

REPORT OF THE
Department of Education
and
Conservation
FOR THE YEAR 1900

VICTORIA, B.C., February 1974

To the Honourable WALTER STEWART OWEN, 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, 1973.

JACK RADFORD
Department of Recreation and Conservation

VICTORIA, B.C., March 1974

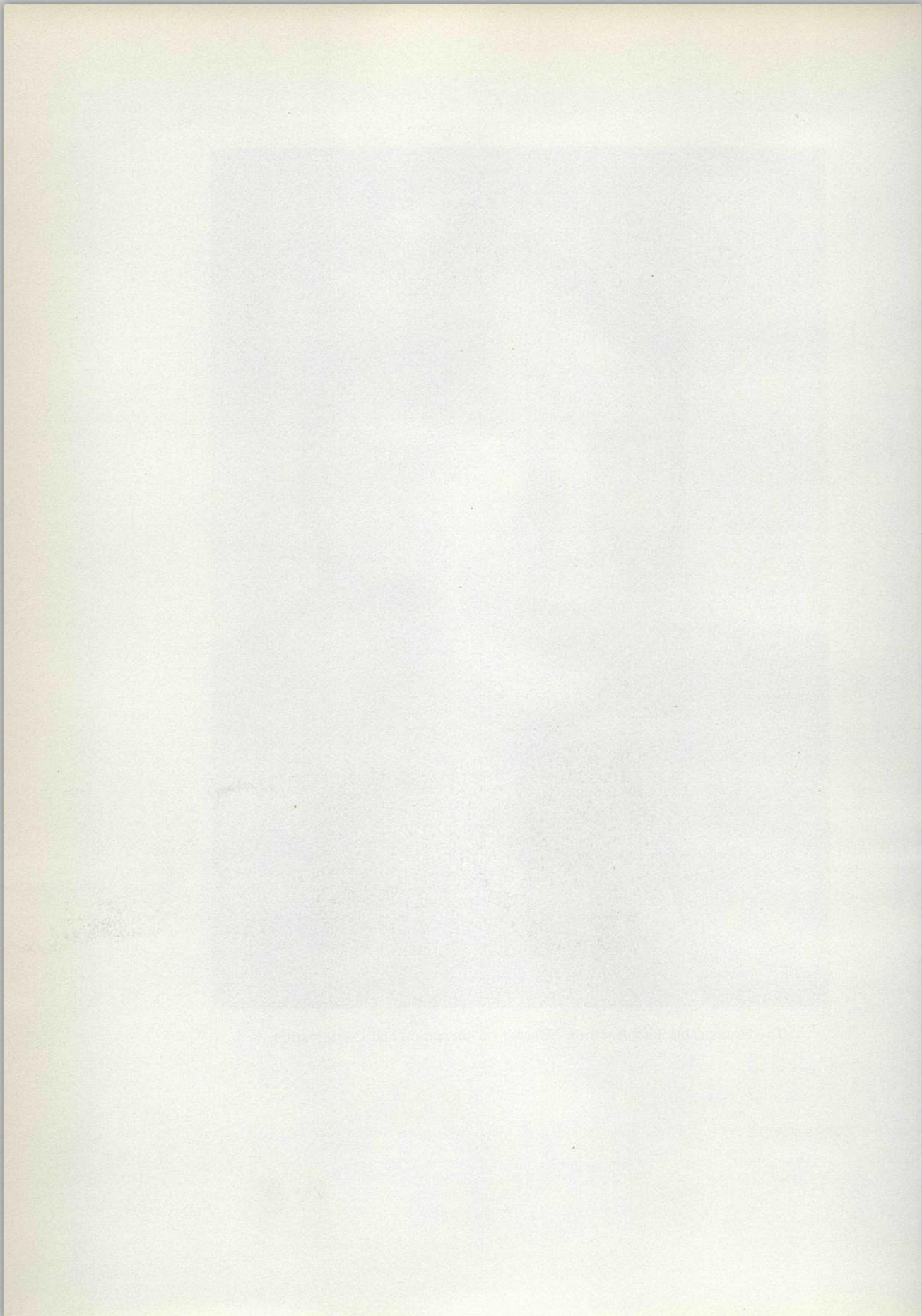
*The Honourable Jack Radford,
Minister of Recreation and Conservation.*

SIR: I have the honour to submit the Annual Report of the Department of Recreation and Conservation for the year ended December 31, 1973.

LLOYD BROOKS
Deputy Minister of Recreation and Conservation



The Honourable Jack Radford, Minister of Recreation and Conservation.

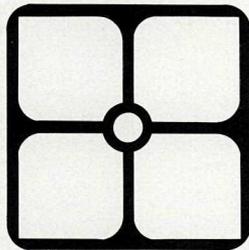


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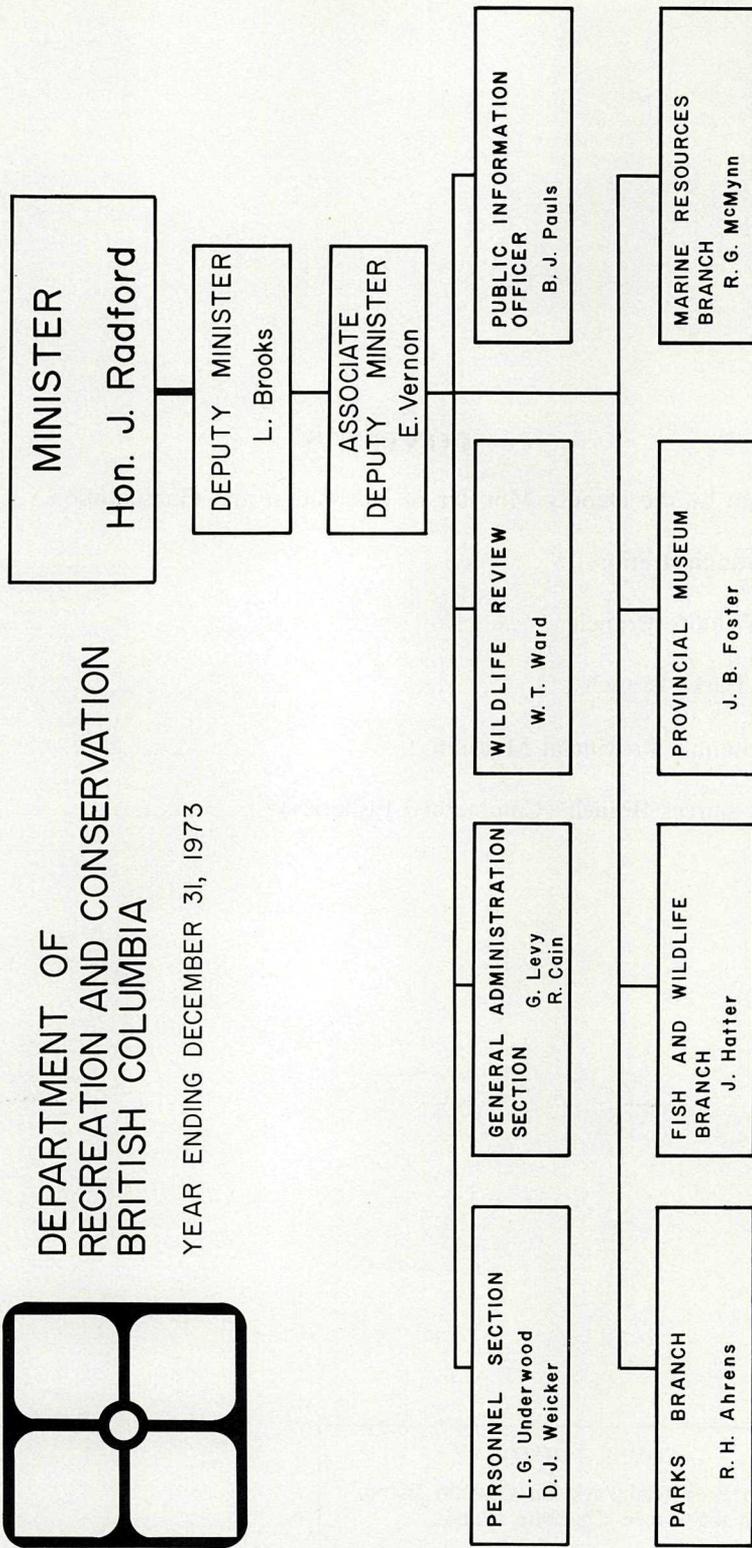
COVER PHOTO

Naikoon Provincial Park, on Graham Island,
in the Queen Charlotte Islands.



DEPARTMENT OF
RECREATION AND CONSERVATION
BRITISH COLUMBIA

YEAR ENDING DECEMBER 31, 1973



Report of the Department of Recreation and Conservation, 1973

LLOYD BROOKS, DEPUTY MINISTER AND COMMISSIONER OF FISHERIES

INTRODUCTION

Significant progress was made during the year to accommodate the growing demands on the Department from an environmentally concerned and aware public. Stepped-up activity was possible by all four branches as a direct result of welcome new funding and staffing.

The first restructuring of the Department's senior administration was made with the appointment of an Associate Deputy Minister and additional Assistant Directors in both Parks and Fish and Wildlife. These additions will enable the Department to respond more effectively to specialized needs of senior management and the public.

There was a substantial increase in new park acquisition under the Provincial Parks Branch. New protection by statute of 82 of the most important Provincial parks was most welcome and timely. Continued emphasis was given to historic parks in response to growing public interest in this special type of facility. Over one-quarter million visits were recorded to each of the two most developed historic parks—Barkerville and Fort Steele.

Progress was also made in new park research projects and in new planning approaches to meet changing demands. Also, a new programme, the Community Recreational Facilities Fund, stimulated construction of much-needed recreational facilities in over 90 communities throughout the Province. This programme has generated tremendous response and should do much to enrich the lives and recreational opportunities of thousands of British Columbians.

The Provincial Museum is moving full speed ahead to complete its new exhibits, thanks to increased budgeting. A target date of 1976 has been set to complete all galleries in the Museum. Work was started on the remaining space designated for the Anthropology and Natural History Galleries. Of major importance is the first concerted effort to prevent the loss from this Province of historical objects through the historical artifact acquisition programme. The Provincial Museum is also initiating needed new programmes such as travelling exhibits and technical aid to other museums to give this important service a truly Provincial dimension. Scientific study and collection of the flora and fauna of the Province is being expanded.

The Commercial Fisheries Branch is being renamed the "Marine Resources Branch" to reflect more accurately its broader involvement in the marine resources of this Province, especially conservation. The Branch stepped up its activities as a Provincial voice in national and international fisheries negotiations and to provide guidance to other departments whose activities may impinge on the Province's marine resources. New aquatic plant management programmes are being developed in anticipation of increased commercial activity in this relatively new field. Similarly, improved management capability in the shellfish industry was initiated.

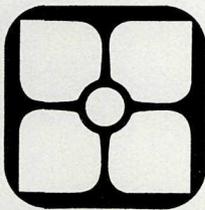
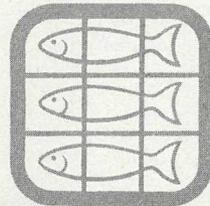
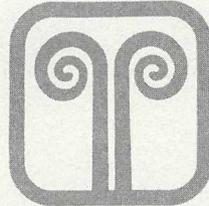
A backlog of Fish and Wildlife inventory needs required the hiring of new staff to provide a catch-up. The inventory is urgently needed to serve as a guide to current resource allocation decisions. New staffing under this Branch also resulted in better habitat protection and increased enforcement.

The growing concerns and changing demands of the public are expected to place a continued heavy load on the Department of Recreation and Conservation, but 1973 marked an important turning point in permitting the Department to improve its capability in responding to these demands.

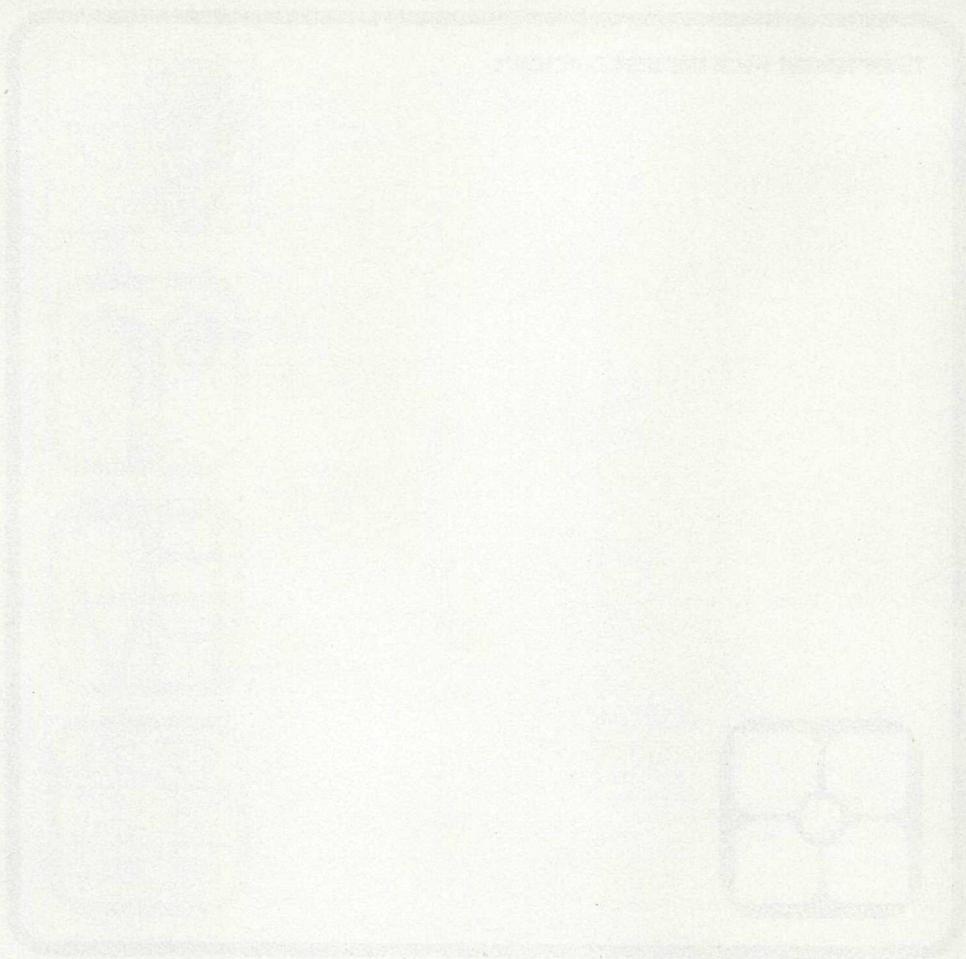
General Administration



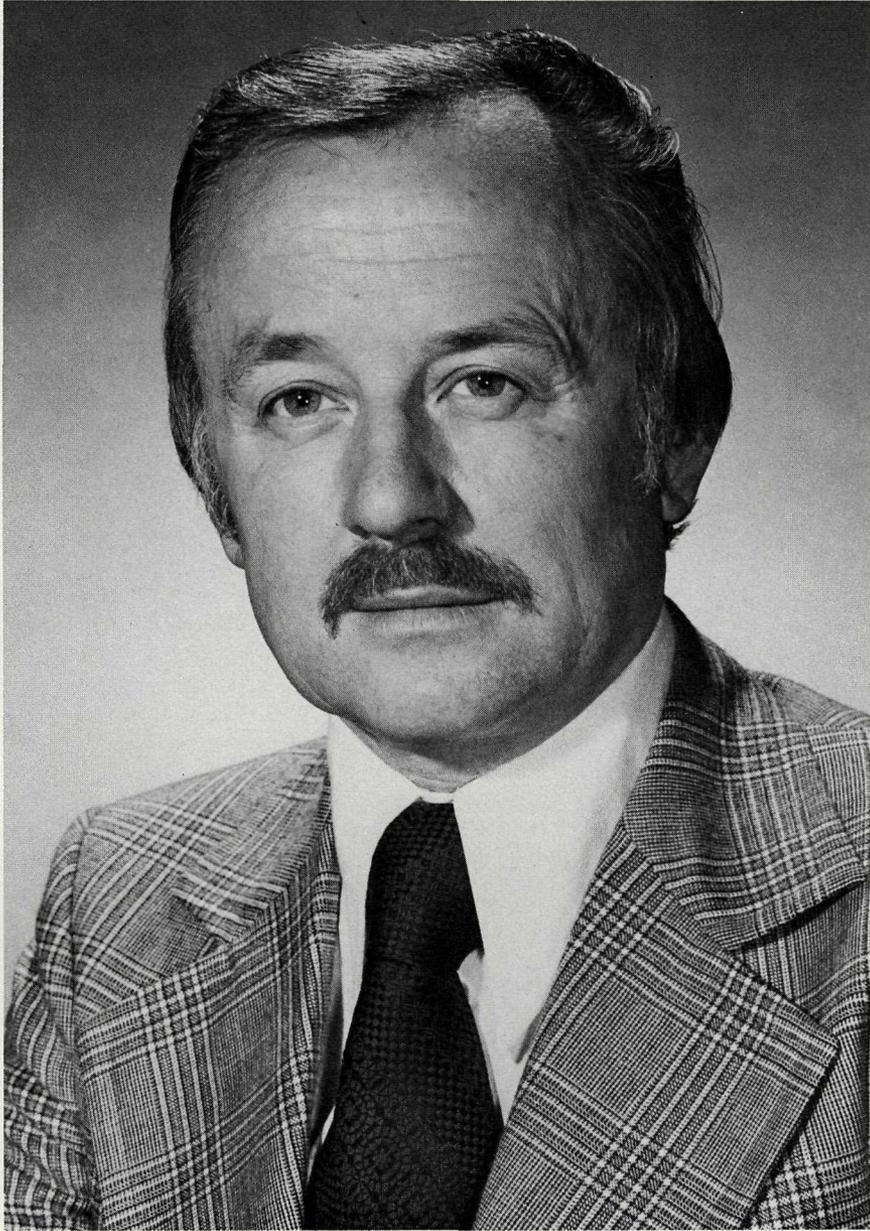
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Branch



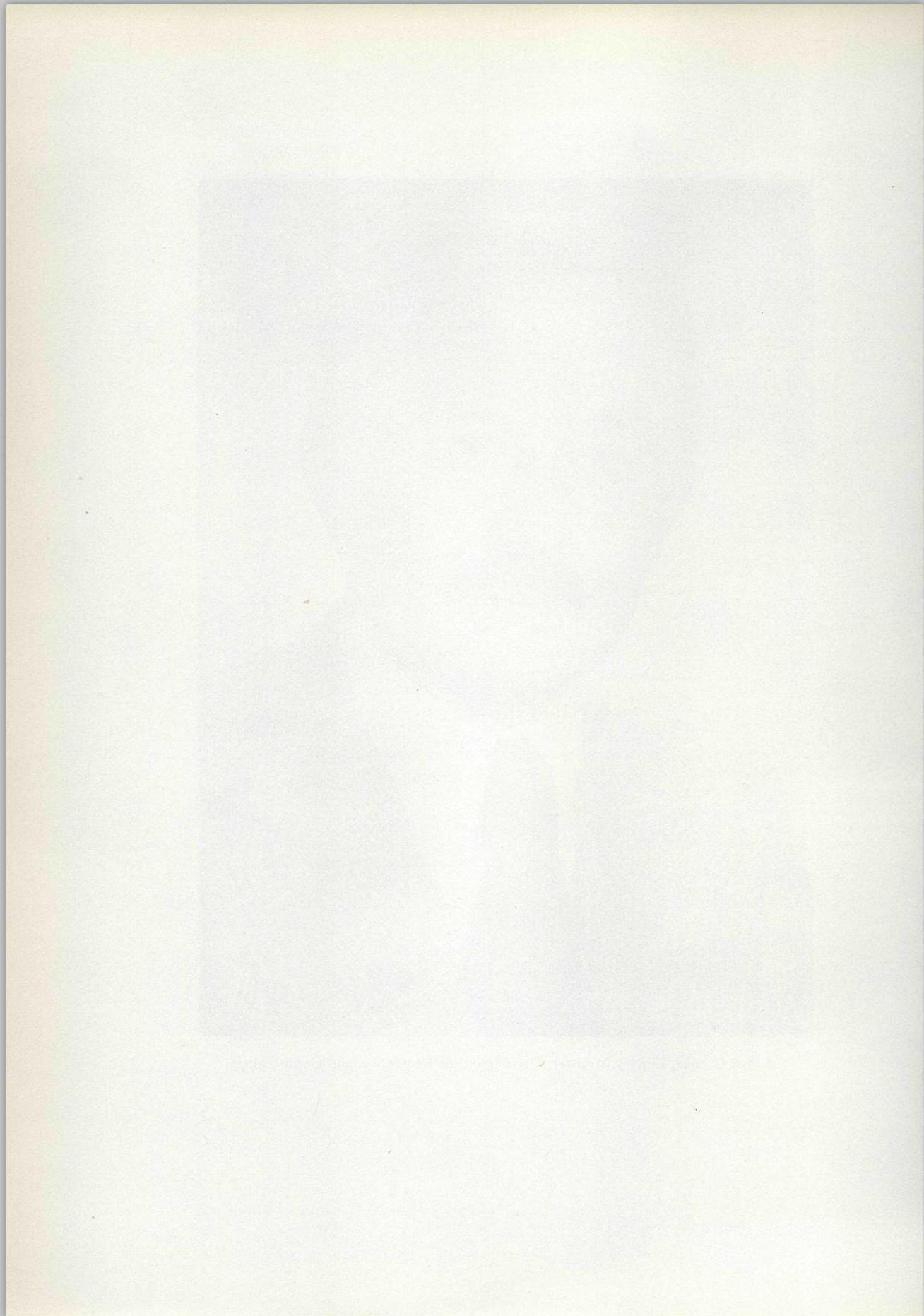
Department of Recreation and Conservation



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Lloyd Brooks, Deputy Minister, 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*.

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.

PROJECT SAM

The Department continued a programme of environmental conservation by removing abandoned and derelict motor-vehicles and other scrap materials from roadside and recreational areas through the services of Project SAM; the name is 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, has compacted 54,203 derelicts at 223 depots in 116 communities within 22 regional districts throughout the Province. In that time 37,011 of these compacted derelicts have been hauled to the shredding plant in Richmond. The remaining cars are stacked in depots around the Province. Enumerable old stoves, refrigerators, washing-machines, freezers, and water tanks have also been compacted and hauled. A number of depots in 11 regional districts have been serviced twice already.

The hauling has been done by Project SAM lowbeds, private sector trucks (on a back haul basis), and barge companies.

The reclaimed material is used in the manufacture of a wide range of steel products.

Approximately 15,000 cars were hauled to the shredder and 19,000 cars compacted during the period of January 1, 1973, to December 31, 1973.

WILDLIFE REVIEW

The Departmental magazine *Wildlife Review*, which is issued quarterly, has an average press run of 36,000 copies. Individual circulation accounts for 25,000 of these, while bulk purchases from some branches of the Department, from the Canadian Forestry Association, and others, represent a further 8,000 copies. Copies are also sent to the various regional offices of the Department throughout the Province.

The magazine has a limited exposure through selected stores. Some 22,000 of the regular subscribers are in Canada, 4,000 in the United States, 500 in the United Kingdom, and small pockets of readers in countries throughout the world.

PERSONNEL SECTION

The year 1973 saw a continuation of the development of the Personnel Section within the Department of Recreation and Conservation. An additional Personnel Officer and three clerks were added to staff. A comprehensive system of employee evaluation was introduced with some degree of initial success. Work has begun on a system of establishment control and the development of basic personnel filing systems. Other systems within the Personnel Section will be established during the forthcoming year.

During 1973, major classification reviews were undertaken involving the various technical groups within the Department. These included the park technicians, fish and wildlife technicians, and museum technicians. In addition, numerous individual classification reviews were undertaken. The Personnel Section also assisted in major reorganizations of the Parks Branch and the Fish and Wildlife Branch.

The Section had an extremely active year in the recruitment of additional staff at all levels. Extensive recruitment of short-term employees was again continued through the Accelerated Parks Development Programme.

Over 200 new continuous employees were recruited at the professional, technical, and clerical levels. Highlights included the appointment of an Associate Deputy Minister, two new assistant directors in the Fish and Wildlife Branch, and one new assistant director in the Parks Branch.

In 1973, two employees completed the Basic Course in Public Administration, one employee from the Department commenced the 1973/74 Executive Development Training Programme, while three were admitted to the Course in Public Administration. A number of employees attended short programmes in staff management, first aid, and secretarial practice. Plans were laid to train senior management and supervisory staff for the introduction of collective bargaining procedures during 1974.

Six employees in the Department received 25-year continuous service awards:

Fish and Wildlife Branch: R. R. Farquharson; Dr. J. Hatter; W. S. Webb;
A. M. Hames.

Parks Branch: W. R. Heggie.

Provincial Museum: C. J. Guiguet.

The Department of Recreation and Conservation was honoured in receiving the Premier's award for the most improved accident prevention record in the Provincial Government during 1973. This marks the second time that the Department has received this award since its inception in 1970.

Two safety awards of merit were presented to the Parks Branch:

Alouette Lake Region, bronze.

Langford Workshop, silver.

PUBLIC INFORMATION OFFICE

The public's interest in the things we do continued to be demonstrated in 1973, with an increasing tendency on the part of the public to seek information in a collective manner.

As few as three press releases were issued in February and as many as 20 in November. The increase resulted from the emphasis given to the need for media contact as the year progressed. Additional staff were provided with the appointment of an assistant to the office secretary, and a photographer, assigned on a temporary basis.

The Resource Use Information Committee, composed of public information officers from departments represented in the Environment and Land Use Committee, was dissolved in 1973 as the E.L.U.C. Secretariat was formed.

The Departmental Public Information Officer continued to be a member of the Wildlife Review Advisory Board. As well, he assumed the appointment of assistant editor on the departmental publication and, in that capacity, conducted a general readership survey.

The Departmental Public Information Officer also carried out information duties with the Man and Resources programme (Canadian Council of Resource and Environment Ministers) and assisted at the Provincial and national meeting in an information services role.

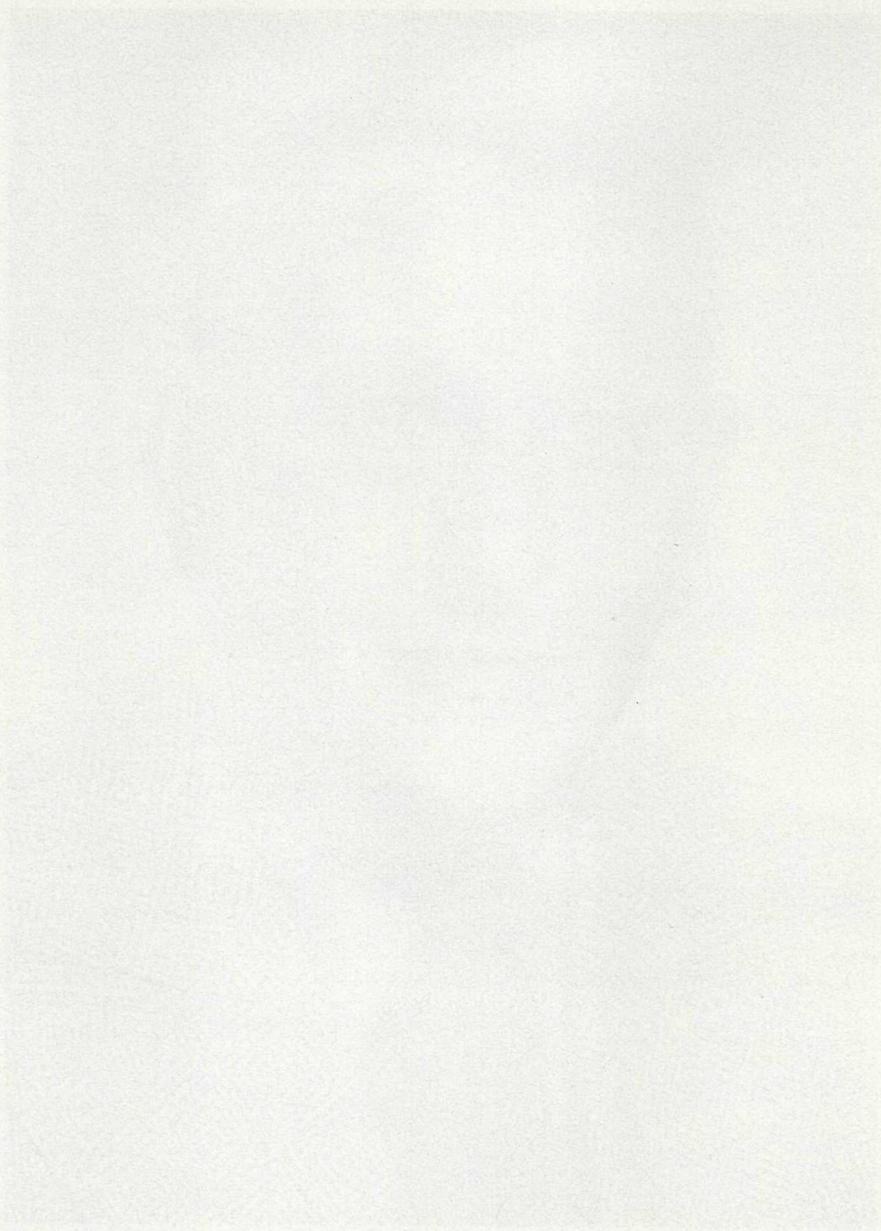
Several meetings of Public Information Officers and senior staff in the Department were held during the year to discuss the possibility of improving information services. Generally, information officers felt that services to the public and to the Department needed much improvement and as the year concluded they looked ahead with hope that 1974 would see important changes.

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E. H. (Ed) Vernon, Associate Deputy Minister.

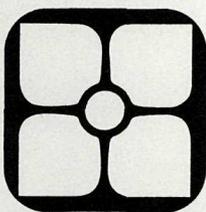
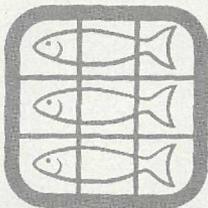


THE UNIVERSITY OF CHICAGO

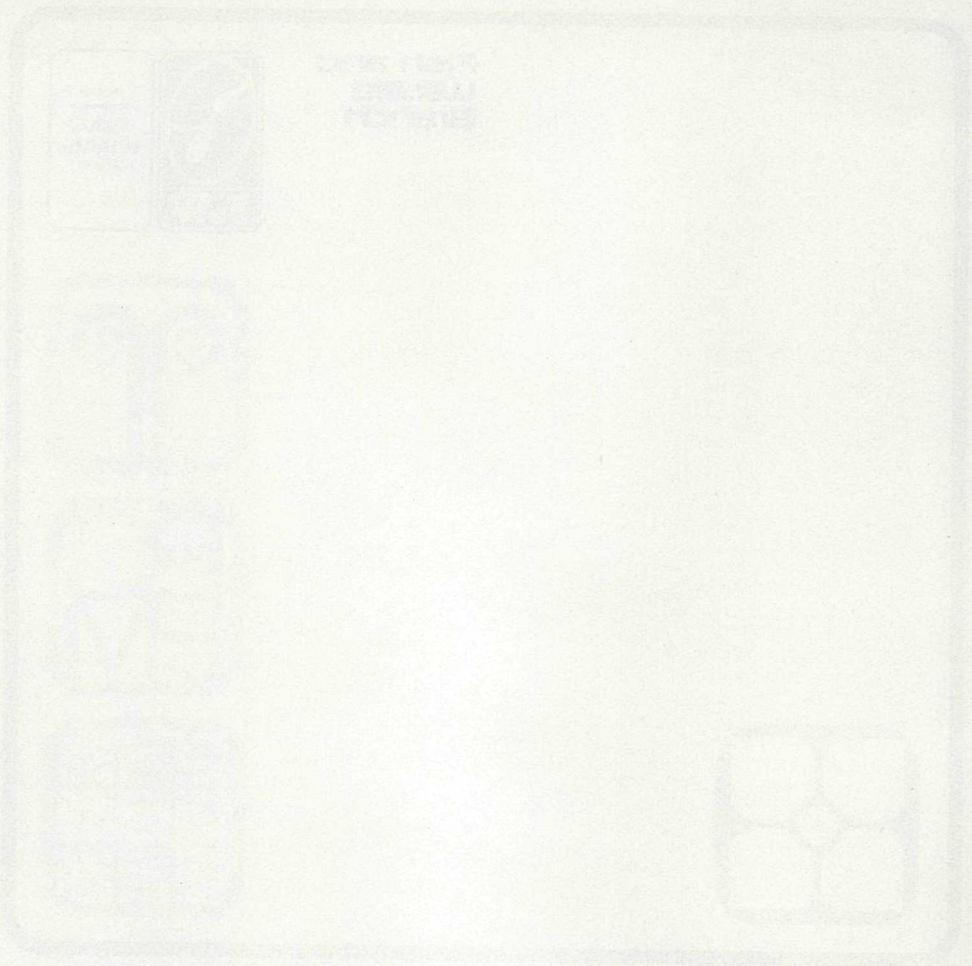
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Wildlife
Branch**



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**Fish &
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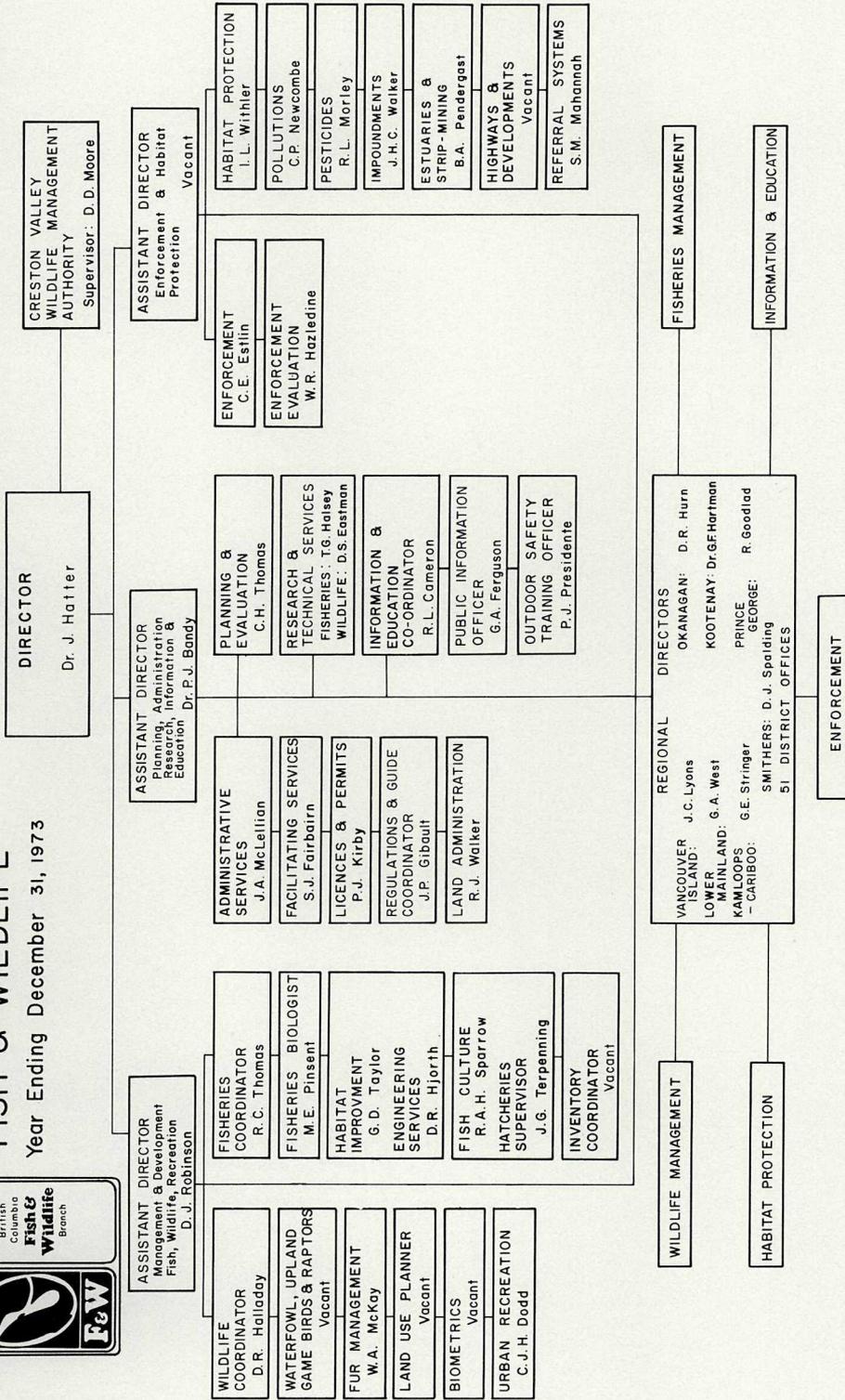


Department of Recreation and Conservation



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FISH & WILDLIFE
Year Ending December 31, 1973



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FISH AND WILDLIFE BRANCH

J. HATTER, DIRECTOR

A budget increase of \$1.2 million and an increase of 48 in permanent staff enabled the Fish and Wildlife Branch to improve and expand most of its programmes and services above previous levels. Public concern for the welfare of fish and wildlife resources and many associated environmental matters placed heavy demands on the Branch for the implementation of more intensive management practices of all kinds and for greater interdepartmental involvement in natural resource planning. Similar demands placed on other agencies and industry created heavy demands for information and consultation services which the Branch was unable to meet at previous budget and staff levels. Budget increases permitted the Branch to obtain more precise estimates of fish and wildlife stocks as well as more detailed knowledge of habitat requirements; to acquire more inventory information applicable to land use and resource development decision-making; to improve and extend enforcement, information, education, and habitat protection services; and to conduct a number of habitat improvement projects.

During the year the Branch was reorganized into three main divisions—Management and Development, Planning and Administration, and Enforcement and Environmental Protection. Assistant Directors were appointed to each of these and senior positions were added to the headquarters staff to co-ordinate major activities within the Branch. This has served to redistribute a very heavy work load and to provide better co-ordination of activities and programmes throughout the Province. In addition, a new regional office was established at Smithers to provide essential services in this rapidly developing northwest section of the Province.

The need for increased habitat protection services throughout the Province was partially alleviated by the appointment of eight habitat-protection biologists and technicians to regional offices. This permitted wildlife and fisheries biologists, who were previously inundated with demands for this type of work, to redirect their attention to management aspects of more direct benefit to hunters, fishermen, and other recreationists.

Newly established conservation officer districts at Cassiar, Port Hardy, and at Tlell on the Queen Charlotte Islands, an addition of 10 Conservation Officers, and an increase of 57 in the number of auxiliary Conservation Officers has expanded and extended enforcement services. In addition, five Conservation Education Officers were appointed to regional offices in order to provide improved information education services and to permit the extension of the Conservation Outdoor Recreation Education programme throughout the Province.

Continuing increases in the demand for hunting and fishing opportunities are reflected in the revenue statement for the 1972/73 fiscal year. Resident hunters increased slightly and more than 8,000 additional resident fishermen elected to spend some of their leisure time on the waterways of British Columbia. Hunting by nonresidents increased only slightly, while fishing activity decreased. However, Canadians from other provinces enjoyed fishing in British Columbia to a greater degree than ever before.

Revenue by Source

	1968/69	1969/70	1970/71	1971/72	1972/73
Resident hunting licence	\$ 579,412	\$ 604,906	\$ 623,988	\$ 615,745	\$ 620,974
	(\$4)	(\$4)	(\$4)	(\$4)	(\$4)
Nonresident hunting licence (other than Canadian)	173,725	182,800	179,450	166,225	175,475
	(\$25)	(\$25)	(\$25)	(\$25)	(\$25)
Nonresident hunting licence (Canadian)	2,160	1,995	1,995	2,715	2,265
	(\$15)	(\$15)	(\$15)	(\$15)	(\$15)
Deer-tag licence	179,387	173,544	177,581	162,451	151,505
	(\$1)	(\$1)	(\$1)	(\$1)	(\$1)
Moose-tag licence	300,770	329,058	319,545	311,636	330,114
	(\$6, some \$5)	(\$6)	(\$6)	(\$6)	(\$6)
Elk-tag licence	55,680	56,080	51,090	44,380	45,530
	(\$5)	(\$5)	(\$5)	(\$5)	(\$5)
Mountain goat-tag licence	15,420	14,938	14,751	12,976	10,480
	(\$2)	(\$2)	(\$2)	(\$2)	(\$2)
Mountain sheep-tag licence	12,180	12,280	12,985	13,215	13,275
	(\$5)	(\$5)	(\$5)	(\$5)	(\$5)
Caribou-tag licence	24,610	24,290	26,585	28,540	31,580
	(\$5)	(\$5)	(\$5)	(\$5)	(\$5)
Grizzly bear-tag licence	28,460	26,545	28,160	22,670	25,080
	(\$10)	(\$10)	(\$10)	(\$10)	(\$10)
Black bear-tag licence	7,882	8,136	8,970	10,677	10,407.50
	(50¢)	(50¢)	(50¢)	(50¢)	(50¢)
Cougar-tag licence	-----	-----	1,795	2,244	2,295
	-----	-----	(\$5)	(\$5)	(\$5)
Nonresident game bird licence (Canadian)	-----	-----	-----	-----	-----
Big-game trophy fees (non-resident)	321,760	328,436	324,570	298,820	280,725
Resident angler's licence	550,667	610,128	639,552	642,651	667,821.50
	(\$3, some \$2)	(\$3)	(\$3)	(\$3)	(\$3)
Resident steelhead angler's licence	9,462	10,856	10,700	48,717	54,087.31
	(25¢)	(25¢)	(25¢)	(\$2)	(\$2)
Resident senior citizen angler's licence	-----	-----	-----	-----	2,684
	-----	-----	-----	-----	(\$1)
Nonresident anglers	232,710	257,000	261,070	249,870	238,640
	(\$10)	(\$10)	(\$10)	(\$10)	(\$10)
Nonresident angler's licence (Canadian)	65,862	67,986	72,486	78,753	84,684
	(\$3)	(\$3)	(\$3)	(\$3)	(\$3)
Nonresident angler's (short-term)	138,298	165,882	168,151	163,103	157,001
	(\$3.50, some \$2)	(\$3.50)	(\$3.50)	(\$3.50)	(\$3.50)
Nonresident steelhead angler's licence	9,635	11,995	10,495	9,620	9,655
	(\$5)	(\$5)	(\$5)	(\$5)	(\$5)
Nonresident angler's licence (minor)	17,883	20,731	20,908	19,388	17,780
	(\$1)	(\$1)	(\$1)	(\$1)	(\$1)
Resident trapping licence	11,020	11,665	10,880	10,360	12,543
	(\$5)	(\$5)	(\$5)	(\$5)	(\$5)
Guide-outfitter, registered guides, and small game and angling guides	12,185	12,405	29,400	29,136	28,170
	(\$15, \$10, \$5)	(\$15, \$10, \$5)	(\$50, \$5, \$15)	(\$50, \$5, \$15)	(\$50, \$5, \$15)
Resident fur trader's licence and royalty on fur	35,778	37,040	36,793	29,671.24	37,700.50
Fines imposed under the <i>Wildlife Act</i> and <i>Firearms Act</i>	29,645	31,094	35,282	38,181	58,062.50
Miscellaneous revenue	23,079 ¹	18,049 ¹	8,132	6,916.50	10,140.21
Subtotal	2,837,610	3,017,838	3,075,314	3,018,661.24	3,086,590.52
Less commissions on sale of licences	132,675	109,347	157,972	142,912.91	129,779.27
Totals	2,704,935	2,908,492	2,917,342	2,875,748.33	2,956,811.25
Less <i>Wildlife Review</i>	-----	-----	-----	-----	29,542.11
Total	-----	-----	-----	-----	2,927,269.14

¹ Includes subscriptions to *Wildlife Review*.

FISHERIES MANAGEMENT

During the year a specialized environmental protection team was created by combining fisheries and wildlife habitat protection elements within the Branch. The resultant division considerably strengthens and specializes the habitat protection function and allows the fisheries management unit to direct more effort toward management, enhancement, and specific regulation of the freshwater fisheries of the Province.

Most Branch fisheries management work is organized and conducted in the field by biologists and technical staff under the direction of regional directors in the seven management regions of the Province. Much of the fisheries activity is therefore outlined in the regional sections of this Report. However, several Province-wide functions are administered or co-ordinated through the Victoria office to provide services and support to regional management programmes. These activities are outlined in the following sections.

ANGLER USE AND LICENSING

The number of freshwater anglers in the Province increased by approximately 9,000 from 1971/72. Anglers in British Columbia freshwaters have increased by about 50,000 (18 per cent) in the last five years (1968/69 to present). Table 1 presents the estimated number of angling licences sold in the Province annually for the last nine years. Due to some duplicate licensing (steelhead licences and alien three-day licences), there is a variation between these data (*see* below) and the actual number of anglers using British Columbia freshwaters.

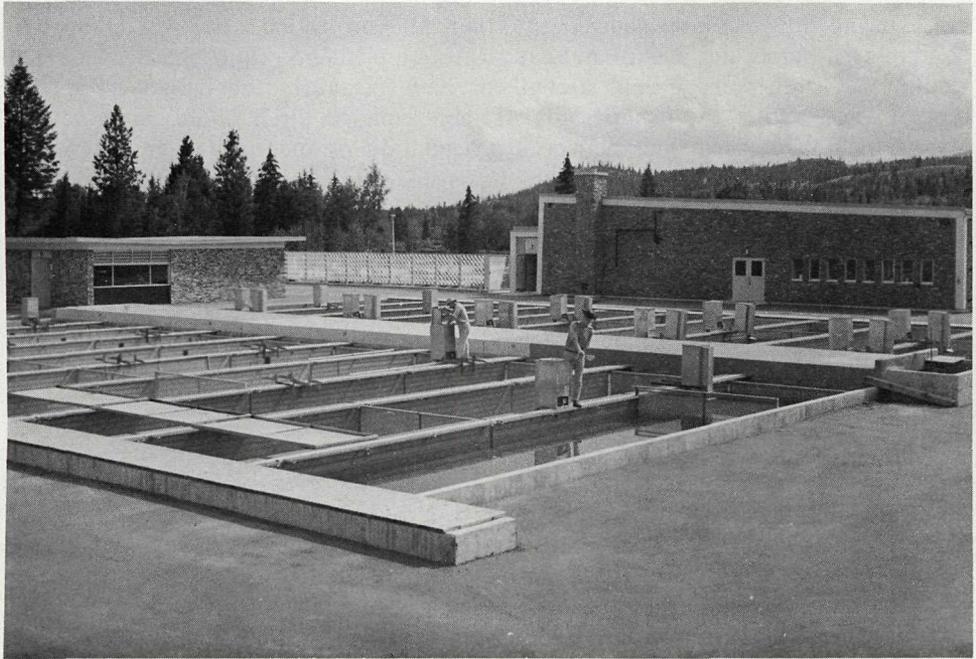
Total Freshwater Anglers and Total Licence Sales, 1964/65 to 1972/73

Year	Total Licence Sales	Year	Total Licence Sales
1964/65	219,551	1969/70	365,691
1965/66	236,789	1970/71	376,227
1966/67	289,436	1971/72	357,468
1967/68	315,790	1972/73	368,869
1968/69	328,767		

Analysis of angling licence sales indicates that fewer United States anglers are coming to British Columbia from Washington and California than in past years, while more visitors from the eastern and southern states are angling here. In 1968/69 about 72 per cent (17,121) of the non-Canadian anglers came to the Province from Washington and California. In the 1972/73 licensing-year only 67 per cent (15,975) of the alien anglers came from these two states, in spite of identical licence fees. Alberta anglers still make up over 80 per cent of all angling from other Canadian provinces.

STEELHEAD QUESTIONNAIRE RESULTS

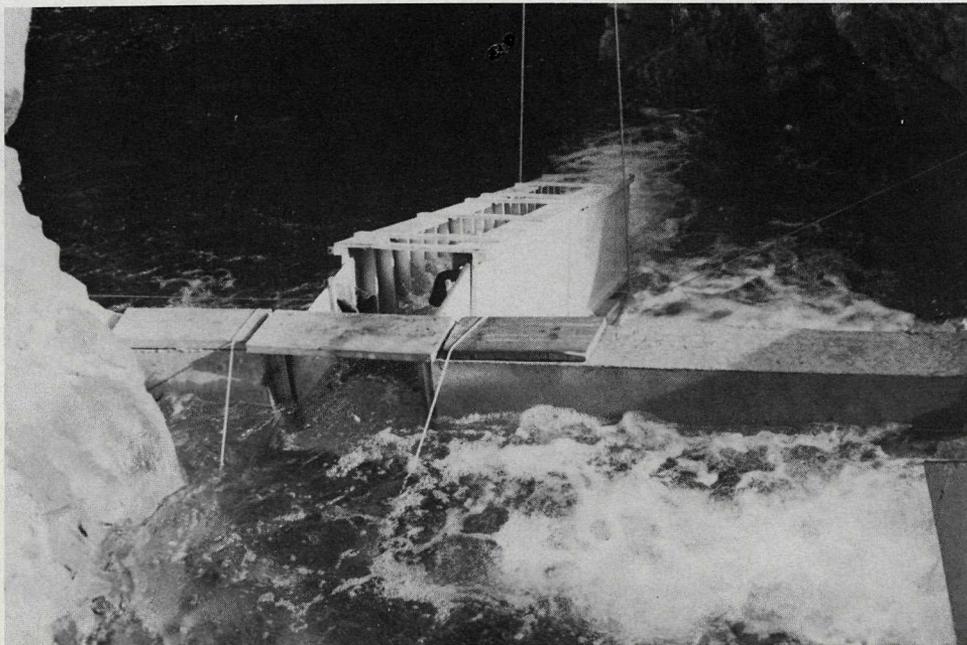
In the 1972/73 licence-year, 28,992 anglers purchased steelhead licences. Of that number 9,503 (32.8 per cent) did not fish for steelhead. Of those who did (19,489), only 8,165 anglers (42 per cent) were successful in taking one or more steelhead. Some 61,452 steelhead were caught, of which 25,670 were released. These data are almost identical with the catch and release figures of 1971/72. Steelhead angling provided an estimated 203,400 angling-days of recreation in the past year.



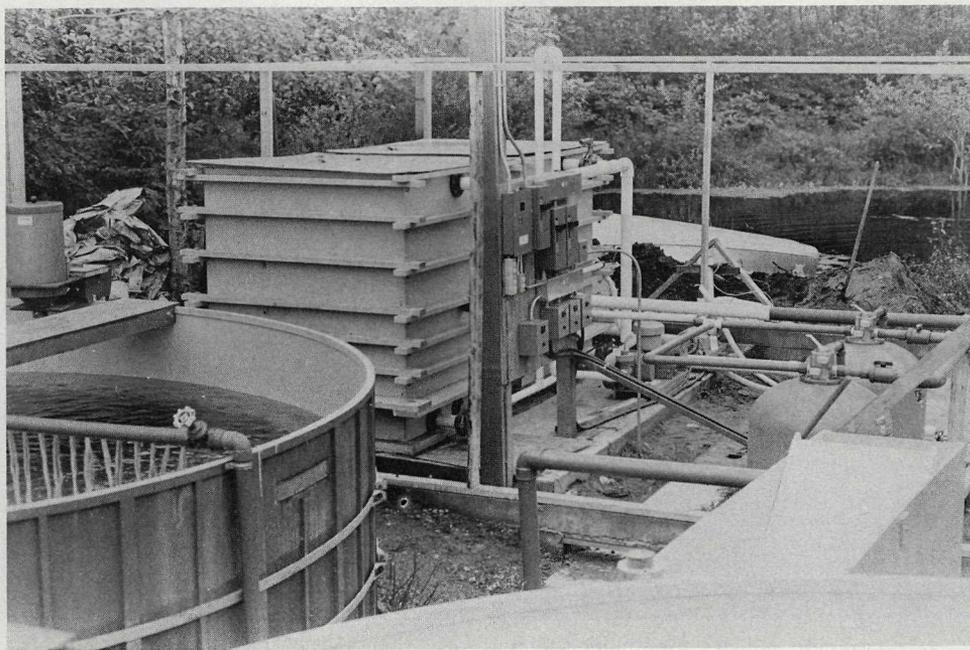
Outside rearing-ponds at the Kootenay Trout Hatchery near Wardner. Two and a half million fish were raised in these ponds in 1973.



The satisfaction of an outdoor experience.



A temporary fishway built by the Fish and Wildlife Branch to pass kokanee over an obstruction on Inonoaklin Creek, a tributary to Arrow Lake near Edgemont.



—(Photo by B.C. Research Council)

Partially constructed pilot plant to evaluate water recycling for the new Fraser Valley Trout Hatchery. Note newly designed circular rearing-ponds at lower left.



California bighorn sheep on lands secured for wildlife management near Riske Creek.

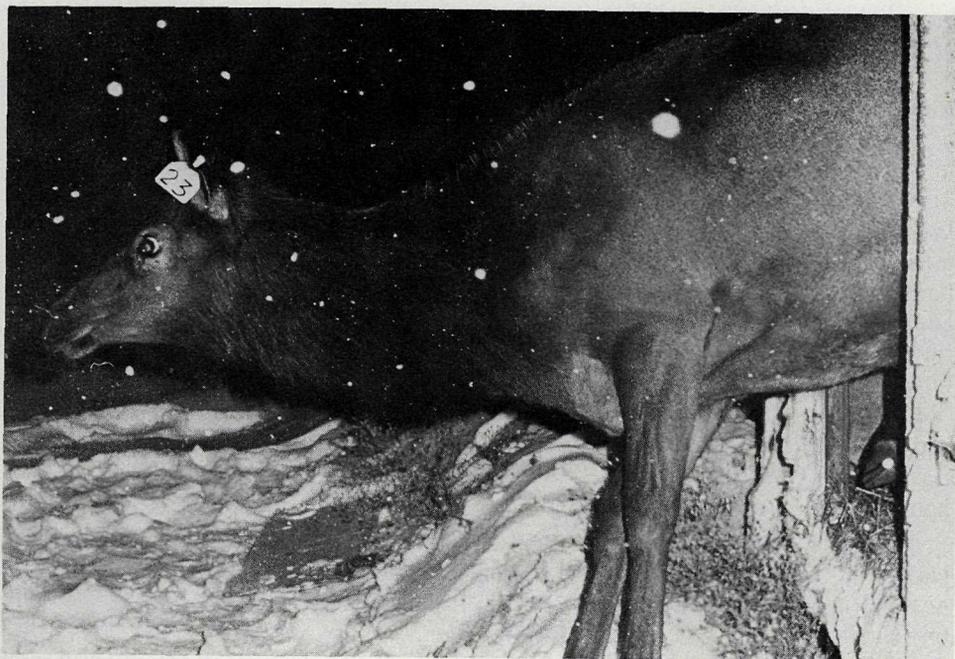


Two million ducks, five million shorebirds, and thousands of other bird species migrate annually through the Lower Fraser Valley. In addition, about 250,000 ducks, 20,000 snow geese, and 1,000,000 shorebirds remain to winter on the tidal marshes and agricultural lands of the valley. The Fish and Wildlife Branch is continuing its efforts to preserve this critical aquatic bird habitat.



—(Photo by D. Demarchi)

Valuable grass benchlands near Riske Creek acquired by the Fish and Wildlife Branch to insure more effective management of the California bighorn sheep.



—(Photo by R. Wright)

One of the forty elk transplanted from Jasper National Park to the release site near Lytton.

INVENTORY

A total of 89 lakes throughout the Province was fully surveyed or partially resurveyed in 1973. Emphasis was directed toward southern Vancouver Island (Victoria area), the Cariboo-Coast Region, and the Northern Region. Information pertinent to fish management, for nearly 1,300 of an estimated 22,000 lakes in the Province, is now available. A total of 62 drainage systems was examined by stream survey crews with emphasis placed on description of physical conditions and fish distribution. Aerial photograph interpretation and overflights in some systems reduced ground reconnaissance requirements.

Requests by other Government agencies, industry, and the public for information on water bodies noticeably increased during the year. A data retrieval system and method of preparing survey maps for wider distribution was investigated to meet growing demands. Co-operative surveys with several resource agencies (e.g., Forest Service, B.C.L.I.) provided opportunities for cost-sharing and preparation of objective alternatives for integrated resource-use planning.

HABITAT IMPROVEMENT

A wide range of improvement activities included stream clearance, diversion structures, lake aeration, chemical rehabilitation, food organism (shrimp) and egg transplants, and lakeshore clearing.

Co-operative ventures with service clubs, several logging companies, and the Parks Branch were, for the most part, highly productive. Stream clearance, including log-jam removal, stabilization of road banks, and fish-passage structures were the major activities.

Engineering, biological, and technical support from headquarters was provided to most regions, several other sections in the Department, other Government branches, municipalities, and the public to expedite both long- and short-term local projects involving fisheries.

Reconnaissance and subsequent project initiation have become more complex with increasing and competing demands on water and land resources.

The following is a brief summary of typical improvement projects pursued in 1973:

Lightning Lake outlet—The second co-operative venture between the Fish and Wildlife Branch and Parks Branch (Vancouver District) resulted in the improvement of an outlet spawning stream in Manning Provincial Park. A phased and limited stream-clearance programme was commenced in 1973 as well as providing adult and fry ascent facilities for rainbow trout. It is anticipated in 1974 that further clearance work will be conducted by Parks personnel with Fish and Wildlife direction.

Meadow Creek—In 1973, progeny from the third (1969) kokanee spawning-run in the artificial channel returned to spawn in Meadow Creek (North Kootenay Lake area). An estimated 630,000 fish entered the system, a population level half again as large as the donor stock.

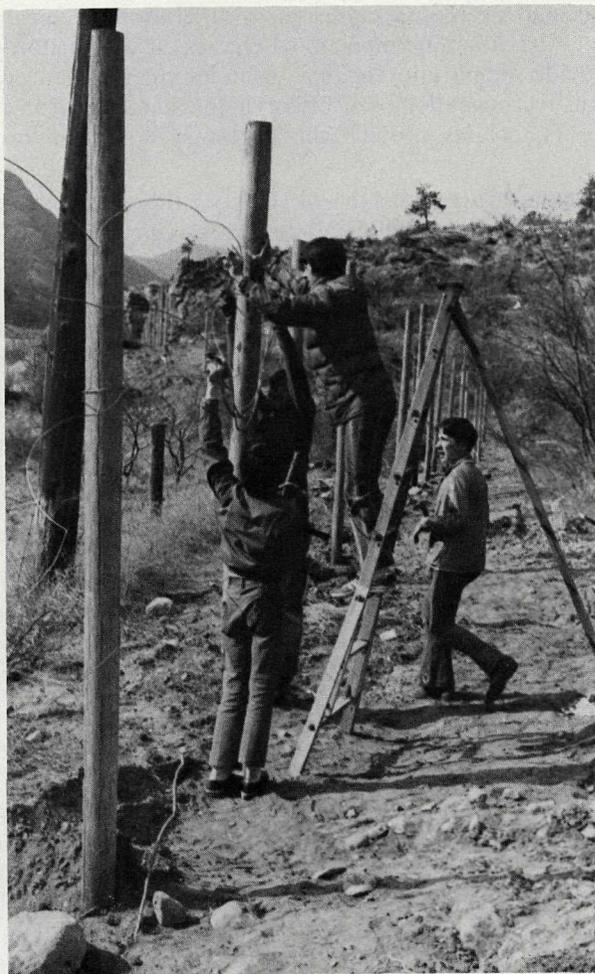
Loosening and partially cleaning the gravel in the spawning-channel in the past several years, in conjunction with controlling the number of spawners, has resulted in increased fry survival. From a previous low in 1971 of 6.3 per cent fry, survival rose in 1973 to 25.6 per cent.

Diversion of a tributary stream, which annually deposits large quantities of sand, silt, and bedload materials in the channel, was commenced in 1973 and is expected to be completed in late 1974.

Lake rehabilitation—Five small lakes located near population centres throughout the Province were chemically treated with fish toxicants (rotenone and antimycin) to remove undesirable fish (*see below*). A number of permanent stream barriers were built prior to treatment to prevent reinvasion by coarse fish species. Following detoxification and recolonization of food organisms (in the cases of rotenone treatments), the lakes will be replanted with game fish in 1974.

Lakes Chemically Rehabilitated in British Columbia in 1973

Lake	Region	Location	Size (Acres)
Courtenay.....	Kamloops.....	Merritt.....	153
Corbett.....	Kamloops.....	Merritt.....	50
Vidette.....	Kamloops.....	Savona.....	86
Twin.....	Okanagan.....	Kaleden.....	82
Blue.....	Cariboo-Coast.....	Williams Lake.....	126



Sheep-proof fence being constructed near Vaseaux Lake to keep California bighorn sheep out of orchards in the area. The local Rod and Gun and Naturalists Clubs assisted in the project.

Inonoaklin Creek—In 1972 the feasibility of providing access for migrating adult kokanee over a series of obstructions in the stream at its exit to Arrow Reservoir near Edgewood was determined. Since initial results indicated a combination of reservoir-level control after 1976, and comparatively inexpensive fishways could make 15 miles of excellent spawning environment available, the first of several large egg plantings was completed in October and November. Approximately 2 million eyed eggs (partially developed) were planted in 12 sites about 4.5 miles upstream of the reservoir. In 1977, adult kokanee returns should number 20,000 or more. Planting will likely occur in each of the next three years to build up donor stocks for one cycle in these 4-year-old fish.

Stream clearance—As a result of surveys near Williams Lake in the Cariboo-Coast Region in 1972, five important trout-spawning streams were improved through stream clearance programmes in 1973. Removal of instream debris (log jams) and beaver dams increased spawning area ninefold (from $\frac{3}{4}$ to $6\frac{3}{4}$ miles).

FISH CULTURE

A permanent staff of 13 fish culturists, a supervisor of construction, and 22 seasonal employees based at permanent hatcheries at Abbotsford, Summerland, and Wardner provide support to regional fisheries management programmes involving artificial fish propagation. A biologist in charge of fish culture and the Superintendent of Hatcheries provide the necessary co-ordination with regional staff.

Fish species cultured included brook trout, cutthroat (coastal and Yellowstone) trout, kokanee, lake trout and rainbow trout (including steelhead). Seventeen field stations were operated in 1973 to collect the eggs necessary for subsequent fish-rearing and eventual release.

The weight of fish distributed in 1973 was the highest on record. Almost 6 million fish weighing 51,000 pounds were stocked in 380 lakes (*see below*). This is the first time since 1962 that production has exceeded 50,000 pounds.

Number and Weight of Fish Released From Hatcheries in 1973

	Number	Pounds
Brook trout	71,500	204
Cutthroat trout—		
Yellowstone	64,000	20
Coastal	1,950	56
Kokanee	289,750	332
Lake trout	57,000	1,955
Rainbow trout	5,325,270	47,056
Steelhead	19,463	1,023
	<hr/>	<hr/>
Totals	5,828,933	50,646

Duncan River (Kootenay Region) was again planted with a small number of fish (3,200). This is part of an enhancement programme for this population of large rainbow trout which has been prevented from spawning in traditional areas due to construction of the Duncan Dam.

Some 868,000 kokanee eggs were placed in Mission Creek as compensation for eggs lost from the native run when a mud slide covered many of the eggs with sediment.

Two liberations of young steelhead were completed during the year. The first summer steelhead, of Coquihalla origin, were placed in a seminatural rearing-pond

adjacent to the river. High water in December caused the loss of an unknown but large number of the 2,900 fish which were introduced earlier in the year. In 1974 a larger number of summer steelhead will be released in the Coquihalla pond for an additional year of rearing with supplemental feeding. About 17,000 winter steelhead were liberated in a rearing-pond located on property of the Armed Forces Base at Chilliwack. No artificial feeding was provided for this group of steelhead. An attempt is being made to establish a small run of fish to this site for future egg collections.

In total, 18 million eggs were collected in 1973; 9.5 million rainbow trout, 4.8 million kokanee, and 3.2 million brook trout. Sufficient numbers of eggs of most species were obtained to satisfy requirements for regional fisheries management programmes. For the first time, no eggs were imported this year from outside the Province. Adequate numbers of brook trout and domestic rainbow, which were formerly imported, were obtained from British Columbia fish stocks.

Planning and design of the Fraser Valley Hatchery continued as a major project of the Department of Public Works and staff of the Fish and Wildlife Branch. Design of this facility was nearing completion in December when a contract was let to preload the construction site with gravel. Evaluation of a system for water reuse and treatment was completed during the year by B.C. Research. The pilot plant used in tests has operated satisfactorily for five months and design of the new hatchery will incorporate features of the test unit for water recirculation.

Several construction projects were completed or nearly completed in 1973. A wooden weir used to trap mature rainbow trout in the outlet stream (Spahomin) of Pennask Lake was replaced with a more durable structure. Trapping of fish at this site has been poor in recent years due to fish movement past the 40-year-old structure. At Swalwell (Beaver) Lake, another important field station for egg collections, improvements were made to the residence, grounds, egg-holding and boat-dock facilities. New water-distribution lines to the fish ponds and egg incubation room were installed at Summerland along with replacement of all the fish rearing-troughs.

In co-operation with the Department of Bacteriology and Biochemistry at the University of Victoria, a small number of trout from 13 lakes were examined to determine what bacterial groups were present and in what orders of magnitude. Many of the study lakes are sites for fish culture operations, and "background" levels of bacteria could prove to be useful in future fish culture programmes.

Fisheries Research Board personnel from Winnipeg were given assistance in collecting fish for a genetics programme designed to develop suitable fish stocks for aquaculture developments.

An evaluation of two manufactured fish foods commenced in 1969. This year, the study involved sampling the returns of spawning rainbow trout, of three-year classes, which were hatchery reared and planted in Swalwell and Premier Lakes. In each of three years, 25,000 marked fish raised on each diet were introduced to Premier Lake. The following summarizes returns of mature adults of different ages to the spawning-stream according to the diet:

Year Class	Ewos Diet				Clark Diet			
	Age			Total	Age			Total
	II	III	IV		Ii	III	IV	
1969.....	1,508	502	211	2,211	1,307	426	215	1,948
1970.....	227	171	.....	398	129	103	.....	232
1971.....	515	.....	.....	515	269	.....	.....	269
Totals.....	.....	.....	.....	3,134	.....	.....	.....	2,449

A much smaller number of marked fish have been accounted for in spawning-streams at Swalwell Lake. Creel census data indicates this may be due to the more intensive fishery in this lake when compared to Premier Lake.

About 35,000 people visited the three fish hatcheries in 1973 (about 20,000 in 1972), with most visitations in the summer months. Tourist guides were on staff at Summerland and Kootenay Hatcheries to assist visitors during their tours.

RESEARCH AND TECHNICAL SERVICES SECTION

The emphasis of fisheries research has shifted from strictly biological studies of fisheries management problems to a broader view of the effects of other resource uses on dynamics of sport fish populations. In addition, a growing proportion of research effort has been spent participating in interagency, multidisciplinary resource studies, both within the Provincial service and in co-operation with the Institute of Animal Resource Ecology at the University of British Columbia.

Trout Production and Resource Conflicts, Loon Lake

This year the study has been directed along two basic lines of investigation—(1) to determine biological and environmental factors regulating rainbow trout production in the lake as well as the inlet and outlet streams, and (2) to assess the impact of angling, increased cottage development, and intensified ranching on lake production and productivity.

Production of juvenile trout from the outlet stream was lower in 1973 (16,600) than in 1972 (25,000), but 10,900 fry migrated in 1973 compared to only 4,500 in 1972. Inlet production of 125,000 fry in 1973 was similar to the 1972 estimate despite an unusually dry year. This estimate suggests that some of the previous, less detailed estimates have probably been conservative.

In order to determine the trophic state of the lake, standing crops of phytoplankton and zooplankton have been measured and algæ bloom species identified. Preliminary analysis of the ratio of selected diatom species found in lake bottom sediment cores indicates that the lake may have undergone a change in recent times.

Examination of scales of outlet spawners marked as juvenile and fry migrants indicate possible differences in pattern and rate of growth as well as differences in age at return when compared to those from the inlet stream. Trout migrating to the lake as juveniles return as males age 2+ or 3+, while females return at either age 3+ or 4+. The relationship between age of lake entrance and age of first return as a spawner has yet to be determined.

Food selectivity of stream rearing-trout in inlet and outlet streams is being determined by comparing stomach contents with available food items found drifting in the stream; seasonal patterns of food availability will also be assessed. Similar data for young trout in the lake littoral zone indicates that in some months more

plankton is found in the diet of juveniles than in fry, which supports earlier observations of niche differentiation by the two age-classes.

A more comprehensive analysis of the sports fishery was undertaken in 1973 using two methods to assess angler success and effort. Resort-owners provided patrons with survey cards on which to record fishing-trip duration and number of fish caught. These data will be compared to stratified samples of anglers interviewed on the lake itself. Preliminary computations of catch indicate that it is slightly higher than last year (about 41,000 fish) in spite of a small decline in total effort.

During the survey, demographic data and angler preferences for types of fishing environments were gathered. British Columbia residents comprised 75 per cent of the angler population, while the remaining 25 per cent originated in the United States. In response to a hypothetical question regarding a change to fly fishing only on Loon Lake, less than 5 per cent of the anglers indicated that they would fish the lake more frequently than present, while 40 per cent indicated that they would stop fishing Loon Lake under those circumstances. If evidence of clearcut logging was visible to the angler on the lake, then 43 per cent of the British Columbia resident fishermen stated they would not change their frequency of visitation, while 40 per cent would go elsewhere. In contrast, corresponding values for nonresident anglers were 70 per cent and 23 per cent respectively.

An experimental screening device on the inlet stream prevented adult and juvenile trout from entering an irrigation ditch, but evaluation for passage of fry was postponed because of low water conditions.

Fisheries Management and Forest Harvesting

The interagency study involving the Fisheries Service, Department of the Environment, the B.C. Forest Service in co-operation with a forest products company, was continued in the Slim Creek watershed, 50 miles east of Prince George. The study is designed to determine the effectiveness of fisheries protective measures currently incorporated in forest harvesting plans.

Preliminary results of physical and biological measurements have demonstrated the primary importance of obtaining and utilizing soils data in the early planning stages of forest harvesting designs. The major biological impact has occurred at Centennial Creek, as a result of sediment transport originating from main roads and skid trails located in silty textured soil deposits. Without erosion controls and relocation of roads, reserve strips along Centennial Creek were limited in effectiveness. Results of surveys on stream-course alterations, associated with several streamside harvesting practices, indicate that selective harvesting in narrow reserve strips, rather than harvesting to and across streambanks, is an effective management practice for minimizing instream debris accumulations, bank scour and slumpages, possible fish obstructions, and diversions in small tributary streams.

Limnological conditions and fish populations of Tumuch and Shandy Lakes were assessed monthly during spring to fall in 1973, concentrating on light penetration, zooplankton composition, and fish catches in beach seines. Possible changes in Tumuch Lake, induced by forest harvesting, will be compared to Shandy, the control lake. The post assessment period is scheduled for 1975; preliminary results indicate reduced light penetration from suspended colloidal sediment and increased nutrient input in Tumuch Lake during spring and fall. Growth rate of mountain whitefish in the two lakes appears identical at this point in time.

Sedimentation and Salmonid Egg Survival Studies

In both natural streams and those associated with poor land-use practices, suspended sediment loads may reach levels that seriously impair salmonid repro-

ductive success. Studies were initiated during 1973 to provide a better base for assessing the effects of various suspended sediment loadings in rainbow trout and kokanee spawning-substrates. Sediment deposition, survival, and quality of emergent fry were examined for typical trout egg incubation conditions throughout a range of suspended silt loads. Emphasis is being placed on determining the effect of various particle sizes on egg survival, emergence success, emergence timing, and fry condition.

Canada-British Columbia Okanagan Joint Study

An investigation of the distribution and spawning habitat requirements of shore-spawning kokanee in Okanagan Lake was completed by the preparation of a report that provided estimates of the effects of lake-level change on reproductive success. An average of about 30 per cent of all eggs deposited in 1972 were probably killed because of the drop in lake level that occurred between November 1, 1972, and January 31, 1973. Distribution of shore spawning was determined primarily by the availability of suitable gravel.

Water Management Investigations, Ellison, Wood, and Kalamalka Lakes

Under the auspices of the B.C. Water Investigations Branch and in co-operation with B.C. Research, the Research Section assessed the fishery resources of the lakes and streams; estimates of the effect of several water-management alternatives on the fishery resource have been made. Possible improvements in Wood Lake water quality would likely decrease the total annual yield per acre, but this would likely be compensated for by an increase in the relative abundance of kokanee, mountain whitefish, and rainbow trout. Maintenance of water quality in Kalamalka Lake will probably have little or no effect on sports fish populations there. Water-management schemes will have no impact on recreational fisheries in Ellison Lake because no sports fish are found there; winter recreational use of the lake will have to be taken into account by management alternatives—some opportunities for rehabilitation of the lake for sports fish do exist.

Lake-level changes in Wood and Kalamalka Lakes during 1972 did not cause any significant loss of shore-spawning kokanee. Reproductive success of salmonoids in Coldstream Creek is restricted because of a deterioration in water quality induced by land-use practices in its watershed. Initial feasibility studies have been made to determine the possibility of restoring spawning habitat in Vernon Creek between Ellison and Wood lakes.

Technical Services

Computer programming services, advice on statistical analyses, and data processing were provided for several other Branch sections and regions.

Fisheries Research personnel acted as expert witness in two successful court cases under section 33 of the *Fisheries Act* and assisted in evidence collection procedures for a third case.

Samples of fish scales from several projects in many areas of the Province were processed and read. Benthic samples from the Kootenay River were sorted; preliminary analysis indicate that there was a greater number and diversity of invertebrate species above the pulp-mill effluent and significantly fewer species and numbers below the effluent discharge.

PUBLICATIONS

- HALSEY, T. G., and B. N. LEA, 1973. The shore spawning habitat of kokanee in Okanagan Lake and the effect of lake level changes on reproductive success. *Task 66E Preliminary Report*. 22 pp.
- NORTHCOTE, T. G., 1973. Some impacts of man on Kootenay Lake and its salmonids. *Technical Report No. 25*, Great Lakes Fishery Commission. 46 pp.
- 1973. Eutrophication and recreational fishes in two large lake basins in British Columbia. *Proceedings of the Symposium on the Lakes of Western Canada*. pp. 173-180.
- SLANEY, P. A.; T. W. CHAMBERLIN; and T. G. HALSEY, 1973. Effects of forest harvesting practices on the aquatic environment of watersheds in the central interior of British Columbia: A progress report of the fishery-forestry studies at the Slim-Tumuch watershed. 33 pp.

WILDLIFE MANAGEMENT

As a direct result of revised Government concepts of multiple resource use, wildlife management improved its position in the field of land-use planning. Progress was also made in the areas of wildlife inventory, habitat evaluation and protection, mainly due to increased funding and staffing. Waterfowl habitat improvement projects, both independently and in co-operation with other conservation agencies, were a continuing phase of wildlife management during the year. More specific references to these aspects of management are included in the following regional portions of this Report. Opportunity for Youth programme and the employment of summer students were intrinsic parts of these and other projects.

HABITAT PROTECTION

Recognition of the importance of critical ranges to wildlife management resulted in the acquisition of several key areas. These include:

- (1) A donation of 469 acres of land near Golden made to the Fish and Wildlife Branch by John and Caroline Bergenham. This land will be used for the preservation and propagation of wildlife in the East Kootenay area.
- (2) Extensive holdings of Riske Creek Ranch (formerly part of the Gang Ranch), which are important to bighorn sheep, were acquired by the Crown in trade for grazing land of less importance to wildlife. This trade will allow for effective management of the bighorn sheep in the Chilcotin River area.
- (3) An area of 250 acres in the vicinity of Mud Bay, known as the Serpentine Wildlife Management Area, has been declared a wildlife sanctuary under the *Wildlife Act*. The Fish and Wildlife Branch, Ducks Unlimited (Canada), Canadian Wildlife Service, and Douglas College are co-operating in a project to raise Canada geese in the sanctuary for release throughout the Fraser Valley.
- (4) An area of approximately 1,900 acres, known as Bummers Flats near Fort Steele.
- (5) An area of approximately 1,012 acres, known as the Gordon Earl Ranch near Newgate.
- (6) An area of approximately 975 acres known as Three Sons Ranch near Wasa Provincial Park.

Studies were initiated to examine ways of minimizing land-use conflicts in the Mica Reservoir and in the Purcell Range of the East Kootenays. These studies will serve to establish wildlife as a legitimate user of land in recognition of their public values.

MANAGEMENT

The winter of 1972/73 was a favourable one for most wild ungulate populations. Grouse population levels were generally somewhat lower than average, principally due to inclement weather during hatching and rearing periods. The abundance of waterfowl during the hunting season showed a slight increase over previous years. There was evidence of a notable increase in coyotes in the southern and central areas of the Province and this, coupled with an increase in the occurrence of black bears in both urban and suburban areas, necessitated increased predator control measures on these species.

The Hunter Sample continued to provide statistical data on game harvests by British Columbia residents, and the voluntary information submitted by sportsmen to this end is gratefully acknowledged. The following table summarizes the last seven years of resident game harvests:

Summary of Game Harvests by Residents of British Columbia, 1966/72

Species	1966	1967	1968	1969	1970	1971	1972
Deer.....	76,692	70,534	77,013	57,035	65,830	56,117	25,433
Moose.....	19,940	19,397	22,469	15,205	16,450	17,379	11,486
Elk.....	1,970	1,709	2,257	1,498	1,638	1,526	933
Caribou.....	798	1,191	830	854	949	1,000	1,080
Goat.....	1,762	1,577	1,661	1,557	1,386	921	737
Sheep.....	225	221	267	227	248	223	252
Grizzly bear.....	182	159	192	176	204	159	194
Pheasant.....	29,207	32,324	23,531	23,634	25,267	24,017	7,982
Grouse.....	508,514	978,485	623,979	807,229	948,142	691,585	384,954
Licensed hunters.....	134,351	143,048	145,052	151,653	153,424	152,759	150,615

The management of wild fur-bearers continues to contribute significantly to the income of resident trappers, particularly in the central and northern Interior of the Province. The commercial value of the wild-fur harvest over the last 11 years is as follows:

	\$		\$
1963.....	1,024,898.26	1969.....	867,494.12
1964.....	854,422.29	1970.....	657,733.72
1965.....	600,316.91	1971.....	702,049.11
1966.....	889,332.40	1972.....	794,445.80
1967.....	666,682.06	1973.....	1,744,480.40
1968.....	687,255.16		

The high values for the years 1963 and 1973 probably reflect the cyclic periodicity of Canada lynx populations, which tend to reach a high population density approximately every tenth year.

The Department has joined an all-out effort to find a human alternative to the controversial steel leg traps. A contribution of \$5,000 was made to the Canadian Association for Humane Trapping in furtherance of that organization's humane trap development programme. There was also an involvement on behalf of Provincial wildlife management in the Federal-Provincial conference on humane trap development planning. As a result of this conference a committee has now been established to co-ordinate humane trap research and development on a Government-sponsored, nation-wide basis.

SPECIAL STUDIES

A study of opportunities for improving hunting recreational use of private lands was conducted in the Fraser Valley. The results of this study will provide guidelines for developing better relationship between wildlife managers, land-owners, and sportsmen. In particular, the Fish and Wildlife Branch will act as a catalyst to facilitate co-operation between owners of huntable lands and the hunting public. A pilot test area will likely be set up for the 1974 hunting season in the Fraser Valley.

WILDLIFE RESEARCH AND TECHNICAL SERVICES

Research

Wildlife species are integral parts of the many ecosystems in the Province. As parts of the whole, they are affected by the development and utilization of resources in these ecosystems, especially by habitat alterations. Again this year, research activities were keynoted by the study of these interfaces that are of important and often critical value to wildlife.

The effects of logging on moose, blacktail deer, Roosevelt elk, and mountain caribou were examined in such diverse areas as the sub-boreal and boreal forests of north central and northeastern British Columbia, the coastal rain forests of Vancouver Island, and the alpine and subalpine zones of the Kootenays. These studies are defining baselines for the habitat requirements of these species and looking at the effects of different logging practices, with the aim of producing guidelines for forest management. The mountain caribou project is unique as it is an international effort to research the last remaining herd in the contiguous United States.

The interaction between wildlife and domestic stock was studied at three locations. In the East Kootenays, we partly supported a study of the habitat preferences of elk, mule deer, whitetail deer, bighorn sheep, and cattle on an important big game winter range. This study will likely conclude in 1974. In the Ashnola, near Keremeos, a regional project is concerned with the response of California bighorn sheep to the removal of cattle. Since the cattle were removed in 1968, little change in the adult population has occurred. We are also co-operating in a study on deer and cattle on the Dewdrop Range near Kamloops, in order to determine how cattle-grazing affects the capability of a winter range for deer.

Our growing concern for humane trapping and for the nonconsumptive use of wildlife is reflected in two supported projects. We extended a grant to McMaster University for a research project that is trying to develop a humane alternative to the leghold trap. We also funded a new project for this year—a proposal to increase deer numbers on a Lower Mainland area for both nonconsumptive and consumptive users in this most heavily populated area of the Province.

Long-term research on the population dynamics of Vancouver Island blue grouse was also supported in 1973. A variety of projects are under way designed to determine why grouse numbers vary between areas and with time. Continued support was also provided for contract studies into the economic benefits of wildlife to the people of British Columbia.

Technical Services

In addition to conducting and supporting research projects, we completed a variety of technical services for the regional offices. Requests for data were collated and compiled. Specimens submitted for autopsies were examined for parasites, and tissues were submitted for pesticide analysis. The analyses carried out are for

chlorinated hydrocarbons, polychlorinated biphenyls (PCB's), and mercury. We are especially concerned with those accumulator species near the top of food chains such as hawks, falcons, eagles, owls, and sea-birds, and those species used for human consumption, such as grouse and waterfowl. We acted as a liaison between regions and the several agencies that carry out and provide remote sensing data, from aerial photographs to satellite imagery.

Additional services included assistance to enforcement through identification of hair samples; laboratory analyses, such as plant identification and rumen content analyses for food habit studies; and graphic services such as draughting and artwork.

The first of a proposed series of public information booklets on wildlife parasites and diseases was released. Titled *Trichinosis in British Columbia*, the pamphlet describes the disease—symptoms and occurrence, the causative parasite and its life cycle, and how wild meat should be cooked to make it safe for eating.

Report

- EASTMAN, D. S., 1973. Moose-factory interactions in the sub-boreal spruce zone of north central British Columbia. Second annual report. 29 pp.
- 1973. Integrating moose habitat management with forest development. Presented Ninth North American moose conference and workshop, Quebec. 10 pp.
- 1973. Effects of logging on moose habitat in north central British Columbia. Presented to Fish and Wildlife Branch Seminar, Prince George. 12 pp.
- FRIIS, L. K., 1973. Trichinosis in British Columbia. Fish and Wildlife Branch publication. 4 pp.

CRESTON VALLEY WILDLIFE MANAGEMENT AREA

Construction activities continue to change the face of the management area for greater public enjoyment as well as for greater waterfowl usage. The construction of dykes, nesting islands, and water-level control structures at Leach Lake neared completion this year with the co-operation of Ducks Unlimited (Canada). Now vegetation patterns may be altered by the manipulation of water levels, permitting a greater diversity of habitat for migratory and resident waterfowl and, in time, substantial numbers of locally produced waterfowl will be seen.

Summit Creek Campground was opened to public use in early July. Overnight facilities received over 30 per cent utilization in 53 nights of use. The Parks Branch again assisted in providing maintenance funds.

Public facilities for greater enjoyment of Duck Lake's waterfowl populations were completed with the generous assistance of the Creston Kiwanis Club. Club members donated labour and materials to build a viewing platform and a rustic shelter from which visitors may better watch the activities of the waterfowl. The facilities occupy a site overlooking the northeast corner of Duck Lake, and include an information shelter with appropriate signs.

A contract for the construction of the Creston Valley Wildlife Centre was awarded this year. The site for the centre is located in the marsh near the Management Authority's administration centre. The first permanent staff member for the new wildlife centre will plan to conduct the summer's interpretative programme—this will consist mainly of organized tours and talks until the wildlife centre is completed. This programme should greatly enhance public understanding and appreciation of the management area, of the Creston Valley, and of other natural features of the area.

In addition, technical and public advisory groups to the Management Authority have been established to provide more active public participation in the plans and programmes of the management area.

HABITAT PROTECTION

In 1973, each administrative region acquired a habitat protection biologist and technician. The full-time involvement of these persons in local resource conflict investigations has made the regional protection function far more efficient than in the past, and has considerably reduced the burden of these activities previously thrust under regional fisheries and wildlife management biologists. However, because of the varied training and work experience brought to the Branch by each of these new employees, there will continue to be a good amount of sharing of this particular work, and a reliance upon the considerable knowledge of wildlife populations which is acquired by other staff members in the course of their management and enforcement activities.

Liaison

To an ever greater extent, other branches and departments of Government are entering into effective discussions and agreements with the Branch to provide for protection of fish and wildlife resources. Particularly encouraging were invitations extended by the Deputy Minister of Water Resources to begin informal meetings with Pollution Control Branch and Water Resources Service to improve the effectiveness of the referral systems existing between our branches.

Although beginning discussions have focused on more administrative matters, future meetings should explore wildlife resource problems relating to policies in placer-mining, operation of pulp-mills, sewage disposal, and solid-waste disposal. Similarly, discussions with the Water Resources Service should centre on provision of residual flows in fish-bearing streams, regional water management, and flood control policies. The Department of Highways is entering into a system of formal notification to this Branch and regular joint staff meetings to allow for input of habitat protective measures in all aspects of highway, bridge, and other construction and maintenance. Although various informal notification systems at headquarters and field offices have existed with the Department of Highways for some years, the real need for a more formal system was not recognized until conflicts arose in 1973 relating to unauthorized channelling of the Similkameen River in Manning Provincial Park.

The Branch has entered into the beginnings of a satisfactory and encouraging relationship with the newly-established Secretariat of Environment. It is hoped that we will provide useful information and some guidance to this group in their future activities.

Hydro-electric Dams

The Province continues to plan for filling the growing need for electrical power by construction of hydro-electric dams. The Branch is, with its own resources and with use of consultants, investigating fish, wildlife, and recreation conflicts and potentials at eight potential damsites in the Province. In 1973, Campbell and Kokish Rivers were reviewed as possible sites for generation of peaking power on Vancouver Island; a site must be selected in early 1974 to supply this need. In the Interior of the Province, studies conducted by environmental consulting firms with some direction from this Branch have mainly been directed toward finding ways to compensate for loss of deer ranges associated with the soon-to-be-constructed

Seven Mile Dam on Pend-d'Oreille River. At Site 1 downstream from the W. A. C. Bennett Dam on Peace River, another environmental consulting firm has determined that wildlife losses will be small, but is devising methods of ensuring that a viable sport fishery will exist within the pondage. The Branch undertook an overview appraisal of problems associated with a possible Kemano II hydro-electric development which includes possible diversion of water from Dean, Morice, and Nechako Rivers. Other sites receiving various degrees of investigation included the McGregor Diversion of the upper Fraser into Peace River system, a small site (Ain River) on Queen Charlotte Islands, and the Revelstoke Dam downstream of Mica Dam on Columbia River.

Pulp-mills

In 1973 the Habitat Protection Section continued to maintain an effective liaison with regional personnel and with other Provincial and Federal agencies in dealing with pulp-mill effluent discharges to inland waters of the Province. Of major concern were mills located on the Thompson, Kootenay, and Columbia Rivers.

Numerous complaints of deteriorating water quality in the Thompson River during the low-flow period (November 1972 to March 1973) prompted a hasty interagency appraisal prior to the onset of run-off conditions. The Fish and Wildlife Branch co-operated with the Pollution Control Branch, Fisheries Service, and the Environmental Protection Service in an attempt to isolate and identify pollution sources. It was found that colour was a direct result of pulp-mill discharges. Orders have since been issued to rectify this problem. A further more comprehensive study involving additional Federal and Provincial agencies has begun and will continue through a complete water cycle (to spring 1975). The information obtained will form a basis for further management recommendations.

A sampling programme was conducted on the Kootenay River in order to document our objection to grossly deteriorated conditions arising through effluent disposal. These data are currently being reduced and interpreted.

Recent personnel additions will enable the Fish and Wildlife Branch to expand its capability to investigate pulp-mill pollution at all Interior locations. This Branch has been invited to participate in developing a proposal for quantifying the effect of various effluents on fish and their habitat in the Columbia River near Trail. It has been suggested that the pulp-mill at Castlegar be included in this study.

Forestry

"Total Resource Planning" has been the key phrase during 1973 for the Forest Service and Fish and Wildlife Branch. The concept of integrated forest resource planning was originally formulated through the efforts of the Prince George Forest District and (Northern) Region VII of the Fish and Wildlife Branch. The objective and principle of this system is to establish and identify all resource values with their respective constraints *before* the planning for forest harvesting commences. During 1973 the first steps were taken to expand this system throughout the Province.

Continuing excellent co-operation from the Forest Engineering Division of the Forest Service in all regions has resulted in a number of major forest road and bridge construction projects completed with minimal environmental damage.

During 1973 the Habitat Protection Section was invited to sit on a number of Forest Service Engineering water improvement project committees. These committees are charged with planning the clearing of drowned timber in a number of large reservoirs in British Columbia, including Nechako Reservoir (Ootsa Chain), Willis-

ton Reservoir, and Mica Reservoir. Habitat Protection personnel are currently engaged in planning priority cut areas, leave areas, etc., for the benefit of lake fisheries, recreation, and lakeshore wildlife range.

Road Construction

Referrals from Department of Highways Design and Survey Section and Bridge Design Section reached monumental proportions in 1973. Major construction projects in which the Habitat Protection Section became heavily involved were Highway 1 from Victoria to Nanaimo, Highway 3 from Hope to Princeton, and the extension of Highway 401 from Hope to Merritt via Coquihalla and Coldwater River valleys.

Extensive environmental problems encountered along Similkameen, Skagit, and Sumallo Rivers adjacent to the Hope-Princeton reconstruction project have resulted in the Department of Highways establishing the Highways Environmental Liaison Committee on which sit representatives of Fish and Wildlife Branch, Parks Branch, and various sections of Department of Highways. The purpose of the Committee is to discuss and devise ways and means of establishing closer liaison between headquarters and in the field.

Pesticides

Regulation and monitoring of pesticide use in British Columbia became a major function of Habitat Protection personnel in 1973. Through its representation on the B.C. Interdepartmental Pesticide Committee, the Branch is able to recommend environmental protection measures for all herbicide and insecticide projects conducted throughout the Province. Branch personnel made numerous pre- and post-spray inspections in 1973 with the excellent co-operation of the B.C. Forest Service and the member companies of the Council of Forest Industries.

Representation on the Council of Forest Industry's Pest Control Committee provides this Branch the opportunity for involvement in all the planning stages for control of major forest insect outbreaks, ensuring the early formulation and incorporation of environmental protection measures. An example of a major insecticide programme in 1973 was the northern Vancouver Island spray project aimed at control of the black-headed budworm in the Neuroutsos Inlet area. The chemical, Simithion (fenitrothion), was applied twice at the rate of 2 oz./acre, a concentration believed not to be harmful to animal or fish life. Although a 600-foot leave strip was to be maintained on all water bodies, Fisheries Service and Fish and Wildlife Branch personnel monitored the spray for effects on fish. To date, no adverse effects on fish populations have been discerned as a result of spraying.

Referral Systems

Placer-mining—The concept of placer-mining throughout the Province has come under critical review this past year by all resource agencies involved in the issuance of leases. It has become increasingly difficult to justify the small monetary gains made by placer miners as opposed to the substantial degradation of the environment that results from some placer operations. Consequently, there has been a greater emphasis on more restrictive protective clauses and the responsibility has been placed on the miner to fully reclaim damage done to the environment.

The Fish and Wildlife Branch currently receives all applications for placer-mining on the Fraser River watershed, numbering 94 applications in 1973. Of major concern during assessment of these applications is the discharge of silt-laden effluent waters into fish-producing streams, instream work resulting in destruction of spawning-beds and disruption of habitat, and the channelization of streams.

Close co-operation between the Mines Branch and the Fish and Wildlife Branch is intended to ensure that both fisheries and wildlife interests are protected.

Water licences—Excessive removal of water from rivers, streams, and lakes in the Province is of great concern to the Fish and Wildlife Branch. Approximately 1,900 water licence applications were referred to the Branch for comment in 1973, and investigations have shown that further water withdrawals from rivers such as the Salmon in the Kamloops region, the Tsolum in the Courtenay area, and the Kettle in the Okanagan could result in a total loss of fish habitat. This Branch has requested that these waterways be classed as fully recorded.

Pollution control applications—The Fish and Wildlife Branch received 1,300 pollution control permit applications for review from the Pollution Control Branch in 1973. It was our responsibility to investigate the applications and assess their effects on fish and wildlife habitat; an attempt was also made to relate the recreational and aesthetic values of an area to possible harmful effects of the proposed discharges.

Emphasis was placed on such problems as discharge of chlorinated effluents, the need for upgrading of effluent treatment from municipal and industrial sources, the location of dump-sites adjacent to watercourses, and the recurrent problem of refuse-sites and their attractiveness to bears.

This latter situation is a most difficult problem. Bears, both black and grizzly, soon discover garbage-sites are an easy food source. Studies have shown that bears in proximity to humans often lose their fear of people and become panhandlers, raiders, and garbage eaters. Consequently, garbage-eating bears must be destroyed or trapped and relocated to avoid injuries to humans.

One way to minimize these conflicts is to reduce the attractiveness of the refuse. Our personnel have done some study on incineration; and we have encouraged consolidation of refuse-sites and requested bear-proof fencing around some disposal sites.

Reports

HOOTON, R. S. Sport fish, wildlife and recreation values in Chemainus River Watershed, and some effects of construction of a water storage dam. 17 pp.

HOOTON, R., and M. R. WHATLEY. A preliminary survey of fish and wildlife to be affected by hydroelectric developments on Columbia River. 25 pp., appendices.

MORLEY, R., and M. R. WHATLEY. The effects of implementation of the Kemano II project on sport fisheries, wildlife and recreation. 110 pp., plus appendices.

OKANAGAN REGION

The year 1973 was one of unprecedented growth and activity in all phases of fish and wildlife administration. Dominant in the period was the great attention given to acquiring and upgrading of inventory of the fish and wildlife resources of the region. Companion to the inventory emphasis in our work load has been the notable increase in public contact in both field and office areas by our Conservation Officers, in particular. This has resulted in a closer check on the user of the fish and wildlife and has enabled us to respond to a greater variety of public requests for information, guidance, and service. Accommodation for our district officers and for the regional office, however, remains overtaxed. Opportunities to develop and execute meaningful, socially supported fish and wildlife management programmes have never been better. We are confident that with support our activities will further improve the security of the over-all wildlife resources of the region.

PROTECTION AND ENFORCEMENT

The protection of the resource base and enforcement of hunting and fishing regulations were considerably accelerated at the district level with the attachment of six special Conservation Officers to assist in the wide variety of duties in the five district conservation offices. Additionally, the Penticton office was elevated to a two-man district late in 1973 with the assignment of a junior Conservation Officer to the area. This assistance resulted in a much increased public contact which was reflected in a better service to the public and a higher rate of field checking for general enforcement purposes. It also allowed a number of special enforcement patrols to areas of known hunter and fishermen concentrations. Alpine patrols were conducted in the Ashnola area (MA7), Galloping Hills (MA8), and Mount Faith area, in the Granby River drainage. Special creel census programmes were conducted on several waters of the area (Beaver-Dee Lakes, Okanagan Lake and River, Yellow Lake, and the Kettle River and tributaries.) Although the emphasis in general enforcement continues to be placed in the hunting season, public contact with fishermen and other recreationists has been increasing. A significant increase in public demand for protection from nuisance wildlife has been of concern. This area of servicing accounted for almost one-fifth of the field endeavour of our Conservation Officers in 1973 and was largely related to the protection of agricultural crops or live stock from ungulates and black bears.

The present practice of equipping our Conservation Officers with two-way U.H.F. radio continues to bring dividends. Liaison with the RCMP has been improved with the common ability to communicate readily from field locations and we are able to bring enforcement capability upon a given area much more rapidly than formerly. Attempts to tie in aerial patrols to our staff vehicles by radio have given much promise of more effective coverage of backwoods areas by our staff. The demands for the services of our Conservation Officers are increasing rapidly and are having severe effects upon their conduct of field contact with the users of the wildlife resource.

WILDLIFE MANAGEMENT

The winter of 1972/73 was relatively mild, and wild ungulate populations fared well as did game birds. Post-season counts of mule and whitetail deer revealed an increase in overwinter survival of juvenile animals as compared to the two previous years. However, as populations generally remained lower than desired, a further cutback in hunting opportunity was brought about by a cessation of hunting female mule deer throughout Management Areas 5, 6, 7, and 8.

The mountain goat populations of southeastern Management Area 7 are increasing, particularly in that portion between the Similkameen River and the International Border. That group, closed to hunting in 1966, has shown a steady increase, while the stocks north of the river, long closed to hunting, have remained static.

The California bighorn sheep populations of the Ashnola, Vaseaux, and Shorts Creek areas passed the winter in good condition. Carefully regulated hunting seasons were allowed in the Ashnola and Vaseaux area, but the Shorts Creek stocks were closed to hunting.

A three-year study of the migrational behaviour and population dynamics of the California bighorn sheep in the Ashnola was concluded in early summer. The results of this intense study, not yet published, have given a better basis on which to manage the sheep-dependent lands of the area in co-operation with the B.C. Forest Service, which administers the area.

A study of the effect of wildlife damage in orchards and vineyards was commenced under the guidance of a committee representing the B.C. Fruit Growers and the B.C. Grape Growers Associations. The questionnaire sent to all association members (3,000) revealed the dispersal and intensity of damage caused by large mammals (deer, elk, and bear) and provided an estimate of the economic significance of the damage to those agricultural sectors.

The first part of a joint programme to attempt to alleviate the losses of deer in the Summerland-Peachland section of Highway 97 was completed with the installation of a series of roadside reflectors to delay the movement of deer onto the roadway at night when occupied by vehicles. The second part of this project, the erection of a test section of fencing, has yet to be completed by the Department of Highways. It is hoped that these techniques may prove effective in reducing both the hazard to motorists in this area and the loss of animals which, in some winters, exceeds 100 mule deer.

An ongoing deer-tagging programme in the Tulameen portion of Management Area 7 and on the Summerland deer winter range (MA 6) is expected to lead to an understanding of the location and extent of the summer/fall ranges of these two stocks. To date, 31 deer in the Tulameen, and two mule deer of the Summerland stocks have been marked.

Intensive planning for the development of wildlife capabilities of Swan Lake, near Vernon, and the estuary of the Okanagan River at Osoyoos Lake was largely completed in 1973, and it is hoped that these areas may be subject to co-operative development in 1974.

The Gilpin range-management unit, east of Grand Forks in Management Area 8, is a co-operative venture with the B.C. Forest Service, Department of Highways, and Parks Branch. This deer winter and spring range, composed of private, vacant Crown, and greenbelt lands, received intensive improvement during 1973. Refencing, water-hole improvement, browse improvement, and fertilization were variously applied to planned sections of the eco-unit. This experimental approach to the integrated management of several resource values is proving both viable and beneficial and is strengthened by representation of public groups interested in the planning council.

Intensive deer range improvements were carried out on extensive portions of critical deer winter ranges in each of Management Areas 5, 6, 7, and 8. A variety of techniques including browse forage pruning, thinning, seeding, fertilization, fencing, water-hole improvements, and spring burning, were carried out on winter ranges in the following locations:

MA 5—Byers Range, Shuswap River.

MA 6—Shorts Creek; Antlers Saddle, Peachland; Vaseaux Creek.

MA 7—Etches-Cool Creeks, Ashnola River; Hargreaves Flat, Crater Mountain; Ashnola, Juniper Creek.

MA 8—Gilpin Management Unit, Grand Forks.

A review of the current status of road access was conducted by summer assistants for most of the region. Information from the Department of Highways, the Forest Service, the Department of Mines, and logging companies was consolidated to give an up-to-date picture of the extent and availability of roads for recreational use.

A summer assistant was assigned the task of initiating a review of the historical status of fish and wildlife of the region. Study of newspaper archives, Historical Society publications, and direct contact with "old-timers", by tape, was the basis of this still-incompleted project.

Preparation of a publication on the history of the pheasant in the Okanagan is complete and expected to be published shortly.

The involvement of our wildlife staff in resource management planning necessitated the refinement of wildlife inventory data and the initiation of new inventory programmes to provide the data needed for integrated forestry, highway, and regional district planning. This enterprise accounted for a dominant portion of the work-year of our wildlife staff.

FISHERY MANAGEMENT

The rapidly developing demands by resource management agencies for fish and wildlife inventory and recreational evaluations were largely met by the fishery management staff of the region. While this new and exacting function was emphasized, basic fisheries management activities were quite fully pursued, particularly in the improvement to fish habitat.

A two-year base-line study of the fishery and aquatic resources of the Main and West Kettle Rivers was completed in 1973. This evaluation, created in the context of the interdisciplinary planning needs, provides the basis for fisheries management and protection input to each other resource management agency of government. The water requirements of the Kettle River and its tributaries for fishery maintenance purposes has been established and, in marriage with an acute knowledge of the extent and dispersal of game fish stocks of this system, now forms the foundation for planning for the recreational use of this large area in the Kettle River watershed.

Similarly, a definitive survey of Okanagan, Kalamalka, and Woods Lakes for the location and extent of shore-spawning kokanee was completed during the year. This information is important to the future management of both the kokanee and trout fisheries of these lakes and has resulted in various forms of protection being sought for these valued foreshore areas.

A special year-round creel census of Beaver (Swalwell) Lake near Winfield was initiated during the year. This major angling water of the Okanagan supports not only the heaviest of recreational fisheries but is also the source of a majority of the wild Kamloops trout eggs required by our hatchery system. The study is designed to indicate the extent to which the fishery may be exploited before a threat to the trout-egg supply becomes evident.

Twin Lake, southwest of Penticton, was chemically rehabilitated in 1973 with the use of a new, short-life chemical antimycin. This treatment to remove undesirable competition fish completes the restoration of the two lakes in the system—Horne Lake, treated in 1972, and Twin. The latter was stocked with rainbow trout about one month following the chemical operation.

Yellow Lake, on Highway 3A, between Penticton and Keremeos, continues to yield amazing numbers of rainbow and brook trout and to support a unique recreational fishery involving many thousands of angler days. The maintenance of this productive water is due entirely to the operation of a machine-driven air pump which, in the late fall and early winter period, upgrades the oxygen content of the lake to sustain the trout within. It has been calculated that, given a value of \$5 per fisherman day, the benefit to cost ratio of this fishery approximates 16:1.

Not so happily, we must report that in October, the failure of a large water flume adjacent to Mission Creek caused many thousands of yards of clay and silt to be deposited over the entire bottom of the creek for a distance of about 10 miles to Okanagan Lake. This accidental inundation caused the complete destruction

of the 1973 kokanee spawn, then in the gravel of the river, as well as an estimated 80 per cent reduction of rainbow trout juveniles from the spring 1973 spawn-year. The rehabilitation of the creek bottom is being planned for the spring of 1974.

Mining and roadbuilding activities along different portions of the Similkameen river created gross threats to the habitat of fish by the silt enrichment of this river. In both cases, corrective action was adopted and the destructive threats to this beautiful river subsided.

Fishery habitat improvement projects completed during 1973 included the restoration and restructuring of many spawning streams serving the following lakes:

MA 8—

Conkle Lake	5,150 square yards spawning/rearing substrate.
Arlington Lakes (2)	550 square yards spawning/rearing substrate.
Copper Kettle	650 square yards spawning/rearing substrate.
Chain Lake	improvements to Shinnish Creek diversion ditch.

MA 7—

Boss	400 improvements to Shinnish Creek diversion ditch.
Kump (Lost)	300 improvements to Shinnish Creek diversion ditch (plus bank willow planting).
Murphy (2) Lake	235 improvements to Shinnish Creek diversion (plus fish ladder).
Hornet Lake	70 improvements to Shinnish Creek diversion (plus ladder).
Summit Lake	culvert screening.
Gladstone Lake	culvert replacement and screening.
Dead Horse Creek	100
Ketchum Lake	150
Missezula Lake	900
Stringer Lake	300
Rampart Lake	800
Whipsaw Creek	creek clean-up.

MA 5—Hidden Lake

600

MA 6—Coldstream Creek

2 miles of creek cleaned of trash and debris.

Basic descriptive reconnaissance for physical and biological parameters was conducted on the Wap River watershed, tributary to the northern end of Mabel Lake, the Shuswap River above Sugar Lake, and the sloughs at the headwaters of the Kettle and Inonoaklin Rivers adjacent to the Monashee Highway.

During the year, all fishery inventory for the region was transcribed to a standard map base using colour-coding to designate various resource components, i.e., spawning areas, high-use angling waters, obstructions, access, etc. These basic resource-planning functions formed a large part of our effort during the year and, while not the sort of activity which can readily be seen by the public, has already, and will continue to bring, dividends to that public in better recreational resource management.

KAMLOOPS AND CARIBOO REGIONS

RESOURCE PROTECTION

Resource protection received a major boost with addition of a regional habitat protection biologist and one technician to deal primarily with resource conflicts and to apply inventory data collected by management sections to resource decisions. This will allow management sections more time to concentrate on projects designed to improve fishing and hunting.

Inventory crews were active in both regions throughout the summer cataloguing game ranges and surveying lakes and streams. Moreover, additional funds made it possible to hire students for mapping and for collecting information from other agencies applicable to protection work. Data on past fires and past logging activities were assembled and the various Ranger offices of the B.C. Forest Service were most helpful, without exception. Nevertheless, conflicts remain and their seriousness reflects the degree of direct interaction.

Intra-agency meetings programmed every two months provide an effective forum for discussing differences between departments. But there is no doubt the escalating demands for all products of the land make compromise and solutions more difficult.

FISHERIES MANAGEMENT

Cursory survey of streams tributary to Owikeno Lake was made to assess effect of logging and generally evaluate potential production and stream gradient for future referrals. Steelhead counts were again conducted on Chilcotin River immediately downstream from the lake where most spawning occurs.

Stream clearance crews continued to remove log jams and other obstructions that would impede spawning. Also, a number of outlet screening devices were installed to prevent downstream losses of maturing trout where re-entry to the lake was impossible.

Windmills were installed on about five lakes that had a history of winterkill. By pumping air through a diffuser whenever the wind blows, this technique may effectively replace a compressor, thereby reducing cost and need for constant attention. Initial results are encouraging, but oxygen levels will need to be checked throughout winter of 1973/74 before making any meaningful assessment.

Fishing was generally good throughout the year in most Interior lakes, although it dropped off badly during hot weather in August and early September. Run-off was light and reduced natural recruitment. Also, total rainfall was lowest for many decades, magnifying demand for water. Many of the productive lakes near Kamloops are dammed and drawdown was usually maximum. Consequently, water levels were minimal at freeze-up and winterkill in marginal lakes could be higher than usual, especially if there is a heavy snow cover.

Courtenay and Corbett Lakes were rehabilitated with rotenone to remove undesired special and co-ordinated with a study supervised by Dr. P. A. Larkin (UBC) to monitor changes, if any, in flora and fauna. Both lakes will be stocked with yearlings in 1974 and it is planned to release larger trout in Corbett to establish a fishery by early summer.

Vidette Lake near Savona and Blue Lake near 100 Mile were also treated, but with an antibiotic termed antimycin (fintrol). This chemical is cheaper than rotenone and degrades rapidly; post-treatment checks indicate total removal of fish. The two lakes will be stocked but possibly not until fall, thereby providing one summer for food supply to recover.

A creel census was maintained on Dean River from May through September to record angler success, gear used, resident to nonresident numbers, and degree of hooking and release. Some 500 fish were tagged in hope of learning more about movement patterns of this famous run of summer steelhead. While data have not been fully assessed, results show a need to reduce use of natural baits because of a common hook and release practice. Conversely initial impressions on steelhead movement pattern cast doubt on validity of some closures.

WILDLIFE MANAGEMENT

Wildlife managers likewise spent most of the project funds on range inventory and mapping of data collected in past few year. With possible shifting of logging operations from Dean to Kinsquit Valleys, funds were provided to conduct an appraisal of wildlife values and general topography, especially width of valley and slope. These are two key features that determine possible impact of logging on a watershed, problems relative to planning of road location, size of cut-blocks, protective leave strips, and so forth.

Wildlife Biologist H. Mitchell spent two weeks covering streams in Owikeno area as part of a five-year plan to evaluate grizzly populations in this portion of Management Area 17. Grizzly concentrate along spawning-streams, moving in presumably from most of the surrounding area. Track measurements and plaster casts provide a means of identification from which counts of different animals can be made. Experience has demonstrated the advantage of measuring the track, rather than the foot making the track.

Appraisal of winter range on Skull Mountain near Kamloops revealed improvements from experimental logging by Branch personnel as a meaningful technique of range improvement. While not a practical approach using Branch resources, the results indicate that industrial logging of game winter ranges can be modified to extract timber and improve wildlife populations.

Watch Lake grouse study terminated and results will be contained in a Master of Arts thesis which should be completed in early 1974. Study of competition between deer and cattle continued on the Dewdrop area, completing the third year of a proposed five-year study.

With the mild winter of 1972/73, moose and deer came through in good condition in contrast to the previous two winters when conditions were much more severe. Data from Cache Creek indicated both number of hunters and game harvested increased substantially, even though a partial forest closure in September curtailed hunting at the outset. Grouse were scarce, which was expected because of cold and wet weather during hatching period.

A number of changes were effected in regulations, reflecting the concern of residents about game abundance and their reluctance to share it on an equitable basis. Nonresident were not allowed to hunt antlerless moose and deer in Management Areas 16, 17, 18, and 19, and no complaints were received over what could be considered a marked change in status quo.

ENFORCEMENT

Use of auxiliary Conservation Officers again proved effective in providing better enforcement coverage, particularly during hunting season. One of these temporary officers doubled as a pilot and an aircraft was rented during July and August pri-

marily to check fly-in lakes in Chilcotin and southern Cariboo. One two-man district was established at Williams Lake and it is hoped to add others as funds become available.

Auxiliaries were hired on a monthly basis to work in areas where the Conservation Officer was away on annual leave or had been transferred, whereas others were employed one or two days per week in particular areas.

VANCOUVER ISLAND REGION

In the face of a rapidly expanding population on Vancouver Island and attendant increasing competition for the use of land and water resources, management of the highest order will be required to maximize fish and game production and recreational opportunities. Otherwise today's efforts will prove entirely inadequate to meet tomorrow's needs.

Should the wildlife resource remain in a static condition, or decrease, it is obvious the return to the recreationist will be less in the future than it is today. If we follow the pattern of history, a further reduction in sportsman bag limits and seasons will be in order so that the available supply can be spread among a larger number of sportsmen. Nonconsumptive users will have fewer recreational opportunities. Whether or not these reductions will be made depends largely on the effectiveness of the management programmes developed and to the degree money is invested in these programmes. Science and experience have combined to provide many of the techniques and tools needed to protect and increase fish and game production. Implementation of existing knowledge plus that which will come through further research and experience must be done as rapidly as finances will permit.

On Vancouver Island some vitally needed staff positions were established near the latter part of 1973; these included the posting of a Conservation Officer to Port Hardy, the acquisition of a resource protection biologist and technician at Nanaimo, and the hiring of an Information and Education Officer whose main responsibility, at first, will be to make visible the mandatory CORE programme. The new Resource Protection Section will undoubtedly release fish management and wildlife management staff for other management activities that have been neglected because of work pressure in past years.

The region's main efforts in 1973 were aimed at:

- protecting the resource base;
- protecting the resource;
- inventory;
- research into new and better inventory techniques;
- increasing fishing opportunities in the urban environment;
- initial attempts at sampling public opinion.

FISHERIES MANAGEMENT

Emphasis was placed on habitat protection during 1973, with a considerable amount of time spent on various forestry-fisheries conflicts. Field surveys were conducted on approximately 300 specific areas slated for immediate cutting and those watersheds where cutting is to take place in 1974. Close contact was maintained with officials from various resource agencies, including the Forest Service, the Water Rights Branch, the Department of Highways, the Lands Branch, and the Pollution Control Branch.

A historical study relating past fish distribution and numbers on the Cowichan River with development of the watershed was undertaken. This study will provide some insight into the long-term trends of fish populations.

The first year of a three-year hatchery evaluation and recreational use study was initiated on lakes in the Victoria area. Studied most intensively were Elk-Beaver and Prospect Lakes, while other surveys were conducted on Council, Durrance, Glen, Langford, Matheson, Old Wolf, Prior, Spectacle, and Thetis Lakes. In addition, areas of legal public access to all Victoria area lakes were researched. This information will be used as a base in establishing a management plan for the area.

Inventory surveys on Vancouver Island streams and lakes continued through 1973. Information collected during the inventory is transferred to colour-coded maps and made available to field personnel and various resource managers. Approximately one-half of the region remains to be inventoried.

A number of major rivers and streams have been selected for continuing snorkel surveys. This programme will give fisheries managers information on the relative abundance of various fish populations and will help in pinpointing sensitive areas for fish production.

A preliminary inventory of the fisheries resource of the Tsitika River indicates that the entire drainage is utilized by anadromous fish and contains a fairly large summer-run steelhead population. The Tsitika represents the last unlogged watershed on the east coast of Vancouver Island, and the Fish and Wildlife Branch has proposed that it be set aside as an ecological reserve.

An extensive cutthroat trout research programme was initiated. The programme, which will take three years to complete, includes work on the interactive ecology of cutthroat trout and coho salmon, creel census, scale analysis, and an evaluation of habitat requirements for cutthroat. This work is being carried out at various locations on Vancouver Island, including the Oyster and Puntledge Rivers, Sproat Lake, and the Gorge waterway in Victoria.

As part of a continuing survey of the unique cutthroat trout of Sproat Lake, all accessible tributaries were examined. In a questionnaire designed to sample angler opinion, anglers were asked if they would favour some type of fishing restriction to protect the large cutthroat. Seventy-three per cent replied "yes", 18 per cent replied "no", and 9 per cent had no opinion. If restrictions were introduced, 43 per cent of the people would prefer restrictive bag limits, 27 per cent restrictive seasons, 18 per cent no restrictions, 7 per cent restrictive angling methods, and 5 per cent had no opinion.

ENFORCEMENT

A Conservation Officer was posted to the Port Hardy District in the fall of 1973, thereby providing much needed supervision on the north end of Vancouver Island. This increased the permanent Conservation Officer staff of the region to 10.

Auxiliary Conservation Officers

Ten officers were employed during the year and were of assistance to the district Conservation Officers. The value of such temporary personnel placed on the Gulf Islands, such as Galiano, proved conclusive.

Enforcement

Extra enforcement patrols were made to Gabriola, Galiano, Pender, Hornby, and Denman Islands, in response to complaints from residents.

With the increase in meat prices, it would appear more hunters were afield this year than last. Apprehensions of those who violated the regulations also showed an increase. There were 195 prosecutions in 1973, compared to 86 in 1972. The incidence of night hunting was no worse than the previous year, but accounted for many hours of patrol by Conservation Officers, assisted by the RCMP.

The most common cause of public complaints received at district offices involved cases of dogs running deer or harassing game birds; however, this matter is very difficult to curtail.

During the months of September, October, and November, a total of 11 days was spent on enforcement "blitz" patrols. As many as six Conservation Officers and auxiliary Conservation Officers took an active role each day. An attempt was made to hold these extra patrols in a heavily hunted area, and move the locations in a random manner, to saturate the area.

"Blitz Patrols"

Total number hours	271.5
Total hunters checked	838
Violations	38
Warnings	10

Approximately three hunters were checked each hour, a violation encountered on an average 7.1 hours, one out of every 22 hunters checked was in violation of the Acts or regulations.

During the same months the enforcement staff also conducted programmed patrols within their districts. In comparison, the number of hunters checked per hour were identical, but for the time spent, the blitz programme proved more than twice as effective in apprehending violators.

Conservation Officers also took an active role in inspections of forest cutting permits, pollutions, and inventory.

Predator and Nuisance Animal Control

A great deal of time was spent in an attempt to control the wolf populations at Black Creek and on Cortes Island. In both cases, losses of live stock to wolves were involved. The task of reducing wolf populations is made more difficult by strongly polarized views on predator control presently held by various sectors of the public. The apparent increase in wolf population is remarkable, considering these animals were considered rare and endangered on Vancouver Island over five years ago.

WILDLIFE MANAGEMENT

In 1973 the groundwork was laid for an effective wildlife management programme, and the year's activities were thus extremely significant. The single most important advance was the decision to allow wildlife managers for the first time to have an effective say in land-use planning on the Coast. Thus, for the first time, the Fish and Wildlife Branch had authority for effectively protecting estuaries, winter range, and other areas of importance to wildlife populations.

Important events in 1973 included the following:

1. Following a request from the Fish and Wildlife Branch to have the Tsitika River watershed declared an ecological reserve, a two-year moratorium was placed on logging in the area. This watershed is the last major untouched watershed on the east coast of Vancouver Island, and as a result of the moratorium, a land-use planning study was begun for the entire north island.

2. A team of students was hired to assess wildlife values of proposed logging areas; the first time that this type of protection work has been attempted. The programme was only partially successful, for while the students worked diligently, it was found that the work required more expertise than they possessed, and the available funds did not permit all necessary work to be attempted.

3. Student crews conducted intensive wildlife surveys of the Tsitika River and Kwois Creek, similar to the survey conducted in the White River the year before. Additionally, the Fish and Wildlife Branch supervised a shorter survey of the Toquart River in conjunction with a Forest Service study of the watershed. As a result of these surveys, information is now available on relative wildlife densities in most major types of untouched Vancouver Island habitat.

4. Progress was made in an attempt to assemble land for a waterfowl management unit near Tofino, but by year-end the project was not yet a reality.

5. Cougar research was carried on in two areas—at Port Alberni by Conservation Officer Bill Hazledine, and at Northwest Bay by two independent researchers, Penny and Percy Dewar. Both studies involved tagging cougars, but only in the latter one were radio tags utilized. These studies provided startling results regarding the distances that cougars travel (much further than previous studies had indicated) and the relative vulnerability of cougars to hunting on Vancouver Island. As a result of this research, more restrictive cougar-hunting regulations are anticipated.

6. A study of deer winter-range requirements in the Nimpkish Valley was continued. This study revealed the importance of mature timber to deer survival in high-snow areas, and again, the radio-tagging programme produced surprising information on the extent and direction of deer movements.

7. An inventory of many areas likely to contain colonies of Vancouver Island marmots was conducted in an effort to determine the abundance of this species, which is considered rare and endangered. This inventory indicated that the species may be much more restricted in distribution and numbers than had previously been suspected, and greater conservation measures may be warranted. The Branch also provided assistance to a complementary study of two marmot colonies by a University of British Columbia student.

8. After an extremely mild winter, deer and elk herds began to recover strongly. This fact, combined with very favourable hunting weather, resulted in one of the better deer-hunting seasons in recent years.

9. Twenty-two more Canada geese were released in the Nimpkish Valley as part of a continuing project to reintroduce the species to the area. There were indications that the project was succeeding, as geese from the area were reported wintering in various locations as far south as Oregon. Limited nesting may have taken place near the release site for the first time among the initial group of birds which were placed in the area in 1971. Ten geese were also released at Comox in a similar attempt to reintroduce the species in that area.

10. For the first time, an attempt was made to determine the opinion of Vancouver Island residents regarding hunting, via a questionnaire mailed to randomly selected adults. The topics ranged from the very general, such as the antihunting controversy, to specific aspects of the Vancouver Island deer-hunting regulations. It was found that the public was evenly split on the topic of hunting vs. no hunting, and that most people favoured tighter controls on hunting (mandatory hunter training, compulsory red clothing, more areas closed to hunting, tighter bag limits, and shorter seasons). The majority of hunters favoured retention of the antlerless deer season, although most wanted it shortened and the bag limit reduced. (Both of these moves were made in the 1973 regulations.)

The most surprising aspect of the survey was the high public awareness of the role of adverse land-use practices (mainly logging of ungulate winter ranges) in the decline of wildlife populations on Vancouver Island. However, a high proportion blamed declines on over-hunting and (or) lack of enforcement.

11. At the request of natural history clubs, complete protection was given to mountain quail and rails.

12. A survey of trumpeter swans wintering on Vancouver Island revealed a smaller population than in 1971. This was probably due to a poor nesting season. Five swans bearing blue collars were seen during the survey. These birds were banded in the Copper River delta region of Alaska, thus indicating the origin of the Vancouver Island wintering population.

13. Two Opportunities for Youth projects were completed, one of which resulted in the construction of 31 nesting platforms for Canada geese, while the other involved an initial attempt at clearing up the mess left by logging and hydro operations along the Elk River. A Conservation Officer also directed the planting of willow at the mouth of the river by local residents to prevent erosion.

14. A wildlife survey of the White River was completed in 1973. The results indicated that deer and elk densities are much higher in some mature forests than had previously been suspected.

15. A waterfowl habitat improvement project was also completed involving the construction and placement by members of the public of nesting structures for Canada geese, mallard ducks, and wood ducks.

16. An important precedent was set when the Nanaimo Water District agreed to make provision for elk which will be displaced by the Jump Creek Dam. This will include winter feeding if necessary.

17. The Nanaimo Fish and Game Protective Association assisted the Branch by conducting a winter range survey of the south fork of the Nanaimo River drainage.

KOOTENAY REGION

The Kootenay region has been the scene of several ongoing resource-use conflicts. Some activities have taken place that can help to solve the problems and lead to better planning.

The Mica and Purcell studies have identified many facets of the resource-use conflicts in this region. They have pointed the way to a number of administrative and managerial approaches that will provide partial solutions. The problem of heavy commitment or over-commitment of wood resources to industry remains as a major issue to be dealt with if flexibility is to be allowed resource-users in other sectors. Some major service agencies continue to operate with only secondary planning input from other agencies. Such actions will continue to pre-empt other management opportunities.

Government resource-management agencies are presently working to develop more functional systems of integrated management. Two more major studies have been proposed, in addition to the Purcell and Mica studies, to indicate inventory needs, pinpoint potential conflict areas, and to provide a basis for selecting areas where priority should be placed on immediate planning. A resource management co-ordinator, support staff, and equipment have been requested as an integral part of regional management process.

These measures will not totally remove agency problems and public concern. If British Columbia sustains its rapid economic and population expansion, continuing resource-use conflicts will arise. Continuing trade-offs will be required. Wildlife and fisheries can be managed with some types of land use, but cannot be main-

tained with others. Wildlife and fisheries resources and wilderness are sensitive indicators of change. They will continue to be in the forefront of problems associated with expansionism.

WILDLIFE RESOURCE PROTECTION

Conflicts between wildlife, forestry, and agricultural interests involving Government agencies, the industries, and the public intensified in the Region. Two separate resource studies, the Purcell Study and the Mica Study, were initiated and completed during the year. The commitment of the timber resource to the forest industry and the range resource to the live stock industry emerged as the fundamental issues frustrating the achievement of integrated resource management. It is an inescapable conclusion that as long as the timber resource is committed to a programme of maximum sustained yield, subalpine forests, essential for the survival of subalpine species such as mountain caribou, will continue to be exploited at rates considerably faster than their replacement rates and marginal, low-elevation forest lands will continue to be committed to the regrowth of conifer trees at the expense of big-game winter range. The superimposition of live stock grazing over most of the low-elevation winter ranges and the subsidization of a marginal agricultural industry further complicates the achievement of optimum resource management programmes. The fact that these commitments have been exposed through two independent resource studies can be considered as a major achievement toward solving resource-use conflicts in the region.

The expanding world demand for energy resources has placed a new focus on the coal reserves in the Fernie Basin. One new open-pit coal mine was announced in the Corbin area and at least three more potential open-pit mines are under active exploration. Concern over long-term environmental destruction, including losses of important big game habitat in the Elk, Fording, Michel, and Flathead Valleys, has resulted in some action by Government and industry to minimize the losses. At least one company (Kaiser Resources Ltd.) initiated an intensive reclamation programme, including the training of excavation-equipment operators in environmental matters. However, the damage by open-pit mining and bulldozer exploration in high-elevation mountainous terrain is severe and cannot be entirely eliminated. A proliferation of pipe-lines, transmission-lines, highways, railroads, industrial plants, and human settlements adds further to the deterioration of the limited valley-bottom lands.

HABITAT ACQUISITION AND MANAGEMENT

Mitigation proposals for wildlife losses resulting from the Libby Reservoir were combined with ongoing and proposed land acquisition and management programmes into a submission entitled "A Program for Land Acquisition in the East Kootenay." The objective of the programme is to acquire key parcels of land and associated leases and permits on a voluntary basis for the purpose of integrated resource management, according to the capability of land in the Rocky Mountain Trench. Emphasis was placed on the acquisition, protection, and management of big game winter ranges for public benefit.

Land-management projects, including clean-ups, rail-fencing, and habitat improvements, were completed on the Branch's Bull River and Wolf Creek properties, a fencing project was completed on the Cominco property on the Pend-d'Oreille deer winter range, and work was initiated on the Bergham property. Detailed

management plans, including Ducks Unlimited (Canada) projects, were drafted for the three ranch properties and a joint resource agency-public committee involving both public wildlife and agricultural interests was established to participate in the development of the management programmes.

WILDLIFE MANAGEMENT

A thorough review of elk management over the past 20 years in the Kootenays was initiated and the review of mountain goat management neared completion.

A revision and subdivision of Provincial management areas was undertaken and co-ordinated between regions. A preliminary draft was prepared and submitted.

Classified big game counts in the East Kootenay revealed depressed bull moose and elk components and lower-than-average juvenile deer, elk, and moose in most areas flown. Bighorn sheep continued to increase in the Elk Valley herds where an increasing proportion of rams was observed along with an increase in total numbers. Bighorn herds in the Rocky Mountain Trench continued to show gradual recovery following the severe die-off of 1964 to 1967. The Premier Ridge herd showed a marked increase in the lamb component following several years of critically low recruitment. The large Wigwam herd reached near pre-die-off numbers and appears to be stabilizing.

Only minor changes were made in the 1973/74 hunting regulations following the major restrictions in the preceding year. The most significant changes made were the antler restriction imposed on bull elk and moose designed to protect yearling males in order to restore a normal sex ratio.

Over-all big game hunter success in the East Kootenay continued to decline directly as a result of diminishing big game numbers and indirectly because of hunting season restrictions. Hunter activity and success in the West Kootenay remained relatively stable for the major species—mule deer, whitetailed deer, and elk.

A trial pheasant-hunting season under special permission forms issued by land-owner agreement was held at Creston. More than half of the farmers on the Creston Flats opened their land to pheasant hunters. About 150 hunters paid the daily \$5 fee and killed about 50 pheasants. A follow-up survey revealed that the season was well received by both the farmers and the hunters.

An additional 19 elk were released near Deer Park, completing the release of 75 elk at this site, while 18 elk were transplanted from Jasper to West Creston to supplement the small native herd. The release of 18 elk to Premier Ridge for radio-tracking purposes did not produce the desired results as the elk dispersed over a large area, independently of the native herds.

Publication

DEMARCHI, R. A., 1972. Post die-off recovery of East Kootenay Bighorn Sheep. Presented to *N. Wild Sheep Council Symposium Proceedings*, pp. 22-28. Alberta Fish and Wildlife publ. (Edmonton).

Wildlife Resource Protection

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These measures will not totally remove agency problems and public concern. If British Columbia sustains its rapid economic and population expansion, continuing resource-use conflicts will arise. Continuing trade-offs will be required. Wildlife and fisheries can be managed with some types of land use, but cannot be maintained with others. Wildlife and fisheries resources and wilderness are sensitive indicators of change. They will continue to be in the forefront of problems associated with expansionism.

FISHERIES MANAGEMENT

Kootenay Region fisheries habitat continued to deteriorate in the face of increasing industrial expansion. Logging-road construction, highway construction, pipe-lines, power-lines, and reservoirs all contributed to further loss of fish habitat in 1973.

Despite close co-ordination with the Forest Service, logging-roads severely damaged several streams. In terrain dominated by steep, narrow valleys such losses must be expected. However, this difficulty is compounded by over commitment of the forest resource, thus making it necessary to road every valley in the Kootenays. Planning of undeveloped watersheds in the Kootenays still follows development. Until planning considers all resource uses prior to development, conflicts will continue to occur.

Fish Habitat Protection

1. *Mining*—Both Kaiser Resources and Fording Coal Ltd. appear to have reduced the rate of habitat destruction in their respective operations. Much less time was spent with these companies now that their operations are reasonably well established.

Announcements in late 1973 concerning coal mining at Corbin and at Sage Creek (Flathead Valley) undoubtedly will result in considerable work in 1974.

2. *Forestry—Fishery liaison*—By far the most time-consuming consideration in fish habitat protection has been the impact of forest development. In 1973 several major conflicts appeared, some of which have yet to be resolved. The Fry-Carney Creek issue was considered as part of the Purcell study. This study dealt with resource conflicts in the Purcells and the results will be made public in 1974.

Less noticeable publicly but equally intense in conflict was the proposal to log Elk Creek. This valley was the subject of numerous meetings in 1973 and a compromising settlement was reached. Considerable damage to fish and wildlife habitat will occur with logging in this drainage, regardless of care taken during actual logging.

Skelly Creek, a major tributary of the Goat River, and Upper Kootenay River north of Radium, were inventoried for fish in anticipation of logging proposals.

3. *Reservoirs*—The Kootenay Canal power project construction phase probably peaked in late 1973. This project is having minimal effect on fish and wildlife habitat.

The Libby Reservoir was two-thirds filled in 1973, thus flooding the Kootenay River and several tributaries. Silt retention in the Libby plus extremely warm weather caused severe algæ blooms on the south arm of Kootenay Lake.

The Pend-d'Oreille River was actively under investigation in 1973 for potential power development. Some stream survey work in this area was conducted in 1973.

The Mica Reservoir began to form in 1973 and several hundred miles of fish habitat will be lost in the process.

4. *Fisheries management*—A major stream inventory was conducted on the upper St. Mary River. Fish distribution, identification of spawning habitat, and angler use was documented during July to October. A food-habitat study of the large Kootenay Lake rainbow trout was conducted in 1973.

Mysis shrimp transplants from Kootenay Lake to Slocan, Arrow Lakes, and Wilson Lake were conducted in 1973.

HABITAT IMPROVEMENT

Minor improvements were made to the Alces Lake Diversion constructed in 1972. In addition, an outlet screen was constructed at Whiteswan Lake in an attempt to prevent loss of spawning rainbow trout.

Land-clearing commenced at the Meadow Creek spawning-channel in preparation for construction of a diversion on John Creek. When completed in 1974 this diversion will allow control of flood waters in the spring and also provide suitable flows during spawning.

A major rainbow spawning-channel below the Duncan Dam has been proposed and feasibility studies are now under way.

Nearly 2 million kokanee eggs were planted in the Inonoaklin River in the fall, 1973. This plant is the first of several in an attempt to build up a spawning population in this system.

Some habitat improvement work in the Lardeau River at Gerrard was attempted in late 1973. Gravel taken from the Lardeau River downstream of Mobbs Creek was hauled to Gerrard and placed in a pre-selected site. This was the first in a series of proposals to improve and increase the amount of available spawning habitat for the Gerrard rainbow trout.

The 1973 adult kokanee run into Meadow Creek increased from that of four years ago, i.e., 407,000 fish spawned in Meadow Creek in 1969 and 630,000 in 1973. The entire spawning population of Meadow Creek is gradually increasing from the pre-Duncan Dam years. Nearly 1 million fish are anticipated for the 1974 run.

As expected, 1973 kokanee fry production at Meadow Creek improved considerably as a result of channel scarification in the summer of 1972. A near record 25-per-cent egg-fry survival rate was recorded for the spawning-channel. Gravel cleaning was again carried out throughout the entire channel in 1973 (summer) and production figures for 1974 should be between 25 to 30 per cent.

KOOTENAY LAKE FISHING

A substantial decrease in the 1973 burbot fishery was evident. However the main lake kokanee catch was recorded at a high of some 18,000 fish. Main lake rainbow fishing continues to decline, particularly on the north arm.

Resident dissatisfaction of nonresident use at Balfour continued and has grown to conflict proportions. New licence fees and a trophy fishery licence for Kootenay Lake was proposed during 1973 and accepted. A 25-per-cent reduction of non-resident use at Balfour is expected due to the new licence structure.

ENFORCEMENT

In the Kootenay Region, 12 Conservation Officers and one Regional Protection Officer now comprise the enforcement staff. This is an increase of two men over former years. All nine districts are currently staffed and three districts are now established as two-man districts. It is hoped to have an additional man in each of the remaining districts by the end of next year. In addition, a total of 20 auxiliary Conservation Officers and four part-time office workers were employed during the past summer and fall. This is the second season auxiliaries have been used in this region and the first time office help has ever been available to the field staff. This additional help has relieved the permanent staff of many of their routine duties and office work and permitted them to spend more time in the field and to concentrate on the more serious enforcement problems. This has resulted in much more efficient service to the public and made people much more aware of the existence of this Branch.

Prosecutions

There was a total of 193 prosecutions in the region, of which there were 189 convictions and four dismissals. The total fines amounted to \$11,896. This is an increase of 57 per cent in prosecutions and 123 per cent in fines over the previous year. Some very substantial fines were meted out, indicating that Judges are taking a more serious view of offences committed under the Wildlife, Firearms, and Fisheries Acts. Loaded firearms in a motor-vehicle are still the most common infraction found in this region.

Hunting Accidents

During the past year there was a total of six accidents in this region. Five of these were firearms accidents of a more or less minor nature which occurred while target-shooting. The remaining one, which was quite serious, was a non-firearms hunting accident which occurred when a hunter was poked in the eye by the antler of a bull elk whose throat he was attempting to cut with an axe.

Nuisance Animal Control

Conservation Officers spent considerable time on nuisance animal control. Bear complaints were down considerably over that of the previous year. A number of complaints were attended this past fall concerning elk which have moved into the Castlegar, Kinnaird, and Robson area and become a nuisance around gardens and orchards. Quite some time has been expended by Conservation Officers trying to discourage these animals, with little success, so they will probably have to be disposed of or live-trapped and transported to another area.

Equipment

Most of the enforcement staff in this region have now been equipped with two-way radios, which will help increase their efficiency. It is hoped by next year to equip the remaining staff with radios and to install a radio repeater in both the East and West Kootenays for added efficiency.

LOWER MAINLAND COAST REGION

FISHERIES MANAGEMENT

The year 1973 saw the Fisheries Management Section of the Coast-Mainland Region extensively involved in many situations where land use could conflict with fishery values.

The hiring of students for the summer period also was invaluable in that much needed inventory data were obtained as a result of their field investigations and office work.

General fisheries inventory and habitat improvement work continued, with emphasis on stream management for steelhead.

Logging and Fisheries

Investigation of new areas to be logged continued to occupy a large amount of time within the fisheries section in 1973. The advent of a specialized habitat protection section for this region in late summer eased the load considerably.

Some of the areas that were investigated in response to the referral system (by the fisheries section) were Homathko River drainage, Cayoosh Creek-Duffey Lake area, Chehalis watershed, Harrison Lake tributaries, Powell River-Daniels River watersheds, and the Nahatlatch watershed.

The fisheries section was also involved in a multi-agency watershed study which included the Chapman Creek drainage on the Sechelt Peninsula. The purpose of this study was to develop a methodology for quickly assessing watershed values on a priority basis. This was administered by the Forest Service and was prompted by increasing forest land-use conflicts where forestry values clashed with other values such as fisheries and wildlife.

Steelhead Management

In keeping with fisheries management policy for the Lower Mainland, emphasis was placed on steelhead management. Considerable time was expended on all aspects of steelhead management.

A. *Habitat protection*—Investigations were conducted into problems or potential problems that occurred on the following steelhead streams:

- (1) Little Campbell River (Surrey): A fish kill resulting from a feed lot that was immediately adjacent to the river:
- (2) Coquihalla River: Proposed major highway from Hope to Merritt immediately adjacent to the river; aerial survey of the main stem of the river and its tributaries to assess the impact of past and present logging; aerial and ground assessment of logging and mining road impact on Ladner Creek, a tributary to the Coquihalla:
- (3) Coghlan Creek: An illegal dam on a small tributary to this creek that posed a threat to steelhead and salmon migration.

In addition to these, fisheries section investigated numerous proposed changes to small streams, important to steelhead, in the Surrey-Langley area. Many of these investigations were the product of the excellent referral system that has been established with the municipalities.

B. *Habitat improvement*—The steelhead rearing-pond at Watercress Creek on the Coquihalla River continued to operate during 1973. Of the 24,000 Coquihalla stock winter-run steelhead fingerlings that were initially placed in the pond, 20,100 migrated to the Coquihalla River during the spring months. The pond was subsequently restocked with 3,000 Coquihalla stock summer-run steelhead fingerlings.

A new steelhead rearing-pond was established on Department of National Defence property adjacent to the Vedder River. This was stocked with 14,000 Vedder stock winter-run steelhead fingerlings.

Several other potential steelhead habitat improvement projects were investigated on the Coquitlam, Chehalis, Brunette, and Cheakamus Rivers and on Hastings Creek on the North Shore.

C. *Inventory*—An adequate inventory of potential spawning areas, actual spawning areas, and knowledge of spawner numbers and distribution is essential to good steelhead management.

Helicopters were used to assess spawning potential and holding-pools on the Coquihalla River and its tributaries, on Silverhope Creek, on the Chehalis River, and on the Indian River.

Ground surveys were conducted on Ladner Creek, Sowaqua Creek, Silverhope Creek, the Stein River, and all creeks on the Strait of Georgia side of the Sechelt Peninsula.

Skin-divers were also used to define spawning potential and to assess spawner number and distribution. This method was used on the Capilano River, Lynn Creek, the Coquihalla River, Silverhope Creek, and the Chilliwack-Vedder River. Most startling was the small number of summer-run steelhead counted in the Coquihalla River.

Counting fences to enumerate steelhead spawning runs were constructed on Brohm Creek and Stawamus River in the Squamish area.

D. *Research*—A 12-month water quality study commenced and continued on three streams on the North Shore of Vancouver and on two streams in the Hope area.

A co-operative steelhead tagging programme on the Squamish-Cheakamus River system was initiated and directed by the Fish and Wildlife Branch and carried out by the organized steelhead anglers. This programme was established to gain information on such factors as steelhead movement and incidences of recapture.

STUDENT SUMMER EMPLOYMENT

The hiring of three students to assist in fisheries work over the summer period must be deemed an unqualified success. Capability of the fisheries section, especially in accumulation of much needed inventory data, was increased enormously.

Two of these students spent almost the whole of their employment period roving throughout the region gathering inventory information, while the third student was involved in summarizing the ever present back-log of fisheries data that has existed in this section.

HABITAT IMPROVEMENT

A spawning-channel for resident coastal cutthroat was constructed at the outlet to Ruby Lake on the Sechelt Peninsula in 1967. As part of a continuing programme to monitor the channel, a counting fence was constructed to enumerate the 1973 fall spawning migration.

A large increase in the number of fish using the channel was noted this year. It appears that the channel has been successful in increasing the outlet spawning run.

HABITAT PROTECTION

The population of the Lower Mainland has expanded greatly in past years; 1973 was no exception to this general trend. With increasing population there has

been more pressure for urban, suburban, and recreational living space with subsequent land-use conflict. Land use where it interacts with fishery values, especially those of small streams, has been most critical.

The year under review saw much improved awareness and liaison developing within the private sector. Individual problems still occur, but gradually land-developers are beginning to realize that when water bodies are involved, fishery agencies must be contacted during the planning stages of land development prior to the actual start of construction. Private lands, however, are still a problem when attempting to maintain streamside values such as vegetation.

The local levels of government (regional districts and municipalities) have become attuned to the need for preserving natural habitat within their geographical jurisdictions. The leaders, in so far as protection of fisheries habitat is concerned, are District of Surrey, Sunshine Coast Regional District, District of North Vancouver, and the District of Langley.

Liaison with Provincial Government agencies such as Water Rights Branch, Pollution Control Branch, Lands Branch, and the Forest Service continues to improve.

Communication problems still exist with such agencies as the Department of Mines and Petroleum Resources. Unlike the forestry referral system where Fish and Wildlife Branch has input into all aspects of logging, we have very little input into analogous problems as they relate to mining and mining exploration.

Liaison with the Department of Highways, specifically in the areas of road location, maintenance, and improvement, is poor. A very good liaison has been developed, however, with regard to Department of Highways subdivision approvals. A referral system has been established in this area.

The protection of habitat is absolutely essential to the effective management of the freshwater sport fishery. Protection of habitat is, to a very large degree, dependent on liaison with the public, with regional districts and municipalities, and with other Government agencies. An awareness of the factors that are important for the maintenance of fish in streams and lakes must be instilled in all persons who are responsible for making land-use decisions. Without this awareness, we cannot hope to maintain fish populations within or in close proximity to urban centres.

STAFF TRAINING AND IMPROVEMENT

Fisheries staff within this region had the opportunity to participate in a number of courses and seminars designed to broaden the information base that is so necessary when making land-use decisions.

WILDLIFE MANAGEMENT

Wildlife input in resource planning expanded immensely in 1973. In response to the accelerated demands of the co-operative approach concept of resource management, priorities were placed on wildlife inventory and habitat evaluation programmes. The appointment of a Regional Habitat Protection Section has proved invaluable in this regard, but the Wildlife Section anticipates a continuing high degree of involvement in resource planning.

Big game and waterfowl harvests were average for the season and slightly higher than those of the previous two years. It appears deer populations are recovering well from the devastating winters of 1968/69, 1970/71, and in spite of general reductions in hunting seasons, the harvest was considered quite satisfactory. Waterfowl hunters in the Lower Fraser Valley continue to be hindered by land alienation and local restrictions. This problem warrants serious consideration.

The addition of a full-time wildlife technician and temporary summer help to regional staff has increased our ability to become involved in a number of projects. Specific events and achievements in 1973 can be listed as follows:

Waterfowl

Wood Duck programme—In conjunction with Ducks Unlimited (Canada) and local organizations, several hundred wood duck nest boxes were established throughout the Lower Fraser Valley in an attempt to increase the local wood duck population.

Wild rice project—Wild rice stocks were introduced into the Pitt Polder Shooting Grounds in an experiment to determine the feasibility of establishing this species as a food source for waterfowl.

Canada Goose programme—A co-operative programme sponsored jointly by Ducks Unlimited (Canada), the Canadian Wildlife Service, the Fish and Wildlife Branch, and local organizations saw the establishment of a breeding flock of Canada geese in the Fraser Valley. It is hoped this flock will become the parent stock of an increased huntable population.

Big Game

Elk release—After three years of study and preparation, 40 Rocky Mountain elk from Jasper National Park were released above the village of Lytton, B.C. The herd appears to have selected the predetermined range of Lytton Mountain and Lytton Creek. Several calves have been sighted and the population appears to be establishing itself very satisfactorily.

Carpenter Lake Habitat study—Work continued throughout the winter on the Carpenter Lake mule deer range; including establishment of fertilizer trial plots, studies of predator-prey relationships, slashing of additional overgrown winter foods, and collection of general biological information in the area. The data compiled will provide an extremely useful reference for future land-use applications and game-management proposals.

Dump Bear Marking programme—Several black bears utilizing the North Vancouver garbage dump as a food source were marked with paint in an attempt to determine their occurrence as nuisance bears in residential areas.

Inventory Programmes

Stein watershed wildlife inventory.

Upper Lillooet River system wildlife-inventory.

Kwoiek Creek wildlife inventory.

Chehalis River wildlife inventory.

Squamish drainage wildlife inventory.

Several on-site inspections of areas of proposed logging developments.

Routine spring inventory of key deer herds.

Routine coastal grizzly bear inventory.

Special Projects

In 1973, this office was involved in a model of an integrated resource study for coastal watersheds. The sites were selected for comparative purposes and were located on the Toquart River (unlogged) and Chapman Creek (logged). The data collected should provide an invaluable aid to further resource planning of coastal systems.

HABITAT PROTECTION SECTION

The Habitat Protection Section was established in midsummer of 1973, being initially staffed by a technician who assisted both the Fisheries and Wildlife staff with the interdepartmental referral system. A major portion of his time was allotted to forestry referrals. This referral system was established in 1970 and became functional in 1972. Logging plans and cutting permit applications for proposed new cutting areas are sent to Fish and Wildlife Branch requesting comments and recommendations for the protection of fishery and wildlife values. Investigations are carried out with the co-operation of the Wildlife and Fisheries Sections.

In November a biologist joined Habitat Protection and the Section expanded its responsibilities to include referrals from other agencies such as the Department of Highways and the Pollution Control Branch.

To date, the Section has established an excellent rapport with the forest industry and liaison between other agencies is being strengthened. It is felt that as Branch requirements and priorities become better understood, less time will have to be spent with repetitive requests, and this will enable the Section to develop more detailed long-range plans.

ENFORCEMENT

As it was for many other people, 1973 was a year of frantic activity and drastic change for Conservation Officers. The growth of recreational activity was unbelievable.

Environmental protection work made very heavy demands. This may be to some extent alleviated in the future, with the establishment of specialists within the Branch.

The area of heaviest growth was Squamish-Pemberton. With the improvement and extension of roads, much of the growing pressure generated within the metropolitan area is flowing into Squamish and Pemberton, where wilderness conditions are within easy reach of the population centre. This growth may continue at an even greater rate if gasoline availability and cost discourage travel further afield. A Conservation Officer is desperately needed in Pemberton.

A larger office was secured in Cloverdale, to accommodate a second Conservation Officer appointed to the area, as well as stenographic support. This has resulted in improved service to a highly populated and growing area. The Maple Ridge District was enlarged, extending now to the settlement of Dewdney. The district previously located in Mission City was removed to Agassiz, where office accommodation was secured in the Municipal Hall. This move was made to accommodate the growth of recreational activity created by expanding roads in the Harrison and Lillooet Lakes area. It is anticipated that an all-weather connection will be established with Pemberton in the very near future.

A maximum of 18 auxiliary Conservation Officers were used during the year; principally during the fall hunting seasons. We were fortunate in obtaining effective people for this work, and the programme can be considered an unqualified success. All available indices point to a very much improved control of illicit activity, and public approval of that control. However, over much of the region, protection activity is still not keeping pace with the need for protection, and every effort must be made to expand our services.

PRINCE GEORGE REGION

RESOURCE PROTECTION

Environmental issues related to major changes in access and proposed additional access by rail and highway in the northern part of the Province coupled with resource extraction capabilities inevitably resulting from the planned access network continue to dominate the activities of the operation staff of the region. Concerted effort to document fish and wildlife values in areas subject to imminent resource development remains top priority both for fisheries and wildlife. This, of course, is coupled with detailed recommendations to protect fish and wildlife habitat wherever industrial development is currently taking place.

Despite considerably increased capability in the operating budget for 1973, the vastness of the area under proposed development and the limits imposed on conventional transport makes detailed investigation both time-consuming and costly. Because land access in many cases does not as yet exist, much of our investigative work must involve the use of either fixed-wing aircraft or helicopters, both of which add greatly to the cost of obtaining basic information.

Some of the major ongoing access routes referred to here are: B.C. Railway extension from Fort St. James to Dease Lake, modification to the B.C. Railway extension to Fort Nelson; completion of the officially opened Stewart-Cassiar Highway; looping of Westcoast Transmission's pipe-line from Fort Nelson south, to name only a few. There are many other smaller projects and ancillary access routes developing in association with these major projects.

Initial discussions and some field investigation related to the proposed Canadian National Railways northern extension from Terrace have taken place and accelerated studies will be required in 1974 to investigate the impact on the environment of a major transport network proposed for the northwest portion of the Province.

Following much communication and basic planning dating back to 1971, a system of total resource planning developed by the Prince George Forest District and the Prince George Region of the Fish and Wildlife Branch was officially adopted in January of 1973. It has since been the subject of considerable publicity and public scrutiny. The system appears to have had a high degree of acceptance by all resource departments as well as by the forest industry and interested public participants. Basically the system requires first a commitment to acquire all available resource data from all sources and to compile this information in a central location. The responsibility for this acquisition was assumed by the forest district, but the information is available to all other resource agencies. From this source it is the responsibility of the two departments to map the independent resource values, provide a legend of constraints or operational limitations, and a statement of management objectives which include both social and economic considerations for each independent resource. In this manner, a folio is compiled containing all available information on forests, water, fish, wildlife, waterfowl, recreation, agriculture, etc. In addition, information on soils, climate, topography, etc., is compiled and used to define the basic capabilities for all renewable resources for the area under consideration.

Upon completion of the assembly of all information, the folio is turned over to the industrial licensee, who then has the responsibility to devise a cutting plan which recognizes all resource values. This plan becomes the final portion of the folio and is submitted for joint approval by the Forest Service and Fish and Wildlife Branch, both of which have to be satisfied that the plan is environmentally accept-

able. The system differs from other similar systems in that a folio is compiled for each operational cutting plan, most of which at present have a three to five-year duration. The folio thus becomes the basis of each approval and expires at the completion of harvesting and post-harvesting treatment in the licensed area. The document then becomes a permanent record for reference and eventual evaluation of the effect of the planned timber extraction.

To date nearly 100 folios are in various stages of completion, but it is likely to be approximately one more year before all logging within the Prince George Forest District can be incorporated into the system.

The Prince Rupert Forest District is moving into a similar plan and has provided similar information where possible. However, it will take considerably longer to provide necessary staffing for both departments and to acquire basic soils data, etc. (much of which does not exist at present), before such a plan can become fully operational there. In the interim, recommendations for the protection of fish and wildlife habitat is proceeding through an improved referral system.

In other areas of resource development such as mining, placer development, exploration, seismic operations, etc., communication is improving and unnecessary environmental degradation is decreasing. However, a greater degree of formal inter-departmental and industrial planning is still required before environmental degradation problems are reduced to an acceptable level.

FISHERIES MANAGEMENT

As well as routine inventory work conducted locally, lake and stream inventories were conducted in some widespread portions of the region, particularly in areas south of Vanderhoof, southwest of Burns Lake, and parts of the Skeena and Nass drainages. This area of work requires a rapid expansion in order to provide sound information on which to base recommendations for habitat protection.

In addition to processing information for the folio system previously described for the Prince George Forest District, some 500 logging referrals were processed by the regional fisheries staff as well as approximately 200 referrals associated with pollution control, water licences, placer-mining, etc.

The proposed CNR rail extension up the Kitsumkalum Valley was subjected to close scrutiny, in conjunction with consultants, with the aim of protecting the fishery and aesthetic values of this valley.

Highway referrals on the Kitwanga Bridge, Highway 16 between Kasiks and Tyee, and the forestry access road on the Babine were investigated and reported on.

A special fisheries survey on Nanika Lake was undertaken to obtain information on the potential of the lake for inclusion in a report to show the possible effects the implementation of Kemano II could have on the area.

An analysis of the hack and squirt herbicide programme on the Queen Charlotte Islands was performed to ensure against damage to fisheries values on adjacent streams.

Some significant fishing regulation changes were proposed for 1974, primarily in relation to bag and possession limits, spring closures on spawning creeks, size limits in the Skeena drainage, and some gear restrictions.

The second year of the François Lake project was completed with the minimum of problems and the information was efficiently collected and compiled by two first-year students of British Columbia Institute of Technology Fish and Wildlife programme.

The project consisted basically of

- (1) creel survey on three days of each week, conducted by boat, vehicle, and foot;
- (2) netting of fish for age and growth analysis;
- (3) complete stream inventory of all inflow and outflow streams.

The compilation of data and processing and reading of scale samples is hoped to be completed in 1974. Some additional work is anticipated for François Lake in 1974 to tie up loose ends, in particular the documentation of lake char spawning areas.

The salient points of the Skeena steelhead investigation in 1973 were as follows:

- (1) Kispiox River: Smolt collection and documentation of winter habitat.
- (2) Suskwa, Kitsequela, Kitsumkalum: Assessment of critical areas and present potential.
- (3) Kinskuck, Meziadin, Tseaux, Cranberry: Initial aerial photo interpretation followed by helicopter reconnaissance of critical areas and present potential.
- (4) Sutherland: Survey to verify suspicion of steelhead potential.
- (5) Babine and Zymoetz: Redd sampling and smolt collection related to development of life histories.

Considerable expansion in the field of fisheries management is anticipated for 1974.

WILDLIFE MANAGEMENT

Routine classified game counts were conducted in Management Areas 20, 21, 22, 25, 27, and 28. In general, the big game populations are healthy, but continually increasing demands for wildlife, improved road access, and the increased use of all-terrain vehicles has forced season reductions and in all likelihood will necessitate review of current seasons and bag limits and could force further reductions in the near future.

Mountain goat studies in the Nass Range in northwestern British Columbia were continued in July and August when classified counts were completed. The Nass Range goat study was brought to termination and a final report will be published pending completion of map work. On the basis of this study, the Nass goats will very probably be opened to a Limited Entry Hunting Season in 1974.

Proposals to establish a community pasture near Maxan Lake, southeast of Houston, and an ARDA research project resulting from these proposals, made it imperative that assessments of wildlife values for the area be conducted. Browse studies were performed to gain a better insight into the winter use of the watershed by big game. Furthermore, the Branch, to fulfil its consultancy role to the Advisory Committee on the Maxan project, was committed to

- (1) provide lake survey data;
- (2) conduct classified game counts for the duration of the project (1976);
- (3) advise on methods to investigate browsing intensity of ungulates about enclosure plots;
- (4) become involved, as a representative on the Advisory Committee, in all aspects of field investigations.

An Opportunities for Youth project was initiated and completed during the summer of 1973. The publication *History of Moose Use in the Central Interior* was published. The paper summarized the changing trends in consumptive use of moose in the central Interior and provided as well some valuable insights into the population

dynamics of the species itself. This work will aid in regional decisions on regulations and season lengths for future hunting seasons. There exists a need for similar projects to be conducted on various game species in the northern regions.

A programme to classify and map all big game ranges and wildlife dispersion in northern British Columbia was undertaken and conducted from the Fort St. John office and will incorporate all available information obtained from guides and long-term residents, etc. Field work for most of the area within Management Areas 26, 27, and 28 has been completed and is currently being processed into map form. It is intended to continue this programme in 1974 to include Management Areas 20, 21, 22, 23, and 25.

A second programme being carried out in the Peace River is designed to classify in detail areas suited for agriculture, wildlife, and forestry. The information is being compiled by the Lands Branch, the Forest Service, and the Fish and Wildlife Branch, and will be made available to the Government to establish guidelines for properly planned land use in that area.

Also in the Peace River a joint committee composed of members from the North and South Peace River Cattlemen's Associations, the B.C. Forest Grazing Division, and the Fish and Wildlife Branch have been engaged in formulating zones where various degrees of predator control will be implemented in the future. The object is to provide better protection to legitimate live-stock operations, improved community pastures, etc., without going into blanket control procedures in areas where it is not required.

Land acquisition has become a relatively new programme for the Branch in the central Interior. Several land parcels have been offered to the Branch as wildlife ranges. cursory assessments of wildlife values have been conducted. A regional priority list must be drafted and lands must be adequately and fairly assessed if eventual purchase is to be forthcoming. Several ranches are presently under regional review for purchase considerations.

ENFORCEMENT

A significant contribution toward public safety and improvement of the hunter image resulted through legislation prohibiting the discharge of firearms along 1,500 miles of northern major highways. Specifically, "No Shooting" regulations were introduced prohibiting the discharge of firearms within one-quarter mile on either side of all main highways, with the exception of the Alaska Highway. The public response to these "corridor closures" under the *Firearms Act* was overwhelmingly one of support and acceptance. At this time there is little reason to doubt that more gazetted and heavily travelled public roads in the north will be selected for similar restrictions in the future. To be able to drive roads such as the Stewart-Cassiar and observe most species of native big game along the highway right-of-way is reason enough to view this move as being a positive one.

The region's enforcement attitude changed noticeably this year from one of routine checking by individual Conservation Officers within their respective districts to planned group operations designed to blanket specific zones at specific times. This approach required a flexible movement of regional enforcement staff to high public use or traditional problem areas. It provided frequent coverage of these problem areas and made possible a high frequency of public contact. An increase in the use of auxiliary Conservation Officers complemented this method of enforcement.

A pilot programme involving a Duty Officer system and an answering service was instituted in Prince George this year which allowed the public to contact a Conservation Officer anytime, regardless of the hour. This proved to be a significant factor in apprehending a number of offenders who normally would not have been reported because of the public being unable to contact a Conservation Officer. An all-out public information programme was implemented through the various media to publicize the region's enforcement role. This created a public awareness of the Branch's enforcement function and was also reflected in the attitude of many Courts toward fish and wildlife violations. This year a number of northern Judges rendered near maximum fines under the *Wildlife Act*.

Additional funds made it possible to inspect previously inaccessible hinterland areas by helicopter where a number of more serious offences occur. The Branch leased aircraft was active in patrolling similar areas which could be inspected by fixed wing.

GUIDING INDUSTRY

Since August 21, 1970, when the first guide outfitter's certificate was issued to Leonard W. Dillabough, of Quesnel, B.C., 116 certificates have now been granted. Guide outfitters are recognizing the benefits they derive from holding these certificates, and are now inclined to apply for certification as soon as their guiding areas become eligible.

During the year the Branch was able to examine a greater number of guiding operations. Four guides had their licences cancelled and their renewal privileges suspended for varying periods of up to four years. Most of the guides are endeavouring to maintain efficient and high-quality services and are performing well. The organized guides are policing their own ranks to assure the continuance of a high and acceptable level of performance by their members. The executives of Western Guides and Outfitters Association, representing the majority of organized guide associations, meet twice yearly with the Branch's Guiding Committee, composed of Regional Directors R. Goodlad; G. E. Stringer; and J. P. Gibault, the Co-ordinator of Guiding Services; to discuss all aspects of the guiding industry. The deliberations at these meetings between the two groups is improving the level of communication within the industry.

The guiding regulations were amended during the year and now provide closer direction for administering the guiding industry.

The 1973 summary of guided hunter activity is not available at the time of writing, but the results for 1972 are compiled and compared to those of previous years.

Summary of Guided Hunter Activity, 1968/72

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
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
1971.....	566	842	156	5,670	2,780	559	673	324	429	232	384	200	30	14	64	5,689	97
1972.....	545	847	98	6,198	2,844	451	530	187	380	173	347	159	45	19	96	5,231	83

ENFORCEMENT ACTIVITIES

Seventy-seven (increase of six over 1972) Conservation Officers, senior Conservation Officers, and regional Protection Officers of the six regions comprised the uniformed field staff most concerned with direct "people management." For varying time periods, a total of 114 auxiliary Conservation Officers, effectively assisted in seasonal and high-density enforcement. Due to a welcome budget increase, the auxiliary staff were utilized to a greater extent than in 1972.

STAFF TRAINING

Twenty-two Conservation Officers graduated from Class IV of the two week "Basic Law Enforcement" course at Vancouver Police Training Academy. This valuable programme has produced a marked improvement in staff confidence, ability, morale, and public appearance. In addition, 17 Conservation Officers completed a certificate course provided by the British Columbia Institute of Technology. This is a home study course combined with some 20 days attendance at BCIT covering mathematics, statistics, report-writing, ecology, resource measurement, mapping, and photo interpretation.

COMMUNICATIONS

Mobile radio communication (VHF) is a most valuable aid to our public service and efficiency, especially as our Conservation Officer staff is linked with RCMP offices. Sixty-eight units are now installed in vehicles operated by Conservation Officers. Base stations are located at Burnaby and Penticton regional headquarters, while four more base installations are proceeding at Nanaimo, Kamloops, Williams Lake, and Prince George. In addition, our leased floatplane based at Prince George has SSB communications with RCMP and B.C. Tel.

WILDLIFE SANCTUARIES AND "NO SHOOTING AREAS"

During 1973, one wildlife sanctuary was created under the *Wildlife Act*, while six "No Shooting" areas were provided by authority of the *Firearms Act*. One "No Shooting" area was rescinded.

LICENCE TO CARRY FIREARMS

Effective April 1, 1972, an amendment to the *Wildlife Act* created a new \$1 licence to carry firearms for nonhunting purposes. Thus, unless exempted as in the case of peace officers, a person who carries a rifle or shotgun without either a hunting licence or licence to carry firearms is in violation, and practical preventive action may be taken by the seizure of his firearm. The licence to carry may be cancelled or suspended for cause, as is the case for hunting licences. No such cancellations were actioned in 1973.

Approximately 8,790 licences to carry firearms were issued from April 1 to December 31, 1973, as compared to 7,916 in 1972.

Summary of Firearms Hunting Casualties, 1969-73

Year	Fatal	Serious	Not Serious	Total	Rate per 100,000 Licences	Total Licences
1973.....	2	5	9	16	9.8	163,000 ^{1 2}
1972.....	8	4	8	20	12.6	162,278 ¹
1971.....	11	6	1	18	11.2	160,609
1970.....	5	3	9	17	10.4	163,308
1969.....	8	11	12	31	19.5	158,672

¹ Does not include licence to carry.

² 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 or suspended for cause under the *Wildlife Act*. Where the Conservation and Outdoor Recreation Education course is available, successful completion has generally been a condition of reinstatement in addition to a prohibition period of from one year to life. In 1973, 41 hunting licences were cancelled for violation, while 10 were cancelled arising out of firearms nonhunting as well as hunting situations. Seven hunting licences were reinstated. Two angler's licences and one trapper's licence were cancelled.

PROSECUTIONS

The total number of prosecutions is greatly increased (41.3 per cent) as well as total fines (up 46.3 per cent) over 1972. Average fines shows a continuing annual rate of increase since 1969.

	Prosecutions		Fines		Percentage of Most Frequent Violations	
	Convicted	Dismissed	Total	Average	Loaded Firearm in Motor-vehicle	Lack of Angler Licence
1973.....	1,662	44	\$ 87,477	\$ 51.24	24.9	26.0
1972.....	1,175	14	58,012	48.70	23.4	25.3
1971.....	825	14	38,181	46.78	33.3	21.0
1970.....	834	12	35,282	42.30	27.9	29.4
1969.....	812	15	31,094	38.29	27.0	24.2

INFORMATION AND EDUCATION

The major event of the year affecting the activities of the I & E function was the appointment in November of five regional Information and Education Officers to regional offices. These individuals will be responsible for the development and application of Branch educational programmes at a local level and for the establishment of regular contact and communication between the Fish and Wildlife Branch and the members of the news media, concerned organizations, institutions, and the general public. Much of the work done by the existing I & E function prior to the appointment of these new people was directed toward preparation for their taking these positions and the provision of appropriate programmes and materials for their use. Following this appointment, all I & E staff participated in a two-week orientation and training seminar. At this session, topics ranging from media techniques to

management processes were covered and plans for programmes were developed for the following year's activities. Regional I & E staff then returned to their respective regional offices and to date have become involved in activities ranging from origination of programme materials to the contacting of various involved institutions and organization and evaluation of our requirements for public communication in these areas.

In addition to planning and programme development for regionalization, the head office I & E function completed a number of more specific projects and continued with the development of existing programmes. Some of these include:

1. The series of television programmes initiated last year on fish and wildlife management topics was continued and expanded into two new station outlets. Public exposure to this series was increased considerably with its introduction at one station into a new time slot following the evening news. These programmes, as well as the film and photographic packages used in their production, are now being organized into topic packages for use by regional staff. A series of programmes is now recorded on videotape and available for reuse through local outlets; in addition, a system of cataloguing all visual material is being implemented to make this material available in package form for reuse on other types of programming.

2. A project was initiated this year to originate and erect a series of information signs and shelters at areas of wildlife or wildlife management significance throughout the Province. These structures are not only for public information, but also provide a focus for educational field trips to significant management areas. For this reason, a series of brochures and area descriptions are being prepared for each to assist in lesson planning. To date, nine shelters and some 75 signs have been erected throughout the Province. The completion of displays for the shelters and further construction will be continued through 1974.

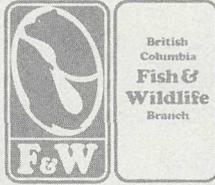
3. The book *Fish and Wildlife—the Recreational Resource* was reprinted this year, a total of 30,000 copies have now been printed. A proportion of this number was distributed through public sale and this type of distribution will continue in the coming year. In addition to this publication a number of smaller publications covering various management activities and fish or wildlife species were completed. These publications are presently being organized into educational packages to be offered to schools for programmes in wildlife and environmental conservation. The I & E function also assumed production of the hunting regulations this year. Finally, two special wildlife management proposal booklets were also completed—one for the Osoyoos management area and the other for wildlife habitat acquisition programmes. These booklets were designed to describe to the public the objectives and proposals for specific management programmes.

4. Preparation of new programming and materials for CORE (Conservation and Outdoor Recreation Education) also occupied a considerable amount of time in the past year. More visual aid materials were created as well as a comprehensive new Instructor Guide. The programme continued to expand with new instructors and areas being added to existing course distribution. In addition, the content of the programme is continuing to diversify with an increasing emphasis on broader aspects of outdoor safety.

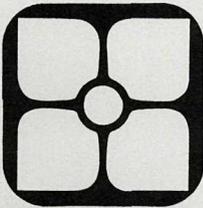
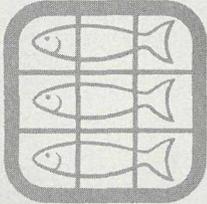
5. Summer Tour Guides to serve visitors to the Summerland and Wardner Fish Hatcheries were hired as a special pilot project this year. These individuals developed well-organized tours and were extremely valuable in satisfying the inquiries of visitors without disturbing fish-culture activities.

6. Information activities such as press releases, film clips for news, special events, and public inquiries increased dramatically in this past year. The causes

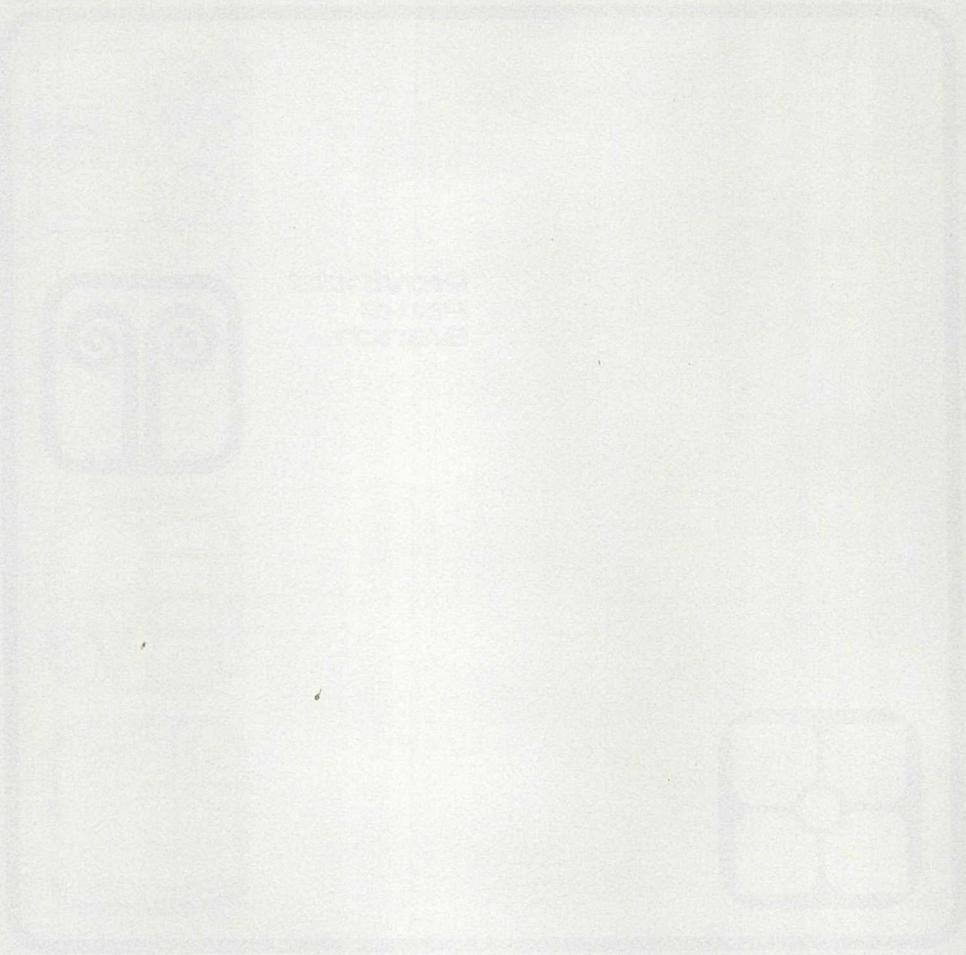
for these increases would appear to be an increasingly obvious branch "image," increasing public interest and concern and the sudden development of exciting management programmes. In addition, I & E staff were called upon to assist in production of materials in conjunction with numerous public and government agencies. This involvement included also serving on committees related to communication of fish, wildlife and recreational concerns, and programmes by other involved agencies.



**Provincial
Parks
Branch**



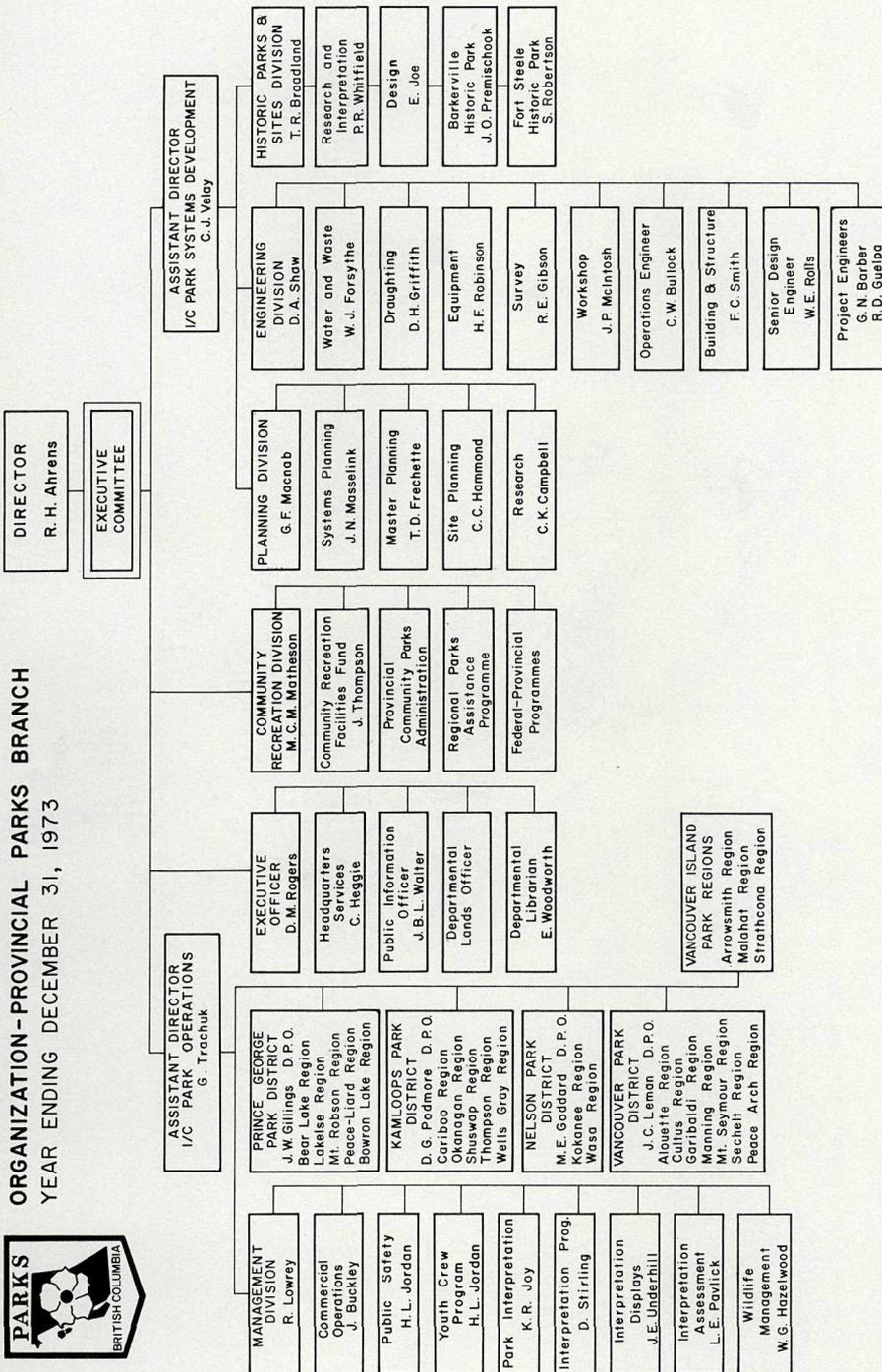
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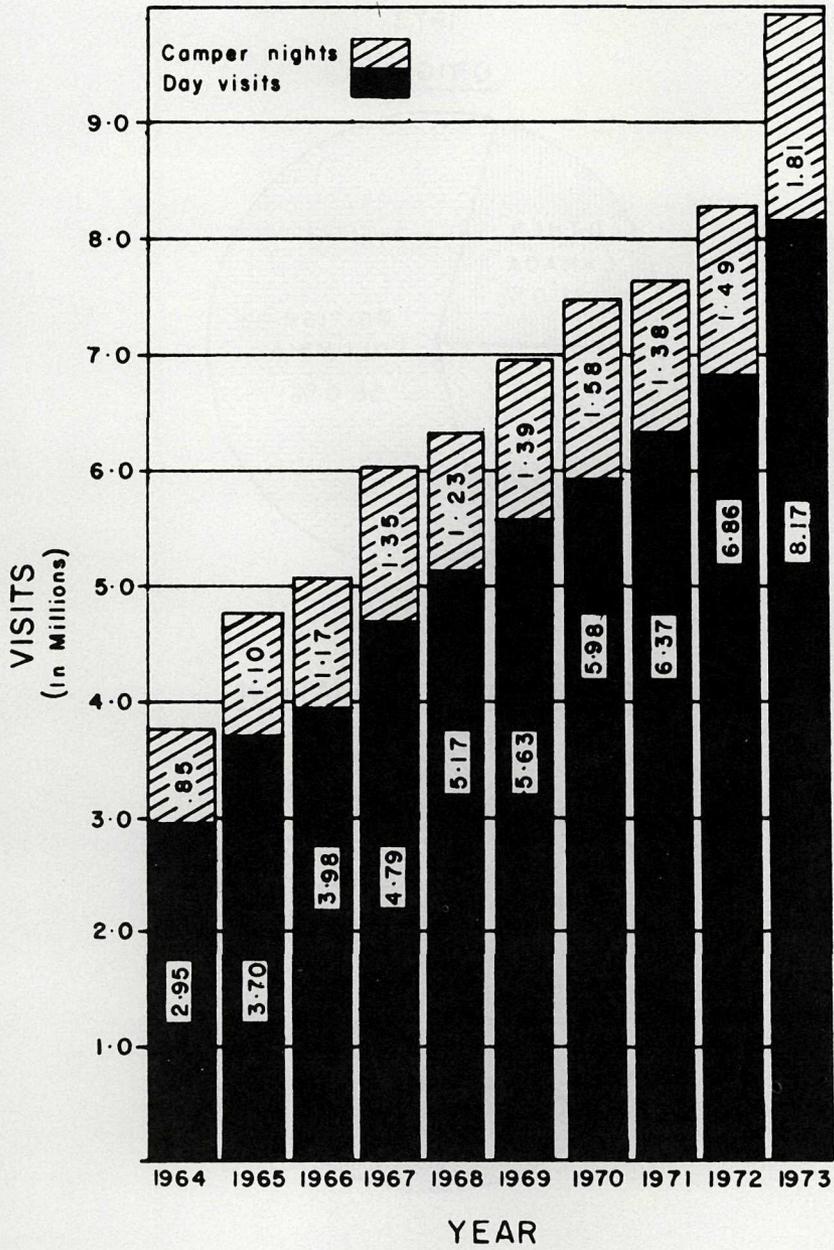
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ORGANIZATION - PROVINCIAL PARKS BRANCH
 YEAR ENDING DECEMBER 31, 1973



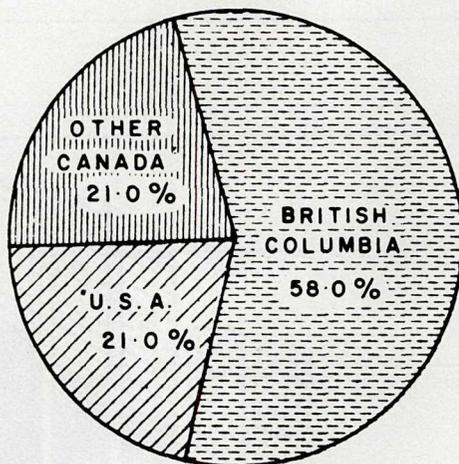
ANNUAL ATTENDANCE



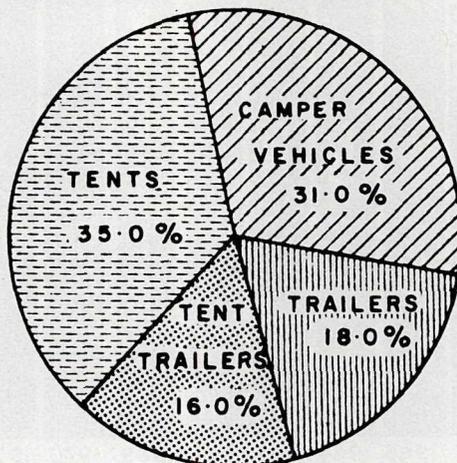
ORIGIN OF CAMPERS VISITING PROVINCIAL PARKS AND TYPE OF ACCOMMODATION USED

1973

ORIGIN



TYPE OF ACCOMMODATION



PROVINCIAL PARKS BRANCH

R. H. AHRENS, Director

A milestone of historic proportions in the history of Provincial parks in British Columbia took place during the Second Session of the Thirtieth Legislature of the Province of British Columbia when the Bill to amend the *Park Act* (Bill 174) was enacted. The amendment to the *Park Act* provided for protection by statute of 73 existing Provincial parks with a total area of 2,888,692 acres, and the establishment by statute of nine new Provincial parks encompassing an area of 1,565,000 acres. In addition to providing unprecedented protection for 82 Provincial parks, the amended *Park Act* gave the Parks Branch effective jurisdiction over all resources in Provincial parks with the *Park Act* having precedence over other Provincial statutes except the *Environment and Land Use Act* and the *Pollution Control Act*. This priority position of the *Park Act* in Provincial parks is a situation that did not exist heretofore.

Continuation of the *Accelerated Park Development Fund Act* of 1972 by the addition of \$5 million to the residual moneys through Bill 77 and by the passing of Order in Council 1812, the Summer Student Employment Programme, which made \$4 million available for labour-intensive projects, enabled the Parks Branch to proceed with the programme commenced in 1971 which has seen a general upgrading of all developments, expansion of camping and day-use facilities, and improvement of water systems, including installation of flush toilets and sani-stations. A total of 2,192 persons was employed in Bill 77 and Order in Council 1812 projects at the height of activity in October.

Acquisition of lands for Provincial parks and purchase of private inholdings in existing Provincial parks was accelerated during the year with the availability of \$2 million for these purposes. A special fund of \$10 million, subsequently augmented to \$15 million, was established as the Community Recreation Fund to be administered by the Parks Branch and to be used to assist communities throughout the Province in the provision of recreational facilities on a shared-cost basis.

Attendance in Provincial parks increased again during the year to 9.6 million recorded visits, continuing an upward movement which commenced in 1965. Camper-use showed the most dramatic upsurge, increasing by 26 per cent over the previous year.

Reorganization and restructuring of the Parks Branch was begun in 1973 in an effort to better meet the Branch obligations of service to the public. To this end, decentralization of park administration to the six park districts, an increase of two such districts from previous years, was started. Construction of works and some aspects of planning are being deployed to the districts.

An outline of Provincial Parks Branch activities for 1973 follows. The level of activity could not have been maintained without the concerted effort of all staff.

PLANNING DIVISION

Consideration has been given this year to the reorganization and restructuring of this Division's responsibilities. This was to facilitate the decentralization process and to provide the Division with abilities to meet the increased demands on its services. Staff training was given more attention this year, which resulted in our representation at the International Seminar on National Parks and Equivalent Reserves; the Conference on Bikeway and Pedestrian Traffic in Orlando, Fla.; a remote

sensing workshop sponsored by B.C. Remote Sensing; an avalanche course given by the National Research Council; a Planning Institute Seminar; a Continuing Education Course on Landscape Architecture; and an in-service field training session on site planning.

PARK SYSTEM PLANNING SECTION

LAND ACQUISITION PROGRAMME

In addition to the 11 new major parks created and the enlargement of Mount Assiniboine Park this year, the Parks Branch has been very fortunate in being able to negotiate successfully seven land acquisitions for inclusion within the Provincial parks system. Six of these have outstanding Provincial significance and include French Beach, a 145-acre property having 5,200 feet of waterfront, near Sooke, on Vancouver Island; a 16-acre parcel of land at the northern end of Chilliwack Lake that will become part of a large lakeside park; two inholdings within Cape Scott Park at the northern end of Vancouver Island, containing 225 acres of land and three magnificent ocean beaches; a 130-acre property adjacent to the Lakelse Lake Park that will permit a significant increase in the recreational facilities provided there; and a 40-acre lot at Smelt Bay on Cortes Island near the site of a major marine park proposal. A seventh property, containing 5 acres next to Sooke Pot-holes Park, was purchased in 1973.

Negotiations are nearing completion on five other properties for which authority to purchase has been received. These properties involve the above-mentioned marine park proposal on Cortes Island, containing 117 acres and located at Mansons Landing; 350 acres of waterfront property on McIntyre Bay within the newly created Naikoon Park on Graham Island in the Queen Charlotte Islands; a 17-acre parcel of land on Moyie Lake near Cranbrook adjacent to Moyie Lake Park; a 75-acre inholding on Bowron Lake within Bowron Lake Park; and the purchase of the lessee's interest on a 7-acre Crown lease on Gwillim Lake near Chetwynd.

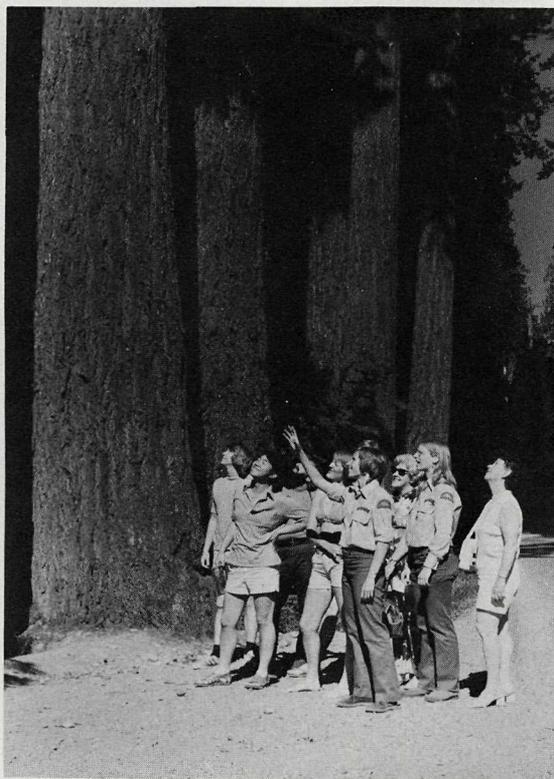
Special mention is made of a 1,200-acre Saltspring Island property made available for park purposes at a most reasonable price by the Ruckle family; a donation of 3.3 acres of land near Westwold by Mrs. J. Pearce for park purposes; a 36-acre property on Christina Lake donated by G. Haszard; 17 acres near Okanagan Landing donated by T. D. Locheed; and 7 acres of land near Harrison Mills donated by The Corporation of Kent for an addition to the adjoining Kilby Historic Park.

INTER-AGENCY STUDIES

Intense public concern developed as a result of conflicts arising from the proposed industrial use and the potential for public recreation in the Purcell Mountains of the Kootenays and the Schoen-Tsitika area of Vancouver Island. Bryan Price and Al Fairhurst attended several meetings with the other Government and industrial agencies concerned, in Victoria and in the field, regarding the ultimate use of these areas. The intention of these studies is to arrive at agreements whereby the land and the resources of the above areas will be used most effectively, with public recreation receiving due consideration.

The ultimate use of the Mica Reservoir, now filling, was the subject of a third study to which Roger Norrish was assigned. The presence of a representative from the Parks Branch at the meetings on this matter was to indicate the future role for public recreation in the region of this body of water where optimum land and resource use management is also sought. In the meantime, reserves for park study have been established in the watersheds of the Blaeberry, Bush, Cummins, and Valenciennes Rivers.

Manning Park Naturalist Pat Swift introduces a young visitor to the world of nature.



Seeing the trees of Cathedral Grove in MacMillan Park through the eyes of Park Naturalists Kathy Earle and Jenny Singleton.

Early morning line-up at Rathrevor Beach Park Campground Gatehouse attests to continuing popularity of camping in the Provincial Park System.



RECREATIONAL RESERVES REVIEW PROGRAMME

With moneys made available through the *Special Funds Appropriation Act*, popularly known as Bill 77, this pilot project, begun in 1972, was enlarged considerably. Under the direction of Bill Hepper, with assistance from Marty Roberts and Rick Simmons, 12 summer students examined and assessed 455 recreational reserves in the Nelson and Kamloops Park Districts. The information gathered by these students has been compiled and is now available for long-term planning for outdoor recreation.

TRAIL INVENTORY PROGRAMME

In order to assist people who inquire about trails and to facilitate planning for trail systems within the Provincial parks, a trail inventory was undertaken this summer by Bill Spriggs, with assistance from Mark Johnston. Park trails may now be seen in an atlas which eventually will show all important trails for hiking, riding, and bicycling in this Province. Sections of this atlas have been made available to park supervisors in charge of large parks with well-used trail systems.

ADAMS LAKE-SHUSWAP LAKE STUDY

The preliminary field work necessary for the preparation of a park master plan for the above-mentioned region was undertaken by Roger Norrish and Gil Scott during July of this year. The master plan will be completed by mid-1974 and will set long-range goals for the establishment of parks and guidelines for their development in this region of the Province.

PROPOSED DOGWOOD BIKEWAY STUDY

Accompanying the increasing interest in bicycling and the provision of safe paths for their use has come an exciting proposal for a hiking and bicycle route along the abandoned 82-mile CNR right-of-way between Victoria and Cowichan Lake. This idea, advanced by Jake Masselink, Chief of the Park System Planning Section, has been called the Dogwood Bikeway Proposal and could be a precedent for other abandoned railways in the Province to be made available for bicycling and hiking. The necessary field work, research, and report writing for this proposal were done by Dave Preston, John Mikitka, Don Tarasoff, and Nick Walton, and were made possible largely by the funds provided for the Summer Employment Programme as authorized by Order in Council 1812.

SUMMARY OF PROVINCIAL PARKS AND RECREATION AREAS ESTABLISHED,
ENLARGED, DELETED, OR CANCELLED IN 1973

	Area (Acres)
Nineteen new parks established—	
Atlin Park (Class A, Category 1)	575,000.0
Blessing's Grave Historic Park (Class A, Category 2) ...	1.2
Brandywine Falls Park (Class A, Category 6)	365.0
Cape Scott Park (Class A, Category 1)	37,200.0
Carp Lake Park (Class A, Category 6)	47,800.0
Chilliwack Lake Park (Class A, Category 6)	384.0
Conkle Lake Park (Class A, Category 6)	1,450.0
Desolation Sound Marine Park (Class A, Category 1) ...	14,000.0
Elks Lakes Park (Class A, Category 1)	13,900.0
Kilby Historic Park (Class A, Category 2)	29.0
Kwadacha Wilderness Park (Class A, Category 1) ...	414,000.0

SUMMARY OF PROVINCIAL PARKS AND RECREATION AREAS ESTABLISHED,
ENLARGED, DELETED, OR CANCELLED IN 1973—*Continued*

	Area (Acres)
Nineteen new parts established— <i>Continued</i>	
Naikoon Park (Class A, Category 1)	179,500.0
Okanagan Mountain Park (Class A, Category 1)	25,500.0
Ole Johnson Park (Class A, Category 6)	36.0
Smelt Bay Park (Class A, Category 6)	40.0
St. Mary's Alpine Park (Class A, Category 1)	22,600.0
Tatlatui Park (Class A, Category 1)	261,500.0
Top of the World Park (Class A, Category 1)	19,800.0
Truman Dagnus Locheed Park (Class A, Category 4) ...	17.3
Additions to existing parks—	
Barkerville Historic Park (Class A)	970.0
Lakelse Lake Park (Class A)	130.0
Mount Assiniboine Park (Class A)	83,606.0
Sooke Potholes Park (Class A)	5.0
Recreation areas established—	
Atlin Recreation Area	95,000.0
Desolation Sound Recreation Area	6,300.0
Kitsumkalum Mountain Recreation Area	3,800.0
Newcastle Island Recreation Area	72.7
Skagit Valley Recreation Area	80,500.0
Deletions—	
Garibaldi Park (Class A)	2,400.0
Kleanza Creek Park (Class A)	12.2
Paul Lake Park (Class A)	3.6
Thunder Hill (Class A)	10.5
Cancellations—	
Skagit River Park (Class A) (within new recreation area)	3,700.0
Tlell Park (Class A) (within new park)	312.0
Tow Hill Park (Class A) (within new park)	493.0

Major reclassifications of parks took place this year which saw 82 parks established by statute, including 9,000-acre Birkenhead Lake Park and 1,303,000-acre Wells Gray Park, which were also reclassified from Class B to Class A following the enactment of Bill 174 amending the *Park Act*.

As the result of a name change, Devil's Pot Holes Park is now called Sooke Pot Holes Park.

The year under review saw the establishment of 58 new reserves for public recreation on Crown land with the co-operation of the Department of Lands, Forests, and Water Resources. Seventeen recreational reserves were cancelled during 1973. There are now 2,763 areas in the Province reserved for public recreation, comprising a total of 563,287 acres.

MASTER PLANNING SECTION

RESOURCE ASSESSMENT PROGRAMME

This year a programme was formulated to systematically collect and record park resource information in a format applicable to master planning purposes. The intent of the programme is to provide a framework under which resource specialists from various fields can assess that component of a park's natural resource in which

they are trained. The information resulting from these assessments is to be used in establishing zoning plans, facility locations, and refined use and preservation objectives for a park.

Assessments of recreation features, landforms, and animal habitats were undertaken in Golden Ears and Mount Robson Parks as pilot projects under this programme.

THE OBJECTIVE PROGRAMME

During 1972 to 1973, studies were undertaken to determine the role of the Parks Branch in the field of outdoor recreation in British Columbia. The aim of the objectives study was to develop and apply a framework for assessing on future park acquisition and development. Areas covered to date include Vancouver Island, Lower Mainland, Kootenays, Okanagan, Cariboo, and Kamloops-Shuswap. Included in this study was an inventory of outdoor recreation facilities by all suppliers and estimates of current use.

RESEARCH SECTION

In 1973, Parks Branch established a Research Section separate from Master Planning, whose objective will be to improve the information base for decision-making. Immediate priority is being placed on improving the quality of user data which are collected by the Branch and making this more readily available. Also undertaken was an inventory of user facilities available in Provincial parks. Proposed studies for 1974/75 go well beyond this and include several environmental impact studies on trail use, development of a programme to analyse flows of park-users within British Columbia, and a study of winter recreational activities.

SITE PLANNING SECTION

Accelerated park development in 1973, as in the previous two years, required site plans for new development, reconstruction, and expansion of existing facilities.

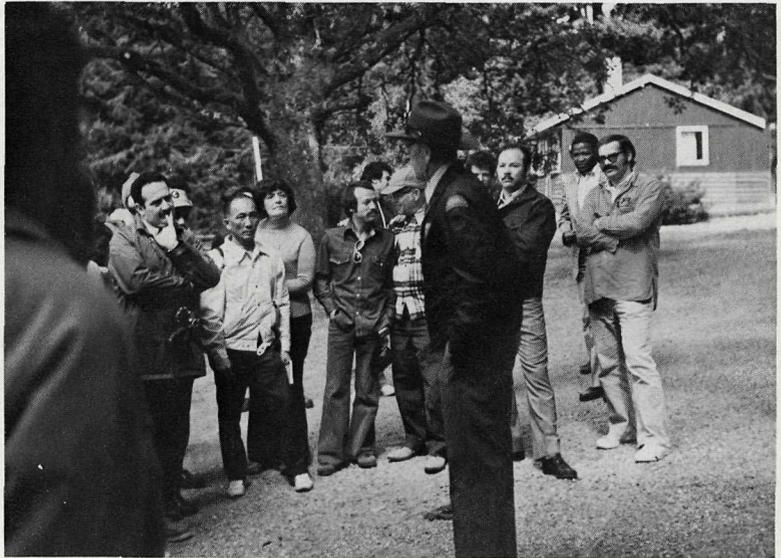
Plans for both campground and day-use areas were completed for Chilliwack Lake, Norbury Lake, Premier Lake, Sasquatch, and Fillongley Parks, and for Green Lake and Horsefly Lake. Under preparation are plans for comparable facilities at Conkle Lake Park.

Plans for parks requiring camping facilities were drawn up for Montague Harbour, walk-in sites; Nancy Greene, high density campground; Golden Ears, conventional and group campgrounds; Delta Grove, campgrounds in Cultus Lake Park, Beaumont Marine, and Rolley Lake Parks, renovations; Ten Mile Lake Park, expansion.

Day-use area plans were prepared for Rosewall Creek and Sasquatch Parks and for Shawnigan Lake. Boat-launching facility designs were completed for Syringa Creek Park and for Clearwater Lake in Wells Gray Park, and for Green Lake. A design concept was prepared and approved for a park information/travel industry reception centre at Mount Robson Park. A service area plan was prepared for Bowron Lake Park.

In addition to the preparation of site plans, staff members participated in general planning problems. Considerable involvement with the pending reorganization of the entire planning division occurred both at the organizational and logistical levels. As part of this effort, a staff member was stationed in a regional office for the summer. During the latter part of the year, two staff members began a landscape architecture course offered by the UBC Extension Department.

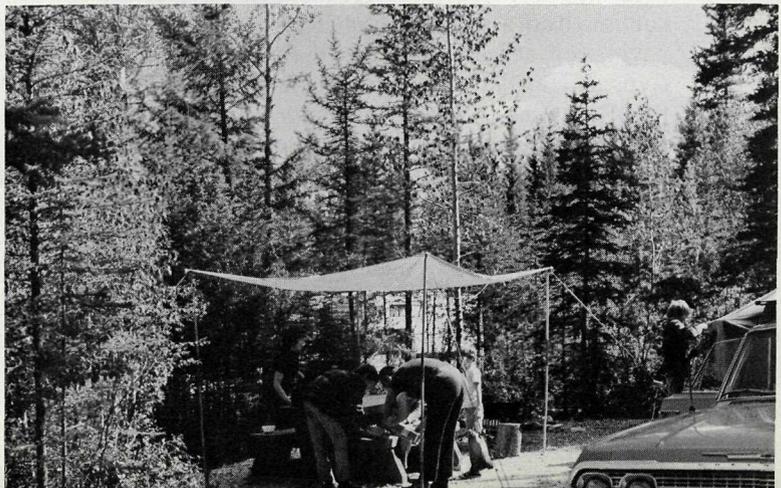
Park Naturalist Freeman "Skipper" King, belying his 82 years, addresses attentive audience of delegates to the Eighth International Seminar on the Administration of National Parks and Equivalent Reserves. Seminar visited Thomas S. Francis Park (shown here) and other Provincial parks during visit to British Columbia in August.



Unstructured camping area is a new campground design concept being tried out at Sproat Lake Park.



Scene repeated throughout the Park Campground system, this busiest year on record, is family setting up camp in newly opened Big Bar Lake Park near Clinton.



WEST COAST NATIONAL PARK PROJECT

The land acquisition programme to acquire the privately held land within the Part I boundary of the Pacific Rim National Park continued with the Provincial Government again putting up \$2 million and being reimbursed for 50 per cent of this amount by the Federal Government on transfer of the lands concerned to Canada.

The accountable advance system, finally accepted by the Federal Government after 2½ years, eliminated the complicated system which had hampered the Branch in its negotiations with the private owners.

No let-up has been indicated in the over-all dissatisfaction with the name of the park and recently the Minister of Indian Affairs and Northern Development assured us this matter was under further consideration.

At the time of writing, 231 parcels have been acquired in the Long Beach area, 15 parcels are under negotiation, and 12 have not yet been dealt with.

In the fiscal year 1974/75, it is proposed to complete the purchases for the Part I boundary (Long Beach area) and the Part II boundary (Broken Group of islands), leaving the West Coast Trail portion for commencement in 1975.

DEPARTMENTAL LIBRARY

In 1973 the Parks Branch Library officially became the Department of Recreation and Conservation Library, and it now offers service to the Fish and Wildlife Branch and the Commercial Fisheries Branch as well as the Parks Branch.

The librarian spends half-days in the Department and half-days at the Provincial Library, and is able to draw upon the information resources of the Provincial Library (which houses all materials published in or about British Columbia), the other B.C. Government libraries, plus all other Government and university libraries.

The estimates for next year include funds to be allocated to the development of regional district sublibraries, which will increase service to the field staff. This year the expansion of the library's physical premises was completed, and the three branch collections are now amalgamated into one central facility.

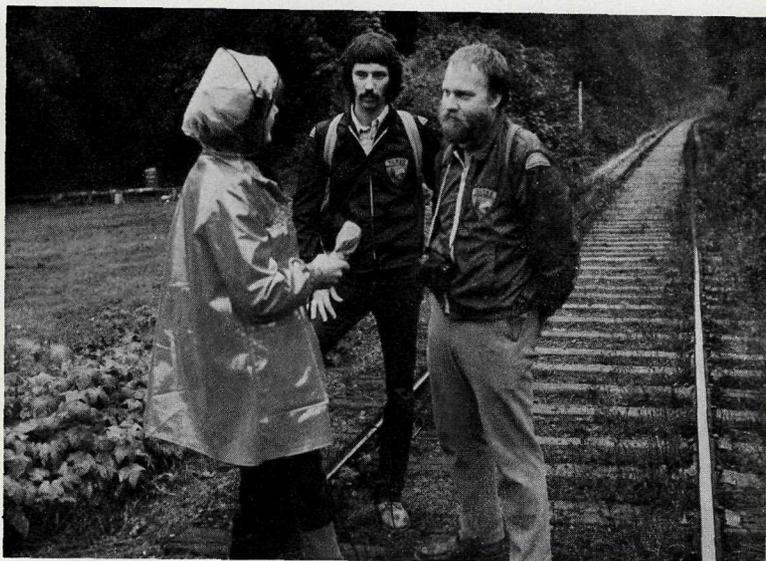
ENGINEERING DIVISION

Administration of field operations was complicated by several changes in the content of the works programme and by a Branch reorganization which deprived the Division of direct control of its construction wing. On the other hand, the scope of work was restricted to projects judged to have considerable technical content or which could best be handled on a contract basis. Combined with the fact that three of the engineers were unaccustomed to Parks Branch practice, these factors had a considerable impact on the effective output of the Division.

Employment of consultants was substantially reduced except in the electrical field, where 14 projects were handled by three firms. The Department of Highways continued to assist the Branch and handled five minor paving contracts, the major paving job at Mount Seymour, the construction of the Goldstream Bridge and the Cypress Highway contracts. The Department of Public Works provided help with the site works to the new Kamloops Workshop.

Administration of consultant referrals and contracts, provision of advice to field staff, and inspection visits absorbed a large part of the effort of the staff. Time was found, however, to design and directly supervise a large new water supply at Kikomun Creek, arrange an emergency replacement of a major bridge at Wells Gray Park, and to design and detail a number of new water supplies and building projects. Twenty-six new well-sites were selected and 21 wells were successfully

Mark Johnston and Don Tarasoff, of the Parks Branch, are interviewed for CBC-TV News regarding proposed Dogwood Parkway which would utilize CN right-of-way on southern Vancouver Island. Portion of the right-of-way near Skutz Falls on the Cowichan River is shown.



Rugged coastline of Cape Scott Park on northwest tip of Vancouver Island. Cape Scott Park is one of 11 major parks established during 1973.



Falls on East Creek. One of the features of Conkle Lake Park.

completed. The Division was also involved in the construction of roads, sewage-disposal systems, boat-launching ramps, the extension of a marina, and the preparation of reports on a wide range of subjects. In the circumstances, 1973 could be judged to be a very fruitful year.

WATERWORKS AND SANITATION SECTION

During 1973 the Section was reorganized to include one engineer, two technicians, and one engineering aide who are responsible for the design and construction supervision of the capital works programmes. The Section provided drawings, specifications, and lists of materials for approximately 12 waterworks projects dispersed throughout the Province and 11 sewerage projects concentrated mainly in the Nelson and Prince George Districts. In addition, a number of pump and pump-control systems were designed for both water and sewerage systems.

A major waterworks system has been designed for Kikomun Creek Park, located in the Nelson District. Because of the complexity of this system it has been presented in four stages, of which Stage 1 has been virtually completed this year and Stage 2 is planned for 1974/75.

BUILDINGS AND STRUCTURES SECTION

A total of 11 contracts for buildings was carried over from the previous year. Due to several changes in the capital works programme, most projects in this Section did not come to fruition. New contracts included those for a regional workshop in Kamloops and major renovations to Manning Park Lodge.

Designs and working drawings were prepared for several projects in addition to those contracted. The designs encompassed such structures as standard workshops, extensions and alterations to several buildings, a crew building, and tourist centre.

As a supplement to the normal work load, the Section was made responsible for the documentation and administration of all contract work.

DRAUGHTING SECTION

Production of drawings continued at a stepped-up rate to keep pace with the Capital Works Programme. Outside firms continued to provide support at times of overload and during the prolonged process of securing replacements and increases to staff in proportion to increased work loads.

The usual wide variety of draughting was undertaken to service the needs of the Branch. These projects included status maps, land-use design, buildings, waterworks, sewerage, tourist maps, publicity assignments, consultant records, park standards amendments and circulation, report maps, and filing and printing of Parks Branch drawings.

The microfilming of all drawings is now nearly complete and a completely new system of referencing and identifying drawings in conjunction with microfilming is expected to be in operation by mid-year.

WORKSHOP SECTION

During the past year the Langford Workshop instituted a production method designed to speed up the process and delivery of materials requested from the field.

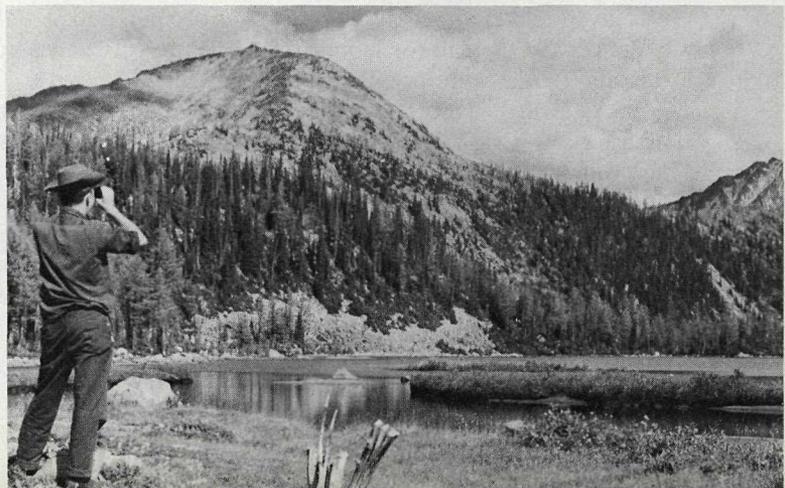


Hikers on Rubble Creek Trail into Garibaldi Lake-Black Tusk area of Garibaldi Park. Increasing public interest in backpacking is evidenced by large numbers of people traversing trails in the park system.

Visitors look over the newly reconstructed Hudson's Bay Company store, butcher shop, and carriage shed at Barkerville Historic Park.



Nelson District Park Officer Milt Goddard surveying recreational potential of Lyallii Lake in St. Mary's Alpine Park, one of 11 major parks established during the year.



This system featured the assignment of a work production number and anticipated delivery date, which was designed to assist the District Park Officer in planning his capital works development programme.

In addition to the normal production and distribution of Parks Branch furniture, the Workshop handled the maintenance and dispatching of the headquarters vehicle pool, the production of plastic fittings for water-supply systems, and the control of the plumbing-supply stores located at Goldstream. A preliminary investigation into the relocation and expansion of the Langford Workshop was carried out with the view to providing better service to the District Park operations.

EQUIPMENT SECTION

Semi-annual equipment inspections were carried out in regions with direct counsel to maintenance personnel to effect repairs. A spring inspection of ski area equipment was carried out at Mount Seymour and Manning Parks, with recommendations for repairs and modifications.

Electric sets were installed at Mount Robson, Naikoon, and Tweedsmuir Parks.

Equipment requisitions and specifications were submitted for vehicles and equipment.

Liaison with suppliers covering specifications, conformance, and warranty administration was carried out. In addition, this Section provided liaison with consultants on ski-lift modifications as well as electrical installations.

A submission was prepared for the development of a Departmental Mechanical Services Division with decentralized headquarters in the Vancouver, Nelson, Kamloops, and Prince George Districts.

SURVEY SECTION

This year was once again a year of high activity for the Survey Section. Summer staff reached a maximum of 32 persons in nine crews and a highly diversified programme was carried out.

Thirty-six mapping projects involving 1,850 acres were completed, and a multitude of control projects involving engineering works or boundary surveys were instrumental in maintaining an active programme. Bridge Lake, Topley Landing, and Shuswap Lake were the most intensive mapping projects, with the Mount Seymour sewer-line, Kikomun Creek water system, and Blanket Creek pondage area proving to be the control projects of note.

A start was made toward reorganization of the Section to provide a faster response and better service to the Branch in line with the general reorganization taking place.

VANCOUVER MANAGEMENT DISTRICT

Continued expansion under the Accelerated Park Development programme was given added impetus this year by Order in Council 1812. All regions responded effectively to the call for labour intensive projects and a good number of local projects and works were pressed to completion.

As a further move toward decentralization of the Branch, a District Construction Section was formed and D. H. Eggen has assumed responsibilities as Construction Superintendent. In addition, positions for a District Planner and an assistant to the District Park Officer were established.

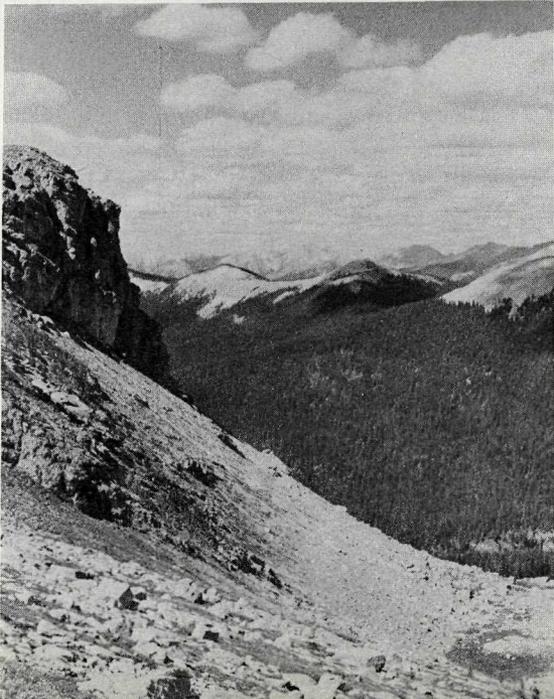
A major paving and reconstruction programme early this fall marked the completion of the Mount Seymour Road. Attendance continues to surpass previous records at Mount Seymour as thousands of visitors now take advantage of the



Mr. and Mrs. Acton Kilby, whose presence lends so much to the period atmosphere of the General Store and Museum in Kilby Historic Park at Harrison Mills.



Carp Lake Park, northwest of Prince George, was already a popular outdoor recreational area before its establishment in 1973.



Mountainscape, one of the features of Top-of-the-World Park, located east of Kimberley. The park is one of 11 major parks created during the year.

smooth three-lane road to the top of the mountain. Extensive renovations have been made to the old V.O.C. Building and the modified structure is now serving the ski school staff and patrons. Considerable grooming and stabilization of the ski runs and hydro seeding on road embankments was effected with the aid of Order in Council 1812 funding.

Construction of 40 additional sites in Lightning Lakes Campground brought the total to 100 units now enjoyed by visitors in this popular section of Manning Park. A new water system for the Pinewoods area was brought into operation this year. The 100,000-gallon reservoir is an asset to the greatly expanded development here. Manning Park also took delivery of a combination triple pumper truck and an ambulance as part of the area's emergency service establishment. G. F. Lawrie was successful in the competition for Safety and Emergency Services Officer and now leads this important facet of Manning Park's operation. Expansion and improvements to the park's trail system were undertaken this year and extensive landscaping and painting was accomplished by our forces under Order in Council 1812. A project in conjunction with the Fish and Wildlife Branch to improve the fishery at Lightning Lake was also initiated. This year's use figures at Gibson Pass have reflected the growing popularity of skiing here and especially the trend to recreational vehicles for family winter camping. A new addition to the Manning Region, made public this fall, was the Skagit Valley Recreation Area, which represents a valuable asset to the Branch in meeting the recreational needs of Lower Mainland populations.

Major renovations and a general upgrading of facilities were carried out at Cultus Lake Park in an effort to rehabilitate the well-used campgrounds there. Delta Grove campground has been refurbished and a new water system is pending. Rowdiness and vandalism, once prevalent in the park, have declined dramatically thanks to effective security procedures. Work commenced at Sasquatch Park this year on innovative camping facilities. Some interesting reaction to this new concept is anticipated.

In the Garibaldi Region, a major effort was concentrated at Birkenhead Lake Park, where a 100-unit campground, boat launch, and preliminary work for day-use area have been carried out. This attractive park is destined to be the focal point for recreation in the Pemberton area. Work in the Black Tusk area continued this year as trail building and rehabilitation kept crews busy all summer. Relocation of the campground by Garibaldi Lake has been proposed and should get under way next year. The Black Tusk continues to be one of the most attractive and well-used alpine regions in the park system where progress is being made toward improved maintenance and control in the area. This fall the Branch took over operation of the Diamond Head Chalet. Parks staff now maintain the building and its access road and provide soup, sandwiches, and hot drinks to day-users of the area.

At Golden Ears Park, considerable effort was made in both the rehabilitation of the day-use area and the construction of a new 120-unit campground to complement existing facilities. Extensive painting, clean-up, and landscaping activities took place under Order in Council 1812, while a continued co-operative programme with Haney Correctional enabled us to accomplish substantial trail work. Foot trails to Alouette Mountain and to Golden Ears, plus work on many miles of horse trails, were among some of these projects. The campground at Rolley Lake underwent rehabilitation this year and a service building was constructed in the park. Vandalism and rowdiness in Alouette Region have been curtailed dramatically, largely due to our new system of radio communication.

Llewellyn Glacier characterizes Atlin Park, a 1973 addition to the Provincial Park system.



Established in 1973, Elk Lakes Park on the Alberta boundary provides scenery and mountain recreational opportunities.



Parks Branch crew moves gatehouse across new Goldstream River bridge in Goldstream Park. New bridge (erected this year) replaces one which had become unsafe for heavier traffic load.



A new workshop and service yard are also being constructed at Peace Arch Park. This facility will certainly be welcome to Mr. Kristjanson, who, for many years now has maintained to perfection what is probably the most photographed park in the Provincial Parks system.

The Vancouver District had a new addition this year in the establishment of the Sechelt Region. Substantial increases in tourism to the Sunshine Coast have precipitated this move and the regional headquarters will be situated in the very popular Porpoise Bay Park. Work on the campground there is approximately 80 per cent complete and construction of the day-use area has been initiated. At Saltery Bay, day-use facilities were renovated and expanded, including the construction of a sorely needed retaining-wall. Princess Louisa is still very popular with boaters and our staff there have upgraded the trail system and accomplished a general clean-up of the area. A picnic shelter, reminiscent of a native Indian structure, was donated by the Princess Louisa Society. It is a welcome respite to boaters during inclement weather ashore. At Plumper Cove Marine Park, 160 feet of Ce-Fer floats were installed to accommodate the rapidly expanding popularity of pleasure boating in the area.

To head the new park region at Sechelt, O. N. Johansen has left his post at Mount Seymour Park which he held for 29 years. Ole's many friends were sorry to see him leave Mount Seymour, but wish him the very best in his new position. A. Midnight, from the Garibaldi Region, will be joining Mr. Johansen as his assistant early in 1974.

To replace Mr. Johansen at Mount Seymour, T. O. Moore has left his position at Manning Park. D. E. Green moved south from Wells Gray Park to assume charge of Manning Park and we are pleased to have him with us. This year we lost H. Schmidt, Assistant Supervisor at Cultus Lake, who was successful in his bid for the vacancy at Wells Gray Park. We wish Mr. Schmidt every success in his new post.

The year 1973 has been active and eventful, much being accomplished, initiated, and continued in the district. Labour intensive projects gave us the opportunity to tie up many loose ends and the shifts in senior personnel, the chance for a new look at the situations in three of our regions.

The district office is becoming more involved in public hearings and meetings as decentralized responsibility and authority falls imperceptibly upon us.

NELSON MANAGEMENT DISTRICT

The continuation of the Accelerated Park Development programme for a third year insured the continued improvement of parks in the Kootenays. The Summer Student Employment Programme, Order in Council 1812, initiated in June 1973, provided funds for employment of young people in the upgrading, maintenance, and construction of park facilities in most parks in the district.

Two major wilderness parks, Elk Lakes and St. Mary's Alpine, were established under the amendment to the *Park Act*, while the wilderness known as the Top-of-the-World was given Class A park status by an Order in Council. Another Order in Council significantly extended the boundaries of Mount Assiniboine Park. Class A park status also was given to lands surrounding Conkle Lake and to the old Class C park lands at Premier Lake.

Park Rangers were stationed for the first time at Fortress Lake in Hamber Park and at Conrad Kain Hut in the Bugaboos. These Rangers, in addition to their regular maintenance responsibilities, guided park visitors in the use of these

wilderness areas, and recorded a wide range of data which are required for completion of the long-range plans for these parks.

Major construction works were undertaken at Norbury Lake Park where 46 camp-sites and a day-use development had been readied for final completion in June to meet the 1974 summer visitor use. A start was made on the reconstruction of the old Class C park facilities at Premier Lake Park—improvements to the boat-launching site, the parking-lot, and the campground were started late in the year so that public use during the summer would not be interrupted. This project, however, ran into adverse weather conditions and was forced to shut down before works were completed. The campground construction previously started at Moyie Lake Park was completed, bringing the camp-site total to 71 units. Paving contracts under the direction of the Department of Highways were undertaken at Moyie Lake and Yahk Parks.

The development of Kikomun Creek Park, situated on Lake Kooconusa, continued throughout the year, with emphasis on trails, placement of tables, toilets, and changehouses. The first phase of the water system has been completed with the construction of a 70,000-gallon concrete reservoir and installation of 8,632 lineal feet of water pipe.

Development of facilities at Kokanee Creek Park continued in the Sandspit Campground until 104 sites were completed for public use. The campground first opened July 1, 1973, providing 50 units for camping, with another 20 sites being opened August 1, 1973. The day-use parking-lots were redesigned and readied for final dressing, while the meridians were reshaped for landscaping. An access road was built to the new boat-launching area in preparation for the construction of a boat ramp.

Camp-site construction at the Kettle River Recreation Area continued with works concentrated on the completion of the campground, on the extension of a scenic river trail, and on the development of day-use facilities.

Two boat ramps with adequate parking were constructed in Syringa Creek Park to meet future boating needs of people wishing to gain access to the waters of the Arrow Lakes Reservoir. One of the ramps has been extended to low-water levels to provide launching facilities throughout the year.

Construction continued at Blanket Creek Park near Revelstoke with the development of a large swimming-basin adjacent to the Arrow Lakes Reservoir. Some reconstruction of the access highway was necessary to improve roadside and ditches which were not completed during initial construction. The Students' Employment programme provided the necessary workers to improve the camp-sites, rebuild trails, landscape small creekbeds, etc.

Numerous other small projects and reconstruction works were undertaken in Nancy Greene, Beaver Creek, Erie Creek, Stagleap, Mount Fernie, Johnstone Creek, Boundary Creek, and Mount Assiniboine Parks.

Sewerage systems for newly constructed toilet buildings were completed at Champion Lakes, Syringa Creek, Christina Lake, Kokanee Creek, Wasa Lake, Mount Fernie, Dry Gulch, and Mount Fernie Parks.

Deep wells were dug at Syringa Creek and Kokanee Creek Parks and at Kettle River Recreation Area to extend and improve the water systems in these park developments. Electrical contracts under Engineering Division control were let to meet pumping requirements at Wasa Lake, Dry Gulch, Kokanee Creek, Christina Lake, and Beaver Creek Parks.

The trail programme continued in Mount Assiniboine Park with 6 miles of trail and two bridges being constructed in the Simpson River valley. Trail improvements

in Kokanee Glacier Park were undertaken in Coffee Creek, Silver Spray Creek, Woodbury Creek, Joker Lakes, Paupo Creek, Enterprise Creek, Lemon Creek, and Nilsik Creeks.

The Youth Crew programmes at Kokanee Creek, Champion Lakes, Wasa Lake, and Mount Assiniboine provided 60 boys with a working experience in the outdoors. Their recreation programmes included canoe trips, wilderness hikes, water ski-ing, and a close association with Park Naturalists, trappers, and Conservation Officers.

The Park Naturalist programme was extended from Champion Lakes, Kokanee Creek, and Wasa Lakes Parks to include very successful walks and talks in Kokanee Glacier and Mount Assiniboine Parks.

NORTHERN MANAGEMENT DISTRICT

Park development in the northern districts for 1973 was again active as a result of the continuation of the *Accelerated Park Development Act*. As in previous years, emphasis was placed on the improvement and expansion of existing recreational facilities.

In the Bear Lake Region, sewage-disposal systems were constructed in Crooked River Park to complete the two public toilet-changehouse buildings. Hydro power to the park will be connected in the spring of 1974. The campground at Whiskers Point Park was enlarged by 32 camping units and a service yard and staff residence building constructed. At Ten Mile Lake Park, the day-use area facilities were increased by the addition of 1,000 feet of beach, construction of a 30-table picnic terrace, and two changehouses. Parking facilities were enlarged to accommodate an additional 150 cars.

The major project in the Bear Lake Region was at Purden Lake. A 78-unit campground plus service yard and boat-launching facilities were constructed. The construction of a day-use area is scheduled for 1974.

Construction efforts in the Fraser Lake-Stewart Lake area consisted of construction of a 30-table picnic terrace and 600 feet of beach at Beaumont Park, as well as the completion of Parrens Beach day-use area on Stewart Lake.

In the Lakelse Region, major activities were confined to Lakelse Lake and Maclure Lake Parks. At Furlong Bay, a gatehouse was installed, and construction of sewage-disposal fields for the public toilet buildings was started. Completion is scheduled for early 1974. The campground at Furlong Bay has been enlarged by 24 units; construction is not yet complete, but these units should be ready for the start of the 1974 season.

At Maclure Lake, a six-unit public toilet building was constructed, as was a sani-station and sewage-disposal system. The beach frontage was also enlarged by dredging and sanding. Other minor works in the region consisted of drilling and installation of wells at Topley Landing, Ethel F. Wilson, and Pendleton Bay Parks. Roads and parking areas in Exchamsiks Park, near Terrace, were paved.

Activity in the Peace-Liard Region was significantly lower than in 1972. At Liard River, a campground renovation programme was undertaken, and the boardwalk to the hot springs was replaced. At Charlie Lake, general renovations were done to the campground and boat-launching ramp. At Moberly Lake a Pan-Abode garage-workshop was constructed, and improvements to the beach trail system undertaken.

Bowron Lake Region was the scene of considerable activity this past season. A new service yard, made necessary by increased park usage, was constructed, and a new well drilled. The Youth Crew programme was introduced in the park and

construction of a new camp was started in conjunction with the service yard. To date, construction of a washroom and three accommodation buildings have been completed. Continuation of the camp-service yard complex is scheduled for 1974. Other works in the region included improvements to the lake chain facilities and portages, and the construction of a residence building for the regional supervisor in Wells.

In the Mount Robson Region, the Youth Crew complex was expanded to accommodate an additional 15 boys, bringing the camp size up to 45 boys. Four additional accommodation buildings were erected, and a laundry building, storage shed, and a storage room added to the cookhouse. Construction of an entrance portal at the west gateway to Mount Robson Park was also completed. A Youth Crew camp was constructed in the Berg Lake area of Mount Robson, and operated during the summer season. The projects concentrated on were trail improvements, installation of toilet facilities, and garbage collection. This programme will be continued in 1974. Other projects undertaken in the region included the extension of the water system to the Robson River campground and completion of the sani-station at Robson Meadows campground.

The 1973 season saw a number of changes in the administrative make-up of the northern districts. The most significant change was the establishment of the Smithers District, with headquarters at Smithers. R. Norrish is the District Park Officer in charge of the district. An additional administrative change was the establishment of the Tweedsmuir Region, with headquarters at Houston. J. P. I. Rogers is the newly appointed Regional Supervisor.

R. A. Russell, Regional Supervisor, Bear Lake Region, was transferred to the Nelson District as Regional Supervisor, Kokanee Region.

KAMLOOPS MANAGEMENT DISTRICT

Reorganization seems to have been the key feature of a year, highlighted by the posting of District Construction Superintendents. The third phase of the Accelerated Park Development programme, Bill 77, coupled with the inception of a Student Summer Employment programme, Order in Council 1812, saw an unprecedented increase in funding. Again, efforts were concentrated on trying to complete works that have been in progress for several years. Much was done, much more remains to be done. The only new project initiated was the work at Green Lake in the Cariboo, where the construction began of what will become a fine park, accessible by a 35-minute drive from the Cariboo Highway. Changes in ledgering and accounting procedures added substantially to the district work load. Fortunately, increased financing permitted the hiring of additional staff in the district headquarters, which in turn permitted us to respond to regional needs at a reasonable level.

The Okanagan Region was allocated 13.6 per cent of district funds. The most meaningful work was undertaken with funds provided by the Student Employment programme. Many parks and reserves were cleared of an accumulation of debris produced by a decade of use and neglect. The infusion of these funds into the local economy was almost as significant as their effect on the landscape.

The Shuswap Region absorbed 13.2 per cent of district funds. Much of the financing provided by the *Accelerated Park Development Act* was absorbed in the completion of buildings and intensive landscaping in Shuswap Lake Park. The student programme was extremely beneficial and, among other things, permitted trail work and the meticulous hand-grooming and cleaning of both developed and

undeveloped parks and reserves. No new works were initiated and the region, which offers great variety of recreational opportunities, remains deficit in basic facilities.

Almost one-third of the total funding for the Kamloops District was expended in the Thompson Region on bringing facilities up to standard, and undertaking the construction of basic facilities that had been planned, designed, and on paper for some time. Very significant additions were made to Paul Lake and to Lac Le Jeune, while minor but equally significant works were undertaken in other region parks. The student programme permitted a much higher standard of construction than normal, and the intrusive appearance of new construction was softened by landscaping which included the placement of topsoil, turf, and trees. Of real significance is the completion of the regional headquarters, which includes such basic administrative necessities as a service area, garage workshop, and office space. Regional staff have survived a trying period when the lack of proper accommodation has made efficient administration difficult.

The Wells Gray Region utilized 30.4 per cent of the funds allocated to the Kamloops District. These moneys were expended in Wells Gray Park, with the bulk of those funds spent on either roads or trails. The success of these projects would have remained largely unsatisfactory except for the provision of supplementary funding through the student programme. As with most other regions, the effort was concentrated on the completion or upgrading of existing facilities, rather than the construction of new ones. Following a reassessment of the capability of the Murtle River Bridge, the section spanning open water was replaced with a Bailey bridge under the design and supervision of Engineering Division. Public use and acceptance of the Park would indicate that additional camping facilities are required immediately.

At Lac la Hache, the Day-Use area was landscaped to guard against erosion. Bridge Lake was reconstructed and landscaped to Planning Division specifications. Landscaping and completion of the day-use area, together with the purchase and construction of a simulated log building for a seasonal residence and a small workshop were projects slated for Big Bar Lake. Perhaps the most significant work undertaken in the Cariboo was the beginning of a park at Green Lake, where the bulk of the student programme money was expended. A most significant contribution for 1974/75 will be the completion of the first stage of this development.

The South Tweedsmuir Region was allocated 3.1 per cent of district funds. The administration of this subregion has been handled through the Cariboo office of this district on a temporary basis. This year saw substantial improvements to the headquarters area as well as to the campground on the Atnarko River near Stuie. The trail improvement programme continued, with perhaps the most significant achievement being the construction of two log footbridges crossing the Hotnarko River near Young Creek and the Atnarko River near the Stillwater.

VANCOUVER ISLAND MANAGEMENT DISTRICT

Emphasis was again on improvement to facilities and standards of maintenance in the Malahat Region, with extra fundings provided by Bill 77 and Order in Council 1812. A new bridge across the Goldstream River was constructed by the Department of Highways and another 12 camp-sites were reconstructed to accommodate larger recreational vehicles in Goldstream Park. Extensive renovations were carried out to the changehouse and toilet building in Bamberton Park. Planned facilities at Gordon Bay Park were completed, which included beach improvements, parking-lots for boaters and picnickers, and landscaping. Two new cabanas were constructed

at Gabriola Sands Park and improvements made to the grounds and parking-lots. Heavily used China Beach Park received a new parking-lot and access road. The renovation of Prior Centennial Park campground marked the completion of the major renovation projects required to bring the region up to new design standards.

Parks in the Strathcona Region continued to receive heavy use by campers, picnickers, and hikers during 1973. In addition to normal maintenance commitments, staff directed much effort to organizing and managing the Summer Student Employment programme, Order in Council 1812, which permitted improvements to park services and facilities. An average of 35 people was employed on the reconstruction of Elk Falls Park, continued reconstruction of Miracle Beach Park, reconstruction of 11 miles of the Elk River Trail in Strathcona Park, and in various management duties throughout the region.

The establishment of Cape Scott Park within the Strathcona Region provides a challenge in the development of techniques relating to the management and administration of a wilderness, sea coast park.

Activities in the Arrowsmith Region during the year were supported by the funds available through Bill 77 and Order in Council 1812. All main roads were paved, the original barn was restored, and the entrance to the campground and the area around the sani-station were landscaped in Rath Trevor Beach Park. In Little Qualicum Falls Park, a new pumping station was installed and the water system was completed. Trails were upgraded and various buildings were painted in parks throughout the region. The Youth Crew programme was most successful, with trail construction, stone work, and some maintenance being carried out.

PARK SECURITY

During the 1973 camping season full-time security patrolmen were employed in 15 parks, seven with gatehouse control and eight without. During the Easter school holiday, before security measures were in effect, outbreaks of vandalism and rowdiness occurred in some parks, but these were quickly brought under control, and from May 1 the operation was successful. As in 1972 there were virtually no complaints of rowdiness from the camping public and serious acts of vandalism were few. The eviction section of the regulations was used early in the year before any incipient disturbance could reach major proportions. This proved effective. There was a noticeable drop in complaints from the public about the security measures, and against the enforcement of these measures by park staff. This is probably due to, first, the acceptance of controls by the public and, second, more experience on the part of park staff.

ACCIDENT PREVENTION

With no serious accidents, and the Department of Recreation and Conservation again being awarded the Premier's trophy for accident reduction, it is felt that 1973 was a good year. Emphasis again was on on-the-spot inspections, accident prevention committees, an increased awareness of hazards, and the necessity of safe work habits.

YOUTH CREW

Following the pattern of previous years, crews were made up of boys 16 and 17 years of age, with the work tailored to their physical and emotional capabilities, and liberally broken up with sports, trips to points of interest, and periods of relaxation.

Camps were again operated at Little Qualicum Falls, Manning, Champion Lakes, Kokanee Creek, Wasa, Mount Robson, and Crooked River Parks and at

Horsefly Lake. New camps were opened at Golden Ears and Bowron Lake Parks and alpine camps were in operation in the Black Tusk area of Garibaldi Park and in Mount Assiniboine Park. Considerable renovation of old trails was accomplished and a fair mileage of new trails built. These activities, together with the construction of the new camps and improvements to the old, made for a busy summer. This year, Manning Park returned to a system of satellite camps, a system which had not been used for some years. One headquarters camp, with all amenities was established, with three primitive camps in semiwilderness locations being operated from it. With four crews moving progressively from camp to camp, each boy got a taste of what each area had to offer, as well as spending a period of time at park headquarters. Foremen and cooks were maintained at each satellite camp, and supplies were brought in from headquarters. The boys thoroughly enjoyed the experience and they were not long enough at any one camp for the work to become boring. During their time at the headquarters camp, they were taken on trips to points of interest and spent considerable time at sports and relaxation.

With a total of 254 boys in the field, it is felt that 1973 was quite a successful year.

PUBLIC INFORMATION AND EDUCATION

Requests for information from the general public and interested groups and organizations increased again in 1973 over previous years, reflecting the continued and growing concern of the people of British Columbia and elsewhere for the Province's natural heritage as exemplified by the Provincial Parks system. Inquiries for folders and brochures were up by 29.5 per cent over 1972, while the dissemination of letters and memoranda remained at the same level.

Providing the required informational material necessitated revising and reprinting of nearly all available publications and the preparation and printing of three new major folders—*Kokanee Glacier Provincial Park*, *Gibson Pass Ski Area of Manning Provincial Park*, and *A New Era for Provincial Parks*. In addition, a number of temporary mimeographed hand-outs describing smaller parks were prepared and distributed.

Information about Provincial parks was presented to the public in the Okanagan, Lower Mainland, and on Vancouver Island through the Parks Branch portable display which was exhibited at outdoor shows, university open houses, recreation associations, and schools. The refurbished Department of Recreation and Conservation display in the B.C. Building at the PNE in Vancouver told the story of parks as well as of Commercial Fisheries, Fish and Wildlife, and the Provincial Museum to countless visitors during the year.

Special presentations on Provincial parks were made to the annual Travel Counsellors' school in Vancouver and to Tourist Advisers in Prince George and Nelson in co-operation with the Department of Travel Industry. Talks were delivered to students of recreation at the University of Victoria and at Capilano College in North Vancouver as well as to other groups in various locations in the Province. The Information Officer appeared on a television programme taped at the CHEK-TV Station in Victoria for broadcast on the CTV network in British Columbia and was a guest on a CKWX radio open-line show in Vancouver.

Arrangements were made for the visit to British Columbia of the Eighth International Seminar on the Administration of National Parks and Equivalent Reserves in August. During the seminar's stay in the Province, the delegates toured Provincial parks on Vancouver Island and they were transported to Sidney Spit Provincial Marine Park on board Canadian Forces' ships through the courtesy of Rear-Admiral R. J. Pickford, C.D., Commander, Maritime Forces Pacific.

News releases and features prepared by the Information Officer helped keep the news media informed of the activities of the Parks Branch. An article about Mount Edziza Provincial Park and Recreation Area was written for *Beautiful British Columbia* magazine. Assistance was given to individuals and agencies writing about Provincial parks through provision of photographs and by editing and proofreading manuscripts.

The Information Officer helped in the preparations and arrangements for the Parks Branch conference held in Vancouver in December. In connection with this, a Parks Branch logo was designed and submitted for official approval. During the course of the year the Information Officer visited parks throughout the Province and recorded Branch activities and park developments on film and in print.

INTERPRETATION

Expanded programmes and record attendance marked a successful year for Interpretation in 1973. Under Order in Council 1812, programmes were extended to September 30, allowing naturalists the opportunity to reach a larger audience, particularly among school children.

Six new staff members were added to Interpretation's various sections during 1973. L. Pavlick and G. Hazelwood were appointed respectively as Assessment Officer and Wildlife Officer to assist in carrying out Interpretation's traditional roles of providing information on parks' natural features, and of the protection of wildlife in parks. Miss J. Fisher and Miss P. Swift joined the Programmes Section to assist in the office support for the increased number of summer naturalist programmes. Peter Eyles and Miss Connie Knowles joined the Display Studio staff to increase the quality and amount of art work in each display production.

A seven-day training workshop session for seasonal naturalists was held in May at Parksville where the natural setting proved ideal for practice walks and talks. An intensive week of study, together with briefings by park administrators and outside resource people, introduced new employees to all aspects of the naturalist's role in the park system. The sessions also provided new information and techniques of interpretation for experienced naturalists.

PROGRAMMES SECTION

Park Naturalist programmes were conducted in 29 parks throughout British Columbia, ranging from a pilot project at Ralph River in Strathcona Park to a new programme at Mount Assiniboine. Fifty seasonal naturalists, an increase of 10 over 1972, welcomed 240,259 visitors to programmes conducted from Vancouver Island east to Alberta and north to the Yukon boundary. As a result of this expanded programme with increased staff, headquarters personnel spent many extra hours in field supervision and administration, visiting 23 of the 29 park programmes during the summer.

Nature houses containing popular displays were open in Bowron Lake, Manning, Miracle Beach, Mount Robson, and Shuswap Lake Parks. The Miracle Beach programme introduced 44,937 people to the environment of the forest and the sea, while Shuswap Lake's walks, talks, slide shows, and Nature House entertained a record 46,371 people. Goldstream's extension programme gave 9,534 school-children the opportunity to experience the park's natural history, and the fall salmon run attracted an additional 45,000 visitors.

Experimental interpretive programmes were conducted in three parks—Horne Lake Caves, Liard River Hotsprings, and Mount Assiniboine. Of these, the Horne

Lake Caves programme was the most unusual and, in a sense, the most successful. Visitors were equipped with cave exploration gear and were conducted through two contrasting caves—one badly damaged by vandals, the other gated, protected, and in excellent condition. Members of the Vancouver Island Cave Exploration Group served as guides. Many man-hours of their time were donated to helping people understand and experience the nature of the cave world. In 20 days of operation, over 2,000 people ventured underground. An experimental community Park Naturalist programme was started during December in the Lower Mainland area. The purpose is to provide a naturalist resource person who can take school-children outdoors for a natural history experience or give talks indoors to interested groups on Provincial parks and outdoor recreation opportunities in parks close to Vancouver.

ASSESSMENT SECTION

Liard River Hotsprings Park, an unusual area of natural hot springs, luxuriant vegetation, and water-formed tufa terraces on the Alaska Highway, was carefully studied for its interpretive value and its natural area protection requirements. Other parks assessed in this way included Carp Lake and Kikomun Creek. Preliminary observations and assessments were carried out for Purden Lake, Premier Lake, Whiskers Point, Fort McLeod Historic, Davis Lake, Sasquatch, and Chilliwack Lake Parks, and at Toad River Hotsprings.

WILDLIFE SECTION

Activities since September have included field examinations of Cape Scott, Mount Robson, and Hamber Parks to determine the nature of specific wildlife specifications. These parks were assessed in order to ensure the continuation of wildlife populations for park visitor enjoyment. The work involves liaison with wildlife management agencies, consultants, and knowledgeable individuals involved directly with park animal populations.

DISPLAY STUDIO SECTION

The major work undertaken during 1973 was the complete revision of Shuswap Lake Park Nature House. In total, 17 new indoor displays were planned and completed for all nature houses. A second major work, an ecological display for Manning Nature House, was planned. To date, two-thirds of this display has been completed.

More emphasis was placed this year on outdoor displays in parks. A survey of present and potential outdoor displays in southern British Columbia was completed during the summer. Ten outdoor display panels, including sets of aluminum signs, were produced for visitor use in MacMillan, Alice Lake, and other southern parks.

The campground orientation map programme was accelerated slightly to produce 14 of these visitor aids. Three new pamphlets, *20 Plants of Champion Lakes Park*, *Trees of British Columbia's Parks*, and *20 Birds of Miracle Beach Park*, were written, illustrated, and prepared for the printers.

The success of the 1973 programme and related activities is a direct result of the enthusiasm, dedication, and interest expressed in the work by all staff. Particular credit for this success goes to the seasonal naturalists whose attitudes and activity have so much to do with a park visitor's feeling of enjoyment in a park.

HISTORIC PARKS AND SITES DIVISION

In addition to the regular historic sites funding from the Provincial Secretary's Department, the Division utilized \$280,000 of the Accelerated Park Development Fund for historic parks and sites projects throughout the Province. Besides the various projects described below, a grant of \$15,000 to the Atlin Historical Society enabled acquisition of the courthouse and other buildings.

PARKS SECTION

Barkerville Historic Park—Attendance continues to increase, with a total of 280,000 day-visits and 40,000 camper-nights estimated for the season. In order to protect the approaches to the park from the possibility of both placer-mining and commercial development, about 800 acres extending along nearly 4 miles of the highway between Wells and Barkerville were added to the park. Projects during the year included the completion of the carriage shed in the Hudson's Bay Company complex; the completion of the Conklin Gulch feeder to the water system; completion of 80 of the 90 units in the Lowhee Campground, and the water system in the campground; continuation of the souvenir shop-refreshment pavilion to be opened in 1974, and drilling of two water wells in the Forest Rose Campground, 50 units of which will be available in 1974. Employment of a full-time exhibits man enabled long-due attention to be given to displays throughout the park. New displays included the carriage shed, Mrs. Neate's house, and working exhibits in the Cariboo Sentinel print shop and the blacksmith's shop. New displays are planned for 1974.

Cottonwood House Historic Park—Although this pleasant historic park attracts less than 10 per cent of the visitors going to Barkerville, it does so without publicity and without any interpretive programme. Now that all the roofs except the one on the main building have been reshaked and most of the immediate reconstruction has been completed, attention can go to interpretation.

Fort Steele Historic Park—The park attracted 275,000 day-visits, including 62 organized school groups. The school visits doubled over the previous year and are demanding thorough planning and preorganization. The appointment of an Assistant Supervisor has enabled that necessary attention be given to the many aspects of both short- and long-range planning. The construction of the hospital completed the reconstruction of the eight-building North West Mounted Police post as originally built by Superintendent Sam Steele and "D" Division in 1887. The Clydesdale horses now occupy the barn. A start was made on completing the balcony in the Wildhorse Theatre, and it should be ready for use for the 1974 theatrical performances. Studies are being made toward a provisional master plan. On the basis of present use and available space within the interpretation area, it is estimated that the optimum use of the park should not exceed 700,000 visitor-days during the summer season. The establishment of privately operated campgrounds in the vicinity of the park has presently removed the need for governmentally developed facilities. Preliminary work was done toward the publication of a visitor's guidebook which should be available for public sale in 1974. In September the park hosted the first annual meeting of western Canada Federal-Provincial-Municipal historic sites people and the 17th Annual Training Seminar of the British Columbia Museums Association.

Kilby Historic Park—With the addition of two parcels fronting on the Harrison River, there are now 29 acres in the park. Surveys have been completed toward an over-all development plan which will include parking, picnicking, water, sani-

tary, and fire-protection facilities. Floor plans were drawn of the Kilby Store Museum toward planning for the best use as an interpretive centre. An automatic oil furnace was installed and fire extinguishers placed in the museum. Two students assisted Mr. and Mrs. Kilby during the summer and continued cataloguing artifacts. One assistant is being retained for the whole year. Nearly 7,000 visitors discovered this unique old general store museum during the year.

SITES SECTION

Historic buildings inventory—Two history graduates were employed starting in June on a co-operative programme with the Federal Government's Canadian Inventory of Historic Buildings. Under Phase II, architectural information is being gathered on historic buildings within the Greater Victoria area. The expertise gained from this project is proving valuable toward developing guidelines on heritage structures for the new Historic Sites Advisory Board.

Stop-of-Interest programme—Five new plaque texts were prepared. Particular attention is being given to marking sites in the northern portion of the Province, especially along the new Stewart-Cassiar Highway.

Historic trail reconnaissance—Three students continued the previous summer's work of locating and clearing the Christina Lake-Rosslund section of the 1865 Dewdney Trail. Permission has been obtained from most of the private land-owners to clear the portions of the trail within their respective properties. With the co-operation of the Lands Branch and the Forest Service, a reserve was established on a half mile of the Hope to Tulameen section of the Hudson's Bay Company's Fur Brigade Trail.

RESEARCH SECTION

In the past, except within a few historic parks, emphasis has been placed on natural history interpretation within the Provincial Parks system. In recognition that man's role is an important and interesting part of any given area, more attention must be given to the significant human history of various parks. A much fuller appreciation of any park will be possible through a broadened interpretive programme along roads or trails, at archaeological or historic remains or structures, or within interpretation centres.

A start has been made toward specific studies within Carp Lake, Beaumont, and Liard River Hotsprings Parks; parks in the Shuswap Lake area, the Vancouver Island Bicycle Parkway, and Wells Gray Park.

A complete inventory of human history resources within Provincial parks will be started in 1974, aimed at determining priorities for interpretation through various possible means.

DESIGN SECTION

Within its responsibility for designing and inspecting buildings and structures within historic parks, this year's projects included preparing floor plans of the Kilby Store Museum at Kilby Historic Park; drawing plans for panelling Fort Steele's Wildhorse Theatre ceiling and walls, and plans for expanding workshop areas; inspecting Barkerville's souvenir-refreshment pavilion, and proposed restoration and construction projects in the Chinese section; and supervising the Division's architectural and photographic research and reference library.

COMMUNITY RECREATIONAL FACILITIES FUND

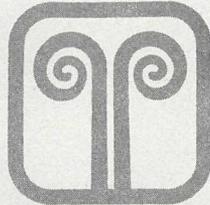
The establishment of the Community Recreational Facilities Fund by an Act of the Legislature on March 31, 1973, has added a new dimension to the Parks Branch. The purpose of the fund is to allocate moneys in such a way that each community within the Province shall have sufficient variety of recreational facilities to provide adequate opportunities for participation by interested residents. The fund is designed to provide capital assistance up to one-third of \$1 million for any recreational facility built by a municipality or a nonprofit, religious, ethnic, or cultural group that is prepared to guarantee that the facility will be open to the general public.

The fund is administered by the Extension Liaison Office, which prepares applications for submission to technical and advisory committees. It is the function of the Technical Committee (consisting of representatives from four separate departments) and the Advisory Committee (drawn from professional recreationists from throughout the Province) to make recommendations to the Minister on the disposition of each application.

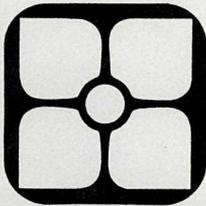
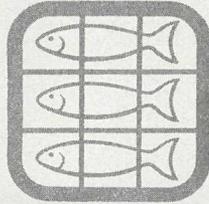
In its first 10 months of operation, the Minister has awarded grants totalling \$15,177,440.80 to 162 applicants in over 90 communities throughout the Province. The wide variety of facilities receiving assistance includes everything from swimming-pools and hockey arenas to theatres and marinas. There is no indication that the demand on the fund will decrease immediately; however, it is expected that once the tremendous backlog of needed facilities is satisfied, the grant requests will level off and become consistent with population and leisure-time demands.



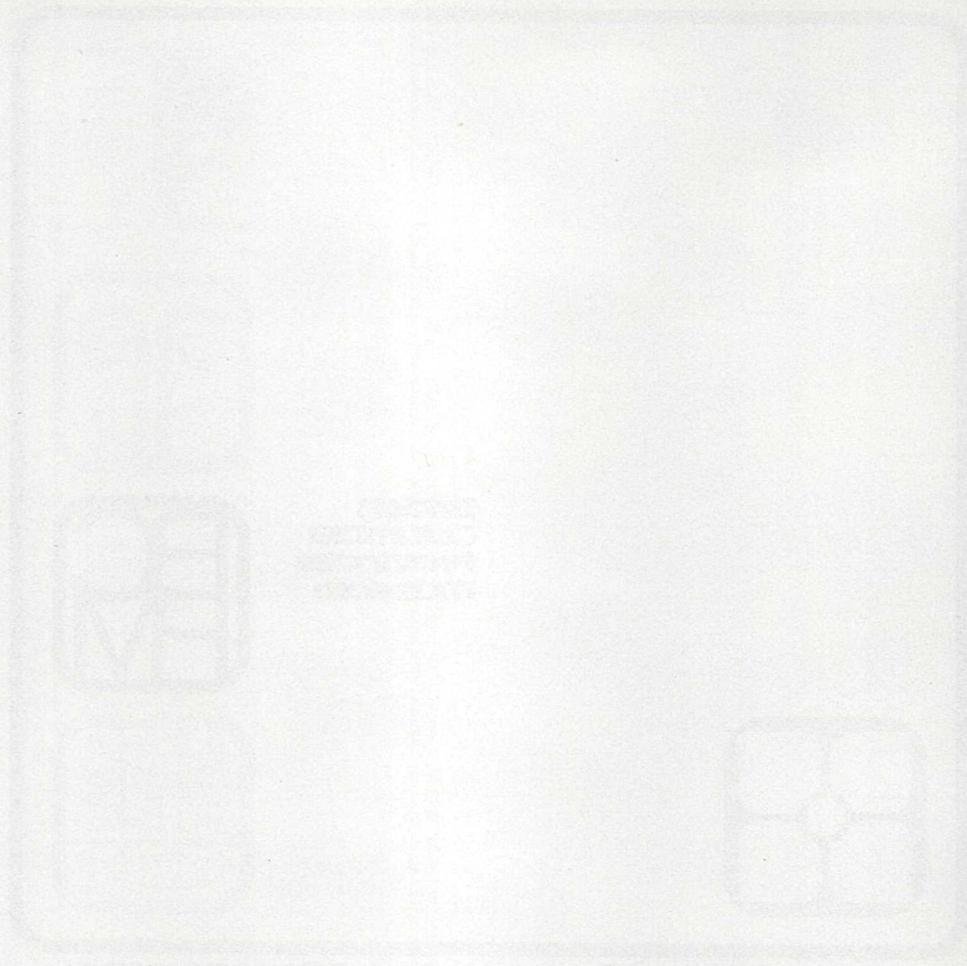
British
Columbia
**Fish &
Wildlife**
Branch



**British
Columbia
Provincial
Museum**



Department of Recreation and Conservation



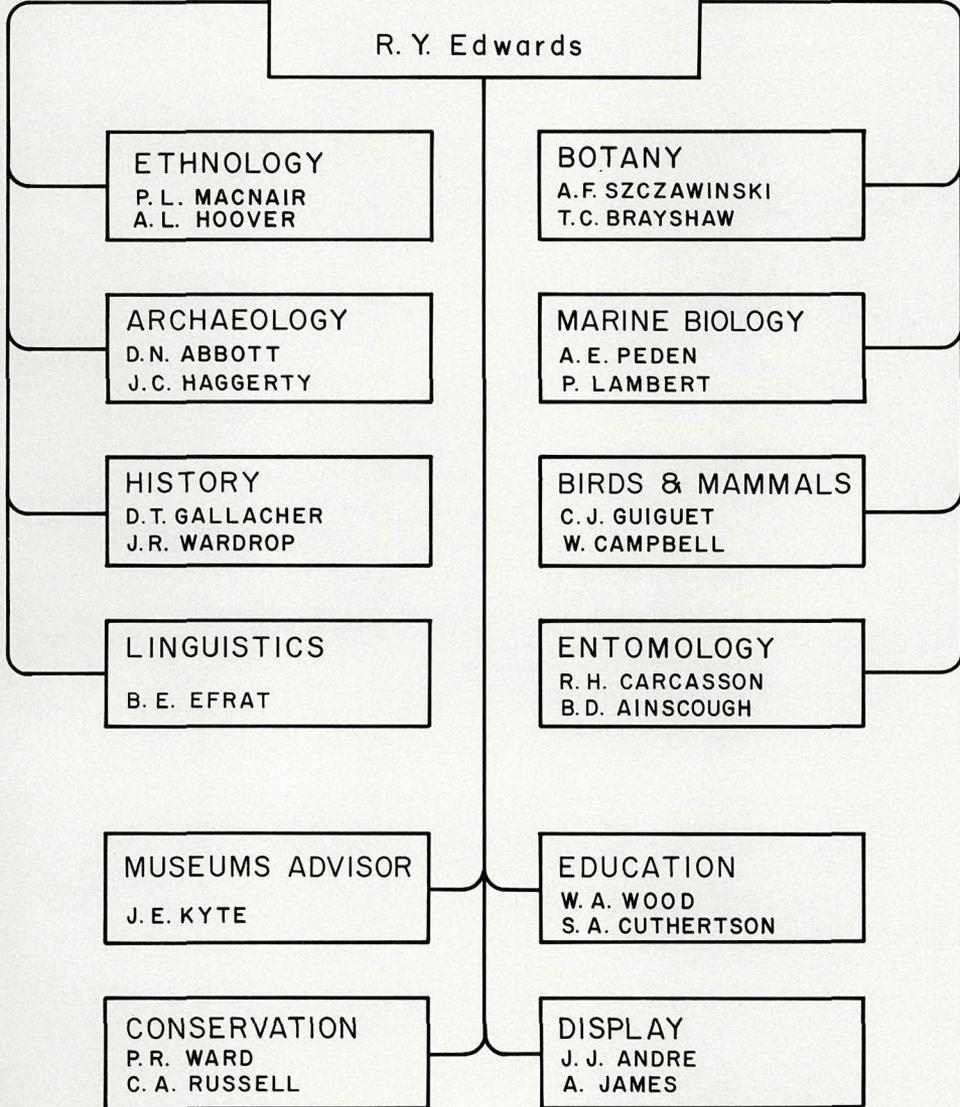
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PROVINCIAL MUSEUM
YEAR ENDING DECEMBER 31, 1973

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J. B. Foster

ASSISTANT
DIRECTOR
R. Y. Edwards



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A. L. HOOVER

ARCHAEOLOGY
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A. F. SZCZAWINSKI
T. C. BRAYSHAW

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P. LAMBERT

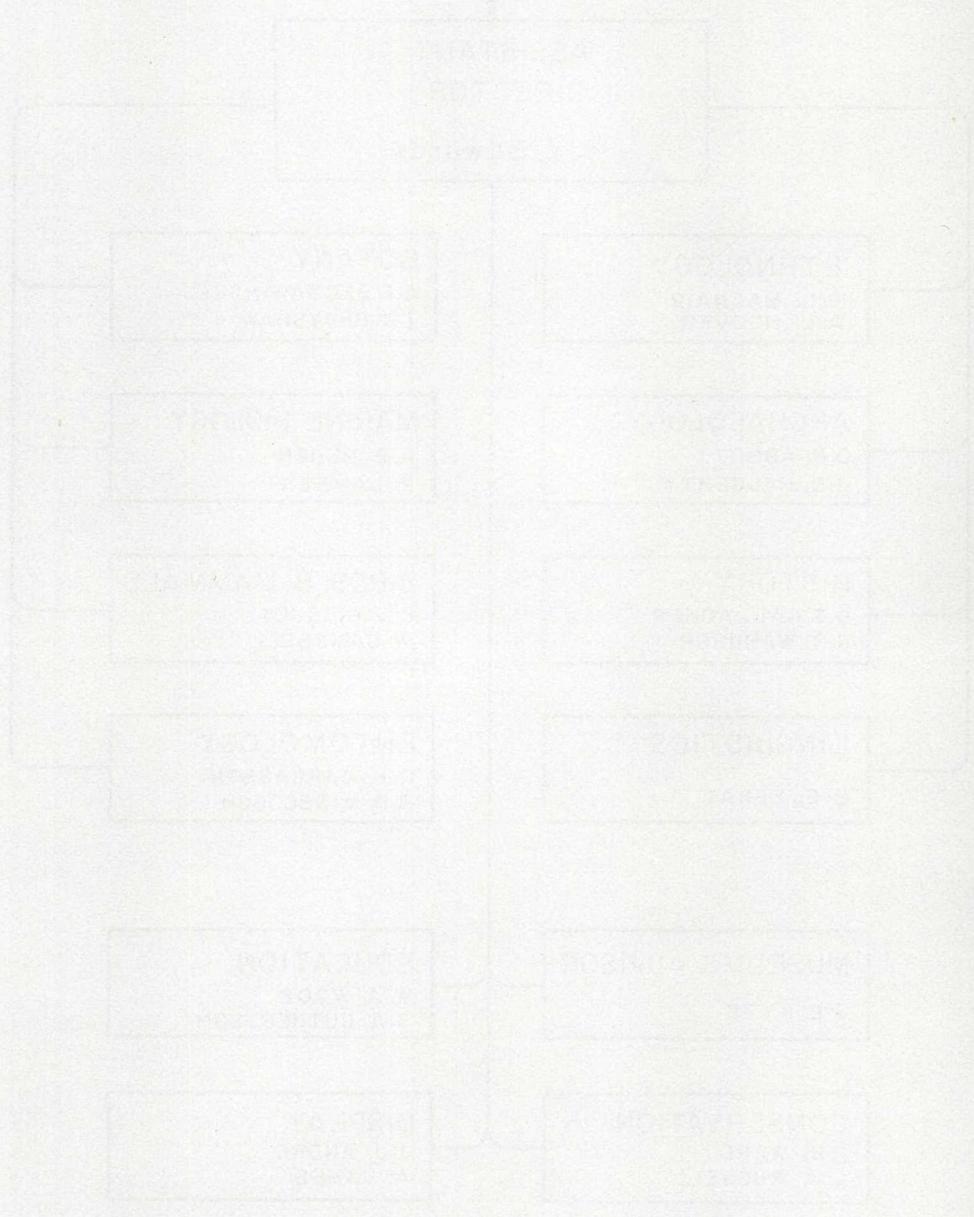
BIRDS & MAMMALS
C. J. GUGUET
W. CAMPBELL

ENTOMOLOGY
R. H. CARCASSON
B. D. AINSCOUGH

EDUCATION
W. A. WOOD
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DISPLAY
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A. JAMES

PROVINCE OF ALABAMA
STATE BOARD OF EDUCATION
REPORT ON THE PROGRESS OF THE WORK DURING THE YEAR 1900



BRITISH COLUMBIA PROVINCIAL MUSEUM

DR. J. B. FOSTER, DIRECTOR

The year 1973 saw unprecedented growth in the Museum fortunes despite the fluctuating vagaries of funding bodies. The Local Initiative project, Mamook, begun in February 1972, died at the end of May but was resuscitated by the *Park Development Act* (Bill 77) until the end of October. Then Mamook expired completely, after a highly successful run of 21 months. The National Museum programme delayed in sending its contributions of funds so that the 33 people hired in the spring on this programme remained on tenterhooks throughout the summer and autumn.

Fortunately, the Provincial Government came to our rescue by more than doubling our budget, by an additional major grant for display construction, by providing an Acquisition Grant of \$250,000, and by assurance that any financial deficiencies in the National Museum programme would be honoured by the Province.

The unprecedented increase in our budget from the Province was aimed largely at our display programme. The history galleries, opened last year as the beginning of Project '70, were acclaimed by both experts and the public. However, acres of empty exhibit area remained and here our priorities were directed.

Yorke Edwards, the Assistant Director, used his considerable knowledge of display, natural history, and tact to act as the catalyst between the Exhibit Chief and the curators to help them produce story lines for two half floors—anthropology and natural history (Coast and Sea).

Construction began in these two half floors in December. It is intended to open the anthropology galleries in early 1975, and the coast and sea galleries about a year later.

For the first time in its history, the Museum has a substantial sum of money to try to stem the flow of important objects and specimens from the Province. The Acquisition Grant was established largely to purchase significant ethnological objects, but the fund could assist all curatorial divisions in obtaining collections. During the year the Acquisition Grant permitted us to acquire ethnological and historical objects, as well as place bids on others.

The National Museums programme got under way in early 1973. It is comprised of four projects—Associate Museum, Catalogue Assistance, Training programme, and National Loan Collection.

As an Associate Museum in the National Museum programme, our responsibilities involve providing aid to other museums in the Province (conservation, exhibits, curatorial, etc.), sending and receiving travelling exhibits and helping to assess other applications for funds from museums to the programme. The Museum Adviser and Education Services were most involved in these aspects of the programme, though most curatorial divisions obtained an "extension curator" to help in the above activities.

The Catalogue Assistance programme gave great impetus to the tasks of properly cataloguing our vast collections of objects and photographs in the fields of history, archaeology, and ethnology. This programme is a precursor to a National Inventory, wherein it is hoped that data on all objects in museums across Canada will be stored in a central data centre.

The Training programme got under way toward the end of the year. It involves both two people coming to the Museum on in-service training and a third person conducting training seminars throughout the Province.

The National Loan Collection programme was to have assembled a collection of very significant objects in Ottawa, which would be available for loan. To this end, the Museum hired a caster who began making replicas of important archaeological objects. However, the Federal Government put this programme in abeyance.

The National Museums programme began to have its effect on the other museums in the Province during the year. At the same time, the *Community Recreational Facilities Fund Act* became an additional source of money for the capital costs of new museums or expansion of old ones.

As well as all the other advantages of the National Museums programme, it helped our Museum to become more Provincial in fact as well as name, for the first time in its history. Field studies were conducted from the Alaska Highway to the Flathead, including an intensive study of the flora of Manning Park and the marine life of Barkley Sound. The last was immensely aided by the addition of the MV *Nesika* to the Museum.

Two new curatorial divisions were added by the Province during the year. Dr. Barbara Efrat became Curator of Linguistics and Dr. Robert Carcasson Curator of Entomology. Native peoples are more concerned than ever for their vanishing languages. There is no other Provincial body concerned with insects other than the few useful or obnoxious kinds, yet these kinds of animals far outnumber all kinds of vertebrates.

Mrs. R. R. Rogers became the Museum's librarian at the end of the year and faces an immense backlog of work.

We find we need our highly successful voluntary organization even more as a result of increased Provincial and Federal support. The Friends of the Provincial Museum and the Heritage Court Society had their best years, providing indispensable help, chiefly in supplying docents and running the gift shop. For all this help and acting as the most important interface between the Museum and the community, we are deeply grateful.



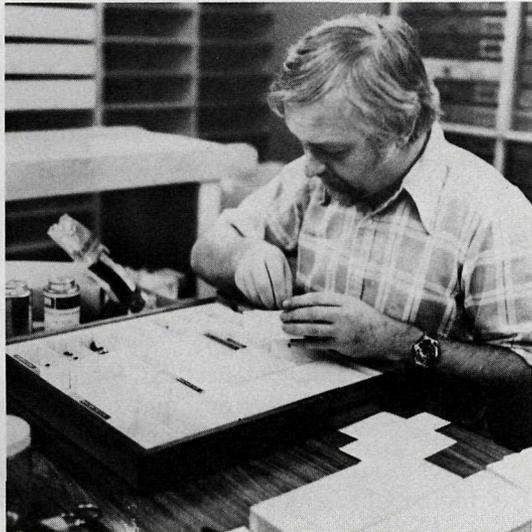
Tweedy's Lewisia (*Lewisia tweedyi*): A southern plant found for the first time in Canada, in Manning Provincial Park in 1973.



Soil profile: Largest-ever soil profile taken from Glenrose Cannery Dig for the archæology permanent exhibit.



Preparing artifacts: Conservation staff members restore and repair artifacts for exhibition or storage purposes.



Cleaning and storing: Entomological specimens are stored and used for research purposes.

DIVISION OF ARCHÆOLOGY

The Division's participation in four of the National Museums policy programmes has allowed us to offer services and perform functions long needed.

Under the Museum's status as an Associate Museum in the National Museums programme, we have hired an additional Curator, Grant Keddie, whose assistance enables us to improve our liaison with the Education Services Division and Museums Adviser, and to provide advice on archæological matters to the local museums of the Province. He also expedites the two-way flow of archæological information for the National and Provincial Inventories. To date, Mr. Keddie has carried out a reconnaissance of 20 community museums, in order to examine the collections, undertake a rough inventory, and assist in an advisory capacity; designed a travelling display "Preserving Man's Cultural Heritage" which is now touring community museums; participated in education activities, including a workshop seminar at the British Columbia Museums Association Conference, a training seminar for Education Services Division docents, lectures and Division tours to school and university classes.

This Division is one of three institutions in Canada actively involved in the National Inventory, which is intended eventually to be a vast computer catalogue network of the major collections in all fields of the nation's cultural and natural heritage. The inventory will begin with limited projects in four disciplines, one being archæology. Three institutions—Memorial University of Newfoundland, the Archæological Survey of Canada in Ottawa, and the British Columbia Provincial Museum—were chosen to set up this project, in co-operation with the Systems Services Division of the National Museums of Canada.

The National Inventory will consist of two basic computer files, one of sites and one of artifacts, accessible to all participating institutions. One museum will act as file controller and data centre for each province and will have direct connection with the central computer in Toronto. The British Columbia archæological site file, already centred here, was copied by the Archæological Survey into inventory format and was transmitted to Ottawa during 1972 and 1973. Work on the artifact file began this autumn under the supervision of our Systems Curator, with the help of two technicians employed for us by Systems Services.

Supplementing and extending our National Inventory project are functions supported by yet another Federal programme, Catalogue Assistance. Tom Loy was hired in late August as Systems Curator, to research and supervise this whole area. He has been charged with studying the feasibility of applying more sophisticated data processing techniques on a regional level to archæological data beyond those covered by the National Inventory. Meanwhile, more conventional curatorial tasks proceeded. Wally Bishop oversaw the continued cataloguing and ordering of the artifact collections. Mrs. Deirdre LaForest reorganized the human osteological collection geographically rather than by accession sequence, and organized two basic comparative collections for faunal identification. She and James Haggarty finalized the cataloguing and accessioning system for the bio-archæological collections. In addition to supervising the transcription of the site file for the National Inventory, Mrs. Oliver prepared a third duplicate of the file for the Union of B.C. Indian Chiefs and joined with Mr. Loy and the Curator in discussion with representatives of the union and of the University of British Columbia to determine policy regarding access to and administration of the file. Relevant portions of the site file were also copied for certain Indian Bands who requested this service and for persons carrying out specific research projects.



Travelling exhibition: Preserving Man's Cultural Heritage was the first travelling exhibit to our community museums in British Columbia under the National Museums programme.

The fourth National Museums programme, the National Loan Collection, enabled us to hire a skilled castmaker and archaeologist, Ross Brand. Mr. Brand is engaged in making precise duplicates of significant artifacts in our own and other collections for exchange purposes, in order to improve the study and display collections of this and other institutions.

The other area of greatest activity in 1973 has been research and planning for the permanent archaeological-ethnological displays to open next year. It was decided only in spring that the archaeology portions of Project '70 would proceed at once. One of the key exhibits will be a pair of monoliths, actual large segments of excavated sites, which between them may represent a time span of 9,500 years of Indian cultural development. The first of these monoliths was removed under Mr. Brand's direction from the Glenrose site excavation in Delta Municipality.

Field work was limited in 1973. One project which we assisted in organizing, and in which Division staff participated, involved training soldiers from the 3rd Battalion, Princess Patricia's Canadian Light Infantry, in archaeological techniques. The exercise, code-named "Raleigh Passage," took place in April at Echo Bay on Gilford Island and at several other archaeological sites on nearby islands. To our knowledge, this is the first time scientific excavations have been carried out by a military unit supervised by professional archaeologists. The experiment proved highly successful. The men, working in small teams, each under the direction of an archaeologist (Provincial Museum staff, the Provincial Archaeologist, and Uni-

versity of Victoria), quickly proved adept and skilled at the delicate and sometimes complicated procedures. As a result, valuable information was acquired from a previously little-known area. Dr. Donald Mitchell, of the University of Victoria, was chosen director of the project, since he had previously prepared a research design which was ideally suited for deployment of a large crew in two relatively isolated areas—criteria important for the PPCLI's training needs. All logistics were handled by the Canadian Armed Forces.

Our association with the Hesquiat project continued. The Assistant Curator and other staff members devoted considerable time to this project during the year. At Hesquiat Harbour the main part of the planned archæological fieldwork was completed and excellent progress was made with construction of the Band's museum and longhouse.

Another Indian-run project which we helped to organize was carried out by the Atlin Indian Band and their archæologist, Diana French, on the Nakina River this summer. The project involved survey, reconnaissance, recording, and salvage of gravehouses and other sites.

A third such project, with which we have been less directly involved, was carried out by the Osoyoos Band. Gerry Roberts, their archæologist, is using our facilities for the analysis of data recovered.

Mr. and Mrs. R. C. Hill received a grant, through this Division, from the Leon and Thea Koerner Foundation to continue their intensive petroglyph recording project on the Coast north of Vancouver Island. Rubbings, photographs, and records from this project have been turned over to the Museum. The Hills are currently preparing a book on the subject, to which the Curator has contributed a foreword.

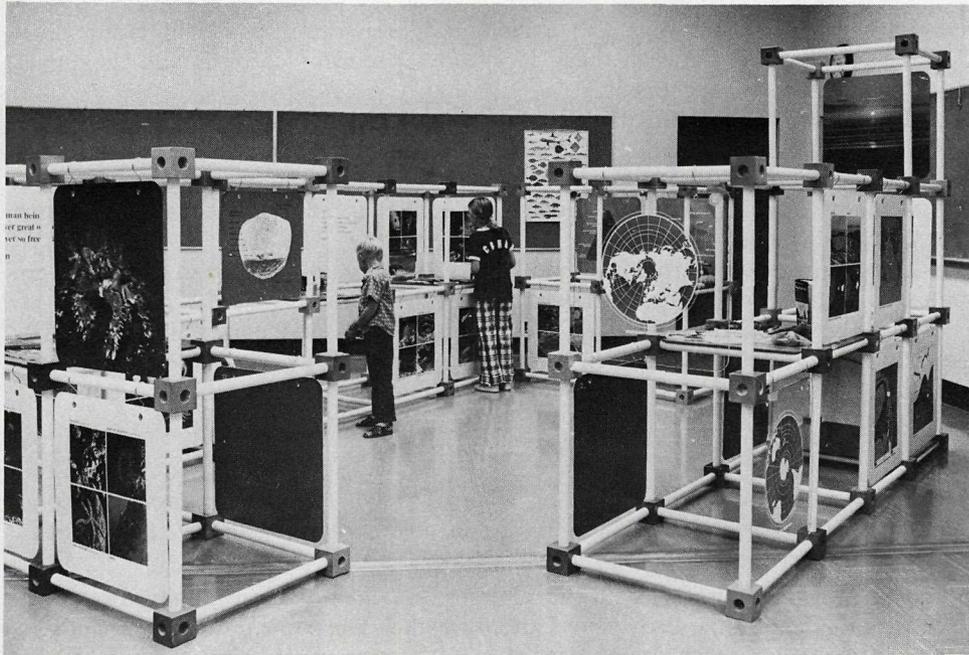
Two projects, funded under the Opportunities for Youth programme, at Esquimalt Lagoon and Coles Bay, received minor support from the Division. These were directed by Ernie Oliver.

In late July the Curator and Assistant Curator, with the Provincial Achæologist, made a brief tour of archæological projects at Hesquiat, Prince Rupert Harbour, and Graham Island.

In addition to the extension activities of Mr. Keddie, other staff members carried out duties of an extension nature. Mrs. Condrashoff, the Chief Research Technician, visited Neskainlith Reserve in October to offer her services as a resource person for the proposed development of a Shuswap Indian cultural centre at Salmon Arm. Several school and university classes were conducted through the Division and staff members lectured in classrooms in Victoria and Nanaimo. The Assistant Curator and Dr. Wyatt (University of Victoria) gave an experimental series of lectures in Victoria highrises. The Curator gave one of a series of public lectures entitled "Pages of Prehistory" in the Newcombe Auditorium. Finally, "The Hesquiat Project" was the topic for a talk given by Mr. Haggarty over CHEK-TV.

The Division has provided space and facilities during the year to the following scholars carrying out associated research: Miss Katherine Capes (Courtenay); John Dewhirst (National Historic Sites); Dr. Roberta Hall and Tom German (University of Victoria); Dr. James Hester (University of Colorado) and Gerry Roberts.

The Division's sincere thanks are owed to Miss Sabrina Murdoch, Miss Jackie Boyer, and other volunteer workers; to the many donors of specimens and information, particularly Mr. and Mrs. Keith Edgell, of Edgewood; to those who have loaned specimens for photography, recording or casting; and to the Friends of the Provincial Museum for the gift of a Wild binocular microscope.



Total learning package: A marine biology kit for travelling to schools was designed and constructed. About 1,000 students have taken part in the project, currently under study.

DIVISION OF BIRDS AND MAMMALS

Main activity centred around study collections, specimen preparation and collecting, and in acquiring record systems in several fields previously housed at the University of British Columbia. These latter include a British Columbia nest records scheme, a photo-duplicate file of British Columbia vertebrate records, a system on consolidating all birds records for the Province, and a seabird banding programme.

Compilation and indexing of field notes old and new continued apace. The lifetime records of three deceased, active field ornithologists—Theed Pearse, Derek Beecham, Rev. M. W. Holdom, as well as field records compiled by staff members this year and last, were processed.

Field activities were carried out on the Queen Charlotte Islands, the west coast of Vancouver Island, pelagic waters, the inside passage, Triangle Island, and in the Flathead region of southeastern British Columbia. These had many purposes, including ecological reserve assessments, scientific study collecting, seabird banding and nesting inventory, display collecting, a cetacean salvage operation, oil pollution investigations, pesticide and pelagic bird food studies. Examinations of specimens collected as a result of oil pollution and for pesticide and food analyses are under the supervision of Dr. Eoin McEwan at the University of British Columbia.

The preparation of specimens for display continued through the year. Richard Gibbs, taxidermist, prepared 110 specimens of birds and mammals, mainly for The Coast and Sea history exhibit planned for the display galleries. At the year's end he was busy with a large specimen of grizzly bear donated by the Fish and Wildlife Branch (an illegal kill, confiscated). The sea lion group, also part of The Coast and Sea exhibit and featuring a large bull, two cows, and some calves, is under preparation.

Barbara Jull, cataloguer and osteological preparator, and Phil Nott, Chief Technician, prepared between them 475 study specimens of birds and mammals, including osteological specimens.

The Assistant Curator was active in slide, television, and radio shows throughout the Province, including the presentations in the Queen Charlotte Islands, Prince George, Kamloops, Victoria, and Vancouver. He also conducted a series of noon bird walks in Beacon Hill Park in connection with an adult education programme sponsored by Camosun College.

Two films, one featuring bird banding, the second on museum taxidermy, were prepared in this Division by the Department of Education.

The Province's scientific study collection of birds and mammals was heavily used during the year. Specimens were utilized by many institutions, individual scientists, artists, teachers, and students.

DIVISION OF BOTANY

The manuscript of the handbook *Wildflowers of Mount Revelstoke National Park* has been completed by the Curator in collaboration with Dr. J. H. Soper, Chief Botanist at the National Museum, Ottawa.

The Assistant Curator spent the summer on field work in Manning Provincial Park with the help of the Provincial Parks Branch. The work produced an authoritative list of the flora of the park, a set of 1,200 specimens and a set of photographs. In addition to examination of his own collections made this summer, the Assistant Curator has examined the existing collections of plants housed in the nature house at Manning Park, in order to compile as complete a list as possible of the flora of the park. His list includes 96 species new to the park. Of special interest among these was *Lewisia tweedyi* the first record of this species from Canada. The photographs will be the basis of an illustrated book on the wildflowers of Manning Park, to be published jointly by the Provincial Parks Branch and the Provincial Museum.

A new series of Museum publications has been started, dealing with methods used in museum work, with the first booklet on *Plant Collecting for the Amateur*, written and illustrated by the Associate Curator.

The Curator and Dr. R. J. Bandoni, of the University of British Columbia, have revised the Museum's *Guide to Common Mushrooms*, describing several additional species. The revised edition will have a complete new set of coloured illustrations.

The Associate Curator spent a month in Ottawa studying records of the catkin-bearing plants of British Columbia in the herbaria of the National Museum, the Plant Research Institute, and the Central Research Forest of the Canadian Forestry Service, for a forthcoming publication on this group of plants.

Dr. T. M. C. Taylor completed his research on the legumes (Leguminosæ) of British Columbia. His manuscripts on this family and on the figworts (Scrophulariaceæ) are now in press. He is currently working on the Cyperaceæ (sedges family). Our illustrators have completed the illustrations for the first two of the above families and are currently working on plate of the Cyperaceæ and Cruciferae, the latter series for a manuscript previously completed.

Dr. Nancy Turner has been carrying on research in ethnobotany and is currently preparing the manuscript for a handbook to be entitled: *Food Plants of the British Columbia Indians: Part 1: Coastal Indians*.

Visiting researchers included Dr. J. H. Soper, of the National Museum, who has been working on the flora of Mount Revelstoke Park; Dr. G. W. Argus, also

of the National Museum, who examined the collection of *Salix* (willows) and identified a number of specimens; and Dr. E. L. Little, dendrologist for the United States Forest Service, who examined tree records in preparation for a forthcoming volume of the *Atlas of United States Trees*.

The Curator has played an active part on the Advisory Board of the Ecological Reserves Committee, mainly in drafting regulations for administration of the reserves.

The herbarium collection consists of 61,261 sheets, an increase of 1,019 in 1973. As our herbarium is listed in *Index Herbariorum*, there are always requests for loans of our material for study. This year a total of 868 plants was sent out for scientific studies by other institutions.

Herbarium exchange was continued with institutions in Canada, the United States, and Europe. There is a rapidly growing list of requests for exchange and study material, which until now has been difficult to oblige. This year, with the able help of additional technical staff, all duplicate material was put in order, labels made and checked, plants grouped into families and finally moved into our duplicate herbarium storage cabinets on the mezzanine floor. This will now enable us to fill requests for exchange material more efficiently.

Another large project that will be completed by the end of 1973 is the numbering of the 5,400 sheets presented to the Provincial Museum from the J. Austin Bailey Herbarium during the years 1972/73.

The Curator has provided a service identifying fungi for hospitals, medical doctors, and the public at large. The Assistant Curator examined and identified material in the Harrison collection, approximately 3,500 specimens, and an old collection of G. A. Hardy, a former Curator of Botany, approximately 1,400 specimens, in addition to working on the Manning Park collections. The Associate Curator identified approximately 3,000 specimens for outside collectors, the largest collection being aquatic plants from the Water Investigations Branch.

Mrs. S. Ewan, of this Division, assisted by Miss L. Pugsley, a student assistant, made multiple collections of plants primarily for exchange purposes. They collected 260 sets of 12 replicates of species of Vancouver Island.

In addition to the collection of aquatic plants made by the Water Investigation Branch, of which the Museum acquired a duplicate set, significant collections were received from other outside collectors. These included

J. Dick—plants from the Stewart and Flathead Valley areas.

J. Risse-Sawitski—plants from the Rocky Mountains and Coast Range.

National Museum—collections from Mount Revelstoke Park and of the willows of British Columbia.

Mrs. T. O. Connolly—from Atlin and Tulsequah areas.

Mrs. R. Rosie—from Frances Lake, Y.T.

R. E. Walton—from Trail and vicinity.

The Associate Curator has been heavily involved in work with the Display Division in planning a large diorama of the Coast forest and seashore for the second floor display area. He has made several field trips in conjunction with display technicians and artists to observe and record natural features that are to be reproduced in the dioramas. He has also advised the artists involved in the construction of plant and tree models.

The Curator and Associate Curator gave a number of lectures and participated in several radio and television programmes. The Curator also assisted with a display of mushroom models in the Centennial Museum, Vancouver.

The Botany Division has benefited from the able assistance of Mrs. R. R. Rodgers, who has brought badly needed order to the botanical library and drawn up a complete catalogue of its contents. Mrs. Rodgers was recently appointed librarian for the entire Museum.

Under the continued supervision of V. W. Ahier, planting and labelling has proceeded in the Native Plant Garden of Heritage Square, Victoria, to the point where over 200 species of plants native to this Province have now been introduced into it. The Associate Curator has prepared a manuscript for a descriptive leaflet and check list of the plants in the garden.

DIVISION OF ENTOMOLOGY

The Division was established in February, with the appointment of the Curator and Associate Curator: the latter had been working on the insect collections since the previous June as *honorary Curator*.

The insect collections, consisting of some 100,000 specimens housed in an assortment of storeboxes, shoeboxes, cigar boxes, and in a few poorly designed home-made cabinets, were in a bad state. They had been stored in a damp basement and many had been damaged by carpet beetles and mildew. There had been little attempt to curate the collections from the time of G. Hardy's retirement in 1955 until 1970, when they were moved to the Curatorial Tower and the Curator of Marine Biology had them fumigated. When the Associate Curator started work on the collections in July 1972, there were no active infestations.

The insect collections had been accumulating since 1886, the result of gifts and bequests from a variety of sources and of a good deal of local collecting by the late Mr. Hardy. When the Division was established there were eight separate collections and no attempt had been made to amalgamate and to arrange the specimens in any kind of systematic order. Much of the material was damaged or without data and had to be discarded. The coverage of the Coleoptera (beetles) and Lepidoptera (butterflies and moths) of southern Vancouver Island was reasonable, but the representation of other orders and the coverage of other areas was and still is deplorably inadequate.

Thanks to a generous gift by the Friends of the Provincial Museum, 200 standard insect drawers were obtained and delivered in September. Another 124 insect drawers of various patterns were scrounged from the University of British Columbia and from other sources.

The eight collections have now been amalgamated; some 50,000 Lepidoptera and 40,000 Coleoptera have been sorted, relabelled where necessary, and housed in an acceptable taxonomic sequence.

There is also arachnid material of two major systematic groups—the Araneida (spiders) and the Acarina (mites and ticks). The former are represented by about 300 specimens of British Columbia spiders preserved in alcohol.

The acarine collections consist of approximately 100,000 specimens, of which about 10,000 are mounted on glass slides for microscopic examination. The remainder are preserved in alcohol. Most of the mite material is on loan from other museums, such as the British Museum, London; the Bishop Museum, Hawaii; the New Zealand Dominion Museum, Wellington; and the South Australian Museum, Adelaide. Geographically, the mite collections represent all continents and most major archipelagos, although the systematic coverage is largely restricted to the Uropodina.

All arachnid collections are in an excellent state of preservation and require minimal curatorial attention.



Journey through time: A museum educator took this travelling kit to schools in the Smithers-Kitimat area.

No field work on insects was undertaken in 1973. First priority was given to the rearrangement and proper housing of the existing collections.

With the acquisition of six Tullgren funnels for the extraction of soil fauna, a project was initiated to study the uropodine mite fauna of the Pacific Northwest. These mites form an important element in the ecology of leaf litter decomposition. Although the Division possesses significant collections from Oregon and Washington, the fauna of British Columbia is completely unknown. A start was made in 1973 with samplings from the west coast of Vancouver Island, although the soil extractors arrived too late for the collections to be extensive. Even this very limited sampling, however, has revealed 10 species of mites new to science.

Priority will be given in the coming field seasons to improving the geographical coverage of the Lepidoptera and Coleoptera collections and to building up a more adequate collection of such important orders as the Diptera, Hymenoptera, and Hemiptera. The eventual aim should be a good collection of the major orders, covering the Pacific slope of western North America and a synoptic collection covering the rest of the continent.

A major part of the Curators' research programme will be a study of Holarctic affinities in the Lepidoptera, which should help to shed some useful light on the origins of the insect fauna of western North America. To this purpose, time will be spent in the near future studying the Eastern Palæarctic collections of the British Museum, and it is proposed to establish some contact with appropriate institutions in Japan, the USSR, and possibly China.

The collection of soil mites will be extended to cover as many biotic regions of British Columbia as possible. The sampling of British Columbia, Yukon, and Alaska as thoroughly as possible is extremely important in the context of systematic affinities with Palæarctic species. Certain genera have been found to be exclusively Holarctic in distribution, allowing for the eventual publication of world revisions.

The Museum collections of spiders are presently inadequate. It is hoped to extend these considerably in future, both geographically and systematically.

DIVISION OF ETHNOLOGY

During 1973 the activities of the Ethnology Division were concentrated upon the production of a story line for the permanent Indian History Gallery and upon the providing of services to Indians, students, community museums, and the public generally. Much of the Division's success in achieving its goals was due to an increase in staff, which permitted the expansion in services and research.

Elizabeth Knox and Ray Bethell joined the staff early in the year and their combined photographic expertise produced some 10,000 prints which were catalogued by Elizabeth Virolainen and Daniel Savard. Marilyn Chechik joined the staff in April and is now in charge of the ethnological collection. Hindy Ratner was appointed as Extension Curator and in this capacity toured about 15 museums throughout the southern part of the Province, familiarizing herself with their interests and problems and offering advice or assistance when appropriate. Anne Lowe provided much needed secretarial assistance. John Pritchard joined the staff in September as Associate Curator to assist in preparing the programme. During the summer, several students assisted in the exhibit programme. These included Diane Persson-Aarnoudse, April Frank, Leona Sparrow, Marnie Chapman, Terry Hickman, Brad Taylor, and Ardyth Cooper.

Some field work was possible despite the heavy commitment to the display programme. Various staff members attended potlatches at Alert Bay and Gilford Island, where photographs and tape recordings were made on behalf of those sponsoring the ceremonies. Brief trips were made to the Blackfish Sound and Hazelton areas so that the Chief of Exhibits could familiarize himself with typical areas traditionally occupied by British Columbia Indians. This should enable a more intimate and knowledgeable presentation of typical environments and topographies in the permanent exhibit.

As was the case last year, the main effort of the Thunderbird Park carving programme was directed to finishing the Kwakiutl Indian house, a focal point in the proposed exhibit. The end of the year saw the erection of the permanent framework for the house, and work on the walls and roof is progressing rapidly. Work at the park was directed by Chief Carver Henry Hunt, who was aided by Assistant Carver Ron Hamilton and apprentice Frank Puglas. Richard Hunt was employed for two months to assist in completing the house.

As far as the ethnological collection was concerned, staff members catalogued various miscellaneous items of minor significance that had accumulated over the years. The Legacy Collection of contemporary British Columbia Indian art assembled in 1971 was formally accessioned into the permanent collection. Mrs. J. Tullis, of Victoria, kindly donated a collection of artifacts which included a significant carved mountain goat horn spoon. Other important accessions included a tambourine drum with design painted by the renowned Kwakiutl artist, the late Willie Seaweed. A cannibal bird mask, from the hand of the above artist, was also obtained. This significant piece was made by the artist to replace its prototype, collected by this Museum in 1914.

During the course of the year, staff members gave public lectures and acted as advisers to students pursuing degrees in anthropology.

DIVISION OF HISTORY

With the Modern History exhibits completed in 1972, the History Division was able to turn its concentrated attention toward both temporary displays and the collections.

During 1973, this Division, in combination with the Display staff, mounted four temporary exhibits in the Capital Curios gallery situated above the theatre in the Urbanization gallery. Because many facets of British Columbia's history are not explained in the permanent exhibits, these temporary displays give the public the opportunity to dwell more fully on a given subject. Thus displays for 1973 included "Victoriana," a brief look at collectables of the Victorian era; "British Columbia Through Glass," a representative display of bottles used by British Columbian businessmen over the decades; "Victoria Numismatic Society Display," which included coins, tokens, and bank notes of companies and banks that played important roles in early British Columbia; and "The Outer Woman," which provides a decade by decade account of clothing and accessory style changes as experienced by British Columbian women.

One of the most important reasons for British Columbia's rapid urbanization was street railways. Thus we have almost restored a BCER 400 street-car, which now stands in front of the Museum. Its restoration was the result of concentrated efforts by Museum staff, B.C. Hydro, Friends of the Provincial Museum, and many interested private citizens.

Other elements of the collection have been vastly improved during the year. Accessions have been strengthened by increased funding from both the Friends of the Provincial Museum and the Provincial Government. One of the recent additions is a 1910 Climax steam locomotive, which is at once the smallest and oldest logging locomotive still extant in British Columbia.

The additional staff provided by the National Museums programme has helped solve the problems caused by the backlog of uncatalogued collections. Of these newly catalogued objects, a large number have been restored to a condition suitable for display and study. The strict limitations of storage facilities has been eased with the acquisition of new storage cabinets, thereby doubling our storage capacity.

Two new publications have been completed to accompany the Modern History exhibits. In these, various concepts, dioramas, and artifacts in the exhibit are being explained more fully; the first in the series are *HMS Discovery* and *Fort Victoria*. More are being prepared. Additional leaflets are produced to accompany the temporary exhibits in Capital Curios.

The Curator of History, Daniel T. Gallacher, returned from the University of British Columbia in July upon successful completion of the course work and residence requirements for his doctorate in Canadian history. His dissertation will deal with the beginnings of industrialism in British Columbia.

DIVISION OF LINGUISTICS

In July the Linguistics Division formally entered the Museum family with the appointment of Dr. Barbara S. Efrat as Curator. The establishment of this Division reflects the Provincial Government's and the Museum's growing concern with the preservation and appreciation of the fast-disappearing native languages of the Province. The Division is committed to the following:

- (1) Preservation in written form and on tape of native language data. A secure tape storage facility, with appropriate controls over access to socially sensitive materials, will be made available in the near future.

- (2) Active encouragement of the proper collection of language materials by interested individuals and groups.
- (3) Rendering service to the public by making available information about languages and by encouraging further scholarly research into the structures of these fascinating and comparatively neglected languages.

To help fulfil these aims, the Division appointed Mrs. Alfreda Cooper to its staff in November. She has commenced a bibliography of basic works on British Columbia native languages which will form the basis of a Division catalogue and will eventually be available for interested persons in the form of lists of materials known for individual language families.

To date, the Curator has participated in the continuing Hesquiat project, for which she has prepared a sizeable tape archive and currently is assembling language data for lessons. In addition, she participated in field trips, continuing research in the Saanich and Sooke dialects of Straits Salish and Nooksack. A workshop in interviewing techniques was conducted in November for the Union of B.C. Indian Chiefs; two more such regional workshops are currently being planned in conjunction with this organization.

The Curator has given lectures to several groups, including the Indian Educational Club at William Head Penitentiary and to Anthropology 339 at the University of Victoria, and has participated in a meeting of trustees of the Northwest Linguistic Collection at the University of Washington in September, as well as taking part in a conference of those interested in applied Amerindian Linguistics, held at the University of Oregon. In addition, Dr. Efrat co-authored a paper *The Indian and the Social Scientist: Contemporary Contractual Arrangements on the Pacific Northwest Coast*, which was delivered to the annual meeting of the Society for Applied Anthropology in Tucson, Ariz., in April.

DIVISION OF MARINE BIOLOGY

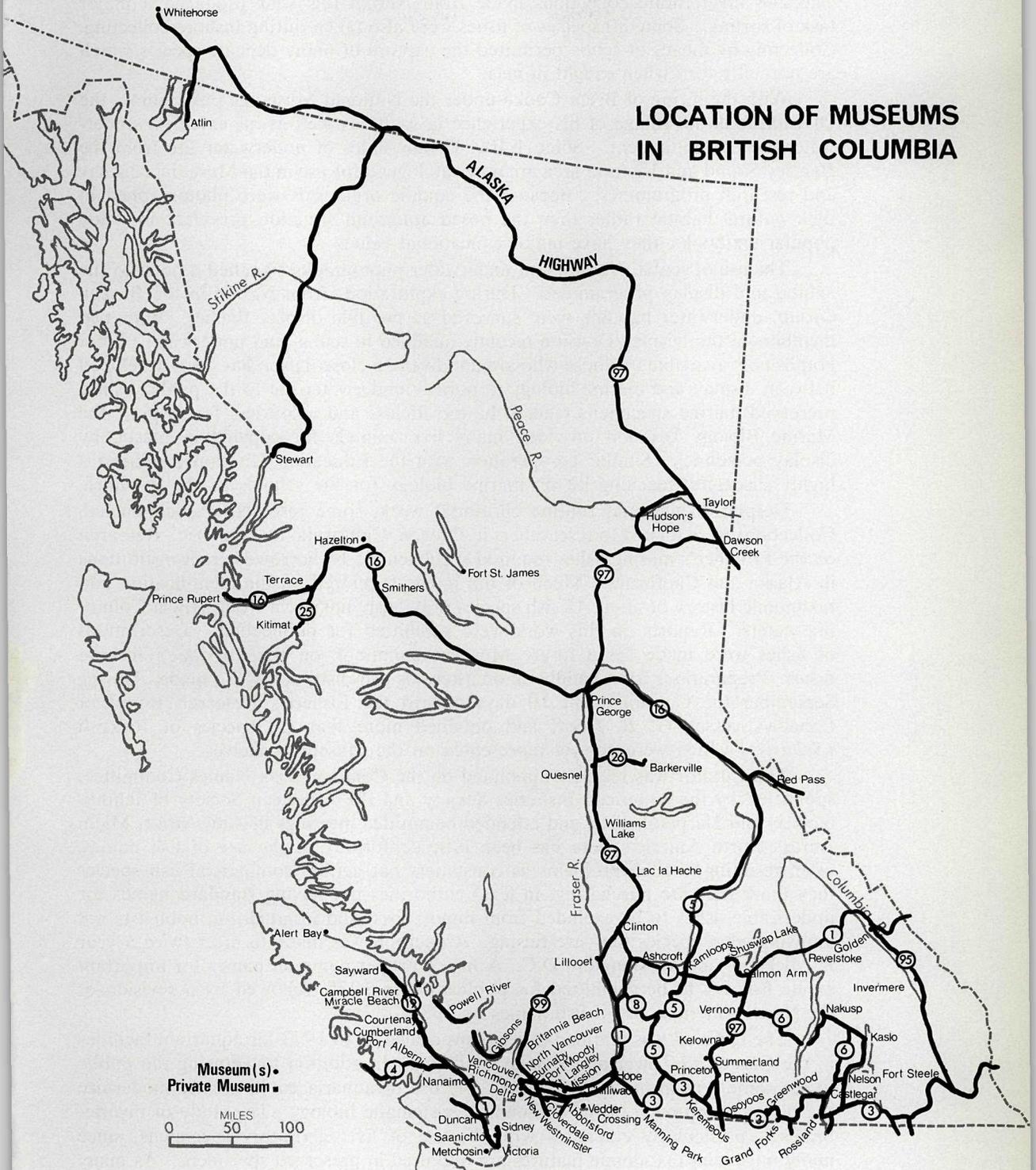
The second year of operation of the Division marked a year of rapid growth and accomplishment. Most significant was the appointment of Philip Lambert as Assistant Curator, who is now chief custodian of invertebrate biology within the Division. A 15-metre vessel, the *Nesika*, was also transferred to the Division from the B.C. Forest Service; an event that increased our capacity for field work.

In 1973, *Nesika* made a brief expedition to the Gulf Islands and a three-month survey of the Barkley Sound-Broken Group area. As the vessel is not yet equipped for hauling nets, the field party on board used it primarily as a floating hotel during scuba operations. The National and Historic Parks Branch at Pacific Rim National Park agreed to the Museum's programme for field work within the park's boundaries in return for a report on field observations made by the Division.

Many days of fog during the summer limited the use of *Nesika*. A need for radar and for hydraulic equipment to raise and lower the anchor quickly was apparent. Some of this equipment was installed in the fall.

Field work from *Nesika* greatly increased the quality of the Museum's marine collections. The initial objective was to make extensive collections in the southernmost waters of British Columbia in 1973 and the northernmost region in 1974. Such collections should indicate the over-all geographic range of many marine species within Provincial boundaries and provide contrasting population samples to analyse morphological variation. As most invertebrates collected were not represented on the Museum's shelves, the numbers of species and phyla obtained have vastly enriched the educational and scientific value of the Division's collections.

LOCATION OF MUSEUMS IN BRITISH COLUMBIA



Museums in British Columbia.

The 248 invertebrate collections made from *Nesika* this year produced a major task of sorting. Some 80 species of fishes were also taken during inshore collecting. Collecting by means of scuba permitted the capture of many delicate species which are normally torn when caught in nets.

With the hiring of Brent Cooke under the National Museums programme, the Division took advantage of his experience in scuba as well as his extensive underwater camera equipment. Some 1,400 35-mm slides of underwater life from the Barkley Sound and Victoria area are now catalogued for use in the Museum's display and research programmes. Because the aquatic organisms were photographed in their natural habitat rather than the posed aquarium situation prevalent in many popular textbooks, they have major educational value.

The use of scuba, *Nesika*, and underwater photographs signalled a boon to the exhibit and display programmes. During explorations from *Nesika* in the Broken Group, underwater habitats were surveyed as possible display themes. With two members of the Display Division recently qualified in scuba, and underwater photographs now available for those who are not divers, a close liaison has been developed between display and marine biology to portray underwater life to the public. Since preserved marine specimens tend to be too lifeless and colourless for display, the Marine Biology Division provided many live animals for copying in plastic by display personnel. Similar co-operation with the Education Division produced a highly successful teaching kit on marine biology for the schools of the Province.

Despite display and routine curatorial work, some research was conducted. Collections were loaned to researchers in Oregon, California, and Quebec. Research on the Province's marine fishes required specimens to be borrowed from institutions in Alaska and California. Much of the research centred on the identification and taxonomic history of about 18 fish species previously unknown from British Columbia waters. Reports on this work were submitted for publication. Descriptions of fishes were made for a future Museum handbook on the Province's inshore fishes. Preparations for a handbook on asteroids (starfish) were also made. During September the Curator spent 10 days aboard the Fisheries Research Board of Canada's vessel, *G. B. Reed*, and obtained more than 20 species of rockfish (*Sebastes*) which were not yet represented on the Museum's shelves.

The Curator was recently appointed on the Common Fish Names Committee, sponsored by the American Fisheries Society and the American Society of Ichthyologists and Herpetologists, and attended committee meetings in Ann Arbor, Mich. Across North America there has been little conformity in the use of fish names, often resulting in such problems as consumers not getting commercial fish species they think they are purchasing, in legal authorities not having standard names for undesirable fishes to be excluded from import lists, and in aquarium hobbyists not knowing what species they are raising. A decision was made to meet twice a year in Michigan and Washington, D.C. A list of proper common names for important exotic fishes is to be submitted for publication in 1975, followed by a revision of the North American list of fish names by 1980.

The Division was gratified to see plans drawn up in 1973 for aquarium facilities in the Curatorial Tower and Display Building. In addition to allowing the public to see some typical marine organisms, the use of aquaria could greatly modernize the research approach of the Museum to systematic biology. The study of invertebrates is particularly enhanced with the use of live laboratory specimens, since many important taxonomic features are obscured in preserved specimens. As many of the taxonomic differences of organisms reflect specialization or adaptations to a species' specific habitat, experimental aquarium studies in conjunction with mor-

phological studies of museum specimens can show much about the adaptation of British Columbia's marine animals to their environment.

DIVISION OF CONSERVATION

Due to the decision taken three years ago that we should train staff for our own use, and to our good fortune in recruiting an experienced senior conservator, the Division's organization has now achieved the balance and versatility which we have long sought.

Also important in achieving this goal were the appointments, in January, of Miss Barbara Kennedy, an experienced archaeologist who joined the Division as a Conservation Technician, and in November, of Mrs. Valerie Hunt, who joined the staff as Registrar to relieve the working conservators of much of the routine maintenance of records and administration.

In August the senior staff was strengthened by the appointment of Richard Renshaw-Beauchamp, who has some 22 years' experience as a Chief Conservator with the National Historic Sites and Parks and Acting Director of the Canadian Conservation Institute's Pacific Conservation Centre.

The treatment of the Museum's collections, and especially their preparation for display, has accelerated. The emphasis continues to be upon anthropology, with special attention to the large collections of the Ethnology Division. Some 200 major objects have received substantial treatment during the year, of which 125 have been from the ethnological collections.

One major project (achieved by the loan from the Display Division of the Museum's cabinetmaker, Ed Mullett) has been the design and construction of special fitted supports for 113 masks. These are designed for use in display, storage, and transportation and represent a permanent asset to the preservation of these unique objects.

The Museum's archaeological collections usually require relatively little preparation for display, but some present special problems which have received considerable attention. Examples are a series of mud cores taken during pollen-analysis studies and the unique bone armour excavated on Gabriola Island in 1967 in fragmentary condition.

In April the Division achieved a "first" in British Columbia and possibly in Canada by establishing and operating an archaeological field conservation laboratory in support of the excavation carried out by the Canadian Armed Forces at Echo Bay with the assistance of the Museum, the University of Victoria and the Archaeological Sites Advisory Board. The laboratory was equipped to provide any treatment which might be required and was staffed throughout by the Division, which relieved the archaeologists of responsibility for the care and treatment of artifacts. Every member of the conservation staff did a tour of duty and acquired valuable experience in the establishment and operation of a remote field laboratory.

Since 1966 the Division has provided an advisory service to other museums in British Columbia and occasionally, in exceptional cases, has undertaken the treatment of objects for them. However, lack of staff has prevented us from advertising this facility. In May it became possible to offer this service of the Museum, which thus becomes the first Provincial Museum to provide a Province-wide conservation service.

In June the Chief Conservator visited the Queen Charlottes, where he advised the Skidegate Indian Band on the recovery and repair of totem poles and consulted with the Queen Charlotte Islands Museum Society. In July, C. A. Russell conducted a party from the Canadian Conservation Institute on a visit to the Washington State University Laboratory at Neah Bay, and he visited the University of

British Columbia to advise on the transportation of excavated material. In August, Mr. Beauchamp visited the Campbell River Museum to advise on the care of their collections and Mrs. Ann Krahn spent two days at the University of Victoria excavation at Fanny Bay.

One external service which merits special mention is the treatment of specimens of organic materials excavated from waterlogged sites. Such artifacts will suffer irreversible damage and possibly complete disintegration if not treated promptly. As the only available source of such treatment we had long been concerned at the possibility that archaeologists excavating in British Columbia might encounter a productive waterlogged site and consequently, as reported last year, the Chief Conservator and Mr. Russell had visited the Washington State University Conservation Laboratory at Neah Bay to study their methods. This preparation was fortunate, for several waterlogged sites were encountered during 1973, including that excavated by the University of British Columbia at Musqueam. By arrangement with Dr. Carl Borden, all organic material from the waterlogged levels at Musqueam is brought to Victoria, treated in the Conservation Laboratory, and returned to UBC for study. This material is now known to include the earliest perishable artifacts yet recovered on the Northwest Coast. By the end of the year some 250 objects had been treated or were undergoing treatment.

Approximately 320 objects excavated from sites at Echo Bay and Fanny Bay were treated for the University of Victoria.

The Division was paid a considerable compliment in May, when the Chief Conservator was officially appointed adviser on conservation to the University of British Columbia's projected Museum of Man.

In museum training, the Division has continued its customary activity. Lectures on "Handling" were given to groups of new employees on six occasions. The Division's entire staff attended the British Columbia Museums Association's Annual Seminar at Fort Steele in September, and together presented two three-hour workshops on "Handling, Packing, and Transportation." The Chief Conservator also conducted a discussion on "Conservation Services in British Columbia." The course on the conservation of antiquities taught by the Chief Conservator for the University of Victoria entered its fourth year with an increase in enrolment of 50 per cent. Three of the Division's present staff of six are graduates of that course, and several more are employed in other divisions.

The Museum received several loan exhibitions during the year and the Conservation Division assisted the Museum Adviser with the reception and handling of each.

In November the Conservation Division took part in the Art Gallery of Greater Victoria's annual exhibition, "The Artist at Work." A member of our staff was on duty throughout the exhibition, during which the Airbrasive unit was demonstrated. The Division's part of the exhibition attracted such attention that at the end of the year a small travelling display on the work of the Conservation Division was in preparation.

DIVISION OF DISPLAY

Framing construction for permanent exhibits on the second and third floors began in December, following a grant of \$425,000 from the Department of Public Works. The construction includes 26,000 square feet of three major galleries at the south end of the Natural History floor (Coast Forest, Coast and Sea) and 22,000 square feet for the archaeology-ethnology exhibits on the third floor, north end.

In the latter part of the year, plans for the archaeology-ethnology exhibits were started and the projected time for opening them is spring 1975.

Ross Brand, of the Division of Archaeology, headed a team from the Display and Archaeology Divisions that took a 23- by 16-foot soil profile from the Glenrose Cannery dig. Probably the largest soil profile ever taken from a site, it will be a focal point of the archaeology exhibit.

Carpenters and Indian carvers and artists completed the construction of a full-size Kwakiutl dance house which will centre the Ethnology Exhibit.

An intensive casting and plant-making programme included many innovative processes and techniques. Using silicone moulds experimentally in casting produced the most perfect replicas for the Sea exhibits. Innovative processes were discovered in making realistic full-size plant replicas. These processes are recorded and filed for future publications.

Plant-modelling consultant, Judy Baumgart, of Milwaukee, joined the staff in May for three months. She taught our staff the basic skills and knowledge required to make natural-looking artificial plants.

The casting and plant-making programmes required regular field trips within the regions to be portrayed by the exhibits. Jean J. Andre, Chief of Display, and Ewald Lemke became qualified scuba divers and this underwater ability is proving valuable as plans for the Sea galleries progress.

During the year, staff members visited the Museum of Anthropology in Mexico City, Los Angeles County Museum, Jacques Costeau's Living Sea at Long Beach, and Disneyland in Anaheim. The visit to Disneyland was a unique opportunity to see in use the same sound equipment that the Museum is installing in its exhibits.

Four temporary exhibits were designed and installed in the History Gallery, including "British Columbia Through Glass" from the Victoria Glass and Bottle Collectors Society, "Victoriana" and "The Outer Woman" from the Human History Collections, and the "Victoria Numismatics Society Display."

DIVISION OF EDUCATION SERVICES

This Division responds to specialized needs of groups in the Museum audience. These include school-age children, teachers, Faculty of Education students and professors, educational associations, and groups interested in education. It also responds, in co-operation with other divisions, to general inquiries not at a scholarly level, pertaining to museum activity.

During the school-year, programmes designed to supplement the school curriculum were taught by trained volunteers (the docents) under the direction of various education staff members. The spring programme included "The Last Chance," presented in the Modern History galleries, which dealt with the exploration, fur trade, and gold-rush periods of British Columbia's history; "Land of the Kekuli," directed by a native Indian instructor, Len Souliere, which gave children an opportunity to experience some aspects of the life of the Interior Salish Indians of the past; "The Link in Time," which used activities with telegraph and printing to demonstrate the importance of communication in this Province; and "The Green Food Factory," an indoor/outdoor programme featuring the native plants of British Columbia.

In the fall, "The Last Chance," with some modifications, continued to be shown in the Modern History galleries; "Kutenai" gave children a taste of the daily activities of native Indian people in the Kootenay region toward the end of the last century; and "Digging up the Past" demonstrated the skills and techniques of the archaeologist. Students participated in a simulated dig and recreated the technology of the past by studying and making stone tools.

Prototype travelling activity exhibits funded by the National Museums programme, in marine biology and British Columbia history, were designed, developed, and pre-tested between January and June. They were prepared for more complete testing in July and August and were set up in school classrooms in Quesnel and Smithers School Districts in September. The "Marine Biology Kit" remained in Quesnel District and was circulated by the Resource Centre to outlying schools in small towns. "Journey Through Time," the history kit, travelled with its museum teacher-developer, Maureen Gee, throughout the Smithers, Kitimat, and Terrace School Districts, staying for short periods at towns like Houston, Telkwa, and Hazelton. These programmes will be more fully evaluated in 1974, with the assistance of the Educational Research Institute. These innovative travelling programmes are unique in this country in that they are professionally designed and developed as total learning packages which can be fitted into the teacher's own space and teaching programme.

Another travelling programme, "Son of Raven, Son of Deer," funded by the Native Indian Fund, was circulated first in the Greater Victoria area in the spring, then in Courtenay and Alberni School Districts in the fall. This programme is a dramatization of a Nootka Indian story published by George Clutesi and is directed by a native Indian instructor, Emma Hunt. Costumes, masks, and paraphernalia used in the programme were commissioned from contemporary Indian artists.

A series of six evening seminars for teachers was held in the Museum from January through February in co-operation with Camosun College. Education staff presented special programmes for teacher staff meetings and professional days when requested through the school-year. Special sessions on the museum as an educational resource were also given to Faculty of Education students from the University of Victoria and the University of British Columbia.

For special needs, Education staff prepared and presented single demonstrations and workshops, at primary, elementary, and secondary levels, and participated in school programmes taking place at schools and at Camp Thunderbird on Glintz Lake. Education staff also receive and facilitate teacher requests for individual loan items from educational collections. Work experience students from Saanich area secondary schools learn audio/visual techniques and assist with school programmes during the school sessions.

Saturday morning and afternoon programmes were developed for children aged 12 and under, from February through April. In February, "Moving About" presented films and projects relating to marine life, birds, and mammals. In March and April the Modern History galleries were the focus and children used all the facilities of the Division for in-depth museum-oriented activities. During the summer, two three-week Ecobox Workshops, using materials obtained from the Ontario Institute for Studies in Education, were held for secondary school-age students. These were a combination of individual research, group activities, field trips, ecology-oriented discussions and presentations, culminating in a student-prepared display and open house in the Museum classroom.

The very popular adult programme, "Memories," was rerun in January and February. This was a series of informal talks, by historians and by people who could remember old times, which took place in the Modern History galleries. "Film Craftsman," a noon-hour series, was also run twice; the first, in January and February, featured films produced by Wilf Gray; the second, in February and March, featured films by J. B. Foster, The National Film Board, and Bill Round. "Heritage Court Presents" featured a variety of exceptional speakers in February and March and was very well attended. Another popular programme at this time was "Music



Collecting in the sea: Marine biologists returning from a subtidal collection trip.

in the Museum," a series of chamber concerts featuring turn-of-the-century and Canadian composers. These programmes provided an opportunity for young Victoria musicians to perform professionally. "Noon Hour Forum" was repeated three times in February and March, in co-operation with Camosun College. The first set was "How to Fill out Your Income Tax," and the others, "Birdwatching for Beginners," took place outdoors with Provincial Museum staff as leaders. One other series, "Pages of Prehistory," was presented in February and March by various professional archaeologists who have made a study of British Columbia's prehistory.

Museum staff participated in a series, "Your Provincial Museum Comes to Nanaimo," presented by the Continuing Education Department in Nanaimo in March and April. "No so Long Ago" was an hour-long Sunday film series for the family, featuring the best of the National Film Board, which ran from February to the beginning of April. Three other special adult programmes were offered in April and May: the "Ksan Dancers," a group affiliated with the artistic community at Ksan Indian Village at Hazelton; "Fur Trade Canoe Routes in Canada," an illustrated lecture by Hugh MacMillan, Ontario Government Archives; and "Downtown Is for People," an illustrated presentation by the Mayor of Victoria, Peter Pollen, and other city officials.

Tour guides, two of whom were supported by the Native Indian Fund, were trained and took groups of students, as well as adult visitors, through the Museum galleries from May to August. Fifty-five docents (volunteer teachers) were trained by Education and Curatorial staff during September and October for the school programmes. Their contribution to the Museum is significant and their training is a further service to the community.

One teacher, commenting on the high-intensity, stimulating programme which uses the Museum's resources fully, said that it accomplished in an hour or two the same amount of learning which a teacher would be forced to take more than a week

to develop. A total of 61,956 people visited the Museum as members of groups in 1973. Of these, 10,371 attended programmes for adults and 11,579 were "unguided." The last refers to school classes whose purpose ranges from a get-acquainted walk-through (often with an orientation briefing), to special in-depth projects designed by their teachers. A total of 17,037 students and adults was given a special introduction to the Museum.

As teachers develop an appreciation of the value of the Museum as an educational resource, requests for special interest programmes are increasing. The greatest student/teacher interest is shown in programmes designed to complement the school curriculum, and 19,860 students took part in these special interest programmes in 1973, while 3,109 took part in programmes which were even more specifically tailored to fit the needs of the group, for example, programmes for handicapped.

Students in structured tours were given almost individual attention in groups of 10 or fewer with one docent; some worked intensively in their own classrooms with Museum travelling programmes for up to eight hours over several days. One class, under the direction of Mrs. John Hall, from Willows Elementary School, was treated to an experimental week with the Museum as their classroom. Some took part in Saturday programmes and came to the Museum for two hours at a time for several weeks.

DIVISION OF MUSEUMS ADVISER

In 1973 the Division continued to emphasize development and assistance for community museums and galleries throughout the Province. Display assistance, training, and travelling exhibitions effectively supported the advisory service normally carried out through correspondence, phone, and personal contacts with the smaller institutions in the Province. With Federal and Provincial involvement in the resurgence of cultural affairs currently sweeping the country, museums in British Columbia have inevitably been drawn into the mainstream of activity. Gradual changes in the pattern of museum development indicated a trend toward a network of intermediate or regional institutions, municipally owned and, in some cases, municipally operated. To these may fall the job of guiding the destiny of the smaller museums within their area of influence.

With the Museums Adviser working in an advisory capacity with Federal agencies under the National Museums programmes, at least four out of the six National Exhibitions Centres proposed for construction in conjunction with existing community museums received approval this year. Additional benefits received from the Federal programmes were training assistance and a number of local and national travelling exhibitions, which toured parts of the Province. A number of qualified personnel, including a co-ordinator of museum training, were made available by the National Museums programme.

A break-through of major significance to all British Columbia museums and art galleries was their assurance of eligibility for partial capital cost funding by the Province through the new *Community Recreational Facilities Fund Act*. The new Act, administered through the Provincial Parks Branch, has already provided partial funding for some facilities, thus attracting further funding from the Federal programme.

While the full implications of this cultural explosion and various funding plans may not become apparent until well into the new year, there is no doubt that community museums have suddenly shifted their emphasis to the possibilities of improved facilities and new displays, and are energetically seeking ways to open new sectors of local museum activity to the public.

FRIENDS OF THE PROVINCIAL MUSEUM

Friends of the Provincial Museum in its third year of operation voted to accept individual memberships, and at the end of the year a total of 425 people had become members. Membership fees are \$5 (family) and \$3 (individual).

At the first meeting and social evening held for the new members, four were elected as interim representatives—A. Douglas Turnbull, Dr. Douglas Ross, Mrs. B. Winsby, and Mrs. M. DeCarie.

Each year a memorial to Dr. G. C. Carl is awarded to a University of Victoria student majoring in marine biology. John Gobolos was the winner in 1973 of the \$300 bursary.

Donations from foundations and industry this year include

- B.C. Cultural Fund, \$1,500;
- Canadian Imperial Bank of Commerce, \$5,000;
- Provincial Secretary, \$1,000;
- Woodwards Limited, \$8,000;
- Leon and Thea Koerner Foundation, \$2,000;
- Council of Forest Industries of B.C., \$5,000;
- Fisheries Association of B.C., \$3,000;
- British Columbia Hydro and Power Authority, \$5,808.75;
- Donation box receipts, \$886.51;
- Sundry donations, \$234.02.

Acquisitions for 1973 include

- Six units of 50-drawer insect cabinets, \$3,947;
- Uniforms being made in England, History Division, \$3,699.38;
- Education Fund, \$500;
- Decanter holder, engraved HMS *Ganges*, \$210;
- Liquor cabinet from Premier S. F. Tolmie, \$103.75;
- Oak chest from Judge M. B. Begbie, \$231;
- Additional equipment for Porta-Pak, \$927.25;
- Selectric typewriter for British Columbia Museums Association, \$733.95.

HERITAGE COURT SOCIETY

The Heritage Court Society has now completed its first full year of operation under the leadership of Mrs. D. A. Ross and her band of volunteer workers. The profits for this year's work are expected to exceed \$60,000. Although most of this money has been put back into stock, some excess has been turned over to the Friends of the Provincial Museum to continue their work on behalf of the Museum.

A banquet and pleasant evening were held at the Faculty Club of the University of Victoria for the volunteers and directors of the Friends of the Provincial Museum on November 21, 1973.

The matter of paying income tax is still being discussed by the directors with legal authorities.

Heritage Court Society sponsored the "Ksan Dancers," May 24 and 25, and "Music in the Museum" in February and March, with the assistance of the British Columbia Cultural Fund.

A special thank you to all the volunteer helpers for their efforts during 1973.

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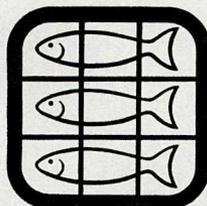
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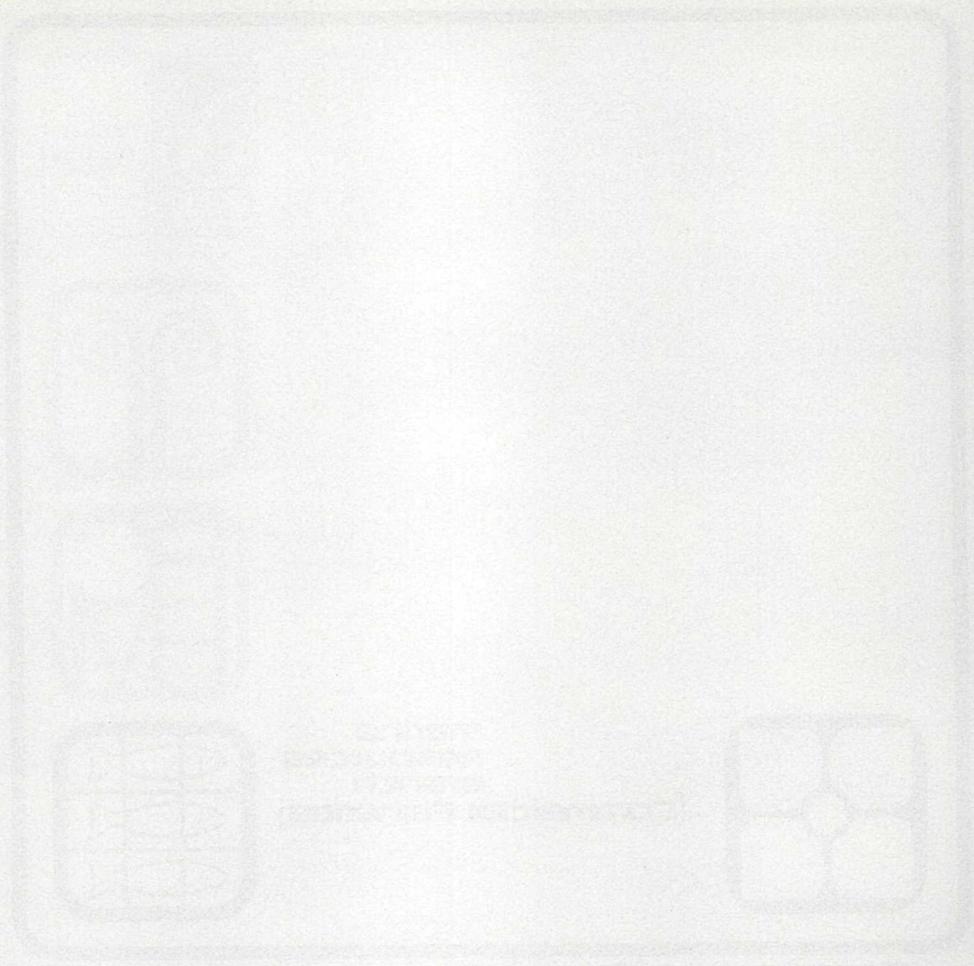
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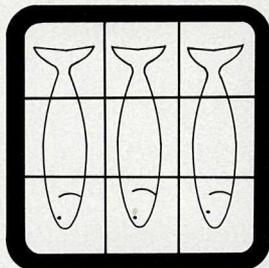
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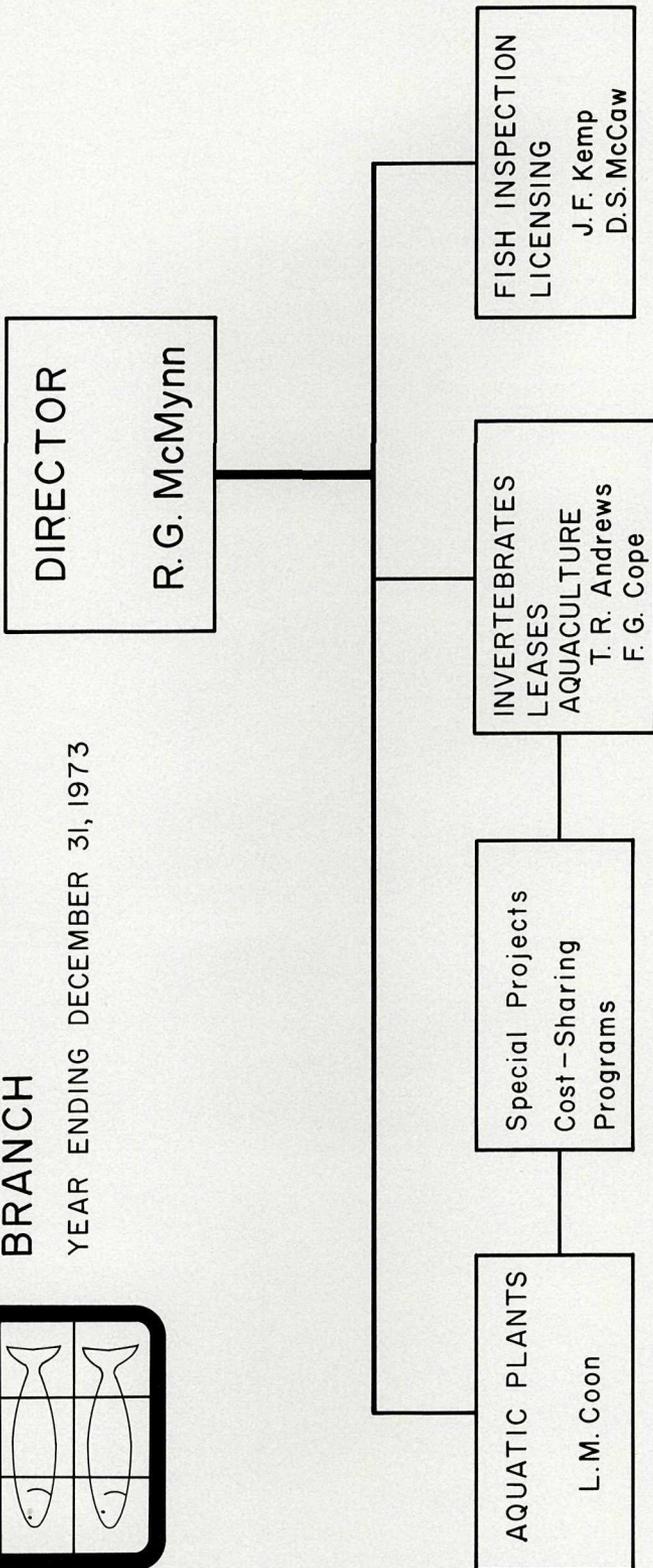


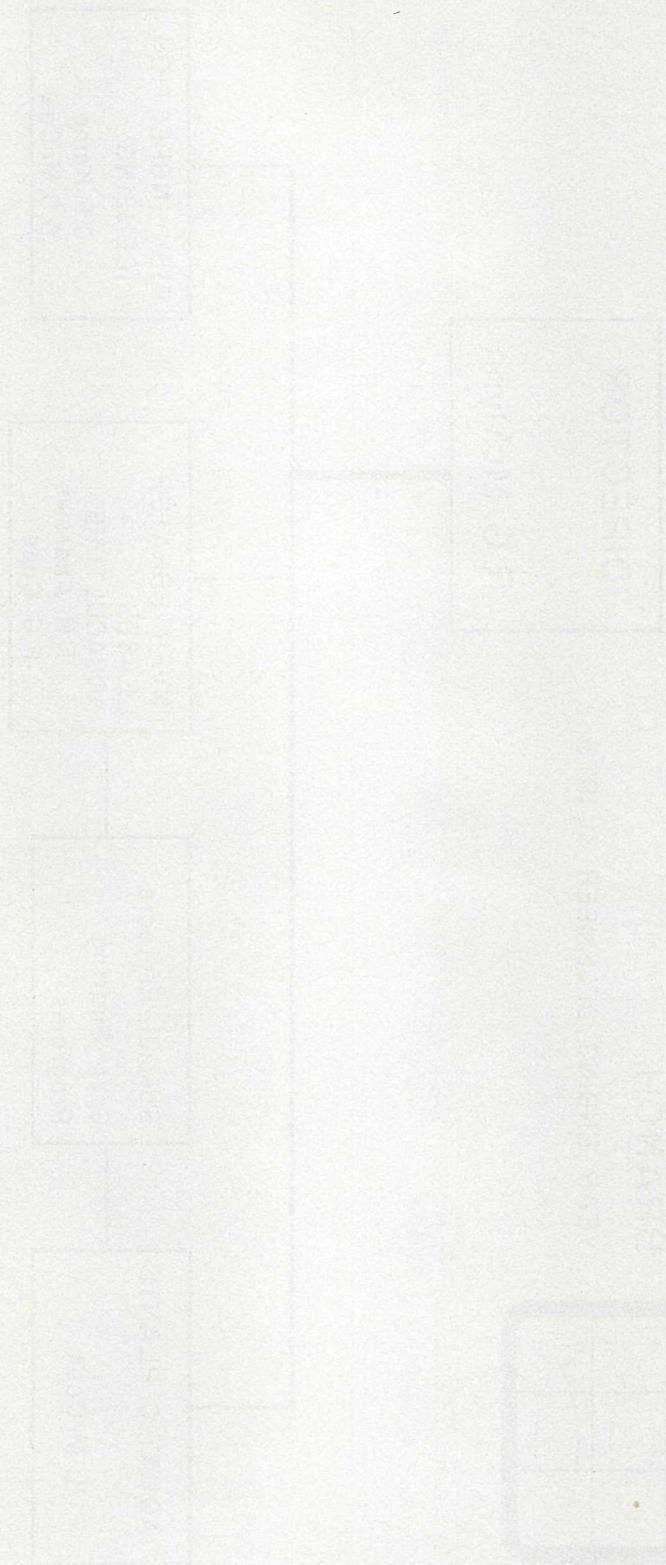
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MARINE RESOURCES
BRANCH

YEAR ENDING DECEMBER 31, 1973





MARINE RESOURCES BRANCH

(Commercial Fisheries)

R. G. McMYNN, DIRECTOR

GENERAL

Commercial and recreational demands on the relatively fixed or diminishing supplies of marine resources of British Columbia continued to escalate during 1973. This escalation was reflected in the increasing and diverse demands placed upon the services of the Branch by segments of the fishing industry, general public, and many Federal and Provincial resource-use agencies. To meet these responsibilities, which run the gamut from answering inquiries from the general public and students to the supplying of information respecting endangered species; providing a Provincial voice in respect to many emerging issues involved in fisheries management; serving on advisory groups regarding the negotiation or renegotiation of bilateral and multilateral fishery conventions or agreements; advising Provincial resource-use departments of the ecological implications of their actions in respect to the marine resources, being directly involved in managing oyster and aquatic plant resources; and preparing and distributing pamphlets, bulletins, and information sheets on marine resources. The Government's recognition of the importance of the Branch's activities in relation to our marine resource heritage is demonstrated by the rapid growth in staffing and funding for the Branch. The rapid development of a "Provincial marine resource expertise," together with the adoption of our new name "Marine Resources" in place of the narrower implications in the former "Commercial Fisheries," are evidence of the Province's resolve to continue to develop a strong and effective voice in the management and conservation of British Columbia's marine resources by and for the benefit of Canadians and British Columbians in particular.

The following sections and statistical tables provide a general view of the fishing industry and a summary of the Marine Resources Branch's major activities.

AQUATIC PLANTS

The vast commercial potential of British Columbia's marine plant resources remains virtually untapped. However, several licensed firms are stepping up their efforts to initiate profitable enterprises. One firm which has taken over the kelp-meal plant at Masset in the Queen Charlotte Islands, successfully attempted a small-scale test run during August and September 1973. A total of 1,200 tons of *Nereocystis* was harvested; 35 tons of meal were eventually produced after a number of mechanical difficulties. This firm expects to produce 1,000 to 3,000 tons of kelp meal in the 1974/75 season.

With the distinct prospect of a large-scale operation in the Masset area, the Marine Resources Branch plans to initiate a 3- to 4-year study of the effects of kelp harvesting on regrowth and repopulation in the beds. The goal of this study is to develop a sound management strategy. Hopefully and necessarily this study will be broadened to include an evaluation of the effects of kelp harvesting on the ecology of associated fauna. An inventory of *Macrocystis* and *Nereocystis* stocks within a radius of 18 miles of Masset performed in August and September indicated a combined standing crop of 130,000 wet tons in beds covering 4,473 acres.

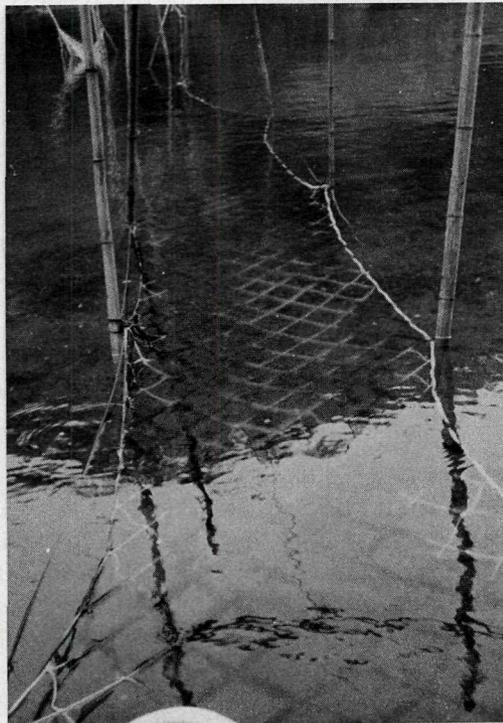
The only other firm engaged in active development has been operating in the northeast sector of Vancouver Island. A total of 200 tons of *Nereocystis* and *Macrocystis* was harvested, much of it being put through an experimental emulsification unit. The product is used as a fertilizer additive.

With the addition of an algal ecologist to its staff, the Branch has reviewed its policy regarding conditions prerequisite to the issuance of licences to harvest aquatic plants and the maintenance of such licences in good standing. As the result of changes in policy the Branch is proceeding with the revocation of licences for all unutilized areas and is seriously considering adopting a "species approach" to licensing.

The University of Victoria inventory of carrageenophyte algae in the Strait of Georgia is continuing under the supervision of the Branch. To date this programme, which is funded under the Federal-Provincial cost-sharing agreement, has provided data which will be invaluable in drafting new regulations governing the harvesting of carrageenophytes and in developing a management strategy.

COST-SHARED PROJECTS

During 1973 the Branch was involved in several fishery projects funded generally on a 75-per-cent Federal and 25-per-cent Provincial basis. These projects were carefully selected for their practicability and (or) potential in respect to expansion of existing fisheries, exploration of new fisheries, product or gear development,



An experimental *Porphyra* (nori) cultivation operation being carried out in Howe Sound using Japanese techniques. *Porphyra* is a very valuable and nutritious marine algae.

increasing or improving productivity, and the inventorying or development of inventory methods for various groups of potentially valuable marine algæ. A brief outline of the projects totalling over \$100,000 follows:

1. Inventory Studies

(a) In conjunction with University of Victoria, the 1972 studies on red alga biology and inventory were continued. Two genera of this group, *Iridæa* and *Gigartina*, are relatively abundant and rich in a valuable "gel" (carageenin). In 1973, field studies were directed on seasonal growth and effects of harvesting. An evaluation of the inventory method developed in 1972 was undertaken, as were pilot experiments on the laboratory and field culture of *Iridæa*. The objective of these studies is to develop a rational management plan before commercial exploitation.

(b) Two biologists undertook an inventory of two important genera of the brown algæ group, *Macrocystis* and *Nereocystis*, within an 18-mile radius of Masset, Q.C.I. The method used involved natural colour and infrared false colour aerial photography in conjunction with scuba-diving to measure bed areas. These beds encompassed 4,773 acres and contained an estimated total of 130,000 tons. During this survey some estimates were also made of sea urchin and abalone populations.

2. Industry Assistance

(a) Masset Kelp Meal Processing Plant: Hi-Co International Limited purchased the new but unused plant from the receiver of Canada Kelp Company Limited in 1973. Fishery agencies of the two senior governments were anxious to see an aquatic plant industry commence and contributed funds for a test run. Some 1,200 tons of *Nereocystis* were harvested from the local beds and, after "run-in" difficulties, 35 tons of meal produced. Encouraging feedback following meal sample distribution will prompt an enlarged harvesting and processing programme in 1974.

(b) Studies of the content and chemistry of lime derived from waste oyster shells were completed in 1973. The lime is of excellent quality and both glass and pulp industries have expressed interest in the product. Economics is a major consideration and the oyster industry may wish to hoard their waste shells for higher prices they anticipate from other uses such as "chicken scratch" or as mother shell in the oyster-seed business.

(c) Secretary-Manager, Gulf of Georgia Oyster Producers Co-operative: British Columbia's oyster industry, traditionally a "cottage-type" operation, has long suffered from lack of strong business-like central direction. This was especially so in respect to market development, quality control, product diversification, and culture practices. In an effort to co-ordinate the effects of individual growers and to improve the grower's incomes, money was made available for the hiring of an experienced businessman for a period of two years. The efforts of this man are being directed toward the location and design of a diversified central processing plant, increased markets, product diversification, and quality control.

(d) Purification of clams: The artificial cleansing of oysters was proved out in 1972 by a project which utilized circulating sea water sterilized by ultraviolet light in which contaminated oysters were held for a period of 48 hours. As clams are also subject to bacterial contamination and thus unmarketable from many areas, a project was initiated in 1973 to determine if clams might be cleansed in the same manner.

3. *Exploratory Fisheries*

During the summer of 1973 a fishing-vessel was chartered to search for unexploited shrimp populations in Queen Charlotte Sound. Fishing was confined to two promising-looking areas and some 155,000 pounds were landed during a two-month period. As a result of this survey, as well as good showings of shrimp as incidental catches in groundfish trawls, a large processing complex plans to expand its operations to include four trawlers and four automatic shrimp-peelers in 1974.

4. *Aquaculture (Mariculture) Studies*

(a) Raft culture of oysters can produce yields in excess of 20,000 lb./acre (compared to 2,000 lb./acre on the beach). Cedar logs, commonly used for floatation, have a life span of only about three years and are becoming increasingly expensive. Thus, alternative floatation methods—styrene plastics, ferro cement, fibreglass floats, aluminum “logs”—begin to look more attractive. The economics of such alternatives is an important consideration to the aquaculturist; therefore, a project was initiated in 1973 to test various types of floatation in Sooke Basin.

(b) Tray culture of oysters, from “seed” to market size, was successfully undertaken on a small private scale in Tucker Bay, Lasqueti Island. Commercial application of this method is now being financially supported by the Branch and will probably continue through 1975. If successful and economically attractive, the oyster-grower in British Columbia is presented with another means of supplementing his income.

OYSTERS

The extension and advisory role of the Branch with respect to oyster production continues to expand rapidly. A biologist has been employed by our Branch to aid in this role and to investigate methods related to further development of the shellfish industry. In this regard a number of problems associated with oyster culture are presently being examined with members of the oyster industry and Federal shellfish scientists. Of particular importance is the previous low effort expended on seed collection by the oyster industry. However, with the aid of Branch staff and a secretary-manager for the Gulf of Georgia Oyster Producers Co-operative, provided through a Federal-Provincial cost-sharing project, the members of the industry are considering several alternatives to solving a serious oyster seed-supply shortage. This facet of oyster culture will continue to receive close attention by Branch staff.

Although production figures compared with the acreage under lease still indicate that efficiency and production can be materially improved, it is felt that the present economic conditions of the industry will provide stimulus for this development. The market demand for oysters remained strong throughout the year and wholesale prices rose to \$8.80 per U.S. gallon. Production for 1973 was about 130,000 gallons, an increase of 13 per cent over the 1972 production of 115,000 gallons. The wholesale value of the 1973 production was roughly \$1 million, as compared to the 1972 wholesale value of \$750,000. About 1,600 tons of shellstock commercially harvested from Crown foreshore on 85 permits contributed almost one-third of the total production. In addition to the shucked oyster production, oyster seed worth approximately \$300,000 was collected in Hotham Sound. Financial losses were reported by seed collectors due to spatfall failure in Pendrell Sound. A more detailed account of this aspect of oyster culture activities is presented below.



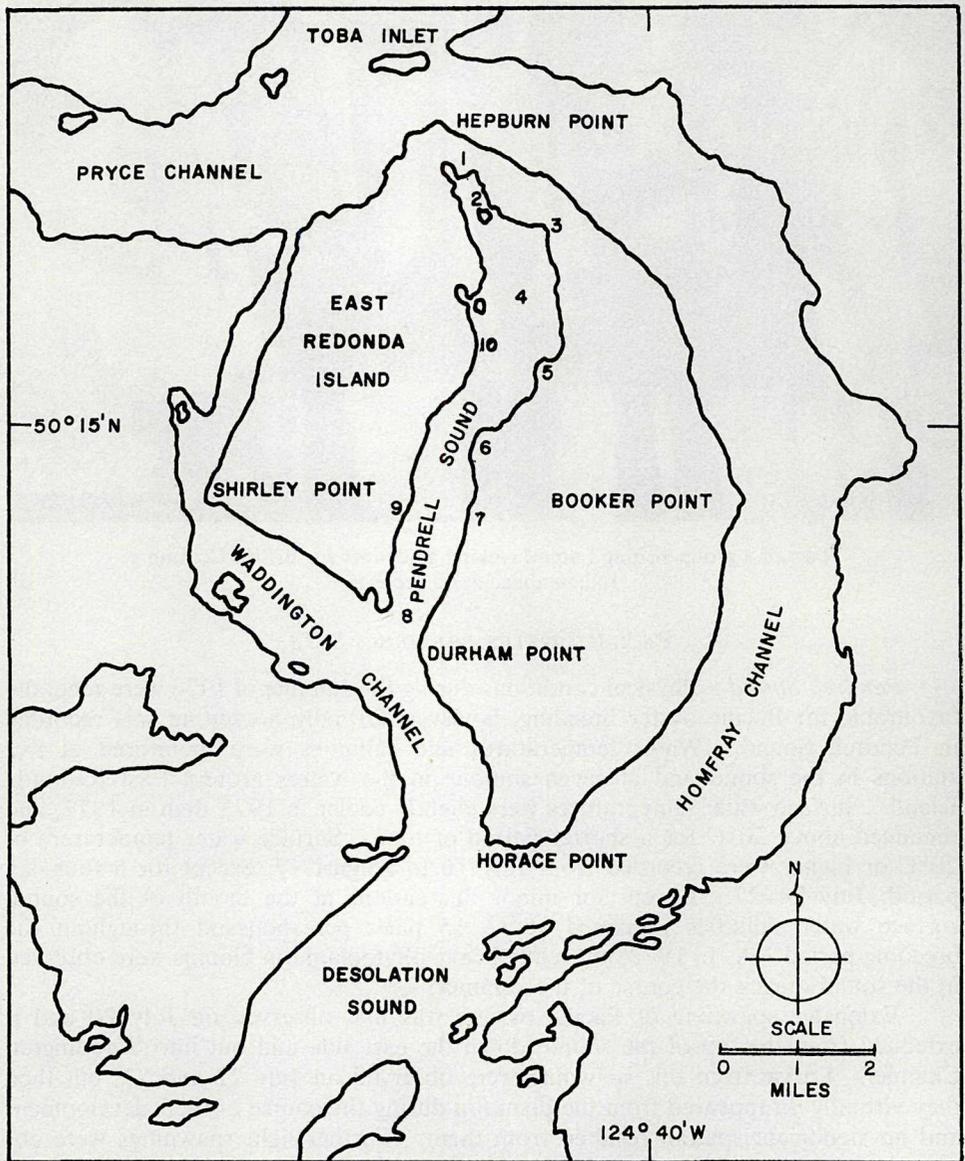
Part of a group visiting Lummi seeking guidelines for British Columbia Indian aquaculture projects.

PACIFIC OYSTER-BREEDING, 1973

Pendrell Sound—Physical conditions during the summer of 1973 were generally favourable for Pacific oyster breeding; however, virtually no setting was recorded in Pendrell Sound. Water temperatures and salinities were monitored at five stations in the sound and at seven stations in the waters around East Redonda Island. Surface water temperatures were slightly cooler in 1973 than in 1972, and remained above 20°C for a shorter period of time. Surface water temperature of 20°C or higher were recorded from July 16 to August 17, except for a four-day period, July 24–27. Except for minor fluctuations at the mouth of the sound, surface water salinities remained above 15 parts per thousand throughout the breeding period. As in 1972, unusually heavy phytoplankton blooms were observed in the sound during the course of the summer.

Extensive spawning of Pacific oysters was first observed on July 20 and it extended from the top of the sound, down the east side and out into Waddington Channel. Larvæ from this spawning were observed on July 22 and 23, but then they virtually disappeared from the plankton during the course of their development and no significant spatfall resulted from them. Further light spawnings were observed on August 3, 13, and 15, but the numbers of larvæ found in plankton samples were small, and the resulting spatfall was minor. Continued light spawning occurred until about mid-September.

Spatfall was monitored at seven locations, Stations 1, 2, 3, 4, 5, 6, and 10. Settlement of Pacific oysters was first observed during the week of August 4–15 at Stations 1, 2, and 4. All cultch was removed and examined on September 25. The maximum number of spat per shell observed at each station was four at Station 1, five at Station 2, nine at Station 3, seventeen at Station 4, nine at Station 5, five at Station 6; and eight at Station 10. Size of the spat ranged from 2 to 11 mm in length.



Map of Pendrell Sound showing location of sampling stations.

—Reproduced by permission from Fisheries Research Board. Bulletin 169, by D. B. Quayle

About 100,000 strings of shell or the equivalent in the form of cement disks were exposed in 1973 by seven companies.

Hotham Sound—At the request of the industry, observations were made in Hotham Sound to determine if this area could be used to obtain commercial sets of Pacific oysters in 1973.

Temperature and salinity measurements in August indicated a surface layer of about 4 m in depth; water temperatures here were above 20°C and the salinities above 20 parts per thousand.

Large quantities of larvæ in the straight-hinge to mid-umbone stages were observed in a surface plankton tow made on August 1. Additional spawnings occurred in the first half of August, producing large numbers of Pacific oyster larvæ.

Spatfall was first recorded on August 13 and continued until about the end of the month. Spat counts of over 1,000 per shell were common. All cultch was removed on September 26 and examined. Spat counts of over 2,000 per shell were observed; the maximum size of the spat was 15 mm, shell length.

About 150,000 strings of shell or the equivalent in the form of cemented veneer were exposed by three companies.

Ladysmith Harbour—No commercial set of Pacific oysters was recorded in Ladysmith Harbour. Surface water temperatures of 20°C or above occurred from July 16 to 20 and July 30 to August 17. No spawning was reported. Surface plankton tows taken during the course of the summer had a few straight-hinge larvæ and one mid-umbone larva, again indicating no significant spawning. No spat was found on the experimental cultch exposed at the sampling station.

Newsletter—The *Newsletter*, started in 1972 to inform the British Columbia oyster industry of Pacific oyster-breeding in the Province and assist with seed-collection operations, was continued in 1973.

FISHING INDUSTRY PRODUCTION

Figures for 1973 were not complete at the time of printing, but preliminary figures are available and indicative of some trends which are worthy of mention.

SALMON-CANNING

Commercial—The canned-salmon pack for 1973 was 1,553,581 48-pound cases, being 380,829 more than the 1972 pack of 1,172,752 cases. Pack figures for both sockeye and chum were the highest for many years.

Fifteen salmon canneries were licensed to operate in 1973. The locations were as follows: Skeena River—Prince Rupert area, five; Central area, one; Vancouver Island, three; Fraser River—Lower Mainland area, six. New Oceanside Cannery in Prince Rupert was built to replace the original Oceanside Cannery destroyed by fire in 1971.

Comparative Pack by Species (48-pound Cases)

	1972	1973
Sockeye	312,308	652,692
Chinook	11,535	11,022
Steelhead	866	996
Blueback		705
Coho	83,413	113,860
Pink	482,933	360,623
Chum	279,481	413,683



Workers at the Lummi Indian Aquaculture Project prepare to harvest cultured coho and chinook salmon.

Sport—Four canneries designed to custom-can sport-caught fish operated during 1973. They were located at Brentwood, Comox, Nanaimo, and Quadra Island. Production to the end of December 1973 was 106,807 cans, a decrease of 3,161 cans from the previous year's total. A total of 2,214 sportsmen used these facilities, of whom 1,952 were residents and 262 nonresidents. The following number and species of fish were canned: Chinook, 5,635; coho, 4,204; pink, 355; chum, 267; sockeye, 724; steelhead, 56; trout, 315. The additional cannery, situated at Comox, only operated at season's end and contributed little to the total pack figure.

HERRING FISHERY

The herring season opened February 27 and the 50,000-ton quota was taken by March 23.

The best catches were made in Barkley Sound to lower west coast of Vancouver Island area, where the total production was 23,998 tons. Other area totals were: Central area, 10,596 tons; upper west coast of Vancouver Island, 8,821 tons; Strait of Georgia, 3,562 tons; Queen Charlotte Islands, 8,540 tons.

The fishing fleet consisted of 105 seiners and between 135 and 150 gillnetters. Another 50 or more boats were used as packers. The gillnetters did especially well and at \$185 per ton some of these fishermen were expected to gross \$20,000 or more for the season.

About 20 companies were involved in the fishery and of these 11 fished dogfish. Total dogfish catch, under the Federal Fisheries incentive programme of 2 tons of herring for every ton of dogfish, was 4,400 tons.

Season's end saw some 12 Japanese buyers participating in the herring-roe auction held in Vancouver. Successful bidders paid up to \$3.50 per pound, but the

average was \$2.75 per pound. This lucrative fishery will attract excess gear to the 1974 herring fishery and will create an extremely difficult management problem for the Federal Government.

HALIBUT FISHERY

Halibut stocks continue to decline and the International Pacific Halibut Commission, in addition to cutting quotas and fishing-times in the various regulatory areas, has introduced such additional conservation measures as a new minimum size of 32 inches instead of the former 26-inch limit and imposed a daily sport catch of three halibut per fisherman during the period from March 1 to October 31 each year. The Bering Sea halibut fishery was open from April 1 to 19 and for the first time no Canadian boats fished the area.

Late in the season catches had declined by nearly 10 million pounds and, although final figures are not available at this date, the preliminary catch figure of 14.4 million pounds is well below the 1972 level. The major reason for the decline in abundance is the "incidental catch" of halibut by the large unregulated foreign fishery off the coasts of Alaska and British Columbia.

August prices for medium-sized halibut reached 89 cents per pound in Vancouver and 87 cents in Prince Rupert. Prices for large halibut also ranged from 80 to 89 cents per pound.

Halibut fishermen, as well as Government "managers," are concerned. To date our fishermen have borne all of the costs associated with reduced halibut catches while "foreign" fleets, especially those of Japan and the U.S.S.R. continue to overfish North American halibut stocks while pursuing their own target fisheries (flounders and pollock). The Halibut Commission is in an extremely difficult position and unless the foreign fishing fleets become more co-operative and "conservation minded" respecting halibut, the very existence of halibut in the North Pacific and Bering Sea is in jeopardy. Hopefully, the forthcoming Law of the Sea Conference will allow coastal management of the shelf species and (or) be instrumental in bringing "foreign" fishermen to the bargaining table in a more co-operative mood.

REVIEW OF FISHERIES PRODUCTION, 1972

GENERAL

The wholesale value of all British Columbia fish products marketed reached a record \$159 million, compared to the 1966 figure of \$123.7 million, the previous high record for the Province.

High prices for practically all types of fish and fish products and the largest chum salmon return since 1954 combined to make it a record year.

Fishermen's earnings at \$75.1 million were the highest ever, about \$16.5 million more than 1971 and \$13.7 million above the 1966 record \$61.4 million.

The wholesale value of all major species was at an all-time high.

As marketed wholesale, the principal species were salmon, with a value of \$114.3 million, herring valued at \$12.612 million, and halibut with a value of \$12.593 million.

The herring fishery remained closed for straight reduction purposes. Landings totalled 43,013 tons, with a wholesale value of \$2,700,000. The marketed value amounted to \$12.612 million, the highest value ever, being \$500,000 in excess of the best previous year, 1947. Roe and herring frozen for the roe market valued at \$10.2 million accounted for 81 per cent of the total 1972 marketed value.

In 1972 the total wholesale value of shellfish amounted to \$3.287 million. The value of the clam production was \$759,000; oyster production, \$798,000; and crab and shrimp production, \$1.73 million.

Tuna landings of 7.8 million pounds valued at \$2.5 million was 3.8 million pounds and \$1.4 million greater than 1971, the previous high.

FISHING-VESSELS

During 1972 the fishing fleet of British Columbia was comprised of drum seiners, 268; table seiners, 30; gillnetters, 1,982; trollers, 1,905; trawlers, 25; and longliners, 46.

SALMON-CANNING

Fifteen salmon canneries were licensed to operate in 1972. The locations were as follows: Skeena River and Prince Rupert, five; Central Area, one; Vancouver Island, three; Fraser River and Lower Mainland, six.

The total canned-salmon pack for British Columbia, according to the annual returns submitted to this Branch by canners licensed to operate in 1972, amounted to 1,172,752 cases, 231,253 less than the 1971 pack of 1,404,005 cases.

Sockeye salmon—The 1972 sockeye pack was 312,907 cases. This was a decrease of 255,849 cases from 1971's total of 568,756 cases.

It was an average sockeye year with a wholesale value of \$20.7 million, a drop of more than \$13 million from the previous record year. Landings were the lowest since 1965, higher prices on both domestic and foreign markets kept wholesale values up.

Pink Salmon—Wholesale value of pinks was only a few dollars less than sockeye and almost the same as the previous year. With a value on the market of \$20.6 million it was almost exactly \$10 million less than the record of \$30.6 million set in 1968 and slightly less than the 10-year average.

This year's pack of 485,164 cases was 17,160 down from the previous year's pack of 502,324 cases.

Chum salmon—Chum salmon was the big money-earner in 1972. After more than 20 years as one of the lesser species, the tremendous return to the Nitinat spawning areas resulted in a chum production in canned and frozen products worth \$30.8 million in the wholesale market.

The 1972 pack was 278,451 cases, 179,943 more than the 1971 pack of 98,508 cases.

Coho salmon—Coho landings declined substantially, reducing the market value of this species to \$16.6 million, down almost \$3 million from the previous year and the lowest since the disastrous 1969 season when it was \$12 million. The 1972 pack was less than half of 1971's 83,755 cases.

Chinook salmon—Chinook produced a record high of \$14.12 million; this was a million above the previous year and far above the 10-year average. This was due entirely to the increase in price as landings were down slightly over the previous year. The 1972 pack was 11,608 cases, down slightly from the 1971 total of 11,653 cases.

Steelhead—The 1972 steelhead pack amounted to 867 cases. Although steelhead are not salmon, some are canned each year, principally those caught incidental to fishing other species.

OTHER CANNERIES AND PROCESSORS

Shellfish and specialty products—In 1972, seven shellfish canneries were licensed to operate in British Columbia and produced the following packs: clams, 9,960 cases; crabs, 21 cases; clam chowder, 10,197 cases. Sundry processing plants produced the following: fish spreads, 82,777 cases; creamed salmon, 4,909 cases; oyster stew, 12,384 cases; salmon chowder, 3,867 cases; smoked oysters, 110 cases; smoked salmon, 7,679 cases; herring in oil, 15,297 cases; salmon milt, 4,851 cases; pickled salmon, 981 ½-pound tubs; fish and chips, 114,000 cases.

Fish-curing—Twenty smokehouses processed the following: herring (kippered, plain, and snax), 56,650 pounds; cod, 744,673 pounds; salmon, 973,000 pounds; oysters, 167 pounds, 20,402 gallons, 870 ½-pound containers, 91 24/6-ounce cases; steelhead, 794 pounds; trout, 180 pounds; mackerel, 6,000 pounds.

Pickled herring—Pickled-herring production in 1972 amounted to 10,679 cases of 12/12-ounce jars; 261 cases, 12/16-ounce jars; 283 cases, 12/32-ounce jars; 237 cases, 6/56-ounce jars; 3,186 128-ounce jars; 50 10-pound pails; 930 20-pound pails; 100 25-pound pails; 87 50-pound pails.

Miscellaneous production—Herring roe, 5,480,000 pounds; mild-cured salmon, 153,000 pounds; salmon eggs and caviar, 4,197,000 pounds; frozen food herring, 14,722,000 pounds; salmon offal meal, 1,795 tons.

SUMMARY TABLES, 1968-72

Total Landings and Effort

<i>Landed Value of Fish and Fish Products</i>		<i>Wholesale Value of Fish and Fish Products</i>	
	\$		\$
1968.....	55,718,000	1968.....	119,255,000
1969.....	44,565,000	1969.....	83,000,000
1970.....	56,909,000	1970.....	123,280,000
1971.....	55,664,000	1971.....	120,100,000
1972.....	70,817,000	1972.....	159,132,000

<i>Number of Licensed Boats</i>		<i>Number of Licensed Fishermen</i>	
1968.....	7,548	1968.....	12,133
1969.....	7,181	1969.....	10,942
1970.....	6,975	1970.....	11,647
1971.....	6,698	1971.....	11,015
1972.....	6,670	1972.....	9,902

Licences Issued and Revenue Collected, 1969-73, Inclusive

Licence	1969		1970		1971		1972		1973	
	Number	Revenue	Number	Revenue	Number	Revenue	Number	Revenue	Number	Revenue
Salmon cannery.....	15	\$ 6,000	17	\$ 6,800	14	\$ 5,600	15	\$ 6,000	15	\$ 6,000
Herring cannery.....	-----	-----	-----	-----	-----	-----	1	25	1	25
Herring reduction.....	-----	-----	-----	-----	-----	-----	2	800	2	800
Tierced salmon.....	3	300	3	300	3	300	3	300	3	300
Fish cold storage.....	21	3,325	19	3,275	23	3,550	27	3,825	30	4,075
Fish-processing.....	61	2,300	64	2,320	63	2,500	67	2,900	91	5,300
Shellfish cannery.....	7	700	7	700	6	600	7	700	7	700
Tuna cannery.....	2	200	3	300	1	100	2	200	2	200
Fish-offal reduction.....	5	250	5	250	5	250	4	200	4	200
Herring dry-saltery.....	-----	-----	2	50	1	25	-----	-----	1	25
Fish-buyers.....	295	14,750	358	17,900	300	15,000	324	16,200	352	17,600
Pickled herring.....	2	50	2	50	2	50	2	50	2	50
Sport-caught fish cannery.....	4	100	3	75	3	75	3	75	4	100
Aquatic plant harvesting.....	31	1,550	51	2,550	51	2,550	25	1,250	27	1,350
Aquatic plant processing.....	3	600	1	200	-----	-----	-----	-----	1	200
Dogfish reduction.....	-----	-----	-----	-----	-----	-----	-----	-----	2	100
Salmon dry-saltery.....	-----	-----	-----	-----	-----	-----	-----	-----	1	25
Oyster-picking permits.....	103	1,030	107	1,070	131	1,310	94	940	85	850
Provincial receipts.....	1,048	4,001	309	2,313	250	3,014	153	1,751	149	3,371
Totals.....	1,600	35,156	951	38,153	853	34,924	729	35,216	779	41,271

Species and Value of Fish Caught in British Columbia, 1968-72, Inclusive

	1968	1969	1970	1971	1972
	\$	\$	\$	\$	\$
Salmon.....	99,956,000	57,982,000	99,597,000	96,926,000	114,349,000
Herring.....	331,000	559,000	682,000	2,256,000	12,612,000
Halibut.....	8,385,000	13,814,000	14,025,000	11,367,000	16,904,000
Crabs and shrimps.....	2,378,000	2,460,000	1,775,000	1,303,000	1,730,000
Lingcod.....	995,000	920,000	1,038,000	1,003,000	981,000
Grey cod.....	1,122,000	937,000	752,000	1,299,000	3,428,000
Oysters.....	743,000	856,000	590,000	575,000	798,000
Sole.....	1,183,000	1,352,000	1,819,000	1,829,000	1,504,000
Black cod.....	349,000	275,000	226,000	219,000	806,000
Clams.....	222,000	226,000	457,000	503,000	759,000
Tuna.....	-----	1,090,000	984,000	1,499,000	3,088,000
Other species.....	3,591,000	2,488,000	1,335,000	1,310,000	2,173,000
Totals.....	119,255,000	82,959,000	123,280,000	120,089,000	159,132,000

*British Columbia Salmon Pack, 1968-72, Inclusive,
Showing Areas Where Canned*

(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

1971

Sockeye.....	439,031	129,725	568,756
Red spring.....	521½	506½	1,028
Pink spring.....	5,571	1,630½	7,201½
White spring.....	2,802½	621½	3,424
Steelhead.....	727	574	1,301
Blueback.....	5,608	-----	5,608
Coho.....	174,640	41,215	215,855
Pink.....	359,041½	143,282½	502,324
Chum.....	24,207½	74,300½	98,508
Totals.....	1,012,150	391,855½	1,404,005½

*British Columbia Salmon Pack, 1968-72, Inclusive,
Showing Areas Where Canned—Continued*

(48-pound cases)

1972

Species	Area		Total
	Fraser Area and South Coast	North Coast	
Sockeye.....	199,890½	113,016½	312,907
Red spring.....	927	874½	1,801½
Pink spring.....	4,292	2,047½	6,339½
White spring.....	3,024½	442½	3,467
Steelhead.....	393½	473½	867
Blueback.....			
Coho.....	52,878½	30,877	83,755½
Pink.....	225,502	259,662	485,164
Chum.....	187,415	91,036	278,451
Totals.....	674,323	498,429½	1,172,752½

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