of Garibaldi Park. A naturalist living in the alpine area contacted 2,500 visitors, assisting them to a greater understanding of the fragility of alpine areas as well as providing them with information on the many beautiful features of Garibaldi's landscape.

Stum Lake, British Columbia's only known nesting area for white pelicans, was created a Class A Provincial Park to preserve the unique bird colony. A naturalist-guardian was employed during the nesting period to protect the birds from human interference and to gather information on the colony and other park values.

Liard River Hotsprings Park, on the Alaska Highway, is another uniquely valuable natural area in the Province. During the summer an ecological study of its plant life was carried out by Dr. T. G. Brayshaw of the Provincial Museum. This study will assist in planning recreational developments for the park.

An experimental naturalist programme was initiated in the Kamloops Region at Lac Le Jeune and Monck Parks to determine their programme potential and natural history content.

A naturalist training school was held in May to familiarize new employees with interpretive principles and techniques. Twenty-four naturalists attended the sessions.

Thirty-five seasonal naturalists were employed in park programmes in 25 parks throughout the Province. They contacted 150,000 park visitors, including 80,000 at nature houses, 40,000 at campfire talks, and 20,000 on guided walks. Attendance at all programmes was down significantly in July as a result of very wet and cold weather conditions throughout the Province. During August this trend reversed dramatically with most programmes receiving record crowds for the month. Total attendance at all programmes reached 180,000.

The Goldstream salmon run again this year proved to be one of the most important natural events with some 35,000 people coming out to the park to observe the spectacle. Freeman King, veteran park naturalist, personally guided 6,000 visitors to an understanding of the salmon's life-history.

The new awareness in schools of the need for outdoor education has placed increasing demands on park naturalists and parks programmes. In 1971 school children were given special consideration in naturalist programmes at Shuswap, Manning, Kokanee, Alice Lake, and Miracle Beach Parks and at Goldstream during the salmon run. Some 7,000 students were involved in outdoor education activities in these parks during the school year.

Initial planning and designs for nature houses at Kokanee Creek and Golden Ears Parks were undertaken with building construction expected to begin in the spring.

In summary, the year was significant for additional funds which permitted a 100-per-cent increase in employment of seasonal naturalists and an expansion of nature-house facilities to more parks. It is hoped that this trend will continue and offer visitors a greater opportunity to learn more about their heritage of British Columbia's Provincial Parks.

HISTORIC PARKS AND SITES DIVISION

Although development, operation, and maintenance of historic parks and sites is primarily financed through the Historic Sites Vote of the Provincial Secretary's Department, considerable financial assistance provided this year under the Parks Branch's *Accelerated Park Development Act* enabled attention to various projects which had been held in abeyance because of more immediate priorities.

Barkerville Historic Park

The majority of road construction and site preparation was completed for the 100-unit Lowhee campground, which, when opened in 1972, will eleminate the very heavily used and unsightly overflow camp-sites adjacent to Barkerville's main entrance.

A guided-tour programme was introduced this summer, and while successful in itself, suggested using a combination of roving and "resident" interpretation guides next year.

The two-building Hudson's Bay Company store and butcher shop was constructed and readied for interior finishing and furnishing as an exhibit building in 1972.

Extensive work was done by the Department of Highways on the road between Quesnel and Barkerville in preparation for paving next year. The programme will provide improved access for travellers and will include paving the main public parking-lot.

A start was made on developing Conklin Spring as a supplementary supply for the growing demands on the park's water system. The addition will be connected next year.

While most sales and concession revenues showed an increase, attendance only slightly increased this year, with the final total approximating 175,000 visitor-days.

Cottonwood House Historic Park

The caretaker's residence was finished, complete with a temporary water system. Disappointingly, a commercial well-driller was unable to locate water on a deep drill and the exploration has been postponed until next spring.

The park was completely fenced with a period style log-rail fence. A park entrance road was constructed to give access from the new highway by-pass to a 30-car parking-lot just outside the restoration area.

The new highway by-pass changed the traffic through the park and permits the exclusion of motor-vehicles from the restoration area. Attention can now be given to restoring the old road itself to its original width and construction as it was during the days when stage coaches travelled between Yale and Barkerville.

The whole project is reaching the point where Cottonwood House is much as it was as a farm and road house which served the miners who travelled to and from the Cariboo goldfields by stagecoach during 1864–1900.

Fort Steele Historic Park

Undoubtedly the highlight of the year was the visit of the Royal Family on June 5, when Queen Elizabeth, Prince Philip, Princess Anne and the Royal Party ate lunch in the Fort Steele Tearoom and spent several hours touring the museum and grounds, riding the Dunrobin train, and chatting informally with the public.

Good progress was made on construction of the Fort Steele Theatre in preparation for theatrical performances which will be part of next summer's special attractions. Hopefully, the theatre will soon become as popular as Barkerville's Theatre Royal.

Construction was completed for the 25- by 140-feet North West Mounted Police horse stable. Interior finishing will be done in the coming spring. A start was made on the 25- by 134-feet barracks, scheduled for completion in 1972. Both buildings are of larch and fir logs, and reconstructed from reference to photos and the original officers' quarters which is the sole survivor of the nine-building post

erected in 1887 by the North West Mounted Police under the direction of Superintendent Sam Steele. When these buildings are finished three buildings will remain for reconstruction.

Her Majesty Queen Elizabeth II, members of the Royal Family, and guests at Fort Steele Provincial Historic Park on May 5, 1971.

Approximately one-half mile of railroad track was dismantled at Fernie and moved to the park to enable construction of spur lines into the new railroad equipment shelter. The shelter, approximately 48 by 75 feet, has three stalls which will house the British Railway coach, and two pieces of rolling stock added this year, namely a Canadian caboose, and an old Shay locomotive. The Shay is in excellent condition and will be used next summer to spell off the Dunrobin. More than 28,000 persons were transported by the Dunrobin in 1971.

The stagecoach was not operated in 1971, but a 30-passenger rubber-tired wagon hauled people within the restoration area without charge. The wagon was drawn by two Clydesdale horses as part of a work programme to keep the horses usefully occupied. The horses themselves were again a park attraction.

Attendance at Fort Steele was about the same as in 1970—approximately 125,000 visitors. It is anticipated that the theatrical performances in the Fort Steele Theatre in 1972 will attract even more people to the Park.

Historic Commemorations

Ten Stop-of-Interest plaques were cast under a co-operative programme with the Centennial '71 Historic Commemoration Sub-Committee. These were specifically concerned with themes related to British Columbia's joining Canadian Confederation in 1871.

Also in co-operation with the Centennial '71 Historic Commemoration Sub-Committee, a history student was employed from mid-May to mid-September to transport a travelling exhibition to 50 communities throughout the Province. The exhibition comprised 15 double-sided panels which incorporated photos, engravings, documents, art work, and pertinent text describing the people and events which led to British Columbia's joining Canadian Confederation on July 20, 1871. The student transported the exhibit according to schedule, erected and dismantled it at each location, and probably just as important, helped to interpret to visitors the significance of British Columbia's entry into Canadian Confederation 100 years ago. It was a successful project.

British
Columbia
Provincial
Museum

Department of Recreation and Conservation

BRITISH COLUMBIA PROVINCIAL MUSEUM

Objects

(*a*) To secure and preserve specimens and other objects which illustrate the natural history and the human history of the Province.

(*b*) To increase and diffuse knowledge in these fields by research, exhibits, publications, and other means.

(Section 4, *Provincial Museum Act, 1967,* chap. 41, S.B.C. 1967.)

Admission

The Provincial Museum is open free to the public. During 1971 the hours of admission were:

January 1 to March 31	10 a.m.–4.30 p.m. Closed Mondays.
April 1 to September 30	10 a.m.–8.30 p.m. Daily.
October 1 to December 31	10 a.m.–4.30 p.m. Daily.

BRITISH COLUMBIA PROVINCIAL MUSEUM

DR. J. B. FOSTER, DIRECTOR

British Columbia has a far more varied terrain than any other province in Canada, ranging from desert and rainforest to alpine and sea-coast. As a result, our Province is the richest biologically, anthropologically, and historically it is as fascinating as any.

The British Columbia Provincial Museum is charged with the task of documenting and interpreting this incredible diversity for the public. As a result of our new buildings, located in the focal point of the tourist capital of the Province, our visitor attendance has almost doubled over the last two years to the million mark.

In view of the public's unprecedented leisure time and quest for knowledge, we believe that our Museum has the momentous task of telling our vast audience a stimulating and meaningful story about British Columbia. Our consuming interest for many years will be the effort of filling our 100,000 square feet (9,300 square metres) of exhibit area.

While in the year 1970, the Museum channeled most of its resources into getting our display programme for the '70's, "Project '70," off to a good start. In 1971 we attempted a more balanced advance in the basic museum undertakings of collection, research, and education. Our goals would have been thwarted in all three areas were it not for the generous financial help of other branches and departments, particularly the Department of Public Works, the Ecological Reserves Committee, the Friends of the Provincial Museum, business, and industry.

The diorama of Hector Tremblay's homestead near Pouce Coupe recreates a typical 1910 scene.

We obtained some truly exceptional collections during the year, including the John Watson Historical Collection, the oldest registered flying plane in Canada, a remarkable collection of contemporary northwest coast Indian art, the large and historically important Cadwallader Collection of Kwakiutl art, the J. Austin Bailey Herbarium, and the results of the most active summer field programme in archæology the Province has ever seen.

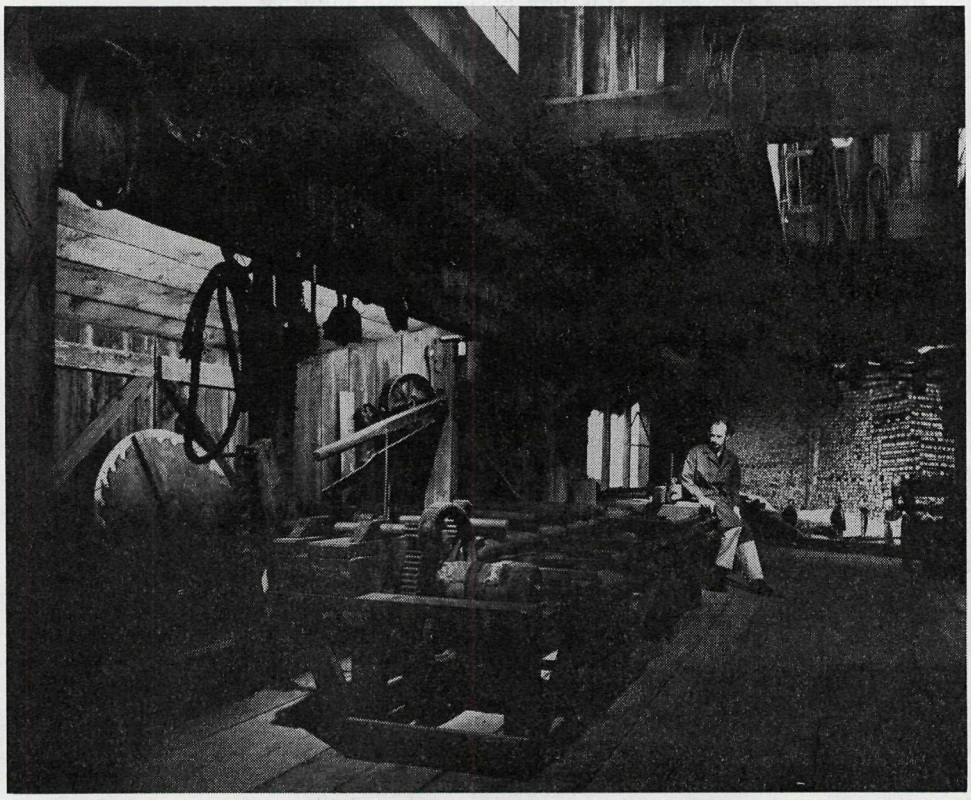
After being vacant for about 18 months, the Curator of Marine Biology position was filled by Dr. Alex Peden, who joined the staff in September. Having a curator in charge greatly increases the growth rate and proper organization of collections. We can expect details on the acquisition of major collections in the next annual report.

The Bird and Mammal Division continued the expensive and time-consuming task of collecting specimens for the new galleries. Financial restrictions resulted in minimal production.

Field research got a boost when the Archæological Division obtained funds from the Parks Branch under the *Accelerated Parks Development Act*. The Botany and Bird and Mammal Divisions carried out surveys for the acquisition of Ecological Reserves in co-operation with the Canadian Committee for the International Biological Programme. The *Ecological Reserves Act* established the agreement that 100 reserves will be set aside in the Province, hopefully representing all habitat types.

Laboratory research was concentrated on the production of handbooks, papers, and newspaper articles. Research for the details of the new History Galleries continues to be a consuming task.

Our efforts at collecting specimens and objects, and the research upon them, is always expected to result in some level of educational material for the public. Our museums' advisor, education officer, and chief of displays stand in the front line between the Museum's specialists and the general public.



The importance of British Columbia's logging industry is illustrated by this recreated 90-year-old sawmill.

As a result of 1971 being British Columbia's Centennial year, our Museums' Adviser was particularly busy. He helped to give advice for 10 new museums or additions, all of which were community Centennial projects. At the end of 1971, over 100 community museums are operating in the Province.

The Museum's Education Officer had a good year, thanks particularly to the 70 volunteers in the Docent Association and to Indian teachers provided by the First Citizens' Fund.

The History Galleries are the first phase of Project '70. They will occupy some 25,000 square feet (2,325 square metres) and will be the Museum's first permanent exhibit. In accord with our ecological theme, every division in the Museum is involved in the project. Its primary purpose of public education and enlightenment will add a further dimension to museology in British Columbia.

Exhaustion of display funds in August coincided with the first major inflow of financial support from the business community. As the donations were made to the Friends of the Provincial Museum, the moneys were available immediately for the greatest display need. We are very grateful to the businesses which have agreed to sponsor galleries in Project '70, not only for the actual dollars which are essential in keeping to our opening date of July 1972, but for the indication of moral support for our ambitious undertaking.

While we regret the lengthy passage of time before the opening of Project '70, we intend in no way to sacrifice quality for the sake of a few weeks or months. We intend that our rising tide of visitors will be treated to one of the most educational, entertaining, and relevant history exhibits on the continent. When completed next summer, we shall begin the somewhat easier but equally stimulating task of building the Ethnology Galleries.

The oft-hidden drive behind the Museum, the Friends of the Provincial Museum, must be one of the most successful societies of its kind. Not only do they support our education programmes through the Docent Association and help to raise money for exhibits, they have taken over the operation of the gift shop and netted some $30,000 in their first year. In many corners of the Museum, Friends will be found typing manuscripts, cleaning birds, and carrying out many other essential but often unglamorous tasks. To the Friends, we owe a special thanks.

Archæology

More primary archæological research was carried out this year in British Columbia than in the total of all the years preceding 1971. The Provincial Museum's Archæological Division was involved in a major portion of this work.

A grant of $100,000 to the Division from the Parks Branch under the *Accelerated Parks Development Act* made most of this extra activity possible. During the year, 51 people, mostly students, were hired out of this fund to participate in the fieldwork within Provincial Parks, to assist in the organization of the projects, and to help process and analyze the data recovered. Several of these people also volunteered assistance before or after their terms of employment. The senior staff hired under this programme include: Mrs. Gay Boehm, Assistant Curator (temporary); James C. Haggarty, Assistant Curator (temporary); Miss Margaret Howat, Mrs. Patricia Schibli (*nee* Denny), Mrs. Christine Oliver, Wayne Choquette, Technicians; David Archer, Sharon Keen, Gregory Monks, John Noury, Dennis St. Clair, Summer Field Directors.

Field projects comprised the bulk of the data-collecting phase of the archæological programme in Provincial Parks this summer:

- Four survey teams covered most of the Provincial parks accessible by road, and several more in the central coast regions, to record the archæological sites con-

tained in each. Two of these teams consisted of students hired for the summer. The Curator joined a reconnaissance organized by the Fish and Wildlife Branch of the Atlin-Upper Taku River areas to record information on sites in parks and some other areas of that region. The coastal survey was conducted by Dr. Donald Mitchell of the University of Victoria and Bjorn Simonsen, Provincial Archæologist.

- A crew under the Chief Technician's direction excavated portions of site EfQu 3 in Shuswap Lake Provincial Park, and did a reconnaissance of other sites in the area.
- David Archer directed an excavation crew working at site EbRd 3 in Monck Provincial Park on Nicola Lake. They also briefly investigated sites in Kootenay region parks in which future developments were planned.
- John Noury led another crew working on Newcastle Island Provincial Park in sites DhRx 6 and DhRx 4.
- A crew under Greg Monks excavated at site DkSb 2 in Saltery Bay Provincial Park, and then continued a more intensive excavation at site DhRx 6 on Newcastle Island.
- Miss Sharon Keen directed a crew which worked at three sites: DfRu 12, 16, and 22, in Montague Harbour Provincial Park. For the last two weeks of August the same crew, under the direction of Dennis St. Clair, carried out exploratory excavations at site DcRv 2 in Witty's Lagoon Park, which is administered by the Capital Regional District.
- The Curator, with the Provincial Archæologist and staff members of the Museum, spent several days in Anthony Island Provincial Park to re-evaluate the condition of totem poles in the 19th-century Haida village of Ninstints (*see* Wilson Duff and Michael Kew, *Anthony Island, a Home of the Haidas,* in the Provincial Museum Annual Report for 1957), to prepare a contour map of the village and to evaluate the archæological resources of the island.

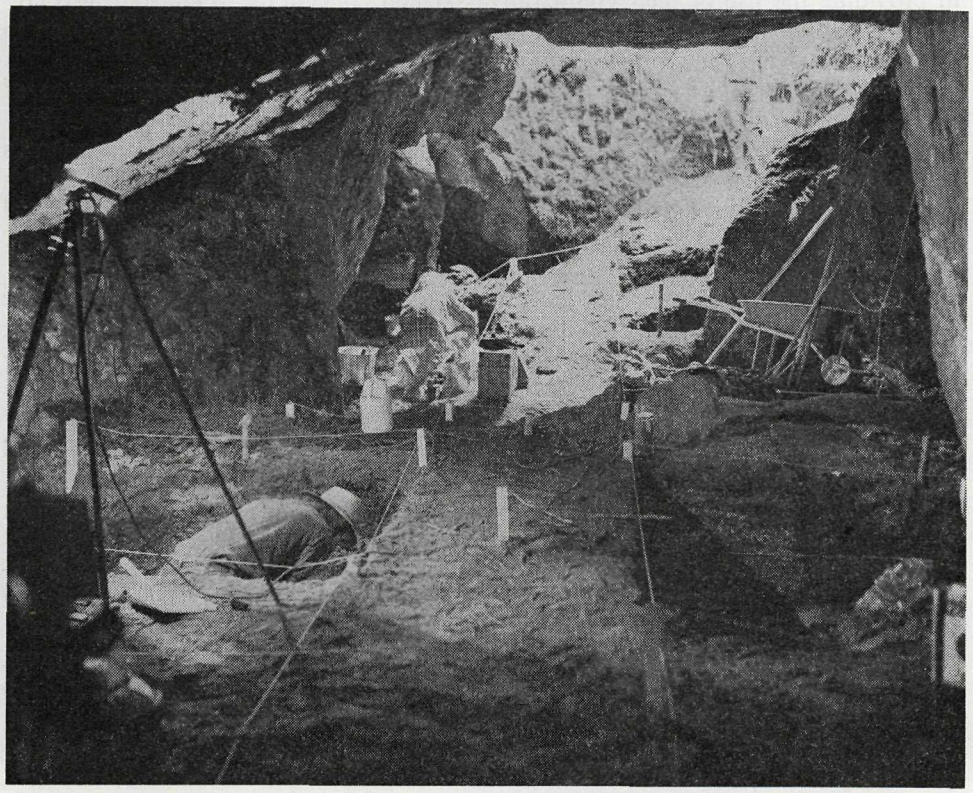
Preliminary reports on most of these projects have been completed and filed with the Parks Branch and with the Archæololgical Sites Advisory Board. More intensive analysis of the excavated sites is under way or planned for this winter within the Division. Mr. Monks is writing about the Saltery Bay excavation as a thesis; Dr. Mitchell is writing up the Montague Harbour sites, and the Monck Park material will be analyzed by David Wyatt of the University of Victoria.

Organization and administration of the Parks' projects were jointly directed by the Curator and the Provincial Archæologist, Bjorn Simonsen. The appointment of a full-time Provincial Archæologist by the Provincial Secretary's Department had been urged by the Archæological Sites Advisory Board for some time and took effect this spring. Mr. Simonsen is sharing the Division's office and facilities.

The Curator, assisted by George Mutter of Duncan and volunteers, excavated during August and September an important prehistorically occupied rock shelter on property owned by T. H. Lines near Maple Bay. Mr. Mutter, accompanied sometimes by his sons and by Doug Aitken, had, over a period of several months, walked over large areas of steep terrain in the Cowichan region seeking out, mapping sites, and reporting them to the Museum. Site DeRv 15, the main object of investigation, was the largest and most important. The Curator and his staff visited many of the rock-shelter sites and several other Cowichan sites with Mr. Mutter.

Members of the Division spent several days recording the important Monsell Petroglyph site which was recently discovered near Nanaimo.

Other field work carried out by the Division during the year included: a brief reconnaissance of Hesquiat Harbour by the Curator, the Chief Conservator, members of the Hesquiat Indian Band, and a representative of the Indian Affairs Branch; a preliminary tour by the Curator, Mr. Sendey, and Mr. Simonsen, of certain Provincial parks known to have archæological sites, to assist in planning the summer's projects; a brief return visit in the autumn by Mr. Sendey and Mr. Haggarty to Shuswap Lake Park to complete mapping of the site and, on the way, to confirm a reported find in Ellison Provincial Park; a day trip to the Beach Grove site near Ladner by Mr. Haggarty to examine a reported disturbance of the site by construction; and several brief checks of known and reported sites in the vicinity of Victoria.



Archæological excavation carried out by the Provincial Museum in a rock shelter site, DeRv 15, near Maple Bay.

Considerable time was given to organization of projects which were executed or begun this summer by other organizations. Most significant of these was the cultural recovery programme of the Hesquiat Indian Band.

Mrs. Schibli prepared for other Government departments maps of known site locations in areas which have been proposed for development. She prepared a similar map of the Gulf Islands at the request of the Capital Regional District. A major programme of filing copies of all archæological-site records with the Lands Branch, as well as with the University of British Columbia, is well under way. Many hundreds of new sites have been added to our files this year, and Mrs. Condrashoff has been heavily involved in keeping our files up to date and co-ordinated with the records of other institutions.

A great deal of "housekeeping" has been accomplished this year, including the reorganization of project-record files, completion of the osteology catalogue, preparation of a full set of 1:50,000 maps gridded with archæological unit areas, reorganization of the photographic collection, completion of an inventory, and organization of field equipment, the beginning of an artifact collection inventory, and the cataloguing of a mass of new acquisitions, and a good portion of the backlog of specimens which, due to earlier staff shortage, it had not been possible to catalogue previously.

Mr. Haggarty and Mrs. Schibli directed the task of sorting and identifying the faunal remains from several excavations. The Birds and Mammals Division assisted in providing the use of their comparative skeletal collections. Our staff also collected and prepared skeletons of the male and female of five species of salmon to assist in identifying fish remains from archæological sites.

The Curator's thesis, *A Study of Factors Relevant to the Interpretation of Archæological Remains on Southeastern Vancouver Island,* was accepted by Washington State University for his M.A. degree. The Curator, with Mrs. Condrashoff's assistance, prepared an annotated list of radiocarbon dates relevant to British Columbia prehistory which was distributed to colleagues. Mr. Sendey continued work on his report of the excavation at Georgeson Bay, assisted latterly by Mr. Haggarty.

Mrs. Condrashoff presented talks to 10 classes during the year. Mr. Sendey gave five talks in Victoria in addition to conducting regular guided tours for park visitors at his Shuswap Lake excavation. Mr. Abbott addressed the annual seminar of the British Columbia Museums Association in Victoria. By special request, tours of the Division were given to the BCPM Docents Association and to anthropology classes under Dr. Roberta Hall of the University of Victoria and Prof. Michael Kew of the University of British Columbia.

Special thanks for assistance given during the year are due to several people, especially: Captain Armstrong, the officers and crew of the Fisheries patrol vessel *Laurier;* to "Ivor" and "Claudia" of the *Loretta A;* Mr. Stewart, Assistant Communications Superintendant and H. D. Kirk, Dispatcher at Queen Charlotte City for the British Columbia Forest Service; the Parks Branch; the Capital Regional District; Mr. and Mrs. T. H. Lines; David O. Chase; Mr. and Mrs. John Stinnessen; Mr. and Mrs. Ed Burnett; Mr. and Mrs. Perry Monsell; and all the volunteers who assisted in our several field projects and in the laboratory.

BIRDS AND MAMMALS

The major activity of this Division during 1971 was the publishing of a handbook for the Provincial Museum handbook series as well as a number of articles pertaining to birds and mammals. In this connection, extensive library research was carried out by the Curator.

Field research and display collecting was restricted this year due to limited funds; however, the Museum Director, Curator, and Chief Technician spent four days in March collecting display and study material in the Ashnola-Hedley region of the Similkameen Valley. The Assistant Curator spent four days collecting in the Newgate area during the month of April.

The Assistant Curator, Chief Technician, and Taxidermist spent five days in July collecting small mammals and investigating the King Solomon Basin area of Vancouver Island for indigenous marmots previously recorded there. None was found. In August the Curator spent 10 days collecting display specimens and recording sea bird observations along the west coast of Vancouver Island. The

Museum Director and the Curator spent three weeks in September on a joint ecological reserves survey and museum zoological exploration expedition to the British Columbia-Yukon region. Field notes on all operations were maintained and indexed by species.

Ninety-seven birds and 115 mammals were collected in the course of the field research activities. An additional 63 specimens of birds and mammals were turned in to the Museum by the general public. Most of these specimens were picked up dead, and have been designated for pesticide research.

John Hermann-Blome, contract taxidermist, this year completed whole mounts of a horse, a mule deer buck, and two bears for future installation in the display galleries. Preliminary work was also carried out on other big-game mammals collected last year for display and study purposes.

Forty-eight birds, three mammals, and 12 fish were prepared for display by the staff taxidermist, who joined the Museum, May 10. In addition, numerous mounted specimens from display galleries and the education section were repaired and cleaned.

A total of 250 specimens of birds and mammals was prepared by the Chief Technician for the scientific study collections. Restoration of the bird and mammal study collections was continued throughout the year by the Assistant Curator with the aid of volunteer workers. Some 7,400 small mammal specimens are now in the new storage cases. About one-quarter of the bird collections (12,000 specimens) was processed this year.

Volunteer assistants who worked many hours cleaning specimens and other projects include Miss Win Speechly, Mrs. H. R. Hanson, Mrs. Rosa Moody, Mrs. Stella Heard, David Zuril, and Mrs. Sheila Mercer.

Staff members took part in conducted tours, lectures and technical demonstrations, meetings and other continuing curatorial activities throughout the year. Tentative floor plans, species space allotments, and flow diagrams for the Natural History floor were determined and blueprinted.

BOTANY

The Botany Division is responsible for the collection, preservation, and interpretation of the species and data relevant to the botany of British Columbia.

The Botany Division's most notable achievement was the transfer of the J. Austin Bailey Herbarium from the University of Calgary, Alberta. This herbarium consists of some 10,000 mounted sheets of flora, mainly of the Rocky Mountain area. We are most fortunate to have Mr. Bailey with us working in our Herbarium.

Field work was extensive in 1971 due to the additional funds obtained from the National Research Council (for ecological surveys) and the Parks Branch for specific projects.

There were a number of objectives to be satisfied:

1. A general botanical collection of the northern flora of the Province for the Herbarium of the Provincial Museum.
2. An emphasis collection of willows, poplars, birches, and other catkin-bearing plants for research purposes and the eventual publication of a handbook.

   The region of northern British Columbia and the neighbouring parts of Yukon, Alberta, Northwest Territories, and Alaska forms an important centre of speciation and distribution of willows in North America, so an effort was made to obtain as complete a collection as could be found of these plants.

3. An ecological survey of Liard River Hotsprings Park and botanical samplings of that park and of Mount Edziza, for the Provincial Parks Branch, in the former case to provide guidelines for further development in the park.
4. Surveys of candidate sites for Ecological Reserves in co-operation with the Canadian Committee for the International Biological Programme.

Between June and September, the Associate Curator travelled in northern British Columbia. He was accompanied by David Barrett from the University of British Columbia. His assistance was supported by a grant from the National Research Council, through the mediation of Dr. Vladimir Krajina, of the Department of Botany at the University of British Columbia. About the beginning of July, a week was spent in surveys on Stum Lake near Alexis Creek, and in collaboration with Dr. G. G. E. Scudder, of the Department of Zoology at the University of British Columbia, on Westwick Lake and Becher's Prairie, on the Cariboo Plateau. Later in the same month a week was spent at Liard River Hotsprings Park on a survey of the ecology and the flora of the park. A second, shorter stay was made there later in August in order to sample the late-flowering plant species. A report on this survey is in preparation, and will include some recommendations regarding further development of the park, and a species list for the area.

Other areas sampled botanically included the Atlin district, Haines Road, and a number of points in the Stikine basin. Short collecting trips were also made in the Cassiar, Fort Nelson, and Fort St. John areas.

While in the Stikine basin, the Associate Curator made a trip to Mount Edziza and collected about a hundred species of alpine plants at altitudes of 6,000 to 7,000 feet (1,800 to 2,140 metres).

A number of short trips were made by the Curator and Associate Curator to: Osoyoos, Grand Forks, Tofino, and northern Vancouver Island.

An interesting find in the Haines Road area was that of an isolated stand of spruce at Kelsall Lake, where, at an elevation of about 3,000 feet (900 metres), white spruce and Sitka spruce grew in company, together with a hybrid swarm of mixed parentage (*Picea x Lutzii*). This stand is now isolated from the nearest continuous forest by several miles of open alpine tundra.

Another find of significant interest was the existence of a hybrid swarm in the Stikine Valley, involving junipers. *Juniperus scopulorum* (here at the northern limit of tree junipers in North America) occurs *J. horizontalis* and a most diverse array of intergradient forms. *J. communis* is present also, but does not interbreed with the other species.

In connection with the work of the Ecological Committee of the International Biological Programme, a number of areas were studied. The Curator, with I. D. Smith, Regional Wildlife Biologist, made a preliminary botanical survey of the Roosevelt elk summer ranges in the area between Salmon and Nimpkish Rivers on Vancouver Island. The Associate Curator, with Dr. L. K. Wade of Capilano College, D. Fraser and S. Cannings of the Okanagan-Similkameen Parks Association, made a survey of proposed ecological reserve sites in the Osoyoos area and, with Dr. E. Oswald and Dr. J. Lee of the Canadian Forest Service, a survey of Nimpkish Valley on Vancouver Island. S. Schannen, Simon Fraser University, Burnaby, made a collecting trip and ecological survey of the Sheslay River, a project sponsored by the Opportunities for Youth programme. A large plant collection with a number of valuable records was submitted to our Herbarium.

The Herbarium is a permanent record representing the living flora, and every manual, flora, or monograph is based on herbarium specimens. These are available for study by qualified persons. Specimens are not merely evidence of what has been recorded or described, but are also bases for statements concerning geographical distribution, variation within species, and inter-relationships of taxa.

The Herbarium collection consists of 56,929 sheets (not including the Bailey collection), which is an increase of 1,725 sheets over the 11 months of 1971. As our Herbarium is listed with other herbaria of the world in *Index Herbariorum,* there has been an increase in requests for loans of our material for study. This year a total of 693 plants was loaned out for scientific studies to: Oregon State University, Corvalis, Oregon; Cornell University, New York; Humboldt State College, California; Eastern Illinois University, Illinois; University of British Columbia, and others.

Herbarium exchange was continued with the following institutions: National Museum of Canada, Ottawa; Plant Research Institute, Department of Agriculture, Ottawa; Laval University, Quebec; University of Helsinki, Finland; Museum of Natural Science, Ploiesti, Romania; Academy of Sciences of the U.S.S.R., Moscow; University of Alberta, Lethbridge, Alberta, and others. There is a rapidly growing list of institutions that are requesting exchange and study material, but unfortunately we are not able to oblige at the present time due to a shortage of technical staff. Various institutions, game biologists, foresters, agriculturists, naturalists, and individuals have contributed a number of plant collections and individual plant specimen during 1971. Deserving a special mention were the National Museum of Natural Sciences, Ottawa (734) consisting of the flora of Revelstoke National Park, Glacier National Park, Mount Arrowsmith, and other miscellaneous British Columbia localities; Mrs. G. Mendel, Kitimat; Dr. J. Kuijt, University of Alberta; Dr. A. K. Skvortsov, Botanic Garden, Moscow, U.S.S.R.; J. Risse-Sawitski, Prince George; Mrs. T. O. Connolly, Atlin; and Dr. R. D. Bird, Saltspring Island.

Significant progress was made on preparation of the flora of British Columbia. Dr. Taylor completed a manuscript for the Legume Family (*Leguminosæ*) and is working on a similar manuscript for the Figwort Family (*Scrophulariaceæ*). Dr. Brayshaw did further study on the Willow Family (*Salicaceæ*) with the completion of a number of illustrations. Mr. With completed 70 illustrations for the Rose Family (*Rosaceæ*). The curator and R. Rogers, Conservation Officer, Campbell River, started an experimental research on restoration of elk winter ranges in the Gold River area.

Various staff members have presented lectures, demonstrations, and participated in field trips on numerous occasions throughout the year, including the annual meeting of the British Columbia Museum Association in Victoria in September. In addition, the Curator participated in three television programmes and made a series of programmes for CBC International Service featuring the flora of British Columbia, Ecological Reserves, and the Provincial Museum.

Ethnology

The Ethnology Division is responsible for preserving and making available to British Columbians, especially its First Citizens, the Indian cultures as exemplified by its ethnological collection. This collection of material culture dates back to 1892 and totals approximately 6,500 items. The Museum has been fortunate in being able to continue preserving and adding to this priceless heritage.

The repatriation of a rare Kwakiutl echo mask that had temporarily left British Columbia highlighted 1971. Ethnology Division also purchased, with the assistance of the First Citizens' Fund, a large collection which included a rare Chilkat blanket

woven by the late Mrs. Robert Hunt (1823–1919) of Fort Rupert. Other items purchased include a Willie Seaweed thunderbird mask and rattle, a Coast Salish spirit dancer's paddle shirt, rattle and rattlers, a button blanket, and an argillite pole.

A major achievement in promoting appreciation and understanding of native culture was the opening of the Indian art show, *The Legacy*. The exhibit, financed by the First Citizens' Fund, is the first major show of its kind, bringing together the best examples of the traditional yet contemporary art forms of the major tribal groupings on the Northwest Coast. All the items displayed were commissioned specifically for *The Legacy* and will remain in the Museum as part of the permanent cultural heritage of every British Columbian.

The Curator, assisted by Mrs. Gloria Webster and Professor Wilson Duff of the University of British Columbia, made many trips into the field commissioning and collecting items for *The Legacy* exhibition, including trips to Alert Bay, Port Hardy, Hazelton, Vancouver, Sardis, and Mount Currie. The Curator also spent a week in Ottawa at the invitation of the National Museum of Man, aiding them in photographic identification and research.

Members of the Division attended a pole-raising and potlatch given by Chief Walter Harris at Kispiox Village in September. Following the events on the Skeena, the Assistant Curator flew to Masset and then to Sandspit, where he joined a Museum field party to Anthony Island, participating in a survey of the Haida totem pole village of Ninstints. Alan Hoover also made a short trip to Fort Rupert, enabling Ethnology to obtain for the Province the large and historically important Cadwallader Collection.

Mrs. Susan Douglass spent time in the field and at the Museum assisting Ethnology in textile research. Ethnology was also fortunate in having the co-operation of Mrs. Mona Horn of Campbell River, who was able to provide needed information concerning the fascinating and complex study of Kwakiutl-woven Chilkat blankets.

Thunderbird Park continues to provide a valuable service to both the Enthology Division and Education Services, as well as to other Government departments and the native people of the Province. Chief Carver Henry Hunt has completed two large houseposts for the Kwakiutl house which will be the central attraction of the forthcoming ethnological display. Assistant Carver Tony Hunt completed a Chief's Seat and the painted housefront for the house. Tony Hunt's painted housefront also served as a backdrop for *The Legacy*.

The two apprentices have continued to show progress in their mastery of wood carving under the tutelage of the Hunts. Ron Wilson, a Haida in his second year of training, has carved an eagle, and repainted a totem pole for the outside display at Thunderbird Park, as well as carving a beaver totem pole for the city of Prince Rupert. Ron Hamilton, a Nootkan completing his first year of apprenticeship, continues to work on copying three fine pieces from the west coast village of Friendly Cove. Tony Hunt, Ron Wilson, and Ron Hamilton carved a 12-foot totem pole for the Provincial Secretary's Department. All four carvers have assisted in teaching for both Ethnology and Education Services, as well as manufacturing a number of material-culture items to serve as teaching-aids for Education Services. Tony Hunt and Ron Hamilton represented the Ethnology Division at a double-pole raising at Masset in September. The poles were carved by Lawrence Bell, a former apprentice carver at Thunderbird Park.

A number of lectures and tours were given to various members of the public by the Ethnology Division in 1971. The Curator lectured to the Vancouver Island Region Boy Scouts Association, presented a lecture and seminar on the "Ethics of

Collecting" at the British Columbia Museum's Association Conference in September, and a lecture in November entitled "Contemporary Kwakiutl Village Life" for the University of British Columbia Extension Department. With the able assistance of the Hunt family he presented the dramatic performance, "A Visit to the Home of Bakbakwalanooksiwae, the Cannibal-at-the-North-End-of-the-World" to both the BCMA Conference in September and for the UBC Extension Department in October. The Assistant Curator, aided by the Technician, gave guided tours and set up special displays for the Fraser Valley Weavers Guild, Mrs. Audrey Hawthorn's UBC museology class, and Dr. Michael Kew's UBC anthropology class.

Another major area of public service provided by Ethnology involves the answering of numerous requests for both information and photographs concerning native culture in British Columbia. Besides written requests, Ethnology also has many visitors, students, and native peoples interested in various aspects of material culture. The ethnological collection thus serves as a large body of knowledge available to students, teachers, and most importantly, the descendants of those people who produced it.

Perhaps the most significant internal event was the appointment in August of Ethnology's capable technician, Miss Barbara Routley. Miss Routley has concentrated her time and effort in the continued organization of the vast and increasingly important photographic collection.

Since September 1970, the Provincial Museum has given research space to Dr. Barbara S. Efrat so that she could pursue her linquistic studies of native Indian languages as Honorary Curator of Linguistics. During this past year she has collected data on two moribund Coast Salish languages, Straits (the Saanich, Songish, and Sooke dialects) and Nooksack. During the winter, Dr. Efrat gave talks to both the Linguistics Club at the University of Victoria and the Vancouver Island Archæological Society on "Linguistic Acculturation in Straits Salish." In September a review of Aert Kuipers' "The Squamish Language" was submitted to *Language,* the journal of the Linguistic Society of America. Current work-in-progress includes research on comparative straits phonology (with Dr. L. C. Thompson of the University of Hawaii) and an article on some phonological problems in Sooke which will appear in a Festschrift for Prof. A. A. Hill, University of Texas.

To gather as much material about the native Indian languages of the Province as possible, a Resource Repository for British Columbia Indian Languages and Cultures has been established with the assistance of the First Citizens' Fund. The repository was established in January 1971, under the direction of Randy Bouchard and David Grubb. Through the programme the languages are being revitalized in order to maintain one of the most important aspects of any culture—the oral tradition.

In gathering these materials, several useful purposes are served. First, the history and traditions are preserved for posterity; secondly, the data collected can be made available for the study and general information of the public, so that a greater awareness of the rich heritage of the Indian peoples can be stimulated; and, thirdly, but perhaps most importantly, native Indian people are being trained to do the work themselves, so that the revival, or at least preservation comes primarily from within, rather than from outsiders who do not have such a vested interest in these traditions.

At present, there are 13 Indian people who are at various stages of learning to read and write their own languages using a practical writing system devised on linquistic principles. These specialists are responsible for the collection, translation, and transcription of the legends, myths, ethnographic texts, and other language

materials of their people. Copies of their work are stored at the Resource Repository for safe keeping; copies which so far amount to approximately 1,100 hours of taped materials in 15 different languages in the Province, as well as a considerable amount of written materials.

HISTORY

The History Division is responsible for developing and maintaining object collections pertaining to the Province's non-Indian population. Following from the accession and cataloguing stages in collections development are a multitude of tasks including: Historical research, object analysis, restoration, publications, exhibits, and participation in both classroom and public education programmes. Because Project '70 accelerated these processes, 1971 was a year in which the Division moved rapidly toward achieving its main goals.

Project 70's street scene during the early stages of construction.

For the year, our collecting efforts have been most active and unusual; the demand for historical objects brought on by the Project '70 exhibit programme has been far greater than our holdings could provide. Thus, we have sought relevant artifacts at every opportunity. Appeals through radio, television, and the press have produced remarkable results, as have requests for permanent loans from other museums. Occasionally we have been able to trade redundant items for objects more suited to the display, while various commercial firms, associations, and corporations have generously contributed toward making historically accurate those galleries that reflect their own antecedents. Other Government departments, organ-

ized labour, primary industries, the Canadian Armed Forces, commercial outlets, manufacturers, transport companies, universities, libraries, museums, and the media have responded warmly to our requests for advice, funds, objects, and services.

Among the major accessions was John Watson's entire collection of domestic and light machinery artifacts from his Crossroads Museum near Ladysmith, purchased for $25,000. Originally gathered almost entirely from Vancouver Island, the Watson Collection is being catalogued and its 10,000 items will markedly strengthen Project '70.

The oldest registered airplane still flying in Canada, Mel Price's Fleet II CF-AOD) biplane, was the second major accession. It has been restored to its original condition and it will be featured in "The Metropolis: 1921–1971" gallery of Project '70. The aircraft flew in British Columbia from 1930 to 1971, and it is a striking symbol of the twentieth century. Used in prospecting, bush-flying, training, and recreational roles, the "Fleet II" is truly a museum piece, and one that promises to stimulate the imaginations of British Columbians who see it.

Dan Gallacher shows naval personnel around Project 70's street scene.

The History Division's main efforts have been concerned with Phase I of Project '70. These history galleries will be the first major display in the Provincial Museum. The exhibits will embody the highlights of British Columbia's past from 1741 to the present.

There are four main galleries that emphasize commonplace events. By concentrating on fundamental historical patterns, we show the basic elements and legacies of civilization in British Columbia. Hence, our story is divided into four major parts:

The Metropolis: 1921–1971.
Urbanization and Industrialization: 1871–1921.
The Gold Rush Era: 1849–1900.
Fur Trade and Exploration: 1741–1860.

Each gallery will focus through artifacts and structures upon technological change, social development, and ecological consequences to portray how our society has evolved through one era at a time. Because historical accuracy and interpretation are so vital, our research activities in 1971, coupled with field trips to the Kootenay district, Peace River district, Chilcotin, and Cariboo, have centred on these exhibits with the goal of thoroughly investigating every operation and geographic area that we have chosen to discuss in the displays. Furthermore, every public lecture and tour given during 1971 by the Curator dealt mainly with these displays, including those talks delivered to the British Columbia Historical Society, the British Columbia Museums Association, and the Canadian Museums Association.

In response to the many requests for advice on interviewing pioneers and other notable British Columbians, this Division organized the first Oral History workshop held in this Province. Aimed primarily at delegates to the BCMA Annual Seminar, it was the first in a series to be given over the next two years in various centres throughout the Province. Topics discussed at this workshop were: Applications of Oral History, Basic Research Methods, Equipment, Interviewing. For those who wish information about Oral History, *see* D. T. Gallacher, "Oral History for British Columbia: 1971," *Museum Roundup* 44: 35–40.

MARINE BIOLOGY

The activities of the Division were limited during 1971 until the Curator arrived late in September. The Honorary Curator ably handled routine matters concerning marine collections prior to the Curator's arrival.

The initial objectives of the Division of Marine Biology are the acquisition and maintenance of representative collections of British Columbia's marine fauna.

Primarily, the specimens provide reference and study material for research; however, where needed, they also supplement the Museum's educational and display programmes. Although all groups of marine organisms are being sought, the greatest expansion will be first in the fish collections because of the Curator's interests in ichthyology. The list of fishes and other organisms occurring off British Columbia is rapidly expanding with the continued exploration of adjacent coastal waters. Consequently, research activity has centred on documentation of new records from this list.

The ultimate direction of the research programme is to investigate through laboratory and field activity the taxonomy, distribution, and ecological relationships of the Province's incompletely known marine fauna. To be effective, the Marine Division will soon adopt more specific research goals; however, if a well cared-for and sufficiently representative collection is obtained, researchers from other institutions should also find it worthwhile to either visit the collection or borrow specimens, and thus further the Division's over-all aim.

In this age of environmental awareness, many organisms which seemed to be of little use in the past are now realized to have significant roles in the marine ecosystem. Considering that some of British Columbia's fishes with commercial potential are still being described for the first time, while others which are little used by North Americans have attracted foreign fishing vessels to the Canadian coast, an increased awareness of the variety and potential of British Columbia's marine life is needed if such resources are to be wisely used. Through research and public education, the Marine Division can accentuate this awareness.

After the Curator's appointment to fill the position left vacant by the untimely death of Dr. Clifford Carl, his immediate task was the reorganization and sorting of the fish, amphibian, reptile, marine invertebrate, and insect collections. He is also organizing a new catalogue system which should facilitate faster information retrieval from the marine collections. This will allow data from these collections to be incorporated with the computerized systems now used on fish collections at either the National Museums of Canada or the University of British Columbia. Marine invertebrates were sorted to either phyla or major classes and evaporated preservative replaced.

Dr. Derek Ellis of the University of Victoria sorted his large marine invertebrate collections in the Museum and left excellent reference material. To facilitate their convenience for future study, the Curator sorted the fish collections, checked species identifications, and is now transferring the specimens from formalin to isopropyl alcohol solutions. Although the entomology and herpetology collections do not fall within the definition of marine biology, they are being cared for until other personnel can work with them. Since the herpetology collection is valuable and relatively small and because the Curator has some experience in this field, the amphibian and reptile collections will remain in the Marine Biology Division.

Numerous fish specimens were donated to the Museum during 1971 and several of these form the basis of reports that will be published in 1972. A large collection from the University of Washington, in Seattle, provided the most noteworthy accession of fishes during the past year. To supplement study material already at the Provincial Museum and to continue work undertaken by the Curator before his arrival in Victoria, several collections of the Zoarcid fish genera *Bothrocara, Embryx, Lycenchelys,* and *Lycodapus* were borrowed from the National Museums in Ottawa, Ontaro, and Washington, D.C. Although probably numerous, very little is known about the occurrence of these fishes off the west coast.

Dr. Hart continued the organization of the Museum's reptant decapod crustaceans and worked on a museum handbook for the crabs and hermit crabs of British Columbia. During the year, Mrs. Katherine D. Hobson, who is studying systematics of polychæte worms from the southern British Columbia region, used research space in the Division. Dr. D. J. Faber of the Canadian Oceanographic Identification Centre in Ottawa also used the Marine Division's facilities during his field trip last summer. Mr. Strong continued his study on garter snakes.

Dr. Hart made a very profitable collecting trip abroad the Fisheries Research Board of Canada's *G. B. Read* and secured many valuable crustacean and fish specimens from deep-water dredge hauls off the British Columbian coast.

EXHIBITS

Project '70 is a four-phase exhibit plan, each consuming about two years' work and each covering a one-half floor of total exhibit space of 100,000 square feet (9,300 square metres). When finished, Project '70 will stand for about 20 years; it will have cost more than $1,500,000; and, during its lifetime, more than 40,000,000 people will view it. Designed as the Museum's first permanent display, these galleries will present British Columbia's natural and human history.

Construction of Phase I, the History Galleries, began in July 1970. These exhibits will depict the history of the white man's culture in British Columbia. The visitor begins in the present and steps back through time from The Metropolis to Urbanization and Industrialization, the Gold Rush, and finally Fur Trade and Exploration.

By the end of 1971 all carpentry and services for the first three major parts of the History Galleries were completed. The Metropolis, a street scene, shows urbanization and industrialization reminiscent of circa 1900. Twelve buildings, totalling 22 rooms, stores, garage, bedroom, saloon, and others, are now finished, plastered, painted, varnished, ready for labels and didactic. Each structure is a replica approximately two-thirds scale of a building that existed either in Victoria, Vancouver, New Westminster, or Nanaimo. The collections will be placed in the structures when the work of the Display Division ends.

To complete the Industrialization Galleries, a 42-foot diorama centres the agriculture section, complete with horse, manure, snake fence, settler's cabin, and threshing machine. The diorama, painted by Frank Beebe, features the Pouce Coupe region of British Columbia. Other Industrialization Galleries include the fish-packing house overlooking the Port Essington diorama (including seagulls, fish scale, and a large didactic area showing the various types of fishing in the Province at the turn of the century), and the lumber industry area, flanked by large photo murals and featuring an original restored sawmill of the 1900's.

The Gold Rush era is represented by a Cornish waterwheel complex under construction and will be supported by a 38-foot open diorama.

Fur Trade and Exploration Galleries were framed, ready for plastering, by the end of the year. Certainly, one of the highlights of the display will be Captain Vancouver's ship, one-quarter of which, the stern section, is being constructed exactly to the same scale as the original. Visitors who come on board HMS *Discovery* will experience the smells, sounds, and sights of sailing days. Vancouver's cabin, his sleeping quarters, and his first mate's cabin will be open to view. J. E. Roberts, a Vancouver structural engineer, spent many years of research on the *Discovery,* and has been contracted as consultant for this unusual project.

Project '70 started July 7, 1970, and was to be completed by the end of 1971; however, the lack of an adequate budget has turned our opening date into a question mark. By the end of August 1971 our budget for this year ran out, and our survival for production was due to the outstanding help given to us by the Department of Public Works. From engineers to electricians and plasterers, they have made it possible for us to keep on schedule.

While most of our efforts have been concentrated on Project '70, many small projects had to be carried out. For instance, the design, supervision of construction, and installation of objects for *The Legacy*—temporary gallery of contemporary Indian art; and the preliminary designs for the natural-history floor, designs and graphics for Museum publications, brochures, folders, education pamphlet illustrations, lecture and art-work for the BCMA Seminar and a score of travelling displays to install or supervise.

Summary of Events

Highlights:

July 1971—Completion of Urbanization Gallery.

August 1971—Opening of *The Legacy.*

December 1971—Completion of three Industrial Galleries, completion of all framing, plumbing, and wiring for the white man exhibit.

Throughout the year—temporary exhibits of:

Community Arts Council of Greater Victoria.

Capital Region Fine Art Committee.

Canadian Institute of Forestry.

Handicapped People Arts and Crafts.

Canadian Imperial Bank of Commerce Coin Collection.

Crown Zellerbach Forestry Exhibit.
Victoria Hand Weavers Guild.
Greater Victoria Secondary School Art Show.
B.C. Telephone Antique Telephones Display.
Logging Paintings by J. C. Griffiths.
Monarch Life Assurance Company Paintings by Clarence Tillenius.
Victoria Sketch Club.
Parks Branch Centennial Travelling Display.

CONSERVATION

The Conservation Division is responsible for the physical welfare of the Museum's collections, with special concern for those of the human history divisions. This general responsibility embraces the preventive procedures necessary to the care of the collections during storage and display, the provision of guidance and assistance to other divisions to ensure safety in handling and transportation, and those aspects of collections maintenance commonly referred to as "restoration." It seeks to develop improved techniques in all these fields and conducts technical examinations of objects in support of the research programmes of other divisions. It also provides an advisory service to other museums and to the general public.

The major activities of the Division in 1971 were unusually varied, with long-awaited equipment and facilities coming into use and, for the first time, permitting the establishment of a systematic routine. The work of repairing fragile and valuable objects is necessarily slow, and may take considerably longer than the construction of the displays which will eventually contain them. Therefore, with the completion of Project '70 scheduled for July 1972, it was necessary to anticipate, by at least a year, the transfer of the Display Division's main effort, from history to ethnology. Thus, the main effort in Conservation underwent the same deliberate shift of emphasis early in the year. One of the most difficult tasks in Conservation is the delicate removal of modern overpainting in order to recover traces of original painted designs. Heavy accumulations of modern paint were successfully removed from several Northwest Coast Indian pieces, revealing beautiful original designs in native pigments. A wide variety of other objects, ranging from masks and baskets to button blankets and aprons, was cleaned and repaired, and a large number of argillite carvings, most of which had been previously broken and very poorly repaired, was cleaned, dismantled, and rebuilt.

The spectacular exhibition of modern Indian art, *The Legacy,* which opened in August, was the subject of a happy collaboration with the Divisions of Ethnology and Display. Precisely fitted individual mounts were designed and made for many of the objects, so that future exhibitors will be able to handle them safely.

A continuing responsibility which, because of its urgency, cannot be pre-empted by other demands, is the emergency consolidation of waterlogged or extremely fragile excavated archæological material, which would otherwise disintegrate very rapidly. With the main vacuum impregnation plant not yet operational, it has been necessary to improvise equipment from standard laboratory hardware. Material requiring such treatment normally constitutes only a small, fairly constant flow; but the improvised equipment has functioned well, despite the greatly increased volume of excavated material resulting from this year's remarkable acceleration in archæological activity.

The task of cleaning fragile objects is now greatly assisted by a sophisticated new tool which was brought into use in September. The "Airbrasive" unit is a very sensitive and versatile instrument which permits the safer and much more rapid

cleaning of many delicate materials which previously could only have been cleaned slowly, laboriously, and at some risk. Only two other such instruments are in use in Canadian museums.

The routine duties of the Division, which are often as commonplace and monotonous as they are essential, continue despite the more interesting work which may be in progress. Two volunteers who have been especially helpful were Mrs. Ann Krahn and Miss Barbara Wade. The Collections Condition Record, introduced last year, has grown rapidly and has already proved to be an invaluable source of information. The increasing labour of maintaining the Record clearly reflects the volume of work passing through the laboratory.

Another indication of the growth of some parts of the Museum's collections has been the increasing attention of the Division to the problems of pest control. A programme of inspection and treatment has been established, and throughout the year the Division has assisted the Department of Public Works with the modification of the fumigation chambers to ensure the maximum safety in operation. It is hoped that they may be ready for use early in 1972.

The Division was very active in the field of museum training, with the Chief Conservator serving as co-instructor in the two Canadian Museums Association seminars ("Registration and Records" in April and "Care of Collections" in October) given at the Museum during the year. A workshop on Conservation was held as part of the British Columbia Museums Association annual seminar in September. In all, some 40 lectures and demonstrations were given to students and members of museums' associations.

In February, at the invitation of the Secretary of State, the Chief Conservator attended the conference "Consultation I: Museums '70+," at which the Federal Government's new programme of assistance to Canadian museums was announced.

Field operations were severely limited by financial restrictions. While members of the Division took part in two important expeditions under the ægis of other divisions (the brief archæological reconnaissance to Hesquiat in March and the more extensive survey at Ninstints in September), the only field work conducted by the Conservation Division was the recovery of three totem poles from Prince Rupert in June. Three large Haida poles had been removed from the Queen Charlotte Islands (two from Ninstints and the third from Tanu) in 1936 and erected in Alder Park by the City of Prince Rupert. By the autumn of 1970, the poles had become unsafe and the city offered them to the Museum on condition that it accepted responsibility for their safe removal from the park and their transportation to Victoria. Accordingly, in June, Mr. Ward and J. E. Waters of the Display Division supervised the removal of the poles by a city public works crew, and during the following week they were brought to Esquimalt aboard HMCS *St. Croix*.

EDUCATION SERVICES

If an interpretation programme in a museum is to succeed, it must have its basis in drama. Drama is a participatory medium, and the goal of educators today is maximum participation on the part of the student. How many museum educators take this into account?

When a group of students visit the British Columbia Provincial Museum, docents endeavour to salt the special interest tours with dramatic effects. For instance, every *Digging Up the Past* lesson involves digging to find real artifacts and, from all the information gathered from the related matrix, profiles, and artifacts, a student reconstructs history of early man. In the *Beachcombing* lesson, children handle live specimens of sea life, including plankton, while they learn about the

delicate ecological balance of the Pacific Ocean's tidal areas. In an unstructured lesson, *Safari,* kindergarten and primary-school children move at their own speed among colourful modules holding "touchable" birds and mammals. Surprisingly, the children are so gentle that only two specimens had to be repaired in a period of three months. High school students take part in a dramatic Kwakiutl dance under the direction of an Indian instructor. This programme, *People of the Potlatch,* leads the participants from contemporary Indian life back to the way of life of the Indian 200 years ago.

Children of Grades IV to VI have the opportunity to feel the creatures of the tidal areas of the Pacific Coast.

"Digging up the past" demonstrates participatory learning as Grade VII students learn how precise an archæologist must be in order to learn about the past.

The dramatic aspects of a lesson can succeed best with small groups of children. Maximum number for each lesson is 40, and on hand for every 40 children are four to eight docents who assist the children in their experiences at the Museum.

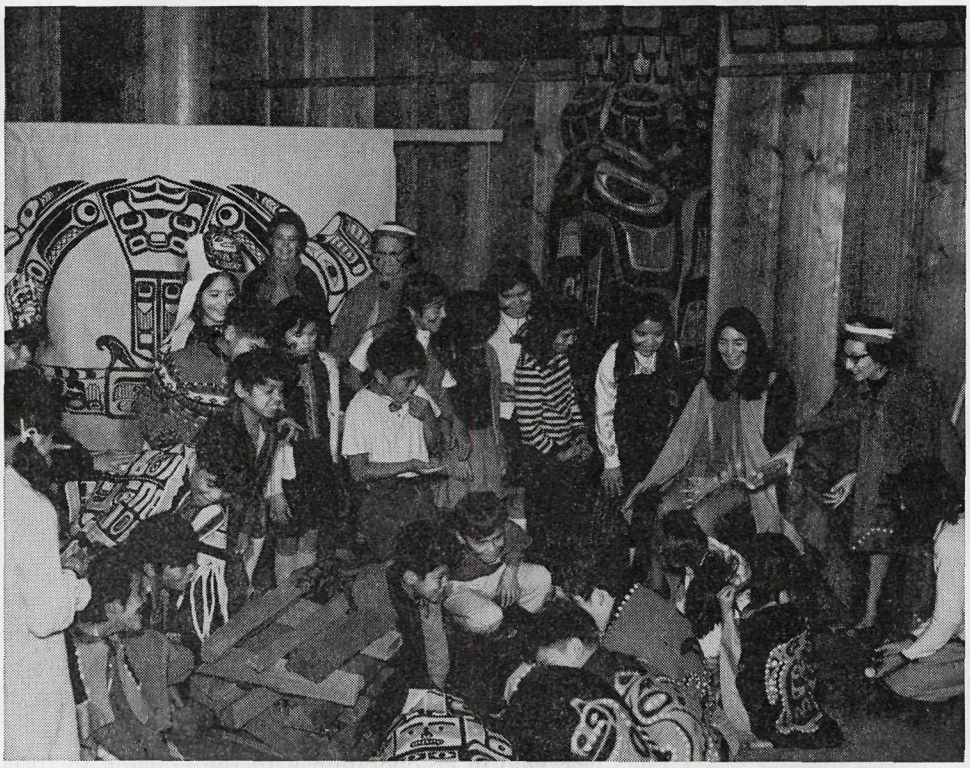
Even in the special classes, on Saturday and during the summer class, sizes are limited to 12. *Crawly Creatures, Sea and Shore, Fossil Fun, Discover Victoria, Wigo* (What Is Going On), and *Kumtuks* were devised for the greatest amount of participation.

The summer programme was held in co-operation with the Greater Victoria School District Summer Happening.

One method to draw closer together the Indian and White cultures is to dramatically present traditional and modern ideas of one to the other. To do this, the Education Services Division has devised a number of programmes prepared and carried out by Indian people who are eager to create cultural understanding among all peoples.

Two Indian teachers are employed for this purpose under the sponsorship of the First Citizens' Fund. Mrs. Jillian Laing is in charge of Indian Adult Education and until her illness in September, Mrs. Helen Hunt was in charge of Indian programmes for children. She continued the fine work of Mrs. Maxine Pape who left employment in February.

"That's how I became a dancer," says Emma Hunt to volunteer Yvonne Bridge and Grade IV students in the programme *People of the Potlatch.*



Gambling games are part of the potlatch programme taught by Maxine Pape and volunteers Hazel Hall, Elizabeth Clement, and Anna Reeves.

To extend the services of the Museum to the summer visitors, Indian guides were hired under the sponsorship of the First Citizens' Fund. They were Margaret Vickers, Ardyth Cooper, Rod Naknakin, and Sheila Cooper, who worked from May 1 to August 30.

During the year, various programmes were initiated with adults in mind. They included the dancing and stories of the West Coast people, The Hesquiaht Dancers; the annual series of illustrated talks, Heritage Court Presents; *Netsilik Eskimo* film series in 10 parts, cosponsored with the National Film Board; *Struggle for Canada,* a nine-part series cosponsored with the Victoria branch of the British Columbia Historical Society and the National Film Board; *Queen's Trips to Canada,* a series of films cosponsored with the National Film Board on May 4; Matsqui Indian Show; The World Around Us, an illustrated lecture series cosponsored with Camosun College.

To encourage new teachers to use the Museum to their best advantage, University of Victoria student teachers taught the "History of British Columbia" at the Museum during their February practicums. Arrangements were also made for some small "special" classes to spend full school time at the Museum for periods of two weeks.

The momentum of activity continues during the year because 70 volunteers worked 6,500 hours encouraging learning of the 20,000 students who came to the museum this year.

The Education Officer, whose work it is to co-ordinate the programmes, to train the volunteers in the annual docent course, also took active part in the professional associations. She was programme co-ordinator for the 15th annual British Columbia Museums Association Seminar in Victoria, September 22–25, and at the annual Canadian Museums Association Convention in Saskatoon, May 24–29, she was named chairman of the Education Section programme for the 1972 convention.

Special displays in the Division were:

Masks—South Park School.
Art by Definition—Glenlyon School.
3-D Art—Central Junior Secondary School.
Fossils of British Columbia—Fossil Fun Club.
British Columbia Heritage of Bottles—Victoria Glass and Bottle Society.
Nature Colour Photography—Wally Bishop.
Carved Birds—Lillian Sweeney.
What Are You Doing?—Environmental Literature Display.

To give information to the public about the Museum and it's services, the Education Officer took part in three television programmes, on Channels 6 and 10, assisted in the "Volunteer Day" programme at the Newcombe Auditorium, and gave 25 talks to teachers and other adult groups. Mrs. Laing gave demonstrations at nine schools, assisted many teachers who needed ideas and advice for stimulating their Indian students, and co-operated in programmes with Camosun College and Malaspina College, Nanaimo.

MUSEUMS' ADVISER

The long-range objective of the Division continues to be the advancement of community museums to a recognized level as cultural and educational institutions within the area they serve. Training programmes, technical advice, and assistance in all phases of museum operation co-ordinated by the Museums' Adviser, John Kyte, are effectively being used to improve museum standards throughout the Province.

As community Centennial projects, 10 new museums or additions to existing facilities were established during the year, and in nearly all cases assistance in preliminary planning was provided by this Division. The incorporation of suggested modifications into initial architectural drawings ensured the more efficient use of space conforming to acceptable modern museum design.

Since most community museums depend upon the services of volunteers as their work force, the lack of expertise continues to hamper development. Recognizing the need for museum training, particularly in the small and often isolated community museums, seminars sponsored by the Canadian Museums Association are being co-ordinated with the Museum Adviser's programme. Intensive three-day workshops providing elementary training in museum records, registration, and care of collections have resulted in 45 members from institutions on Vancouver Island and the Lower Mainland receiving instruction in various phases of small museum operation. The excellent response to initial workshops has accelerated plans for training programmes by instituting workshops at key locations throughout the Province.

The 1971 seminar of the British Columbia Museums Association, held at the Provincial Museum in Victoria, again was one of the highlights of the year. Involvement by the Museums' Adviser was confined mainly to the development of a two-day workshop and lecture programme relating to modern museum methods and techniques. Changed slightly in format from previous years, the workshops were longer in duration, more comprehensive in content, and with an emphasis placed on student participation where possible.

Museum development advanced appreciably during the year, boosted by the Centennial, the expansion of museum training, and, equally important, a noticeable upsurge in public awareness. By the end of 1971, more than 100 community museums will be operating in the Province with at least a dozen historical societies or similar organizations seeking ways and means of establishing museums to house local collections. Through correspondence, visits to museums, newsletters, annual meetings, and other means, contact continues to be maintained with all organizations. The Provincial Museum, as the foremost institution in the Province, holds a position of leadership and consequently those working in the smaller museums consider it a dependable source of advice and help.

FRIENDS OF THE PROVINCIAL MUSEUM

1971 was the first full year of operation for the Friends of the Provincial Museum, and it was a busy and productive year. One new society, The Victoria Glass and Bottle Collectors Society, joined the "Friends" in September, bringing the total membership to 11 societies. At the end of the year the possibility of individual membership was being examined. The Directors met regularly on the second Wednesday of each month, except for July and August.

The first annual meeting of the society was held on January 27, 1971, and all member societies were invited to send observers. Reports from the officers and committee chairmen were received, the new directors took office, and, at the meeting of the directors which followed, the following officers were elected:

Douglas Turnbull, President.
Mrs. Joan Ruskowski, Vice-President.
Miss Winnifred Speechly, Secretary.
Mrs. L. Pamela Lewis, Treasurer.

One of the major activities of the society was the operation of the Museum gift shop. This was operated throughout the year by an active committee chaired by Mrs. D. A. Ross and a group of very hard-working and efficient volunteers numbering about 30. As well as Museum publications, a good stock of books was built up relative to Museum interests. The gift shop was fortunate in arranging to sell the art work of a number of outstanding native artists and was able to offer to Museum visitors an excellent selection of art objects and handicrafts. The operation

of the gift shop, in addition to providing a real service to Museum visitors, resulted in a profit of the order of $30,000, and $14,000 was made available to the "Friends" for their use in furthering the objectives of the Museum.

Good progress was made in providing a suitable memorial for Dr. G. Clifford Carl, former Director of the Provincial Museum. A committee, chaired by Dr. D. B. Sparling, worked actively throughout the year. Gifts were solicited from a large number of people and organizations, and three special benefit programmes were held in the Newcombe Auditorium of the Provincial Museum. The assistance of the Victoria Amateur Movie Club, the British Columbia Museums Association, and of C. P. Lyons, as well as a substantial donation of $1,500 from the British Columbia Cultural Fund, are gratefully acknowledged. Several further benefit programmes are proposed for early in 1972.

The first memorial project was the G. Clifford Carl Memorial Bursary, under which a sum of $300 is to be awarded annually to a deserving student entering third or fourth year in the Faculty of Education, University of Victoria, and specializing in the biological sciences. The capital sum of $5,000 required to support this bursary has been deposited with the University of Victoria Foundation.

A second memorial project is to be the establishment of a suitable reading room and library in the Department of Biology at the University of Victoria. A good start has been made on this project and it is proposed to complete it during the first half of 1972.

The renovation of the original schoolhouse of St. Ann's Academy, which was undertaken as a project under the chairmanship of Mrs. Dorothy Hanson, made little progress since movement of the building to a new location near the Museum by the Victoria Real Estate Board was delayed by various problems.

The society assisted in the arrangements for the Annual Seminar of the British Columbia Museums Association in September.

A fine secretaire-bookcase made for the Hudson's Bay Company in 1865 by Jeffrys of Victoria was purchased by the society in September and donated to the Museum.

The society accepted a number of substantial donations on behalf of the Museum. These were as follows:

McGill and Orme Limited—$500 for a drug-store display. (First instalment of a gift to total $2,500.)

The Hudson's Bay Company—$2,000 for a fur-trade gallery. (First instalment of a gift to total $10,000.)

Canadian Pacific Limited—$10,000 for a railway station display.

The T. Eaton Company—$10,000 for a clothing store.

The Canadian Imperial Bank of Commerce—$5,000 for a gold-rush gallery. (First instalment of a gift to total $15,000.)

At the end of the year the society was actively investigating, with members of the Museum staff, a number of projects in which it might assist the Museum.

Thanks for this successful year are due to many people; to the member societies for their support; to the many volunteers for their excellent work; and to the staffs of the Museum and other organizations for their willing co-operation and help.

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Commercial
Fisheries
Branch

Department of Recreation and Conservation

COMMERCIAL FISHERIES BRANCH

R. G. McMynn, Director

GENERAL

Increasing demands of foreign fishing vessels on fisheries close to our shoreline created some fishing gear conflicts in 1971. The most serious involved "high sea" collisions or near collisions between trawlers of the U.S.S.R. and British Columbia trollers. These incidents, in which neither side was blameless, resulted in an important Agreement being signed between Canada and U.S.S.R. The Agreement provided that Russian fishing vessels could fish in a small area of British Columbia's territorial waters and have some port privileges in Vancouver and Prince Rupert, and in exchange the Russians would stay out of a designated area of the high seas. The area which the Russians agreed not to enter is off the southwest end of Vancouver Island and encompasses a substantial part of the "shelf" where our salmon trollers have traditionally fished and anchored. Another historically important aspect of the Agreement was a consensus on "rules of the road" on the high seas. In the several weeks of intensive negotiation prior to the signing of the Agreement the Province of British Columbia and its fishermen were well represented. An outstanding feature of these negotiations was the mutual respect, honesty, and understanding exhibited by the representatives of Canada and the U.S.S.R. during their meetings.

Now that the United States Columbia River and Puget Sound coho and chinook salmon hatchery programme is adding significantly to Canada's catch of United States-produced salmon that country is most anxious to reach an Agreement with Canada in respect to the "equitable" balancing of the value of salmon belonging to one country but which are intercepted by fishermen of the other country. Until four years ago the United States' catch of Canadian Fraser River sockeye and pink salmon (under a bi-lateral convention in which the catch of these two species, within specified waters, is evenly split) more than offset Canadian interceptions of American-produced salmon. Since then, however, British Columbia fishermen (mostly trollers) have been harvesting increasing numbers of American salmon off the west coast of Vancouver Island and the coast of Washington. Negotiations are proceeding between the two countries in an attempt to resolve how the value of intercepted salmon can be balanced without one country or the other expanding its intercepting fisheries or Canada giving up any more Fraser fish. There is reasonable agreement between the respective countries of the numbers of salmon being intercepted but no agreement as to the value of these interceptions. This valuation is complicated for a number of reasons, including: What values are used (landed, wholesale, retail), whether the interceptions are considered as a gain to the country making the interception or as a loss to the country which would have taken that fish at a later date, and what are the sport fish value of chinooks and coho. Certainly in the long run it may be necessary for Canada to curtail its "high seas" salmon trolling activities and for the United States to share less in the Fraser River's production of pink and sockeye salmon. In these negotiations British Columbia fishermen and government interests were well represented.

Aquatic Plants

No progress of any significance occurred during 1971 in the establishment of a major kelp harvesting or other aquatic-plant processing industry. Only some

150 wet tons of kelp were harvested from British Columbia waters. The Masset kelp-drying plant remains inoperative for want of someone to purchase the plant from its creditors.

The imposition of the United States surcharge and the Federal Government's economic policies respecting foreign investment apparently stymied the building plans of one British Columbia aquatic plant company in 1971. That company states that it is now looking to the location of its main complex in Washington State with only a small operation being planned for British Columbia. After hearing a number of grandiose plans from several companies over the years, and with nothing concrete yet on the horizon, one cannot help but become a little pessimistic about the establishment of a major seaweed industry in British Columbia.

Oysters

The failure or low production from natural oyster seeding in Japan and France during the past couple of years has created a high demand for British Columbia oysters. This demand has not yet been met by British Columbia producers although at least one of the "growers" is shipping some live oysters to France.

In order to assist prospective oyster growers in obtaining the right to grow and harvest oysters on vacant Crown foreshore a study was made of a possible new system of licensing. This study resulted in a number of recommendations being made to the Environment and Land-use Committee.

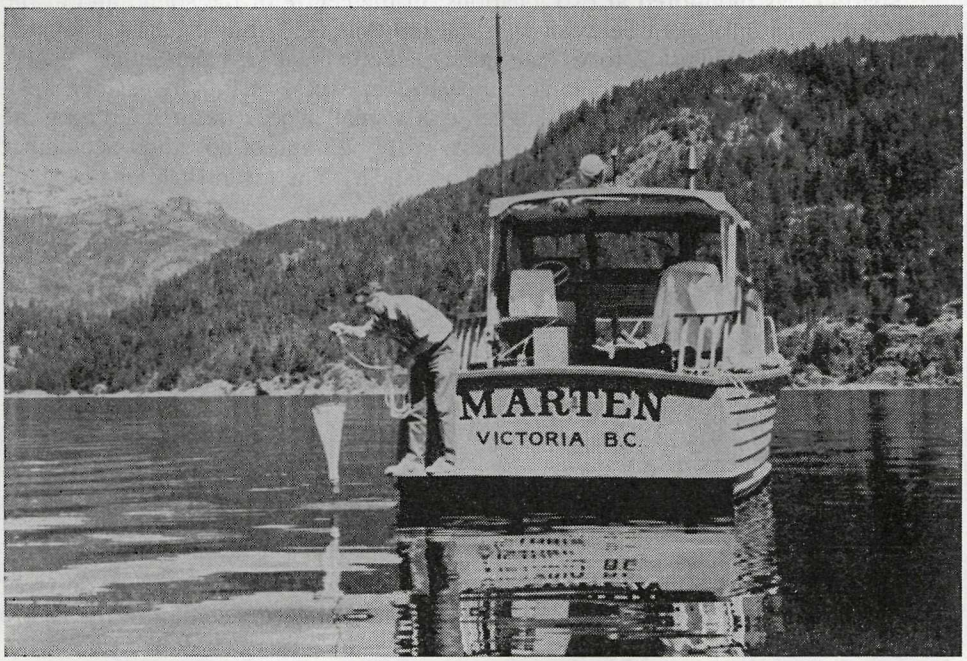
During 1971 considerable progress was made in the matter of the proposed transfer, from Provincial to Federal health authorities, of the public health aspects associated with the growing, harvesting, processing, and marketing of oysters and clams. It is anticipated that this transfer of responsibilities will take place in 1972. Because the Federal Government has more men, equipment, and laboratory facilities at its disposal for this type of work than does the Province the result should be a much more closely supervised molluscs fishery and, consequently a higher degree of public confidence in the industry's product.

PACIFIC OYSTER BREEDING, 1971

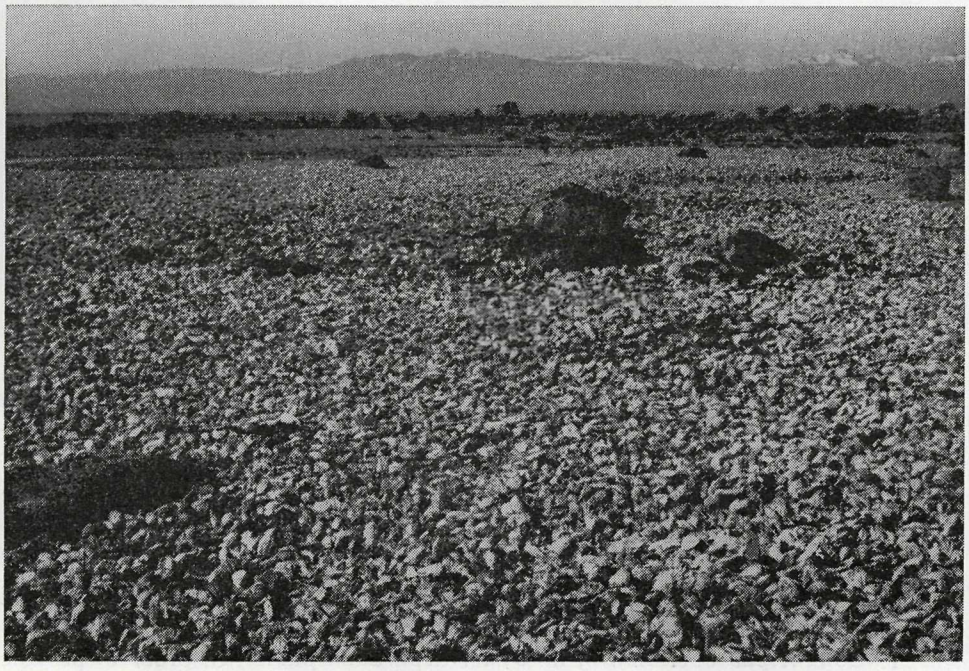
Pendrell Sound

A successful commercial breeding of Pacific oysters occurred in Pendrell Sound in 1971. The set was one of the heaviest on record. Surface water temperatures reached 20 degrees centigrade on July 14 and remained above this temperature for the next 38 days. Temperatures above 25 degrees centigrade were recorded for almost a week at the end of July. Although surface salinities dropped as low as 11.6 per cent at the mouth of the sound, they remained near or above 15 per cent throughout the spawning and setting period in the major part of the sound.

The first spawning occurred on or about July 20 but other spawnings were observed on different occasions until mid-August. Extensive spawnings, as indicated by large areas of "white water," were observed during the period July 25–28 which was the peak spawning period. Straight hinge larvæ at densities up to 66 per gallon were observed in plankton samples taken on July 28. On August 2, straight hinge larvæ numbered up to 300 per gallon and mid-umbone larvæ up to 250 per gallon. Larval concentrations sufficient to produce commercial sets were observed in the plankton until the latter part of August. On August 19, larval counts had dropped to one straight hinge and one mid-umbone larva per gallon.



Sampling oyster larvæ from Pendrell Sound as a service to the fishing industry.



A large, natural oyster crop on a British Columbia coastal island.

Spatfall was monitored at two locations; in the centre of the sound and at the upper end. Spatfall began between July 28 and August 2, but the peak occurred during the period August 2 to 6 (*see* table). Settlement was particularly heavy during this four-day period and some cultch had in excess of 2,000 spat per shell. Spatfall continued through most of August with a smaller peak occurring during the period August 12–19. Shell cultch exposed on July 28 and removed on September 8 had mean spat counts of over 2,000 spat per shell. The mean shell length of the largest of these spat on September 8 was 10 mm.

The minimum, maximum, and mean numbers of Pacific oyster spat counted on shell cultch exposed in Pendrell Sound for five periods, from July 28 to August 25, 1971, were as follows:

Time Interval	Minimum Number Spat per Shell	Maximum Number Spat per Shell	Mean Number Spat per Shell
July 28 to August 2	24	137	74
August 2 to August 6	831	2,233	1,478
August 6 to August 12	51	225	112
August 12 to August 19	90	726	400
August 19 to August 25	8	64	27

A difference in setting intensity was observed on cultch placed at different locations in the sound. Spatfall was heavier at the monitoring station in the centre of the sound than at the upper end. Mean spat counts on shell cultch put out at other locations in the sound on August 2 and removed on August 25 ranged from 710 to 1,466. At all locations the set was heavy and well above commercial levels.

About 150,000 strings of shell or the equivalent in the form of artificial cultch or cemented veneer were exposed in 1972 by four companies. As in the previous year the veneer cultch was designed for export to France.

Ladysmith Harbour

A commercial set of Pacific oysters occurred in Ladysmith Harbour in 1971. Spawning was first observed on July 21 and large numbers of straight hinge larvæ were observed in plankton samples taken on July 22 which had developed to the mid- and late-umbone stage on July 30. Spatfall was first recorded on shell examined on August 4; range of 2–14 spat per shell, mean of 8. On August 11 the number of spat ranged from 19–43 per shell, a mean of 30, and on August 18 the range was 10–39, a mean of 23.

One oyster grower exposed cultch in Ladysmith Harbour in 1971.

FISHERIES INFORMATION

Publication in 1971 of two colourful information brochures; *Pacific Salmon* and *The Commercial Fisheries of British Columbia* have been well received, again demonstrating the interest and demand by the public, especially school children, for such information. Unfortunately, however, the rapidly increasing number of inquiries for information is placing a serious drain on the present facilities of the Branch.

Cost-sharing Fishery Projects

The Commercial Fisheries Branch was involved in a number of interesting and productive cost-sharing projects in 1971.

1. *Commercial operation of an oyster depuration plant*—In order to provide the oyster industry with detailed information on the costs of depurating (purifying

oysters by treatment with ultra-violet treated running sea water) the Provincial and Federal Governments began a commercial operation in December 1971. This operation, under the direction of a hired technician-operator, will continue until May 1972, with close attention being paid to bacteriological samples and "costings." There is little doubt in our minds that some form of depuration of all oysters and clams will be required within the 1970's if molluscs are to be guaranteed by public health and fishery officials as being completely safe to eat.

2. *Mechanical harvesting of razor clams*—A 40-ton hydraulic razor clam harvester was completed and transported to Graham Island, Queen Charlotte Islands, by B.C. Packers in 1971. Initial testing indicates an efficient harvest capability of between 500 and 900 pounds of razor clams per hour. Some problems have been encountered and these will have to be resolved before the harvester will be acceptable to "government." The machine is cumbersome and requires larger wheels and a different steering mechanism in order to make it safer and more manageable. Clam mortalities were initially of the order of 50 per cent but have been considerably reduced. Our objective is to achieve, through further adjustments and modifications, a mortality which does not exceed 10 per cent. The fact that the machine efficiently and rapidly harvests provides a tremendous incentive for the company and the two governments to successfully complete the project. If the project is successful there is little doubt about the construction of a new Masset cannery to handle crabs and razor clams (the old cannery was destroyed by fire in 1971).

3. *Aquatic plant study*—The joint study by the Province and the University of British Columbia of some aspects of the biology of and harvesting effects on red algæ resulted in a preliminary report in 1971. As expected, this report indicated a number of new and practical facts about these potentially valuable species of red algæ as well as pointing out the necessity of further studies. These studies should be along the lines of developing reliable means of inventorying the resource, studying inter-relationships with other plants and animals, and in further experimental harvesting evaluations. An expanded Federal-Provincial-University study is being considered for 1972.

4. *Raft culture of oysters*—The four ferro-cement "logs" constructed and evaluated as alternatives for cedar logs in raft oyster floats proved a disappointment. The "logs" floated low, they were unwieldy and fragile, and they were difficult to hold together. It may be both difficult and impractical to find a cheap substitute for cedar logs even though marine infestations and "water-logging" destroy the latter's usefulness after three or four years of use. One or two oyster fishermen in 1971 began their own experiments on raft culture and while enthused with some of their initial results did encounter a number of minor problems associated with this method of growing oysters.

The artificial cultch (oyster-seed collecting device) developed by the British Columbia Research Council and Federal Government was delivered too late in 1971 for a complete evaluation; however, it appears to be effective as a substitute for natural shell. If it can be produced cheaply enough it may provide an effective method for seeding oyster grounds and producing a subsequent crop with far less labour input than would be the case if natural shell were used.

5. *Shrimp processing afloat*—Some forms of processing at sea, aboard relatively small vessels, may result in higher quality fish products than are currently being achieved ashore. One of these might be shrimp and prawn cooking. The Provincial and Federal Governments plan an evaluation of this and in 1971 designed a shrimp cooker for installation and evaluation in 1972.

Fish Inspection Act

The Provincial *Fish Inspection Act,* passed in 1955, was finally proclaimed and became law August 13, 1971; at the same time, regulations and schedules under the Act came into effect. In the past, only fish and fish products destined for out-of-Province consumption were inspected by the Federal Fisheries Service Inspection Branch; now this same protection will be afforded all British Columbia consumers of fish. Inspection regulations control buildings, equipment, and operating procedures. Starting with the fish-buyer and continuing through the processing sector and ending with the retailer, these regulations are most comprehensive and should ensure wholesome and tasty products for the consumer.

Wholesale Value of Fish and Fish Products	$	*Number of Licensed Fishermen*	
1966	118,000,000	1966	11,977
1967	99,800,000	1967	12,117
1968	119,255,000	1968	12,133
1969	83,000,000	1969	10,942
1970	123,280,000	1970	11,647

Value of Gear	$	*Number of Licensed Boats*	
1966	11,414,000	1966	7,435
1967	11,637,000	1967	7,639
1968	13,032,000	1968	7,548
1969	13,394,000	1969	7,181
1970	14,195,000	1970	6,975

BRITISH COLUMBIA SALMON-CANNING INDUSTRY

The canned-salmon pack for 1971 was 1,405,152 48-pound cases, 18,730 fewer than the 1970 pack of 1,423,882 cases. This total includes salmon canned from United States imports.

Fourteen salmon canneries were licensed to operate in 1971. The locations were as follows: Skeena River and Prince Rupert, five; Central Area, none; Vancouver Island, three; Fraser River and Lower Mainland, six.

Comparative Pack by Species (48-pound Cases)

	1970	1971
Sockeye	395,606	568,638
Chinook	10,024	11,800
Steelhead	531	1,288
Blueback	2,881	5,662
Coho	111,674	215,291
Pink	660,777	504,280
Chum	242,389	98,193

HERRING PRODUCTION

Because of depletion the herring fishery was closed in 1968. Since then herring stocks have shown a marked increase and as a result a modest start was made in the 1970/71 winter season toward a new fishery based mainly on supplying a Japanese market with roe. This promises to be the main market for the coming

season but it is likely attempts will be made to develop other palatable ways of processing herring for human consumption. Once again no herring will be caught specifically for reduction to poultry meal and oil, previously this was the mainstay of the herring industry. The Federal Fisheries Service has set a quota of 105,000 tons for the 1971/72 season.

HALIBUT FISHERY

The 1971 halibut season ended with the poorest catch since 1945. By mid-October when fishing was virtually finished for the year, total landings by both Canadian and American fishermen were 45,527,000 pounds compared to 55,222,000 pounds in 1970. The previous low figure in modern history is the 1968 catch of 48,840,000.

Statistics show that the full-time halibut fleet has declined from an average of 512 boats in the 1960–64 period to 387 boats in the 1965–69 period.

SPORT-CAUGHT FISH CANNERIES

Four canneries designed to custom-can sport-caught fish operated during 1971. They were located at Brentwood, Nanaimo, Quadra Island, and Westview. Production to the end of December 1971 was 217,029 cans, an increase of 94,045 over the previous year's total. A total of 6,114 sportsmen used these facilities, of whom 5,250 were residents and 864 nonresidents. The following number and species of fish were canned: Chinook, 4,601; Coho, 22,035; Pink, 857; Chum, 43; Sockeye, 237; Steelhead, 109; Trout, 167.

REVIEW OF FISHERIES PRODUCTION, 1970

The total wholesale value of the fisheries of British Columbia for 1970 amounted to $123,300,000 which was $40,341,000 more than the 1969 value and about $2,500,000 more than the 1966 record of $120,800,000. Salmon accounted for 74.8 per cent of the total landed value and 80.8 per cent of the total wholesale value. British Columbia fishermen delivered 20,100,000 pounds of halibut to British Columbia ports, compared with 27,200,000 pounds in 1969. The value of these deliveries fell to $7,200,000 from the 1969 level of $11,600,000. The herring fishery remained closed for reduction purposes and only 4,260 tons, with a wholesale value of $682,000, were taken for bait and food purposes.

As marketed wholesale, the principle species were salmon, with a value of $99,597,000; and halibut with a value of $14,025,000.

In 1970 the total wholesale value of shellfish amounted to $2,822,000. The value of the clam production was $457,000; oyster production, $590,000; crab and shrimp production, $1,775,000.

Gear and Equipment

The 1970 inventory of fishing gear included 10,437 salmon gillnets, 502 salmon purse-seines, 8 salmon drag-seines, 145 herring gillnets, 87 herring purse-seines, and 18 herring trawl nets, with a total value of $8,661,000. Wire, cotton, and nylon trolling-lines were valued at $693,000.

Salmon-cannery Operations

Eighteen salmon canneries were licensed to operate in 1970. The locations were as follows: Skeena River and Prince Rupert, five; Central area, two; Vancouver Island, three; Fraser River and Lower Mainland, 8.

The total canned-salmon pack for British Columbia, according to the annual returns submitted to this Branch by canners licensed to operate in 1970, amounted to 1,423,882 cases, 799,729 more than the 1969 pack which was the lowest since the 1921 total of 602,657 cases.

Sockeye Salmon

The 1970 sockeye pack was 395,606 cases. This was an increase of 35,998 cases over 1969's total of 359,608 cases. Sockeye was this year's second most important species, worth $21,800,000 wholesale, about $1,500,000 more than the previous year, but far under the $30,600,000 in 1968.

Pink Salmon

Pink-salmon landings totalled 53,000,000 pounds, compared to only 13,-800,000 pounds in 1969, they were the most valuable species worth $26,000,000 on the market, a huge jump from the $6,700,000 of the previous year. The canned pack for this year was 660,777 cases.

Coho Salmon

The 1970 coho pack was 114,555 cases, almost double that of 1969, when 57,947 cases were packed. Coho catches of 30,000,000 pounds, compared to 17,600,000 pounds in 1969 saw a return of this species to normal levels.

Chinook Salmon

The canned pack of chinook salmon in 1970 was 10,024 cases, 4,723 more than the 1969 pack. Canning utilizes only a small portion of the catch; fresh and frozen, mild cured, and smoked amounted to 101,212 hundred weight worth $11,-238,291. The canned pack had a value of only $339,088.

Chum Salmon

The chum pack was up to 242,389 cases, worth $7,715,299, and the value of the frozen dressed was $7,655,578. This was in marked contrast to the 1969 figures of 46,524 cases valued at $1,459,133, and frozen dressed worth $3,202,028. Here again the yearly catch was back to former levels with 37,000,000 pounds, the best landings in a decade.

Steelhead

The 1970 steelhead pack amounted to 531 cases, 54 less than the 1969 pack of 585 cases. Although steelhead are not salmon, some are canned each year, principally those caught incidental to fishing other species.

Other Canneries

Shellfish canneries—In 1970, seven shellfish canneries were licensed to operate in British Columbia and produced the following pack: clams, 15,458 cases; crabs, 5,327 cases; clam chowder, 5,975 cases.

Specialty products—Sundry processing plants produced the following: fish spreads, 43522 cases assorted size containers; fish and chips, 1,911,294 pounds; smoked pickled salmon, 600 pounds; breaded oysters, 4,175 pounds; breaded shrimp, 1,141 pounds; breaded scallops, 650 pounds; kipper snacks, 400 pounds; smoked oysters, 1,000 6-ounce containers, 432 ½-pound packets, 5 gallons, 100 24/6-ounce cases, 703 pounds (unspecified packaging); tuna, 55,605 cases; pickled oysters, 396 12-ounce containers; pickled salmon, 621 ½-pint containers; oyster

stew, 6,261 cases; salmon chowder, 5,908 cases, creamed salmon, 9,000 cases; creamed tuna, 7,873 cases.

Fish Curing

Twenty-three smoke-houses processed the following: Herring (kippers, 33,980 pounds; bloaters, 500 pounds); cod, 482,325 pounds; salmon, 1,167,125 pounds; kippered salmon, 80,300 pounds; mackeral, 10,000 pounds; eels, 4,500 pounds.

Pickled Herring

Pickled-herring production in 1970 amounted to 10,219 cases of 12/12-ounce jars; 5,637 cases of 12/16-ounce jars; 519 cases of 12/32-ounce jars; 331 cases of 12/128-ounce jars; 178 cases of 6/10-ounce jars; 3,483 12-ounce tins; 572/25-pound kits; 96/20-pound pails; 10/28-pound pails.

Miscellaneous Production

Frozen herring bait, 2,231,000 pounds; mild-cured salmon, 657,000 pounds; salmon eggs and caviar, 3,099,000 pounds. Fish offal reduction: 1,027 tons of meal; 511,000 pounds of oil.

A small processing plant to prepare sea urchin roe for human consumption started limited production in 1970. This roe is for the Japanese market where it is considered to be a delicacy.

Halibut

It was an off-year for halibut fishermen. They landed a total of 29,500,000 pounds in both British Columbia and United States ports, down about 4,300,000 pounds. They delivered only 20,100,000 pounds to British Columbia ports, down more than 7,000,000 pounds from the previous year. The wholesale value reflected the declines, and for British Columbia, landings dropped to $10,700,000 from $13,800,000 in 1969.

STATISTICAL TABLES

Table 1—Licences Issued and Revenue Collected, 1967 to 1971, Inclusive

Licence	1967		1968		1969		1970		1971	
	Number	Revenue	Number	Revenue	Number	Revenue	Number	Revenue	Number	Revenue
		$		$		$		$		$
Salmon cannery	22	4,400	21	8,400	15	6,000	17	6,800	14	5,600
Herring cannery	----	----	----	----	----	----	----	----	----	----
Herring reduction	8	800	1	400	----	----	----	----	----	----
Tierced salmon	3	300	3	300	3	300	3	300	3	300
Fish cold storage	19	1,900	19	3,275	21	3,325	19	3,275	23	3,550
Fish-processing	86	86	65	2,130	61	2,300	64	2,320	63	2,500
Shellfish cannery	11	11	5	500	7	700	7	700	6	600
Tuna-fish cannery	1	1	1	100	2	200	3	300	1	100
Fish-offal reduction	9	9	9	450	5	250	5	250	5	250
Fish-liver reduction	1	1	----	----	----	----	----	----	----	----
Whale reduction	1	100	----	----	----	----	----	----	----	----
Herring dry-saltery	----	----	----	----	----	----	2	50	1	25
Fish-buyers	387	9,675	363	18,125	295	14,750	358	17,900	300	15,000
Pickled-herring plant	----	----	1	25	2	50	2	50	2	50
Province of British Columbia Receipts	145	2,375	97	2,278	1,048	4,001	309	2,313	250	3,014
Sport-caught fish cannery	4	100	5	125	4	100	3	75	3	75
Aquatic-plant harvesting	44	440	44	2,200	31	1,550	51	2,550	51	2,550
Oyster-picking permits	189	1,890	133	1,330	103	1,030	107	1,070	131	1,310
Aquatic-plant processing	2	20	3	600	3	600	1	200	----	----
Totals	932	22,108	770	40,238	1,600	35,156	951	38,153	853	34,924

Table 2—Species and Value of Fish Caught in British Columbia, 1966 to 1970, Inclusive

	1966	1967	1968	1969	1970
	$	$	$	$	$
Salmon	86,572,000	79,747,000	99,956,000	57,982,000	99,597,000
Herring	8,305,000	2,638,000	331,000	559,000	682,000
Halibut	10,741,000	7,353,000	8,385,000	13,814,000	14,025,000
Crabs and shrimps	2,079,000	2,469,000	2,378,000	2,460,000	1,775,000
Lingcod	797,000	801,000	995,000	920,000	1,038,000
Grey cod	1,837,000	972,000	1,122,000	937,000	752,000
Oysters	964,000	765,000	743,000	856,000	590,000
Sole	1,126,000	1,023,000	1,183,000	1,352,000	1,819,000
Black cod	451,000	347,000	349,000	275,000	226,000
Clams	383,000	421,000	222,000	226,000	457,000
Tuna	----------	----------	----------	1,090,000	984,000
Other species	4,704,000	3,117,000	3,591,000	2,488,000	1,335,000
Totals	117,984,000	96,536,000	119,255,000	82,959,000	123,280,000

Table 3—British Columbia Salmon Pack, 1966 to 1970, Inclusive, Showing Areas Where Canned

(48-pound cases)

1966

Species	Area		Total
	Fraser Area and South Coast	North Coast	
Sockeye	287,319½	120,629½	407,949
Red spring	4,254½	1,743½	5,998
Pink spring	1,583	2,905	4,488
White spring	2,054	2,045	4,099
Steelhead	457½	2,022½	2,480
Blueback	20,989	98	21,087
Coho	136,750½	123,785½	260,536
Pink	252,773	699,021	951,794
Chum	36,078	124,706	160,784
Totals	742,259	1,076,956	1,819,215

1967

Sockeye	355,583½	203,208	558,891½
Red spring	3,445½	2,404	5,849½
Pink spring	1,843	3,304	5,147
White spring	1,988	1,695	3,683
Steelhead	322	974	1,296
Blueback	7,799	----------	7,799
Coho	87,892	50,986	138,878
Pink	503,470	146,672	650,142
Chum	30,587½	73,435	94,022½
Totals	983,030½	482,678	1,465,708½

Table 3—British Columbia Salmon Pack, 1966 to 1970, Inclusive, Showing Areas Where Canned— Continued

(48-pound cases)

1968

Species	Area		Total
	Fraser Area and South Coast	North Coast	
Sockeye	398,438	212,573	611,011
Red spring	852½	802½	1,655
Pink spring	1,471	2,332½	3,803½
White spring	823½	1,134	1,957½
Steelhead	263	670	933
Blueback	10,389	----------	10,389
Coho	92,619	84,586½	177,205½
Pink	227,893½	441,453	669,346½
Chum	79,225	191,462½	270,687½
Totals	811,974½	935,014	1,746,988½

1969

Sockeye	253,458	106,149½	359,607½
Red spring	1,402	573½	1,975½
Pink spring	1,446½	823½	2,270
White spring	656	400	1,056
Steelhead	295½	289½	585
Blueback	2,146	----------	2,146
Coho	39,046½	16,754½	55,801
Pink	109,830	44,358	154,188
Chum	36,212	10,312	46,524
Totals	444,492½	179,660½	624,153

1970

Sockeye	279,009½	116,596½	395,606
Red spring	826	348	1,174
Pink spring	4,966	1,037	6,003
White spring	2,205½	641½	2,847
Steelhead	225	306	531
Blueback	2,881	----------	2,881
Coho	62,489	49,185	111,674
Pink	212,996	447,781	660,777
Chum	100,411	141,978½	242,389½
Totals	666,009	757,873½	1,423,882½

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