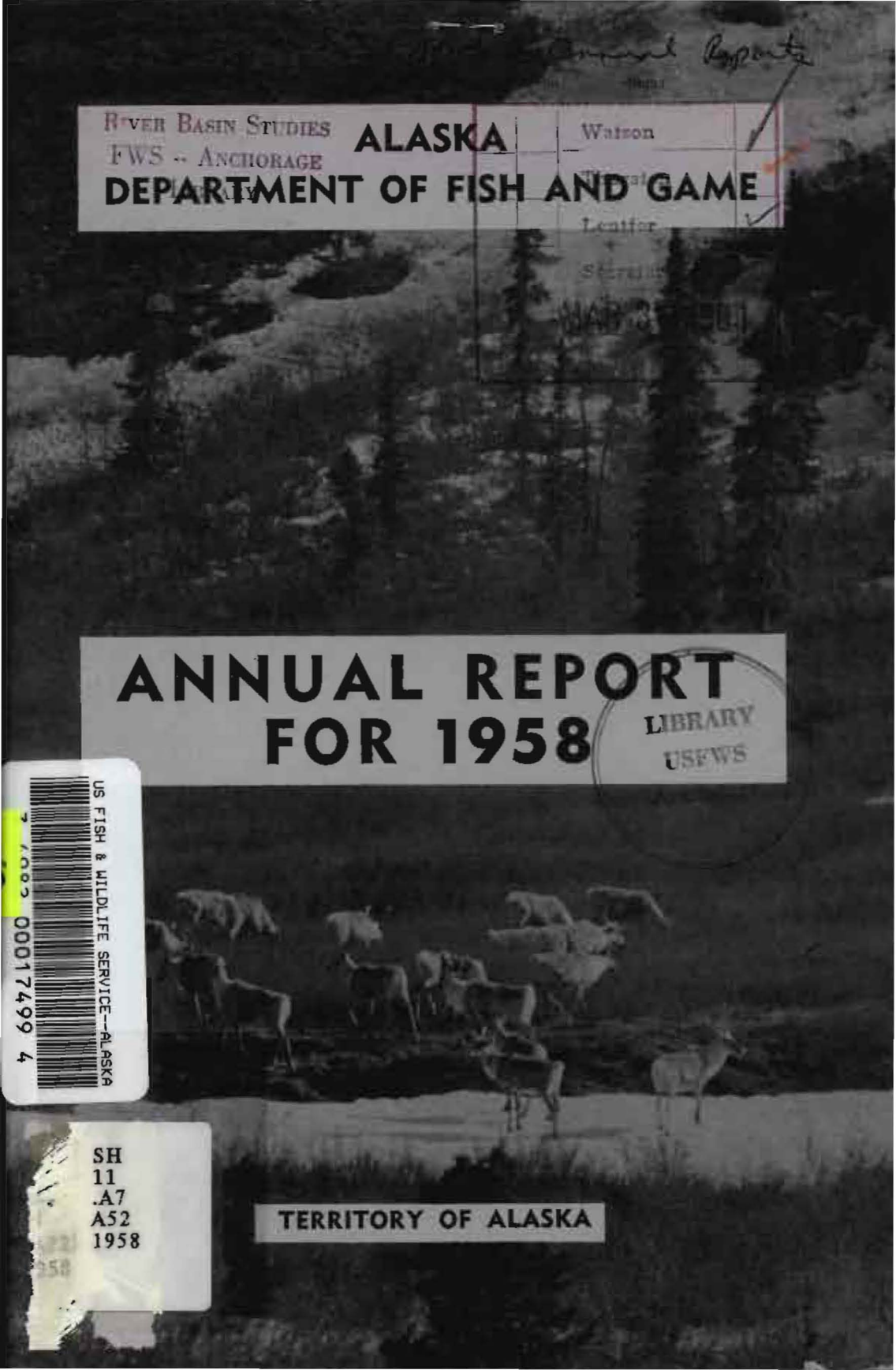
ALASKA DEPARTMENT OF FISH AND GAME

ANNUAL REPORT FOR 1958



TERRITORY OF ALASKA

Alaska Department of Fish and Game
Annual Report for 1958

ERRATA SHEET

Page 50—Paragraph 1: Line 6—Change "Tahlton" to "Tahltan."
" 51—Figure 2—Change "Tahlton" to "Tahltan."
" 52—Paragraph 4: Line 6—Change "Berrington" to "Barrington."
" 57—Paragraph 14: Line 6—Eliminate "and 10".
" 61—Paragraph 2: Line 2—Change "Figure 11" to "Figure 10."
" 64—Paragraph 4: Line 4—Change "Figure 12" to "Figure 11."
" 64—Paragraph 8: Line 2—Change "Figure 13" to "Figure 12."
" 69—Paragraph 1: Line 1—Change "Figure 14" to "Figure 13."
" 70—Paragraph 2: Line 6—Change "Figure 15" to "Figure 14."
" 101—Paragraph 3: Line 2—Insert "not" after "have."
" 101—Footnote, Middle Page: Line 1—Substitute "be" for "have been."
" 101—Footnote, Middle Page: Line 2—Substitute "F" for "C."
" 101—Footnote, Bottom Page: Line 2—Change "aid" to "paid."

COVER: CARIBOU ON MIGRATION
ALASKA RANGE

Photo by Greany

1958
ANNUAL REPORT

Alaska Fish and Game Commission

and

Alaska Department of Fish and Game

MICHAEL A. STEPOVICH
Governor

WAINO HENDRICKSON
Acting Governor

ARTHUR H. HAYR
Chairman

C. L. ANDERSON
Director

REPORT NO. 10

JUNEAU, ALASKA

TO:

THE GOVERNOR OF ALASKA
MEMBERS OF THE TERRITORIAL LEGISLATURE AND THE
CITIZENS OF ALASKA

Herewith is submitted the tenth Annual Report of the Alaska Fish and Game Commission, created by the 23rd Territorial Legislature and approved April 1, 1957.

This report covers the activities of the Commission and the Alaska Department of Fish and Game based on the calendar year January 1 to December 31, 1958.

C. L. ANDERSON, Director
ARTHUR H. HAYR, Chairman
ROBERT C. KALLENBERG, Member
DOUGLAS BABCOCK, Member
NEIL E. GRANT, Member
JAMES HUNTINGTON, Member
NELS E. NELSON, Member

Although the Alaska Fish and Game Commission and the Alaska Department of Fish and Game was created April 1, 1957, for all practical purposes they are a continuation of the former Alaska Fisheries Board and the Alaska Department of Fisheries and accordingly these reports are numbered consecutively.

FOREWORD

The 1957 session of the Legislature enacted Chapter 63, S.L.A. 1957, which repealed Chapter 68, S.L.A. 1949, which created the Alaska Fisheries Board and the Alaska Department of Fisheries. Under the new act, all duties and powers of the Alaska Fisheries Board were relegated to an Alaska Fish and Game Commission to be composed of seven members, viz. three commercial fishermen, one processor, one hunter, one sport fisherman and one trapper. The four commercial fishery members of the old Board were automatically made members of the new Commission. The functions of the Alaska Department of Fisheries were transferred to the new Alaska Department of Fish and Game with fur and game activities being added. This change became effective April 1, 1957.

The Division of Commercial Fisheries continued its work in watershed improvement on various programs. A new chemical, toxaphene, was utilized in six Southeastern Alaska lakes to remove predators and competitors to salmon. When the lakes are clear of the chemical, plants of red and silver salmon will be made, probably in the spring of 1959. Work on the physical inventory of the Stikine River was intensified.

A large run of adult red salmon numbering 7,400, returned to Laura Lake, Afognak Island. These salmon were derived from egg plants made in this system which was opened to salmon by means of a fish ladder in 1951. Research on the life history of the Nushagak king salmon was expanded over previous years.

The Biological Research Division pursued research on a variety of projects. These included activities at the Kitoi Bay Research Station, king crab research at Kodiak, Taku River studies and silver salmon investigations in Southeastern Alaska

Lactic acid experiments to determine the extent of fatigue in troll-caught salmon were continued by Robert R. Parker in connection with his work at the University of British Columbia.

The Division of Sport Fish continued lake stocking of rainbow trout from the Fire Lake and Fairbanks hatcheries in the Interior. Starting with a four-trough operation in 1952 and a lake stocking of 68,000 fry, Sport Fish in 1958, with two hatcheries and 58 troughs, stocked 935,000 hatchery-hatched fish. It was found that the pits along the Richardson Highway could not be set aside by the Fish and Game Commission for the exclusive use of juveniles, because of the lack of authority to do so in the Alaska law. It was suggested that this might be initiated and accomplished on a voluntary basis by sportsmen's organizations.

The Division of Game added two Associate Biologists who staffed offices in Fairbanks and Anchorage. Investigations were conducted on the Walrus Islands, moose calves were transplanted to Berner's Bay in Southeastern Alaska, caribou calving studies were conducted in the Interior and pelt primeness and beaver management studies were initiated.

The Engineering Division provided technical and professional engineering service to the several other Divisions including field surveys, designs, preparation of plans and specifications, and supervision of force account and contract construction.

Fifteen lake surveys were completed; a new type smolt screen was designed and an experimental model built and installed for field checking; development work on a prefabricated portable steeppass fishway for upstream migrants was continued, and the first operational installation of it was made; an upstream migrant holding tank was constructed at the outlet of Little Kitoi Lake; and construction under contract of the Bakewell Falls fish ladder was well along toward completion by the end of the year.

The Education and Information Division conducted an experimental showing of Department-produced fishery films to more than 7,000 persons in 45 audiences located in nine Southeastern Alaska maritime communities within a month's time. Evaluated, the response revealed the motion picture as a useful tool in disseminating fish and game knowledge, and especially in attracting sizable audiences. It is an effective way of enlisting public support for the Department's program to restore the fisheries to a place near their former abundance where they can be harvested on the highest sustained level. The local District Biologist conducted a forum and answered questions stimulated by the showing of the films.

Members of the Board of Fish and Game holding a public hearing.

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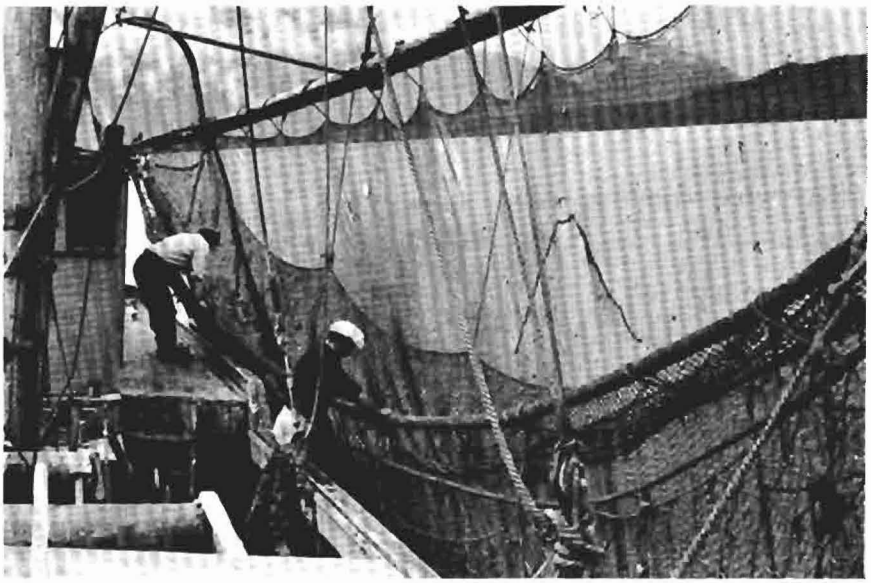
All photographs by Alaska Department of Fish and Game Staff

ADMINISTRATION

The Division of Administration handles all routine business of the Department such as accounting, requisitions, vouchers, personnel records, general files and clerical work. The activities of the Director are likewise covered in this division.

In addition to his other duties, the Director represented the Territory at several important meetings during the past year. The conferences of the American Section of the International North Pacific Fisheries Commission were held during 1958 at Seattle, Washington; one on May 26-27, and the other on September 29-30. A full meeting of the Commission was held October 29 - November 7 at Tokyo, Japan. The Alaskan representative on the Commission was Mr. J. H. Clawson of Anchorage. The Alaskan advisors to the American Section of the Commission for the past year were John W. Smith, fisherman, Metlakatla; Robert C. Kallenberg, fisherman and member of the Alaska Fish and Game Commission, Dillingham; and C. L. Anderson, Director of the Alaska Department of Fish and Game, Juneau. The Director also attended the conference sponsored by the U.S. Department of State in Seattle on October 1, dealing with "The Law of the Sea".

During 1958, inspection and survey trips were made by the Director to the various parts of the Territory, especially where fish and game projects of the Department were being carried forward. Several Meetings were held with fish and game representatives to explain the work of the Commission and the Department and to assist in the establishment of advisory committees of the Commission. Other duties were the preparation of the minutes of the Commission meetings, the writing of a brief to the Fish and Wildlife Service on the proposed 1959 commercial fishing regulations and the preparation of material for the 1958 Annual Report, together with the compiling of information and data requested by various governmental and private agencies.



Beam trawl used for catching shrimp.

FISH AND GAME COMMISSION

During the calendar year of 1958, two regular meetings of the Alaska Fish and Game Commission were held in Fairbanks and Juneau, respectively. A summary of each meeting follows:

The regular spring meeting was called to order at Fairbanks on Monday, April 7, 1958 at 3:10 p.m. by chairman Kallenberg. Those present were Robert C. Kallenberg, Dillingham; Arthur H. Hayr, Fairbanks; Douglas Babcock, Juneau; Neil E. Grant, Wrangell; James Huntington, Huslia and Nels E. Nelson, Ketchikan.

A letter from Mr. Eugene Torkilsen of Kenai was read. He stated he was resigning for personal reasons.

A unanimous ballot elected Mr. Hayr, Chairman, and Mr. Babcock, vice-chairman for the ensuing year.

The minutes of the meeting of November 18 - 22, 1957 were accepted as read.

Letters pertaining to the setting up of a register for big game guides were read. Mr. Kallenberg's motion that the guide issue be deferred was passed unanimously.

Under unfinished business, the Commission was informed that the 1956 Annual Report was in the hands of the printer and that material for the 1957 edition was being compiled.

Mr. Hayr reporting on the status of the Lost Lake access area said he felt the various difficulties concerning it could be ironed out.

Participation by the Department in the work of the Alaska Cooperative Wildlife Research Unit at the University of Alaska was reviewed. To cover this participation, an item of $4,000.00 has been included in the proposed budget of the Fur and Game Division. A motion that the above action be approved was carried unanimously

It was agreed that a night session of the Commission be held on Wednesday evening at the University of Alaska in order that more of the general public could attend for discussing the special items of bounties, registered guides and public access to fishing and hunting areas.

A motion that the financial report be adopted carried unanimously.

The Director reported briefly on the work of the Division of Administration since the fall meeting which included such duties as meetings, preparation of a brief to the Fish and Wildlife Service, writing up the minutes of the November meeting, correspondence on statehood and related legislation, conferences with advisory committees and preparation of budgets for the next biennium.

Sergeant Pruitt of the U.S. Air Force described the service's recreational program, citing special interest in the recreational site on Birch Lake near Fairbanks, which they offered to assist in rehabilitating by supplying manpower, equipment and supplies. A motion to tender a letter of thanks to General Gibson for the cooperation given the Department by the Air Force recreational personnel carried unanimously.

The Commissioner and staff members attended the regular monthly meeting of the Tanana Valley Sportsmen's Association at their clubhouse.

The Commission continued in session at the University of Alaska for an evening public meeting. Members of the staff participated with slide lectures on Departmental activities. The activation of Advisory Committees was discussed. Letters were read pertaining to a proposed big game guide law. Comments from the floor unanimously agreed that some law was necessary.

It was agreed that the Commission should examine the entire proposed budget for the ensuing biennium making such changes as it considered necessary and then pass a motion to cover the entire proposed budget.

By way of summary, the 1959-61 request as amended by the Commission will read as follows:

1. Fish and Game Commission	$ 12,000.00
2. Administration	77,940.00
3. Biological Research	260,000.00
4. Commercial Fisheries	265,000.00
5. Education and Information	42,800.00
6. Engineering	40,000.00
7. Inspection	40,000.00
8. Predator Investigation & Control	116,235.00
9. Construction of Fishways, Etc.	250,000.00
	$1,103,975.00

It was moved that the proposed $1,103,975.00, as outlined above for the biennium July 1, 1959 - June 30, 1961 be adopted. This was carried by unanimous vote.

Mr. Clarence Rhode of the Fish and Wildlife Service presented information on the Kuskokwim Management Areas, its purpose and proposed regulations on fish and game, mining, and oil exploration, none of which he stated would be completely banned.

On the subject of Advisory Committees, each member of the Commission reported on the progress made in their respective districts. Since there would be considerable variation in size, etc., of these Committees, it was moved that the Director be instructed to work up a set of uniform bylaws for presentation at the next Commission meeting, and that during the interim period the Committees use their own bylaws. This was passed by unanimous vote.

Names were submitted for the Metlakatla, Ketchikan, Wrangell, Petersburg, Gastineau Channel, Clam Gulch, (Kenai Peninsula), Homer-Seldovia, Kodiak, Nelchina, and the Matanuska Valley Committees. These were accepted unanimously.

It was recognized that the need existed for a guide register and law and a suggestion was made that the Department and Commission make a study of the problem.

A report was given on the proposed recreational sites along route 70 between Livingood and Manley Hot Springs. After discussion it was suggested that this regular procedure be followed:

1. Field man make a preliminary check of the proposed site as to its prospects for use by hunters and fishermen.

2. Recommendation then be made to the Director.

3. After consideration of the information presented by the field men the Director will, if the proposal looks good, make a recommendation to the Director of the Department of Lands.

4. The Land Department will then take over to do the necessary surveying and procurement of sites from the Bureau of Land Management.

The committee, appointed to draw up a statement of policy on the present and proposed large land withdrawals in the Territory, presented a written statement. It was moved that this statement be accepted as the

official policy of the Commission. This was carried unanimously. The policy statement reads as follows:

> The Alaska Fish and Game Commission herewith instructs the Director of the Alaska Department of Fish and Game to make every effort to ensure that the Authority to administer the fish and wildlife resources within the bounds of Federal land withdrawals shall be transferred to Alaska at such time as the authority to administer fish and wildlife is granted - except for withdrawals for Federal Refuges and National Parks and National Monuments established prior to January 1, 1958.

Angling closures for juveniles only was given consideration and the following statement agreed to:

The Commission hereby authorizes the Director, at his discretion, to assist other agencies or groups promoting warranted angling closures for the benefit of juveniles.
This carried unanimously.

Next it was unanimously moved that the 1958 annual fall meeting of the Commission be held at Juneau.

The regular fall meeting of the Alaska Fish and Game Commission was called to order at Juneau on Monday, December 8, 1958 at 9:30 a.m. by Chairman Hayr. Roll Call showed the following members present: Arthur H. Hayr, Chairman, Fairbanks; Douglas Babcock, Vice-Chairman, Juneau; Neil E. Grant, Wrangell; James Huntington, Huslia; Nels E. Nelson, Ketchikan and Robert C. Kallenberg, Dillingham.

In his opening remarks Chairman Hayr said that this would, without doubt, be the last meeting of the Territorial Fish and Game Commission. Any meeting contemplated for the spring of 1959 would be a State function and under a new commission. He hoped that the proposed fish and game code to be outlined by the present Commission would be acceptable to the first state legislature meeting in January 1959.

The minutes of the spring meeting of April 7 - 11, 1958 were then read and accepted.

By mutual agreement a meeting was scheduled with the Castineau Channel Advisory Committee.

Acting Governor Hendrickson in speaking to the Commission, said we are facing new and tremendous responsibilities in the fish and game field — the responsibilities of control. He thanked the members for offering their services to the Territory.

The motion to accept new members for the Homer-Seldovia Advisory Committee and the Petersburg Advisory Committee was passed by unanimous vote.

It was reported that bid offers had now been mailed on the 1957 Annual Report.

The first order of new business was the presentation of a financial report which was discussed and then passed by unanimous vote.

The report of the Administration Division covered the various trips the Director had made throughout the Territory and in the States.

Mr. Kallenberg reviewed the Tokyo meeting of the International North Pacific Fisheries Commission, which was attended by four Alaskans, Mr. Kallenberg, Mr. Anderson, Mr. John Smith of Metlakatla and Commissioner John Clawson of Anchorage.

Mr. Anderson reported on the Pacific Marine Fisheries Commission meeting in Seattle on November 19 - 21 when the following resolution, which is of interest to Alaska, was adopted.

Whereas: The fisheries of Alaska are one of its most valuable assets, contributing heavily to the marine fisheries production of the Pacific Coast of North America and are, in part, composed of stocks of fish which migrate into Alaska waters from the waters of the other Pacific Coast states; and

Whereas: The coming of statehood will ultimately place the responsibility for managing this resource in the control of the State of Alaska; and

Whereas: The Pacific Marine Fisheries Compact was adopted for the purpose of enabling the States of California, Oregon and Washington to promote the better utilization of fisheries of the Pacific Ocean and to develop a joint program of protection of such fisheries in which program the Territory of Alaska has unofficially cooperated,

Therefore, be it resolved: That in the opinion of the Pacific Marine Fisheries Commission, the purposes and objectives of the Compact will be more fully and completely served if the State of Alaska enters into official membership on the Commission and

Be it further resolved: That, in the opinion of the Commission, such membership will aid the State of Alaska in performing its role in managing these fisheries which are of joint interest, and

Be it further resolved: That the Governors and Legislatures of the States of California, Oregon, and Washington and the President and Congress of the U.S. be advised of the interest and desire of the Commission in securing adherence of the State of Alaska to the Pacific Marine Fisheries Compact to the end that this sentiment may be made known to the Governor and Legislature of Alaska.

Approved November 21, 1958 at Seattle.

The meeting resumed with several commercial fishermen in attendance to offer recommendations to the Commission on proposed gill net areas in Southeastern Alaska, additional closed areas in certain bays, etc. Details of these are being omitted, since they are included in the brief to Ass't. Secretary Ross L. Leffler. A copy of this is attached to these minutes.

There followed some further suggestions for changes to be made in the redraft of the proposed fish and game bill for consideration of the 1959 legislature.

Mr. Edwards of the Department of the Interior, Mr. Schnoor and Mr. Seidman of the Bureau of the Budget called for a general conference with the Commission on matters of mutual interest. All three stated they were in Alaska to do everything within their power to make the transition to statehood as smooth as possible.

The director was instructed to rewrite the proposed sport fishing and hunting license bill to incorporate the changes made by the Commission.

A resolution proposing the abolition of all federal fishing and hunting licenses was presented and read. After minor changes were made, the following resolution was adopted and carried unanimously. The text of the resolution follows:

Whereas: A sportsman hunting or fishing in Alaska must first procure both a Federal and State license; and

Whereas: The dual license requirement has been a nuisance and has created public confusion; and

Whereas: Alaska is the only state of the Union in which Federal licenses are required for sport fishing and hunting; and

Whereas: The State of Alaska is currently working on a sound sport fishing and hunting license act to finance their sport fish, fur and game programs; and

Whereas: The State license fees for participating in sport fish, game and fur activities must be adequate to finance the conservation and wise use of these resources:

Now Therefore: be it resolved by the Alaska Fish and Game Commission, the official State body charged with the responsibility for Alaska's fish, fur and game that the United States Government abolish all licenses for sport fishing, hunting, trapping and associated activities with the exception of the Migratory Bird Hunting Stamp, as of June 30, 1959.

The proposed licensing bill for commercial fishing was discussed and recommendations made. After consideration of a number of changes, the Director was instructed to rewrite the bill taking these changes into account. He was also instructed to leave blank space for all license fees and to attach a sheet showing the Commission's recommendations.

The Commission adopted the following statement to be presented by the Director to the Governor: "The Alaska Fish and Game Commission is submitting suggested legislation, arrived at through serious deliberation, which incorporates basic principles considered vital to the well-being and best interests of the fish and game resources of Alaska. However, the Commission is not averse to the passage of other legislation that does not deviate greatly from the basic principles contained in these bills."

A motion that the Director be requested to inform the Governor that the Alaska Fish and Game Commission consider it desirable for the State of Alaska to join the Pacific Marine Fisheries Compact carried unanimously.

Upon invitation of the Commission, Mr. Jack Doyle of the Legislative Council, discussed the P.A.S. organization and the merits and objections of boards and commissions in general, also the various possibilities open for obtaining transfer of the fish and game resources from the federal government to the State.

The status of the walrus herds in Bristol Bay was discussed and the recommendation made that the Walrus Islands be set up as a walrus sanctuary or reserve. The motion carried unanimously.

A second draft of recommendations for the 1959 commercial fishing season was submitted by Mr. Nelson and his committee. The Commission instructed the Director to prepare a brief for presentation to Assistant Secretary Leffler of the Department of the Interior.

Mr. Babcock's committee on sport fishing and game reported it has, at this time, no firm recommendations for submission to the next meeting of the Alaska Game Commission.

The following resolution was presented:

Whereas: The United States Fish and Wildlife Service has announced that the Japanese high seas fishery has had an adverse effect on the Bristol Bay red salmon stocks; and

Whereas: There has been an announcement by the Federal Government that stringent regulations curtailing the salmon catch in Bristol Bay, even to a complete fishing closure, is contemplated; and

Whereas: The Bristol Bay red salmon fishery by United States nationals has been under severe restrictive regulations for many years indicating full utilization; and

Whereas: Research has ascertained the present Japanese high seas fishery for red salmon fishes predominately on Bristol Bay stocks; and

Whereas: Being under full utilization the further fishing effort on the Bristol Bay red salmon stocks by Japanese fishery now places a prime national resource in jeopardy; and

Whereas: This natural resource being not only valuable from a monetary standpoint but even more important as a desirable source of protein; and

Whereas: A considerable group of people, the residents of Bristol Bay, whose only livelihood is this resource, are being placed in a position of either starving or moving, leaving this great Bristol Bay area uninhabited,

Now therefore, be it resolved by the Alaska Fish and Game Commission: That the United States Government be requested to seek restriction of the Japanese fishery in the area of intermingling until such time as the International North Pacific Fisheries Commission makes a final determination on provision for proper conservation. The resolution passed unanimously.

Because of the uncertainty of the new organization under statehood, no statement could be made as to time, place and agenda for the next Commission meeting, if there be one. All details will have to be left to the Director.

A last suggestion was made that a section be added to the proposed fish and game bill so that maximum protection be given to fish and game in the case of all projects disturbing lakes, streams and other natural habitats.

Mr. Hayr asked that a vote of thanks be given to the entire staff and and especially to the secretary, who worked so diligently taking the notes.

At 9:30 a.m. Saturday, December 13th it was moved that the meeting adjourn and this carried by unanimous vote.

Gill netter taking a king salmon aboard, Taku Inlet.

ALASKA DEPARTMENT OF FISH AND GAME
229 Alaska Office Building
Juneau, Alaska

Fish and Game Commission
C L. ANDERSON, Director
Arthur H. Hayr, Fairbanks
Chairman
Douglas Babcock, Juneau
Vice-Chairman
Robert C. Kallenberg
Dillingham, Chairman
Nels E. Nelson, Ketchikan
Neil E. Grant, Wrangell
James Huntington, Huslia

State of Alaska
William A. Egan
Governor

January 20, 1959

Honorable Ross L. Leffler
Ass't. Secretary of the Interior
U. S. Fish and Wildlife Service
Washington 25, D.C.

DEAR MR. LEFFLER:

The Alaska Fish and Game Commission offers for your consideration the following recommendations for the 1959 regulations of the Commercial fisheries of Alaska.

These recommendations are made only after careful study and consideration by members of the Department staff and the Commission. All available biological information from the various agencies now working in Alaska has been used as the basis for the recommendations.

The cooperation of the Service in assisting our various staff members in becoming better acquainted with the present management practices and the more serious problems in each district has been excellent. Members of this Department have been invited to various meetings of the Service staff on regulations and other problems. This cooperation is certainly appreciated and from it has emerged some of the thinking contained in these recommendations.

The Commission wishes to compliment the Department of Interior on the announced policy of elimination of fish traps. The Commission has taken the stand since its inception that traps should be eliminated to foster the economy of Alaska.

The following recommendations are presented on the assumption that no traps will operate in 1959.

PART 102 - GENERAL PROVISIONS

It is recommended that the Alaska limit for seine boats be retained. The Alaska seine fleet has been built up under this limit and any sudden lifting of the restriction could be harmful to the present fleet.

Eliminate the mesh size requirements on drift gill nets. At the present time various mesh size requirements are enforced in the following districts: Arctic, Bristol Bay, Alaska Peninsula, Cook Inlet, Resurrection Bay, Copper River, Bering River, and Southeastern Alaska. Most of these requirements have to do with so-called king salmon web — 8½", requiring not less than 8½" during a portion of the season, presumably to allow escapement of any red salmon going through at that early date. This does not seem consistent with good management practices on two accounts.

1. It is generally believed that catch and escapement should be secured from all segments of salmon runs. The Fish and Wildlife Service has generally subscribed to this policy. Therefore, any red salmon which

are present in the early season, during the time only 8½" or larger mesh is allowed, presumably should be fished. Normally fishermen will fish the size gear most efficient for the most abundant fish; i.e - if only few reds are present, most, if not all, fishermen will use larger mesh nets than those most efficient for reds.

2. Gill nets are very selective as to the size of the fish taken. The use of 8½" mesh on king salmon normally results in the majority of the catch being in the size range of from 32 to 38 inches. In the king salmon runs which have been observed or studied in Alaska, the range in size of returning adults is from 12 to 48 inches. The females being composed, normally, of two or possibly, in some cases, three age groups fall in their most abundant numbers into this harvested size range, 32 to 38 inches. The males, being composed of six or seven age groups, run throughout the total size range. Normally, of course, the most abundant size range of both males and females lies between 30 and 40 inches, with the peak number being between 34 and 36 inches. However, at all times there are abundant numbers of jacks from 12 to 28 inches in length. Sometimes, this segment of the run equals and at times outnumbers the normal adults. Due to the selectivity of the 8½" mesh, the male escapement is normally disproportionate to that of the females — on most spawning grounds observed, the males have far outnumbered the females. The jack component of the run is relatively non-productive as in most cases the larger males service the females, usually more than one. The larger males spend a considerable portion of their energy and time driving the jacks away from the nests. It would seem desirous to harvest more of the jacks, but under a regulation restricting mesh size to 8½" or larger this is impossible. Although lifting of this restriction would probably not mean a large change-over to smaller mesh size, it would undoubtedly mean some smaller mesh nets would be fished, thus harvesting more of the smaller size kings. This should be encouraged, not discouraged.

PART 103 - ARCTIC AREA

The 8½" requirement for gill nets should be dropped as explained in Part 102.

PART 104 - BRISTOL BAY AREA

The Commission cannot agree to a total closure of the Bristol Bay red salmon fishery under the present situation. Every effort should be made to allow a fishery for the benefit of the economy of the local residents. No sacrifices should be made by these people so as to benefit the Japanese high seas fishery, if still existent, in later years by the resulting escapements from a complete closure.

The Bristol Bay people depend upon the salmon fisheries almost entirely for their existence. They are not a mobile fleet which can move to other fishing areas. To shut off their income, even for one year, would be a disaster.

No opening or closing dates are needed for the Bristol Bay fishery. The present season, June 2 to August 30, is such that it prevents the harvesting of salmon which are present both before and after these dates. King salmon are present before June 2 and silver salmon after August 30. Although the present economics may be such that normally a fishery would not operate before or after these dates, there is no need to discourage any who might be interested.

Remove the mesh size requirements — over 8½" before June 24 and not less than 5½" June 23 to July 25. It would seem desirable to allow the fishermen to select their own mesh size, thus doing away with one more regulation that must be enforced. The reasons the 8½" minimum mesh size should be eliminated have been discussed under Part 102. There appears to be no good reason the 5½" minimum should be maintained, especially in the face of an expanding fishery for pinks which cannot be efficiently harvested with mesh this size.

PART 105 - ALASKA PENINSULA AREA

Remove the mesh size requirement (8½" or larger) in the North Central district.

PART 108 - KODIAK AREA

The Commission is in accord with a long continuous fishing season with shorter weekly fishing periods, and closures or extensions as warranted made by field annonuncement.

PART 109 - COOK INLET AREA

Eliminate the 8½" mesh size requirement on gill nets.

Cook Inlet has not been receiving an adequate king or red salmon escapement under the present fishing intensity. The Commission recommends two steps to help correct this situation

1. Hold the line on the present amount of set net gear in the area by closing all present trap sites to set net fishing
2. Make a more effective gear time table for the remaining types of gear — set and drift nets. This gear time table should be more restrictive as to the days fishing allowed per week with an equal amount of gear as stated in 1958.

The Commission is in full accord with the recommendations of the Fish and Wildlife Service for more strict control of personal use in Cook Inlet. The upper king salmon spawning areas on Deep Creek, Ninilchick River, Anchor River and Steriski Creek should definitely be closed.

PART 110 - RESURRECTION BAY

Remove the 5½" gill net restriction. There seems to be no biological basis for this regulation.

PART 111 - PRINCE WILLIAM SOUND AREA

The Commission believes, in the face of the low state of the odd year pink salmon cycle, a complete closure for Prince William Sound is in order. The Prince William Sound fleet, in the main, is quite mobile and is capable of moving to other fishing areas to take up part of the slack resulting from the removal of traps.

PART 115 - SOUTHEASTERN ALASKA AREA

The general fishing season for purse seines be from June 16 to October 10, with three days a week fishing. Closures or extensions should be made by field announcement as warranted. Included with this longer season should be more extensive closures in many of the bays, some of which are listed, to allow large enough schooling areas to insure adequate escapement. Only with a long season can catch and escapement be secured from all salmon species and the various races in each species.

The following bay closures are recommended:

Southern District:

1. Rudyerd Bay, all waters.
2. Smeaton Bay, east of a line from Pt. Trollop to Short Pt.
3. Boca de Quadra, all waters east of the longitude of Porpoise Pt.

North Behm Canal section of Clarence Strait District:

1. Traitors Cove, all waters.
2. Helm Bay, all waters.

Southwest section of Clarence Strait District:

1. Polk Inlet, all waters.
2. McKenzie Inlet, all waters.
3. Clover Bay, all waters.
4. Port Johnson, all waters.
5. Kendrick Arm, all waters of the West arm and adjacent cove, all waters of South Arm and Short Arm.
6. Nichols Bay, all waters.

The additional bay closure in the Southern District, Rudyerd Bay, Smeaton Bay and Boca de Quadra, are of prime importance. There has been a considerable decline in the early run of pinks which spawn in these areas during the past eight years. The odd year cycle is particularly weak and all possible help should be extended to bring it up to a healthy condition.

The closure of Nichols Bay, Port Johnson, and Helm Bay would offer greater protection to the local red salmon runs. These closures would be especially needed under an early opening as the Commission recommends.

The other recommended specific closures are deemed necessary because the pink and chum salmon are too vulnerable to the gear in these small, narrow areas.

Drum seines should be prohibited in Southeastern Alaska. Even though traps are eliminated now, the present purse seine and gill net gear is sufficient to harvest any runs that may develop. The existing fleet, in the main, has existed for some years on a low economic level due to the low status of the pink runs. A new form of gear should not be introduced at this time.

Larger fishing space should be permitted in the present gill net areas. The gill netters have been cooped up in small fishing zones. Now, with the efficient trap gear no longer in existence, it is time these gill net areas were enlarged, at least on a trial basis.

The opening dates for gill netting should generally stay the same as they have been for the past few years. It is doubtful if, at the present time, the king salmon stocks in the Taku and Stikine Rivers would be adequately harvested without these fisheries. Neither the present sport or troll fishery appear to be very intensive on these local river stocks. However, as the sport fishery increases and the troll fishery continues expanding above Lituya Bay, this may no longer hold true.

Remove the gill net mesh size requirement of: 1. Not less than 8½" prior to June 17 and, 2. Not greater than 6" from June 17 to July 19 on the Stikine and the not less than 5½" on Prince of Wales Island gill net area. The latter mesh size was set to prevent the catching of pinks, however, there appears to be no biological reason why the gill netters should not have as great an opportunity to take pinks as the seine fleet.

If a mesh size changes in the gill net fisheries are kept, have them fall on a Monday or week opening.

The Portland Canal outer gill net boundary during the entire season should extend from Cape Fox to Lord Rocks, thence south to the international boundary.

A mile either side of Tombstone Bay should be closed to all commercial fishing as at the present time, on many drifts part of the net enters the closed areas. Here fish are schooled, preparing to enter the river. The escapement in this river has been poor.

Remove the restriction on trolling during May in Stephens Passage

north of Midway Island and in Lynn Canal north of Point Retreat, and in all contiguous waters. During this month allow as many fishing days as is allowed the Taku gill net fleet. Both fisheries are operating on the same fish — mainly Taku River king salmon. There is no logical reason to close the troll fishery which takes the smaller portion of the catch in the local area. Both fisheries should be given an equal opportunity to take these fish.

Open the entire Stikine District to trolling on a year around basis. There is no established biological reason for the present closure.

Prohibit the commercial taking of herring spawn for export purposes until such a time as research shows the herring populations are at a high peak of abundance.

Prohibit the use of artificial light for the taking of herring until sufficient research data is accumulated to show what effect this may have on individual bay populations.

Otter trawls for shrimp fishing should be prohibited in the Stikine, Sumner strait, and Eastern Districts of Southeastern Alaska. A stable shrimp industry, pursued by beam trawls, has been in existence here for over 40 years. This industry is basic to the economy of Wrangell and Petersburg. The advent of the picking machine has already increased the intensity of the fishery. To add another unknown factor, a more efficient gear, to an already expanded fishery could very likely place this stabilized industry in jeopardy. Until such time as research indicates further exploiting of this resource is wise, let us leave the participating gear on a status quo basis.

Respectfully submitted by,

C. L. Anderson, Director for the Alaska Fish and Game Commission:

Arthur H. Hayr, Fairbanks, Chairman

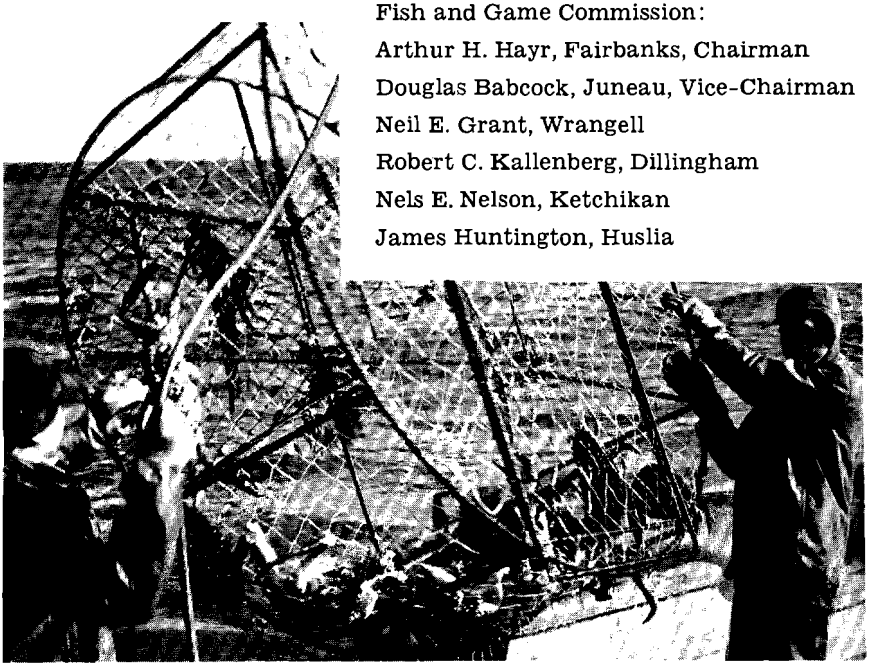
Douglas Babcock, Juneau, Vice-Chairman

Neil E. Grant, Wrangell

Robert C. Kallenberg, Dillingham

Nels E. Nelson, Ketchikan

James Huntington, Huslia



Lifting crabpot, Alitak Bay, Kodiak Island.

BIOLOGICAL RESEARCH

PERSONNEL

The Research Division lost one permanent staff member and acquired three during 1958. John Winther, resident in charge at the Kitoi Bay Research Station left in August to fulfill his military obligations. Dr. William Meehan joined the staff July 1, 1958 to take charge of the Kitoi Bay Research Station program. To assist him in operating the experimental hatchery at Kitoi, Mr. Sherman Marble from California joined the staff in October. Guy Powell joined the Department in March and took over the king crab research studies in Kodiak. Previous to this the king crab studies were temporarily under the charge of Roy Rickey, Management biologist at Kodiak. Dr. Ahron Gibor, with laboratory headquarters in Juneau and making use of Ketchikan and Kitoi hatchery facilities, continued his studies on lake productivity. Dr. William Smoker continued in charge of the Research Division. Robert Parker, a permanent staff biologist on educational leave at the University of British Columbia, returned to Alaska from May through September to work on red salmon studies at Kitoi and on troll salmon fatigue studies in Southeast Alaska. Dan Gittings continued in charge of the research library assisted by Judy Nelson during her summer vacation from the University of Alaska. Gary Finger continued in charge of the Taku River Investigations assisted by Douglas Blanchard. Jerry Rollog from Ketchikan was temporary aide at the Kitoi Research Station and with Charles McLinn of Kodiak assisted in both the Kitoi programs and the king crab program. Dr. and Mrs. Richard Dugdale, assisted by James Wallace and Patricia Erickson from the University of Kentucky on a National Science Research Grant, worked on watershed nutrient dynamics during the summer at the Kitoi Research Station. Richard Dugdale was on the department's research staff in 1956. Dr. Cass Lindsey, Donald McPhail and Donald Miller from the University of British Columbia, as guests of the Kitoi station, collected fish specimens during June for studies at the University of British Columbia.

Ahron Gibor and Guy Powell presented papers at the Alaska Science Conference in Fairbanks in early September on (1) the use of algae in closed water salmon egg incubation systems and (2) king crab research. Details of the papers will be published in the 1958 transactions of the Alaska Division of the American Association for the Advancement of Science.

Biographical Sketches

William R. Meehan was born in Buffalo, New York, in April 1931 where he received a B. A. degree in Biology from the University of Buffalo in 1952. He received his M. A. degree in Biology from the University of Oregon in 1955 after completing a research program concerned with the homing behavior of **Taricha granulosa,** the western rough-skinned newt. A Doctor of Philosophy degree was obtained from Michigan State University in 1958 with a major in Fisheries and Wildlife and minors in Aquatic Entomology and Geology. His Doctorate thesis was entitled "The Distribution and Growth of Fish in the Red Cedar Drainage in Relation to Habitat and Volume of Flow."

He spent two years with the U.S. Army Medical Corps during the Korean War as a corpsman and medical laboratory technician.

Dr. Meehan was employed by the Alaska Department of Fisheries at the Kitoi Bay Research Station near Kodiak during the summer of 1956 and became a permanent staff member in July 1958. While his primary studies have been concerned with salmon production, he has also been interested in such diversified fields as aquatic entomology, chlorophyll production of algae, and the behavior of bears.

Guy C. Powell was born in Ridgewood, New Jersey, April 3, 1933. He entered Rutgers University in 1951 and completed a four year course obtaining a Bachelor of Science degree in Wildlife conservation in 1955. After serving in the U.S. Army as a second lieutenant, Mr. Powell entered the Colorado University Game and Fish School and obtained his Masters degree in the spring of 1958. His Master's thesis was on Fisheries Research in Power Dams. Mr. Powell in the course of part-time summer work during his college years engaged in a lot of SCUBA diving activities which have been a great help in his king crab studies. His previous experience had been with the New Jersey Fish and Game Department at their fisheries laboratory at Milltown, New Jersey and at the New Jersey Oyster Research Laboratory in Port Noris, New Jersey.

Mr. Sherman Marble was born in Oklahoma, January 17, 1917. After completing high school and about four years of carpenter and welding schools, Mr. Marble became interested in fish and game work. He spent four years in the U. S. Navy during World War II. After employment in construction jobs he spent seven years with the California Fish and Game Department receiving excellent background and experience in fish hatchery work. He has been able to make valuable contributions to the operations of the Kitoi Research hatchery.

TAKU RIVER INVESTIGATIONS by Gary Finger

The Taku River investigations began in 1951 with the major emphasis placed on the study of the king salmon (**Oncorhynchus Tshawytscha**). Since 1952, additional data has also been collected on the spawning populations of the other four species of Pacific salmon, but are considered to be preliminary in nature and incidental to the king salmon program.

The Taku river is typical of the king salmon rivers in Southeastern Alaska by having its headwaters in Canada, being largely glacier fed, and having a spring run of kings. The turbid Taku River originates in the high plateau country of Northwestern British Columbia, with two separated clear water tributaries, the Nakina and Nahlin Rivers, and empties into Taku Inlet, an arm of Stevens Passage, located a few miles southeast of Juneau.

Although the clear water Nakina and Nahlin Rivers contribute less than one-fifth of the total discharge of approximately 2,500 cubic feet per second normal summer flow, they have been estimated by both bank and aerial counts to contribute the bulk of the spawning king salmon.

The major fishery on the Taku River salmon is provided by the gill net fleet that operates in the Taku Inlet. A troll fishery also exists on the silver salmon (**O. kisutch**) and to a lesser degree, due to increased fishing restrictions, on the king salmon.

Gill Net Fishery

No estimates of the total troll catch of Taku River salmon are available after 1955. The numbers of salmon caught by gill netting since 1945 are listed in Table I.

The overall catch was above average in 1958, with the best catch of kings since 1953. The king catch was the second highest on record since adequate statistics have been gathered. The pink salmon (**O. gorbuscha**) catch was also high with the best catch since 1951. The chum salmon (**O. keta**) catch was above average while the silver salmon catch was slightly below average. The red salmon (**O. nerka**) harvest was, however, the poorest since 1946 and far below average.

The king salmon gill net catch has been sampled each year to determine the age composition, length frequency, average weights, and sex ratios. Scale analysis has shown that the fishery is selective to the larger, older aged fish, with the catch composition largely restricted to the four and five year old fish (See Table II). Most of the two and three year old fish escape the fishery and as these age groups are composed of males almost exclusively, this results in a predominance of males on the spawning

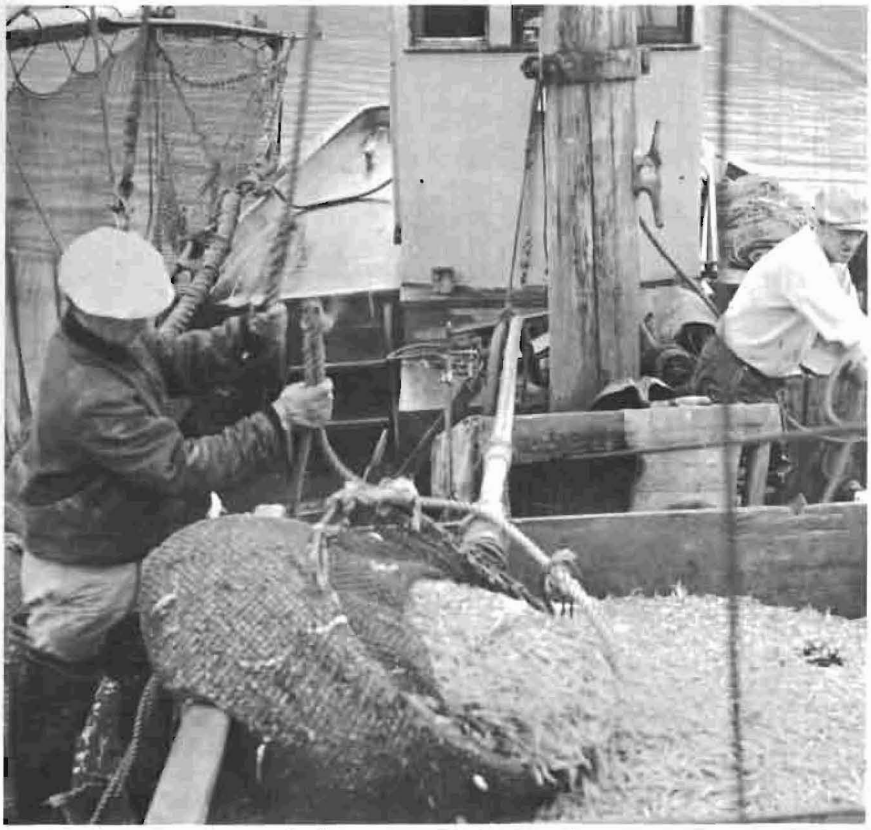
ground as shown by the sex ratio on the Nakina River spawning ground for the years 1956, 1957, and 1958 which were 1:5.55, 1:5.80, and 1:6.87 respectively.

The average weight of the fish sampled in the 1958 king gill net fishery varied from 20.22 to 24.32 pounds, with a season average of 21.71 pounds per fish.

The gill net fishery sex ratio was 1:1.06, with 495 males and 467 females sampled. This was not statistically a significant difference and it may be assumed that there is no evidence that the gill nets took a disproportionate number of males.

Fish Wheel Evaluation

An experimental fish wheel has been used to sample the escapement each year since 1953, with the aim of establishing "Index Counts" to enumerate the escapement of the various species of salmon at the time of the fishery. The fish wheel has been located at Canyon Island Research Station aproximately 17 miles from the river mouth. This sampling device appears to sample all species of salmon adequately, except for the king salmon, where the evidence shows that the wheel has been highly selective to the smaller fish.



Brailing shrimp from beam trawl.

TABLE I.

ANNUAL GILL NET CATCH OF TAKU RIVER SALMON

FOR THE YEARS 1945 - 1958*

YEAR	KINGS	REDS	SILVERS	PINKS	CHUMS
1945	4,263	13,300	25,710	3,699	11,920
1946	6,935	12,233	17,395	1,538	13,481
1947	3,932	24,875	19,393	14,609	5,780
1948	6,035	22,969	35,384	12,327	7,579
1949	6,473	33,565	21,014	17,622	10,271
1950	8,443	38,565	38,301	6,487	20,731
1951	9,792	63,687	27,540	75,027	7,582
1952	12,941	45,233	29,865	39,293	23,945
1953	16,766	51,570	20,502	6,914	18,504
1954	14,348	54,260	42,545	24,282	63,018
1955	10,686	28,765	40,470	16,129	15,352
1956	11,253	36,601	27,767	1,592	38,785
1957	8,482	27,226	27,491	6,633	82,726
1958	15,343	17,037	24,092	73,405	39,161
11 year average 1947 - 1957	9,923	38,847	30,025	20,992	26,570

*Records have been maintained by Fish and Wildlife Service since 1945. For catch estimates prior to 1945, see Alaska Department of Fisheries Annual Report for 1956, pp. 23-27.

TABLE II.

ESTIMATED GILL NET CATCHES OF TAKU KING SALMON BY AGE CLASSES FOR THE YEARS 1951 - 1958

YEAR	AGE CLASSES II	III	IV	V	VI	TOTAL
1951		10	1,680	7,890	210	9,790
Percent		.11	17.16	80.59	2.14	100.00
1952		1,160	5,010	6,440	330	12,940
Percent		8.96	38.72	49.77	2.55	100.00
1953		4.80	8,280	7,590	430	16,780
Percent		2.86	49.34	45.23	2.56	99.99
1954	109	1,435	3,191	9,306	295	14,335
Percent	.76	10.01	22.26	64.91	2.06	100.00
1955		811	4,336	5,203	336	10,685
Percent		7.59	40.58	48.69	3.14	100.00
1956*	.59	1,455	4,997	4,525	217	11,250
Percent	.52	12.94	44.40	40.21	1.92	99.99
1957		556	3,852	3,925	149	8,482
Percent		6.55	45.41	46.28	1.76	100.00
1958	61	1,887	8,097	5,114	184	15,343
Percent	.40	12.30	52.77	33.33	1.20	99.98

*Scale analysis during 1956-1958 was interpreted in a slightly different manner than in previous years.

As a check on the representativeness of the fish wheel sample for king salmon, all the kings captured at the fish wheel and the Nakina River spawning population were measured for a length frequency comparison. If the fish wheel displayed no size selection bias and the Nakina River spawners were representative of the Taku River kings as a whole, the length frequency of both samples should have displayed no significant differences. To assure a representative sample on the spawning grounds, a carcass weir (Figure 1) was constructed to capture all floating dead fish and the river was also patrolled for non-floating carcasses from a selected index area of approximately two miles of stream. A total of 5,552 fish were sampled in the two sampling areas (see Figure 2, Table III). A statistically significant average difference in length for all king salmon of 4.72 centimeters (1.86 inches) was obtained between the fish wheel sample and the spawning ground sample, with the fish wheel length frequency being smaller (See Table IV). This difference shows that for the year 1958, the fish wheel was more selective to the smaller fish and, as such, is a biased sampling device. The largest average difference occurred between the fewer, but larger sized, females where a 10.74 cm. (4.23 inches) difference was obtained. This size difference again points out that the fish wheel was not sampling the larger fish. The much more numerous, but smaller, males (size difference of 4.50 cms. or 1.77 inches) resulted in the overall combined sexes difference being reduced.

Gill net boat winding in a set.

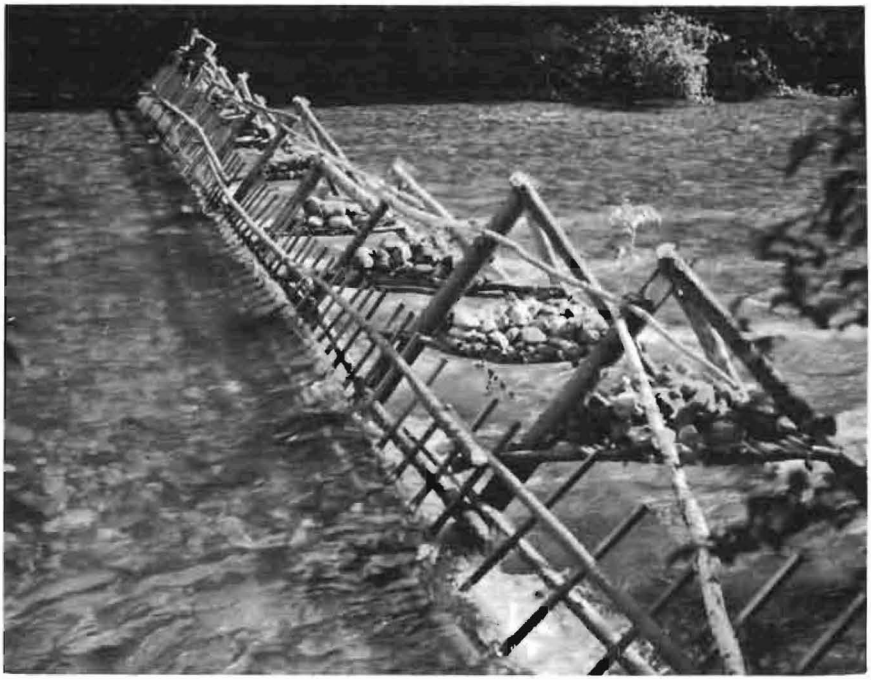


Figure 1. Weir on Nakina River installed to collect dead spawned-out king salmon.

Figure 2. Length and growth data taken from spawned-out king salmon at Nakina carcass weir.

TABLE III.

TAKU RIVER INVESTIGATIONS
FISH WHEEL CAPTURES*

SPECIES	KINGS	REDS	PINKS	SILVERS	CHUMS	TOTAL
Numbers Caught	488	258	2,811	187	1,300	5,044
Numbers Tagged	473**	241	1,024***	74****	599	2,411
Number recaptured	2	8	81	0	13	104
%Recaptured	0.42	3.32	7.91	0	2.17	4.31

*Wheel closed from July 23 to September 7.

**One tagged fish recovered in gill net fishery.

***Twelve tagged fish recovered in gill net fishery.

****Two tagged fish recovered in gill net fishery.

TABLE IV.

AVERAGE LENGTHS IN CENTIMETERS OF KING SALMON

SEX	Nakina River (Weir & Up-stream Count)	Fish Wheel (Canyon Island)	Average Length Difference	"T" Test Level of Significance*
Combined	59.48	54.76	4.72	.01
Male	55.29	50.79	4.50	.01
Female	88.28	77.54	10.74	.01

*A test for homogeneity of variance ("F" test) was non-significant, so the hypothesis of a common population variance could not be rejected; consequently the difference between the average lengths resulted from a true difference in average length in the two samples.

A further study undertaken was an attempt to evaluate the efficiency of catch of the fish wheel. Fish that were obtained by this gear were tagged and released approximately one half mile below the fish wheel and the per cent recaptured from this known release was used to calculate the success of the sampling of the adult escapement. Bias due to tagging and handling injury, dropping back out of the river and a possible learning factor (avoidance of the wheel on the second encounter) were not completely determined or considered in the analysis. Also, the numbers of tagged fish released at any one time, and therefore, the numbers available for recapture were not constant, due to the fluctuations in runs of fish. All of the above factors tend to minimize the final calculated percent capture. The following results were obtained (See Table V).

(1) The pink salmon displayed the largest percentage of recapture of all species (7.91%). They were also the most numerous as far as total catch and numbers tagged.

(2) Red salmon (3.32%) and chum salmon (2.17%) were the next species most easily recaptured, in that order.

(3) King salmon had a very low percentage recapture, (only 0.42%) and there were no recaptures with silver salmon. The latter, however, did not have sufficient releases to make any conclusions as to their susceptibility to being caught.

The above differences in the percentage of fish recaptured points out a wide range in behavior. Pink salmon seemed to be the easiest fish to catch in the fish wheel. These fish are also the smallest and poorest swimmers. The fish wheel was located along the left bank of the river and the easiest fish passage was probably along this bank. King salmon, the largest and probably the strongest swimmers, could have been selecting the middle portion of the river, and, therefore, avoided recapture. Reds and chums are probably in between the above two species in swimming performance. Other factors could have played a role in the failure of the fish wheel to recapture the king salmon, such as learning to avoid the wheel the second time, dropping out of the river after handling and tagging, and too few fish released at any one time (too few fish available for recapture at any one time). The evidence on the second factor, dropping downstream, appeared to be not too important with the king salmon, as recapture of tagged kings in the gill net fishery was extremely small (one fish).

An additional phase of the study was to determine the degree of mortality caused by the fish wheel capture, handling, and tagging by releasing the fish in a clear water slough where they were available for observation. Very little mortality was observed in these fish during their stay in the slough, which varied considerably in length of time.

The length of time between release of marked fish and recapture also varied considerably between species and water level (See Table VI). In general, the pinks took the longest period of time to swim the half mile back to the fish wheel (average of 93.20 hours). The king salmon displayed

TABLE V.

TIME BETWEEN RELEASE AND RECAPTURE IN HOURS

SPECIES	NUMBERS OF FISH	AVERAGE HOURS OUT	MAXIMUM HOURS OUT	MINIMUM HOURS OUT
KING	2	24.25	25	23½
RED	8	68.31	311	13½
PINK	80	93.20	625	5
SILVER	0	———	———	———
CHUM	13	32.04	73	8½

the shortest time interval before recapture, but as this result was based on only two fish, no definite conclusions can be drawn.

Block to Spawning Migrations on Silver Salmon River

One of the main red spawning grounds is in the Silver Salmon River System. This river is a tributary of the Nakina River, which it enters a half mile below the Nakina carcass weir location. The numbers of dead immature male and female sockeye salmon in late August were obtained, along with the Nakina king salmon data, and observed as to spawning condition at time of death. This was for the purpose of evaluating the fish passage facility constructed by this Department in 1957 (See Alaska Department of Fish and Game Annual Report for 1957, Page 29, for additional details).

A total of 2,328 dead "green" (incompletely developed secondary sex characteristics) sockeye salmon were obtained above the Nakina River weir. Slightly over half of these (1,366) were females. At the time of death the eggs were still immature and bound tightly in the mesovarium. This number represents only the fish which had dropped out of the Silver Salmon River and then ascended the Nakina. The numbers of sockeye that died unspawned in the Silver Salmon and those which dropped down the Nakina are not known. The over-all egg loss is considerable and could result in a "limiting factor", as far as the Silver Salmon sockeye race is concerned. This is especially true in a year when the run is small, as it happened to be in 1958 when a very low gill net catch was reported and only a few fish were caught by the fish wheel (See Table I).

The water in the Silver Salmon River was again low, as in 1956, and the fish could not surmount the block conditions successfully. The Department's partial weir succeeded in raising the water level in the lower pool, where the major block occurred in 1956, but the fish were still having difficulty getting over the first falls. It appears as if a major fishway is necessary to protect the Silver Salmon race from extreme environmental fluctuations, resulting in a serious block to adult spawning migrations.

KITOI BAY RESEARCH STATION by William R. Meehan

The Kitoi Bay Research Station, discussed thoroughly in previous annual reports, expanded its program and facilities in 1958. In addition to the continued investigations of Little Kitoi (formerly referred to as Lake Kitoi), Ruth, and Midarm Lakes, a similar study was initiated utilizing Upper and Lower Jennifer Lakes. The latter lakes, being deeper and having greater surface areas, are more typical of sockeye lakes in Alaska.

In addition to these studies, the basic productivity of the lakes concerned was investigated. Dr. Ahron Gibor studied the nutritional factors which might limit lake productivity by means of small floating ponds constructed from polyethylene. A University of Kentucky research team, under the supervision of Dr. R. C. Dugdale, studied the relationship of watershed slope to phosphorus and nitrogen concentrations in the waters of the study area, and in turn the effects of these nutrients on lake productivity. This study showed that the steeper the slope, the less the phos-

phorus content of the stream waters coming off from it and vice versa. This is probably due to the fact that on the steeper slopes there is less opportunity for leaching of the phosphorus from the surface layers of soil because of the more rapid run-off. On the other hand, nitrogen was found to be in greater concentrations in the waters originating on the steeper slopes. This may be due to the heavier growths of alders on the steeper slopes (alder roots fix nitrogen at a substantial rate).

A biology-chemistry laboratory was constructed and equipped in the hatchery building, and now makes possible much wider diversification of research activities. Also construction was begun on a new residence building which will greatly increase the living accommodations of the station.

PREDATOR - COMPETITOR STUDIES

Ruth - Midarm Lakes

The first group of 2-year old smolts was counted out of Ruth Lake and consisted of 8,641 fish or about 9.6% of the fry from the 1955 brood, planted in the spring of 1956. The holdovers may account in part for the decrease in migrant yearlings from the 1956 brood which was only about 14% as compared to 35% yearling migrants from the 1955 brood (Table VI). The number of 2-year old migrants from Midarm Lake was somewhat greater than the number of yearling migrants in 1957.

As in 1957, Midarm Lake was not replanted, and the entire 114,000 fry obtained from both Little Kitoi and Hugh Smith Lake in the Ketchikan area were planted in Ruth Lake. The plant was made by airplane from the hatchery at Kitoi Bay.

A cursory examination of periphyton growth and abundance of plankton in Ruth Lake showed that it is still more productive in this respect than either Midarm or Little Kitoi Lake, even though it's now three years since the lake was treated and the scrap fish killed. The periphyton study was modified this year in that glass rods 4 feet in length were suspended in series in the several study lakes, and the periphyton growth accumulated in this manner.

The 1958 sockeye smolt migration from Little Kitoi Lake (Table VII) differed from the three previous years in that a large number of the 2-year old migrants left the lake as early as May. Also, the average length of the smolts of all ages was considerably larger than those in 1956 and 1957, and was almost identical with the 1955 migrants. The total number of smolts in 1955 and 1958 is also comparable. This could possibly be evidence of a 4-year cycle production of red salmon in this lake.

In 1958, the peaks of the smolt migrations were spread over a month-long period in the three study lakes (Table VI).

The silver smolt migration in 1958 was decidedly smaller than in previous years, with both fry and fingerlings leaving the lake in fewer numbers (Table VIII).

TABLE VI. 1957 AND 1958 COUNTS OF SOCKEYE SMOLTS RECRUITED FROM 1955 AND 1956 BROODS.

LAKE	SURFACE ACRES	RECRUITMENT	SEAWARD YEARLING MIGRANTS (1957) (1958)	SEAWARD 2-YEAR OLD MIGRANTS (1958)	PEAK DAY OF DOWNSTREAM MIGRATION (1957) (1958)
Kitoi	90				
1955 Brood		2,000,000 eggs	20,000 (Approx.)	8,301	June 4
1956 Brood		515,000 eggs	18,627	———	June 8
Midarm	15				
1955 Brood		80,000 fry	1,142	1,720	June 7
1956 Brood		———	———	———	May 25
Ruth	47				
1955 Brood		90,000 fry	31,407	8,641	June 7
1956 Brood		66,000 fry	9,329	———	June 25

TABLE VI. (Cont.)

LAKE	Average fork length (1957) (1958) (mm)		Average weight (grams) (1957) (1958)		Approx. fish per surface acre (1957) (1958)	(lbs.) (1958)	Migrant yearlings as % of Recruitment (1957) (1958)	Migrant 2-year olds as % of Recruitment (1958)
	Yearling	2 year	Yearling	2 year	Yearling	2 year		
Kitoi								
1955 Brood	62	79	2.0	4.1	1.0	1.0	1.0	0.4
1956 Brood	72	———	3.1	———	1.5	———	3.6	———
Midarm								
1955 Brood	72	87	2.7	5.9	0.5	1.5	1.4	2.2
1956 Brood	———	———	———	———	———	———	———	———
Ruth								
1955 Brood	100	142	10.6	27.4	15.5	11.0	34.9	9.6
1956 Brood	112	———	13.6	———	6.0	———	14.1	———

TABLE VII.

RED SALMON SMOLT MIGRATION FROM LITTLE KITOI LAKE, 1955 - 1958

Number of Migrants (Average Fork Length)

YEAR	ONE OR LESS LAKE GROWING SEASON MAY MIGRATION	JUNE MIGRATION	TWO LAKE-GROWING SEASONS MAY MIGRATION	JUNE MIGRATION	TOTAL
1955	none	17,000 (73 mm)	———	12,000 (81 mm)	29,000 (76 mm)
1956	41,000 (39 mm)	9,000 (61 mm)	———	1,000 (72 mm)	51,000 (44 mm)
1957	1,200 (55 mm)	33,000 (63 mm)	———	2,800 (73 mm)	37,000 (64 mm)
1958	3,797 (76 mm)	14,830 (74 mm)	5,114 (78 mm)	3,187 (84 mm)	26,928 (78 mm)

TABLE VIII.

SILVER SALMON SMOLT MIGRATION FROM LAKE KITOI, 1955 - 1958

Number of Migrants

Year	Fingerlings	Fry	Total
1955	3,500	1,000	4,500
1956	3,450	1,350	4,800
1957	3,900	200	4,100
1958	1,645	183	1,828

To further study the effects of removal of predator and competing species on red salmon production in lakes, a Saltonstall-Kennedy contract was entered into with the U.S. Fish and Wildlife Service using Upper and Lower Jennifer Lakes as the study area. These lakes have surface acreages of 100 and 44 acres respectively, and are connected by a channel about 20 feet long and 3 feet wide. During the summer of 1958, a weir was constructed across this channel, and the waters of Upper Jennifer Lake confined to the lake basin. In late August, Upper Jennifer Lake was treated with rotenone to kill all scrap fish while Lower Jennifer Lake remained untouched to act as the control lake. About 800,000 sockeye salmon eggs were obtained from stocks on Afognak Island and placed in newly acquired Roberson trays for incubation and hatching. Because of the early spawning time of these runs (early August) and warmer water temperatures (55-60 degrees F.) the eggs developed rapidly and the fry were feeding by late November. A new technique in salmon rearing was tried in that the fry were transferred for rearing to plastic wading pools shortly after they hatched. At this time it appears that this method will be satisfactory providing that certain conditions are met, such as thorough washing of the pools to remove any toxic dyes before adding fry. The Jennifer Lakes will be planted in the spring of 1959 in accordance with their volumes.

Jennifer Lakes

In contrast to the 1957 season the adult red salmon returning to Little Kitoi Weir in 1958 were somewhat earlier in their arrival time than in previous years. The usual situation of a split run with a small peak in July and the main body in mid-August (described in previous Annual Reports) was repeated. Water conditions during the summer of 1958 were contrary to those of 1957, with heavy precipitation and associated high water flows.

Adults

During the 1958 season, 35 male and 37 female red salmon were placed in Little Kitoi Lake in a 40-foot deep net to ripen. The July segment of the crop was tagged so that a possible earlier spawning time could be detected. Several of the fish escaped from the net by jumping out before a mesh covering was installed; some of these were later seined on the spawning beach where additional eggs were taken for the hatchery. The fish held in the net all ripened, although somewhat later than the naturally-spawning group, and a very high survival rate to time of hatching (greater than 99%) was realized.

In conjunction with this experiment, 9 male and 6 female sockeyes were held in a small net in salt water. The males appeared to ripen satisfactorily, but the eggs of the females never ripened and were not released.

An interesting phenomenon of the 1958 red salmon run was the high percentage of jacks (Table IX, approximately two-thirds of the entire 1958 sockeye escapement).

The run of adult cohoes into Little Kitoi Lake was approximately the same as in previous years with all fish in apparent good condition.

The large number of Dolly Varden trout which entered Little Kitoi Lake in 1958 was the greatest in the years that the upstream weir has been in operation. The number and age composition of salmon smolts migrating seaward in 1959 may in part be influenced by this large number of Dollies.

KING CRAB RESEARCH by Guy C. Powell

The primary objective of the king crab program is to determine growth for all sizes of individuals with a correlating determination. Growth of the larger crabs is being determined primarily by tagging and recapturing, while growth of those too small for tagging is studied by using live boxes and an aquarium.

Other factors being studied and made possible with added minimum effort include: migration, molting, feeding, reproduction, mortality, commercial fishing intensity, experimental tagging, and maturity determinations.

Chiniak Bay has been selected as the study area for concentrating these research efforts. It is believed that the data obtained during this study will be applicable to other areas.

The history of the Kodiak tagging-recapture program is presented in Table X. Since the biologist depends upon the commercial fleet for tag returns, those crabs not desirable to the industry are avoided by the fishermen; consequently tagged females and small males are recaptured to a much lesser degree (Table XI).

Tagging

Table XI shows the number of crabs tagged from each size group and the percent recaptured. Larger crabs enter the fishery at a progressively higher rate up to size 6. Lower recapture figures for size 6 may indicate the small sample size or possible higher death rate for large old crabs (Figure 3).

The fishing fleet harvested 22 percent of the marketable sized tagged crabs. The total harvest for the 1958 fishing year, October - April, as determined by F.W.S. fish tickets, was 36,074; therefore, the population estimate for Chiniak Bay is 154,575 marketable crabs.

The standard loop tag with Peterson disc attached was utilized for the 1958 tagging operation. Considerable study has been conducted to determine the merit of tagging with dart tags. During field tests it was discovered that tagging is four times faster when using dart tags as well as less fatiguing. If dart tags are retained equally as well as loop tags, then it will be inevitable that loop tags will be replaced by the new dart type tags. Dart tags seem to be superior in every aspect.

Retention of dart tags through molting has not been determined; however, it is very satisfactory for all other periods. Crabs smaller than three inches in carapace width show a marked increase in shed tags. This poor tag retention by small crabs may be due largely to tag size.

Experiments prove that double-barbed dart tags are retained at a higher rate than single-barbed darts. Little death resulted from tagging.

TABLE IX.

NUMBER OF ADULT FISH ARRIVING AT THE KITOI WEIR, 1954 - 1958.

SOCKEYE

	1954	1955	1956	1957	1958
Males	864	806	158	125	97
Females	1,150	1,202	269	251	146
Not Sexed	——	——	19	——	8
Jacks	215	95	349	103	466
Total	2,229	2,103	795	479	717
Egg Take		500,000	130,000	60,000	65,000

COHO

	1954	1955	1956	1957	1958
Males	——	189	——	166	158
Females	——	88	——	145	171
Not Sexed	289	——	338	——	——
Jacks	——	15	29	29	33
Total	289	292	367	340	362
Egg Take	——	——	——	35,000	17,000

DOLLY VARDEN

	1954	1955	1956	1957	1958
Males	——	——	——	——	——
Females	——	——	——	——	——
Not Sexed	80	589	410	61	599
Jacks	——	——	——	——	——
Total	80	589	410	61	599
Egg Take	——	——	——	——	——

1957 adults (less jacks) 1.7% of 1955 smolts

1958 adults (less jacks) 1.4% of 1956 smolts

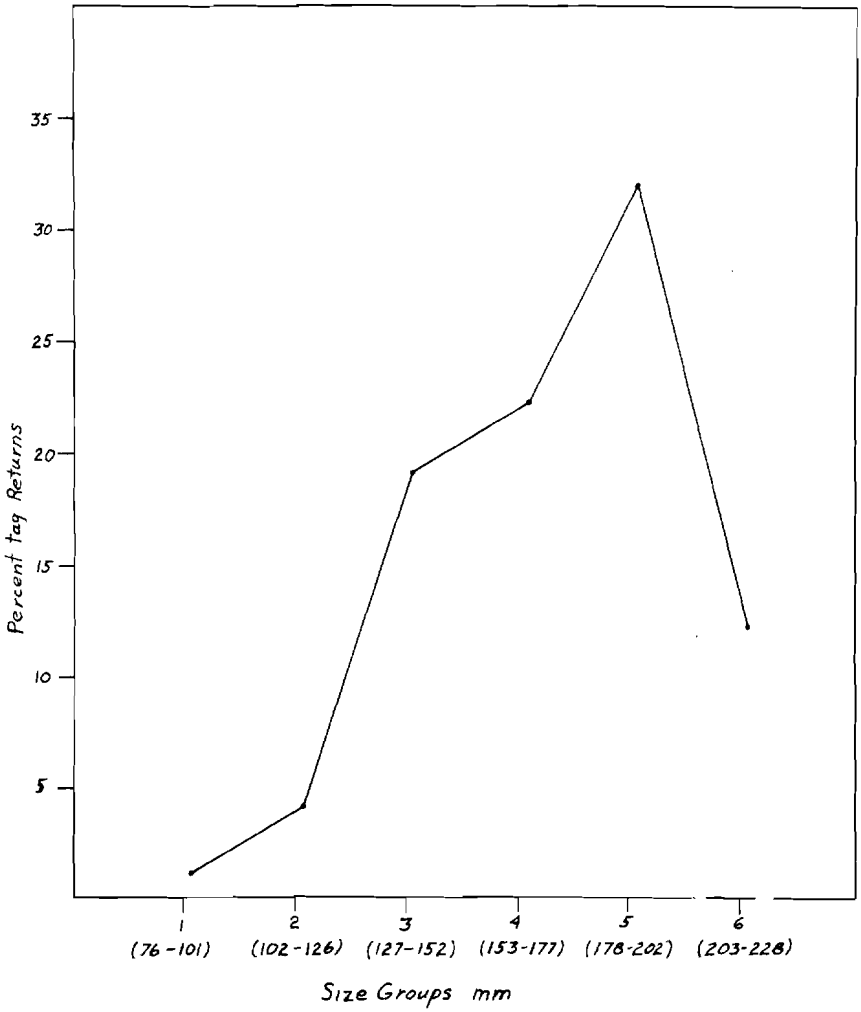


Figure 8. Percent tag returns entering the fishery for specific size groups, Chiniak Bay.

TABLE X.

TOTAL NUMBERS OF KING CRABS TAGGED (1954-1958) AND TOTAL RECAPTURED FROM EACH YEAR'S TAGGING

Year	Alitak Bay		Chiniak Bay		Marmot Bay		Pavlof Bay		Perenosa Bay	
	Total Tagged	Total Recaptured	Total Tagged	Total Recaptured	Total Tagged	Total Recaptured	Total Tagged	Total Recaptured	Total Tagged	Total Recaptured
1954	—*	—	107	2	—	—	—	—	—	—
	—**	—	25	—	—	—	—	—	—	—
1955	—	—	—	—	202	42	—	—	2	—
	—	—	10	—	768	114	—	—	2	—
1956	253	29	—	—	—	—	142	9	216	26
	141	1	—	—	—	—	28	—	83	11
1957	29	2	53	5	318	5	—	—	—	—
	163	—	5	—	—	—	—	—	—	—
1958	105	11	2467	281	—	5	—	—	—	—
	—	—	—	—	—	—	—	—	—	—
	691	43	2667	288	1288	161	170	9	303	37

* Male crabs
** Female crabs

TABLE XI.

TOTAL NUMBERS OF CRABS TAGGED AND PERCENT RETURNS FOR EACH SIZE GROUP DURING THE 1958 TAGGING AND RECAPTURE PROGRAM (MAY 26, 1958 - May 25, 1959)

Date of Tagging and Release	Size 1 76-101	Size 2 102-126	Size 3 127-152	Size 4 153-177	Size 5 178-202	Size 6 203-228
May 26, 1958 through	801	576	298	535	193	69
June 18, 1959	1%	4%	19%	22%	32%	12%

Under a contract entitled "Investigation of the Growth Rates of the King Crab in the Kodiak Area" entered upon with the United States Department of the Interior through the Fish and Wildlife Service and assisted by funds authorized by the Saltonstall-Kennedy Act, the Alaska Department of Fish and Game is conducting a research program to determine growth of king crabs.

Growth

A large number of tag returns representing all sizes of crabs is necessary for adequate reliable data from which conclusions may be made regarding king crab growth. Since the major tagging operation (Chiniak Bay) was conducted only recently, (Table X) a small percentage of the 281 tag returns has shown growth increases. The coming crab fishing season's harvest should produce many tagged crabs, contributing valuable growth data. Every one of the remaining 2379 tagged king crabs in Chinlak Bay that is recaptured will provide data, since all have been free for (at the very least) one year.

Only limited growth information is available from the 1954 - 1956 tagging. Few crabs were tagged and consequently few returns were obtained (Table X). Many of those returned had shown no growth and in many cases only the tag was returned.

The limited growth information is presented in Figure 2. The increase in carapace length is assumed to represent one molt, especially since none of the crabs had been free for more than one year. The three small crabs molted in live boxes; all others were tag returns. Crabs smaller than three inches in carapace width seem to be too small to tag successfully. Small crabs seem to do quite well in live boxes. Too few tagged crabs have been recaptured for any conclusive statements regarding growth. There are ten individuals plotted in Figure 4; at this time next year from 200 to 300 more tagged crabs are expected to be recovered, each one contributing to the total growth picture.

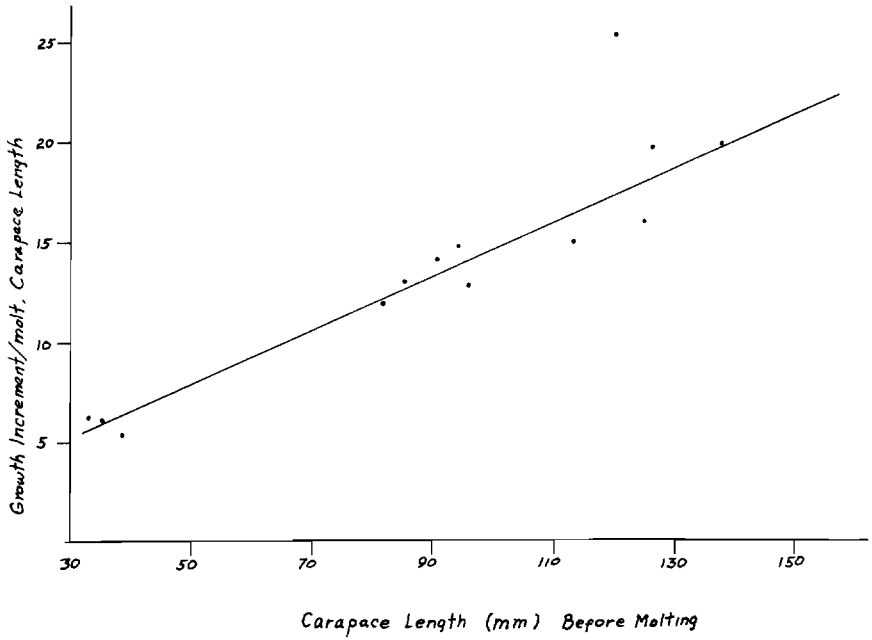


Figure 4. King Crab growth increment/molt (mm) for Chiniak Bay, 1958.

By selecting a certain four of these crabs which showed growth (carapace length, 81mm to 93 mm; 95mm to 110mm; 112mm to 127 mm; 127mm to 147mm) we see a growth rate from 81mm to 147mm representing four years growth. By tagging all sizes of crabs (Table XI) it should be possible to determine age and growth for king crabs within a short period of time. The growth expressed in inches is from 3-6/32 to 5-25/32 carapace length for four years growth.

Migration

The migration pattern during 1958 - 1959 of commercial sized king crabs within Chiniak Bay was determined entirely by tag returns. Crabs were tagged during May and June 1958 and all were released at the location marked X (Figure 5).

Biologists tagging king crab to determine migration pattern.

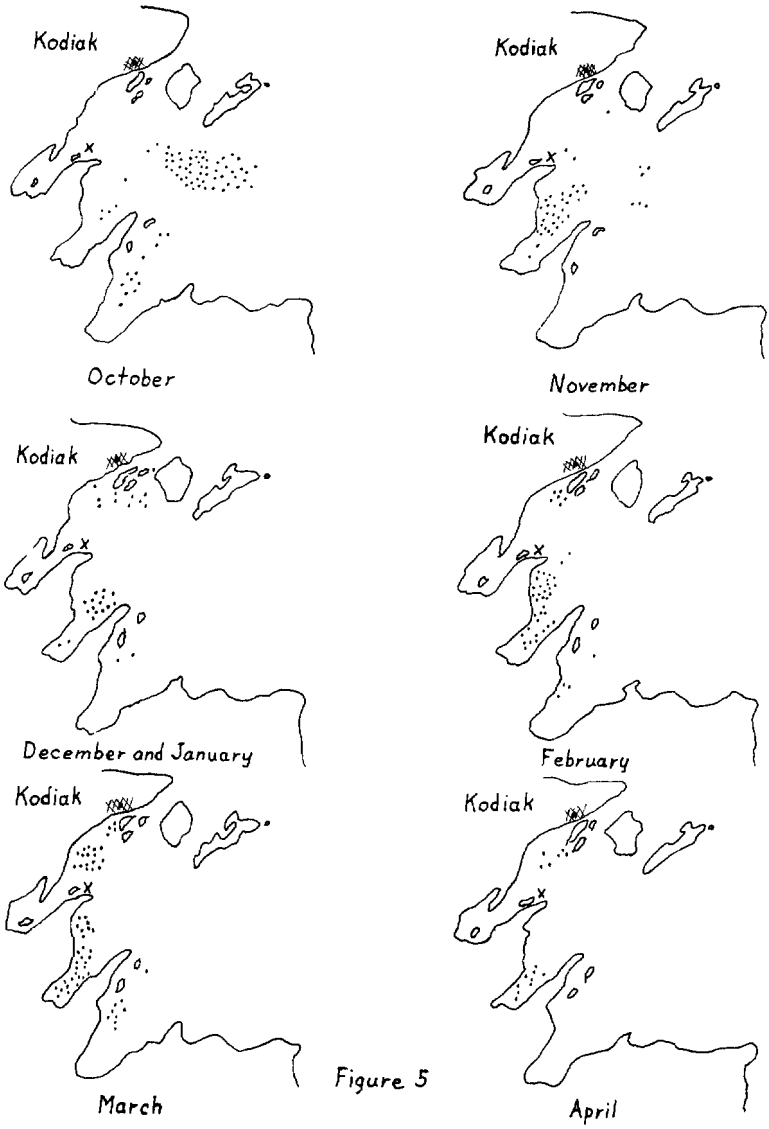


Figure 5. King crab migration pattern within Chiniak Bay, determined by returns of tagged crabs which are harvested by the commercial fleet from October, 1958 through April, 1959, a period of seven months.

Crabs moved from 80 - 100 fathoms into 50 - 60 fathoms as the month of October progressed. A definite movement into the bays (14-30 fathoms) occurred during early November. During the following five months (from December through April) the crabs remained in the shallow bays. The tagged crabs captured during February, March and April were all harvested from water depths of 5 to 15 fathoms.

Female Reproductive Size

A total of 3,468 female crabs were examined as they came aboard commercial fishing boats operating in Chiniak Bay. Two answers were being sought: (1) at what size do female crabs begin to successfully reproduce, and (2) has the selected harvest of male crabs by creating an off balanced sex ratio produced large numbers of unserviced mature females. If these females exist, they could be utilized in the harvest along with male crabs without lowering the reproductive potential of the bay.

The procedure for data collection was simple. Every female crab was examined for eggs; all large females with eggs and all small females without eggs were returned to the sea. All large crabs without eggs were returned to the sea. All large crabs without eggs and all small crabs with eggs were measured and the data recorded. All individuals around 115mm were not only examined for eggs but measured also. Carapace width and length measurements were taken.

The smallest female crab found bearing fertile eggs was 104mm, carapace width (Figure 6). The largest female crab without eggs was 138mm. There were only four individuals in 3,468 examined that were above 128mm and without eggs. The overlap zone which finds some females with eggs and some without eggs occurs in crabs between the sizes of 4½ and 5 inches. The data shows that a very high percentage of females do not reproduce until they reach a carapace width of 110mm, and a very high percentage do reproduce after attaining a carapace width of 118mm. The 8mm difference may represent the gap between two age groups.

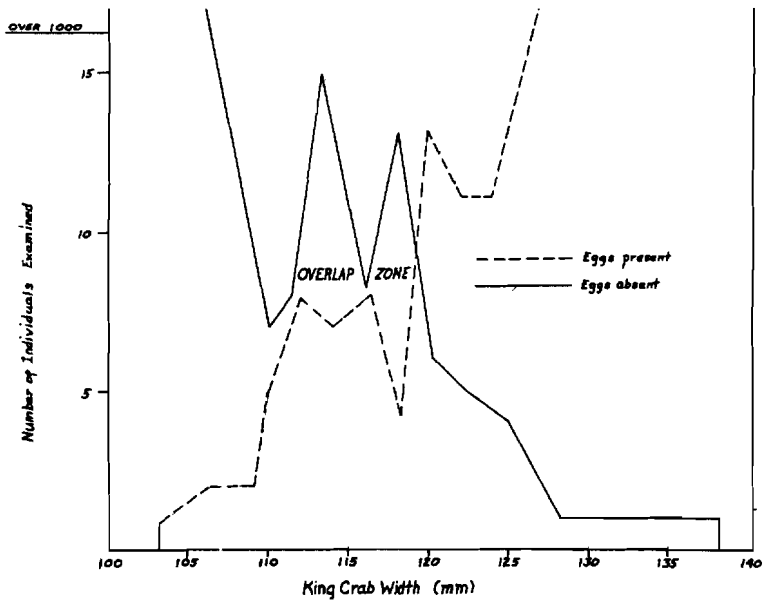


Figure 6. Carapace width (mm) of egg-bearing female King Crabs, Chiniak Bay, 1958-1959.

There is no indication that selective harvesting of male crabs produces a situation where there are not enough males to service the females. The absence from the fishery of large females without eggs further substantiates this. It could be that female crabs not serviced have a higher mortality rate than serviced ones, therefore not entering the fishery. Mortality rates of unserviced females are being investigated.

The peak molting period for legal males and mature females is shown in Figure 7. Mature females are considered as those carrying eggs.

Molting

It was rare to find an old carapace male below 160mm in width after the peak molting period had taken place. Large old carapace males were not uncommon after the molt, indicating that a high percent of all male crabs up to the carapace width of 160mm molt at least once per year. Those individuals molting less frequently enter the fishery as "old shell" after the molt has taken place.

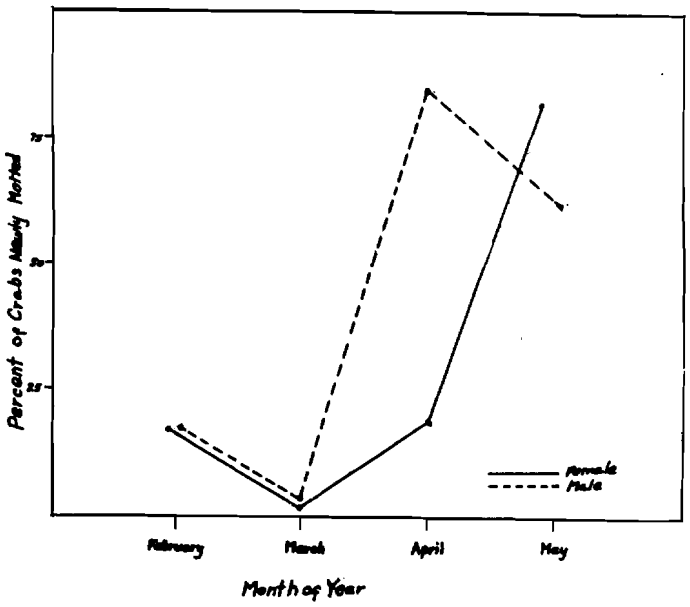


Figure 7. Month of the year molting occurs for legal male and mature female crabs, Chiniak Bay, 1959.

On February 14, 1959, thousands of small (2 inches carapace width) shed king crab exoskeletons were sighted and examined in the area of Marmot Bay, northwest of the village of Uzinki. The finding of these vast numbers of shed exoskeletons indicates a late winter bloom-type molt for small crabs. Male and female crabs of similar size molted in live boxes in June and July 1959, further indicating that molting frequency for these two-inch crabs may well be two or more times per year.

A great deal of time was devoted to a study of growth of legal males held captive in live boxes and in an aquarium. For some unknown reason not one male crab out of several hundred had molted; consequently, determining growth of legal males held captive was unsuccessful. Mature females, which were not under study, molted quite readily and easily, especially if captured just prior to or during the molting and reproduction period. All eggs had hatched and left the swimmeretts by April 15, 1959,

one month before the peak molting period. The ideal time to obtain females for molt and growth data is during this month, after the eggs have hatched and before the peak molt.

Considerable knowledge was gained by feeding those crabs held captive for growth studies. Since food consumption is closely related to growth, the captive crabs had to be fed and with little added effort observations were made on feeding.

Feeding

Food items fed and eaten by captive crabs include: sea urchins*, starfish*, clams of all types*, shrimp*, smelt*, rockfish (perch)*, turbot*, octopus, herring, sand fish, halibut, blenny, black cod, and sculpin (items seemingly preferred are indicated by an *). King crabs seem to be bottom scavengers utilizing many varied forms of recently killed flesh. The fact that crabs are readily captured in pots baited with everything from birds to seals indicates an attraction to all fresh meat.

Good evidence that the diet of crabs is influenced somewhat by their physiological state was obtained when newly-molted soft-shell crabs seemed to seek out sea urchins and starfish. Crabs feeding on these items were able to harden their soft shells much faster than individuals without this high calcium diet. The migration following molting and reproducton in large part might be a result of a food item required and sought by the crabs. During periods of poor fishing, the crabs may be grazing (as sheep do) upon the rocky areas abundant in starfish and sea urchins. Since rocky areas are difficult to fish and the crabs prefer baits not used by fishermen, few crabs are captured.

There was little evidence to prove that the chela act as crushing devices in gathering food. Clams were not readily accepted unless broken prior to feeding. All fish introduced to the aquarium in a natural condition were abandoned for those fish that were slashed open with a knife. Crabs were observed having difficulty eating fish not cut so that the underlying flesh was exposed. The chela were seen in use only as ripping and tearing appendages and in conveying food to the mouth.

None of the crabs had large voracious appetites. Often food would remain in the aquarium with small quantities eaten each day. Fifty to eighty crabs were constantly being observed in the acquarium.

SPECIAL STUDIES

Dr. Ahron Gibor, during the winter of 1958, conducted several simple experiments whereby he succeeded in incubating and hatching salmon eggs in dishes containing quiet, non-flowing water. He used varous combinations of salmon eggs and algae cultures wherein the algae provided oxyen for the eggs and removed the nitrogenous wastes. It is believed that this is the first time salmon eggs have been incubated and hatched in non-moving water. This may be an important first step in solving the problem of present day hatcheries which require large amounts of fresh, flowing, non-chlorinated water.

Robert Parker continued studies on fatigue effects of troll-caught salmon. It was demonstrated that feeding salmon in offshore salt water sustained much higher delayed mortalities from the severe exercising due to being caught on troll gear than salmon which have stopped feeding and are ascending fresh-water streams. It was noted that the silver salmon exercised severely at Canyon Island in the Taku River and then tagged and released were recovered in much greater proportion back down in salt water than silvers that had been tagged but had not been exercised.

A special study at the Kitoi Research Station conducted during the summer and fall of 1958 by Dr. William Meehan demonstrated that both male and female adult sockeye salmon could be successfully ripened for artificial spawning by holding them in a deep net suspended in the lake. Male adults from the same run held in nearby salt water ripened but females did not. The ovaries of the females became discolored and hardened and the eggs did not mature when held in salt water.

COMMERCIAL FISHERIES

When the 1949 Territorial Legislature created the Alaska Department of Fisheries, which has now grown to the Alaska Department of Fish and Game, one of the primary goals set by the Legislature for this Department was " . . . to overcome the present depleted condition of the salmon runs."

Vast watersheds suitable for salmon production, yet unused by salmon for various reasons, are found in many areas of Alaska. Since the inception of the Department this Division has concentrated on trying to bring such waters into salmon production.

The most successful project of this type has been establishment of a new run of red salmon into the previously barren Laura Lake system, described under the Kodiak section following. Work paralleling that of the Laura Lake project is progressing in other important drainages in the Kodiak, Ketchikan, and Wrangell-Petersburg Districts, and we fully expect to establish important new salmon runs in all of these areas within a few years.

Seven lakes in Southeastern Alaska have been "rehabilitated" this year; that is, fish life in them (mostly scrap fish) has been eliminated by chemical treatment, readying them for production of new runs of salmon.

Most of these lakes had natural or man-made blocks which prevented salmon from reaching them. This involves another important phase of work of the Division — that of locating such blocks, and through means of ladders or altering stream gradient making it possible for salmon to ascend these drainages to spawn.

A hatchery at Ketchikan, and egg taking and eyeing operations in the Kodiak District have been important in providing eyed eggs and salmon fry for planting in these formerly barren (of salmon) watersheds.

A new and extremely interesting possibility in this field is that of anesthetizing adult, ready-to-spawn salmon, packing them in ice, and flying them into new watersheds, as described in the Wrangell-Petersburg section of this report.

Aerial and ground surveys by foot and boat have been important activities of the Division this year as in the past. The survey made of the relatively unknown Stikine River system in the Wrangell-Petersburg District gives some indication of the kinds of important information that may be lacking on many watersheds.

The Stikine has a vast drainage. It is a major salmon producer. Yet this survey revealed for the first time some tributaries of this great stream that are not accessible to salmon; and other tributaries are probably not producing as many fish as they should.

A low dam on one tributary to conserve water for the dry season, and alteration of stream flow at a partial block on another tributary — both relatively minor projects — could conceivably increase salmon production of the Stikine noticeably.

Surveys of this type to find areas where present production can be increased, and to find and study barren but potentially productive salmon waters have been and will continue to be important activities in all Districts of this Division. An appreciable increase in present numbers of producing salmon streams and lakes for all of Alaska appears a practical and worthwhile goal.

One of the undeclared reasons for Alaska's Territorial Legislature establishing this Department was to have ready an Alaskan agency capable of assuming administration of Alaska's fisheries from the U.S. Fish and Wildlife Service in event of Statehood.

Statehood is a reality as this report is being written, though control of the resource will not change hands until the end of 1959. The Commercial Fisheries Division has had capable biologists working in key areas of Alaska for a number of years. These men, while concentrating on the above-described work, have also worked closely with the fisheries, escapements and other factors involved in management. They are now familiar with local fisheries and their problems. The knowledge these biologists have of their own specific Districts will be an extremely important factor during the first few critical years of State management of Alaska's fisheries.

The following reports on the progress of the Commercial Fisheries Division represent the combined efforts of the staff.

Walter Kirkness, Senior Biologist
Stanley D. Swanson, District Biologist, Ketchikan
Roy A. Rickey, District Biologist, Kodiak
Clarence A. Weberg, District Biologist, Homer
Charles H. Meacham, District Biologist, Wrangell
A. Dean Paddock, District Biologist, Dillingham
Lee Larsen, Fish Culturist, Ketchikan

KETCHIKAN

Activities in this District have become more varied each year. In 1958 emphasis was focused on attempts to build new runs of salmon. Non-productive lakes were treated to destroy fishes of no value with plans of putting them into salmon production, and fish were planted in waters which were previously so treated.

The Deer Mountain hatchery was operated, as usual, and silver, king and red salmon eggs were hatched, and fish released in various drainages.

Work was continued on stream survey projects, and an important fishway that will open new waters to salmon was nearly completed.

The improvement of lake systems for salmon production was continued in the Ketchikan area with the rehabilitation of four lakes. Three of the four lie in an interconnected system and have a common drainage into Tsa Cove in George Inlet, 22 miles by water from Ketchikan. These three lakes, though small in surface area, have considerable depth. (Table I).

TABLE I.

SURVEY DATA OF TSA COVE LAKES

Lake	Surface Area in Acres	Volume in Acre Feet	Max. Depth in Feet	Avg. Depth in Feet
Tsa Cove No. 1	40.6	1464.0	90	36.1
Tsa Cove No. 2	14.4	363.0	50	25.2
Tsa Cove No. 3	21.0	408.5	40	19.4

Lakes No. 1 and No. 2 are accessible to anadromous fish. A barrier falls in the stream between lakes No. 1 and No. 3 prevents fish from ascending to the upper lakes. Toxaphene was applied to the lakes during August in the following concentrations:

lake No. 1,—— .023 ppm
lake No. 2,—— .024 ppm
lake No. 3,—— .01 ppm

Lake No. 3 was treated August 9th and 10th. No immediate results upon fish life were observed on the 9th after a concentration of .005 ppm had been applied. On the morning of the 10th, before further application of toxaphene, a salmonoid of about 8 inches in length was seen feeding

on distressed sticklebacks. Inlet streams to the lake were treated after the lake concentration had been brought to .01 ppm.

On August 11th, U. S. Fish and Wildlife Service biologist Chester R. Mattson visited the lake and observed 2 dead and 48 distressed sticklebacks, 2 under 6" Dolly Varden trout in distress and one 7" Dolly Varden in apparent good condition. The smallest fish, regardless of species, are the most susceptible to this toxicant.

The lake was revisited during the third week of August and 5 Dolly Varden trout, seemingly healthy, were taken in a gill net. Sticklebacks in distress were seen on this survey. Live fish were seen in the main inlet stream of the lake, so all of the inlet streams were treated with rotenone and an apparent complete kill was obtained.

Lakes #1 and #2 were treated with toxaphene on August 22nd and 23rd. Rotenone was applied to all of the inlet streams of these two lakes on September 10th and 11th. The delayed action of the toxaphene made it impossible to determine if and when all of the fish were killed, as limited funds prevented keeping an observer at the lake through the fall. Mortality of cottids was noted in the main outlet stream and small numbers of cutthroat trout, Dolly Varden trout, sticklebacks and silver salmon fry were observed both dead and in distress. Further observations are planned for early 1959 to assess full effects of the chemical treatment. Plankton and temperature studies, initiated in the system prior to treatment, will be continued.

Lake Arrowhead, of 7 surface acreas, on the east corner of Revilla Island near Rudyerd Island, was treated with rotenone July 14th and 15th. Stickleback, Dolly Varden trout, cutthroat trout, cottids and silver salmon fry were present in the lake. A barrier falls in the outlet stream immediately below the lake prevents re-entry of sticklebacks and cottids. Planting of fish in this system is not planned. Rather, answers to the following are sought: 1. Will the cycle of silver salmon eliminated in the system be re-established through variation in time of return of adult fish of the same year class? 2. Will cutthroat and Dolly Varden trout re-establish themselves in the system? If so, how much time will elapse before significant numbers are present? 3. How much increase in natural production of salmon will result from the elimination of competitors and predators?

FISH PLANTING

Princess Lake, with a surface area of 22 acres and located on the east side of Revilla Island near Smeaton Island, was treated with rotenone in 1957 and found to be free of toxicity early in 1958. It was stocked with a combination of silver, sockeye and fall king salmon fry (Table II). The downstream migrants will be trapped as they leave the system in the spring of 1959. Numbers of each species, weight and length will be recorded ,and scale samples taken. This phase of the work will be done by the Biological Research Division of the Department.

Silver and king salmon fry are being reared to migrant size and allowed to leave at will from the Deer Mountain, Ketchikan, hatchery pond, as in previous years, to establish brood stock runs of these species for hatchery use.

SALMON RETURNS

Two hundred and twenty-eight marked adult silver salmon returned to the Ketchikan hatchery trap between July 14 and November 29. These fish originated from 13,700 eggs taken from 7 female cohos at Reflection Lake in October of 1955. Twelve thousand five hundred fingerlings were raised from these eggs. All were marked by removal of the adipose and left ventral fins prior to their migration in the spring of 1957. Two of these fish came back to the fishway and trap as 2 year jacks in the fall of 1957. Two adipose-left ventral fin marked silvers were taken and reported in the S. E. Alaska troll

Silver Salmon

fishery during the 1958 season. It is likely these fish were of Ketchikan hatchery origin.

Some of the marked adult silvers by-passed the fishway entrance in Ketchikan Creek, but later were not in evidence upstream. It was assumed they had returned to the fishway and ascended to the pool.

TABLE II.

FISH PLANTING, 1958, KETCHIKAN AREA

DATE	Species	No. per lb.	No. of Fish	Area planted
April 29	Sockeye Salmon	2900	90,000	Princes Lake
April 29	Silver Salmon	1550	45,000	Princes Lake
May 15	Silver Salmon	1450	30,450	Princes Lake
May 15	Silver Salmon	1600	14,550	Princes Lake
May 15	King Salmon	650	3,250	Princes Lake
June 2-3	King Salmon	332-415	83,000	Hatchery Pond
June 4-9	Silver Salmon	600-950	83,000	Smuggler's Cove Lk
July 30	Silver Salmon	160	11,000	Hatchery Pond
Sept. 2	Silver Salmon	114	3,500 (1)	Hatchery Pond
Sept. 15	Silver Salmon	78	2,500 (2)	Hatchery Pond

(1) Marked by removal of left ventral fin.
(2) Marked by removal of right ventral fin.

One hundred thirty-nine unmarked silver salmon entered the trap at the hatchery. This run began July 29 and continued until December 17. Some or all of these may have been 4-year-olds returning from the plant of Soos Creek origin fish made in Ketchikan Creek in January of 1956. Analysis of scales has not been sufficient as yet to establish whether this may be true.

Fall King Salmon

From 1955 through 1958, one complete four-year cycle, one hundred thousand fall-run king salmon eggs were received each year from the Washington State salmon hatchery at Soos Creek. These eggs were hatched at the Deer Mountain, Ketchikan, hatchery and the fish reared to migrant size in the hatchery pond. Migration of the fingerlings begins in August and continues through to the following May. In 1957, one two-year jack returned to the trap. In the fall of 1958, eighty 3-year-old jacks came back. These fish ranged in size from 2.5 to 10.5 lbs. One fish bore a hook mark of recent origin; probably it had been incurred within two weeks of its entry into the trap. This run started on September 18 and continued through October 28.

If a run of sufficient size develops, other streams of the area will be stocked.

Salmon Egg Take

A total of 430,000 sockeye eggs was taken at Buschman Creek, tributary to Hugh Smith Lake, during the first three days of October. In addition, 284,000 silver salmon eggs were taken from fish returning to the hatchery trap. The eggs will be incubated at the hatchery and the fry fed for at least 30 days before planting. Some of the silver and sockeye fry will be used for stocking lakes in the Wrangell-Petersburg area which were rehabilitated in 1958. Some of

the sockeye fry will be planted in the Bakewell system, while the remainder of the silver and sockeye fry will be stocked in rehabilitated lakes of the Ketchikan area, except for 20,000 silvers which will be reared to migrant size at the hatchery to perpetuate the brood stock run.

Stream Surveys

Numerous aerial, skiff and foot surveys were conducted on salmon streams of the Ketchikan District. Pink escapements in the early run streams were comparable to the fair escapements of the parent year, 1956, with the exception of the Martin River which had a big return.

Middle run streams had equal or better returns over the parent year, but the late run streams suffered a drastic reduction from the escapement of 1956. An unusual feature of the pink salmon run in the Ketchikan District was the exceptionally large size of the fish returning to some of the streams.

Bakewell Fishway

A major part of construction of the Bakewell fishway was completed in 1958. Completion date is set for July 10, 1959, which should be in time to permit returning sockeyes to ascend to the lake. The fishway will provide access for salmon to a lake having a surface area of 742 acres. Detailed description of this system has appeared in previous annual reports. Table III lists the egg and fry plants which have been made in this system.

TABLE III.

SALMON EGG AND FRY PLANTS MADE IN BAKEWELL LAKE

YEAR	Species	Green Eggs	Eyed Eggs	Fry
1954	Sockeye	100,000	200,000	
1955	Sockeye			49,700
1955	Silvers			86,000
1956	Sockeye			301,200
1957	Sockeye	525,000		
1958	Sockeye			11,500

WRANGELL-PETERSBURG DISTRICT

Work in this District remained largely exploratory. Major effort was focused on salmon, though attention was given to shrimp, herring, and sport fisheries during their respective peak periods. Several stream improvement and lake rehabilitation projects designed to improve salmon production in the District were initiated.

STIKINE RIVER EXPLORATION

The Stikine River investigation started in 1955 was continued during 1958. Preliminary reports of this program appear in the Department's Annual Reports of 1955, 1956 and 1957.

Surveys were continued for the fourth consecutive year in British Columbia on the Tahltan River and were begun on the Chutine and Iskut Rivers, the two remaining unexplored large tributaries to the Stikine.

Tahltan River, B. C. one of the larger tributaries of the Stikine River system, flows 40 miles from Tahltan Lake to join the Stikine River at the Indian fishing village of Tahltan, 167 miles from saltwater.

The Tahltan is believed to be the largest single contributor of king and red salmon on the Stikine system. Observations made on the spawning grounds of the Tahltan River system during the summer of 1958 further bear out our findings of 1956 and 1957; that is, a large loss in the Tahlton red salmon run occurs annually, due primarily to a partial block existing in the main river about 20 miles below Tahltan Lake. (See Annual Reports for 1956 and 1957).

Tahltan River, B. C.

Not only does this obstruction block a large portion of the red salmon run; but it causes a critical delay to that portion of the run which successfully ascends the obstruction and many are unable to reach their spawning grounds in Tahltan Lake due to lack of water.

Unusually low rain and snow fall in winter 1957-58 coupled with high summer temperature in this section of interior British Columbia caused a very serious low water condition during July and August, the time mature red salmon normally enter Tahltan Lake. On August 12th, the outlet of Tahltan Lake was dry (Figure 1) and for a distance of two miles below the lake, Tahltan Creek contained dead or dying salmon. Quarter mile stretches in the outlet stream were absolutely dry of surface water. Scattered pools contained dying red salmon while 2,000 dead unspawned red salmon were counted in the dry creek bed (Figure 2). A similar but less serious condition also occurred during August of 1957.

Typical Alaskan salmon cannery.

Figure 1. Condition of Tahltan Lake outlet in low water year.

Figure 2. Three quarters of a mile below Tahlton Lake.
Note drying creek and dead unspawned red salmon.

As a first step in remedial work, installation of a 3-foot flow-maintenance dam at the outlet of Tahltan Lake is planned for the spring of 1959 to assure sufficient flow during salmon migration even in the driest years.

The annual count of king salmon spawning in Little Tahltan River was made for the third consecutive year and showed the 1958 king salmon escapement into this tributary to be the highest in the three year period.

Chutine River, B. C.

Chutine River, B. C., one of the largest tributaries of the Stikine River flows 35 miles from glacial Chutine Lake to join the Stikine some 125 miles from saltwater (Figure 3). Despite the Chutine's colloquial name of "Clearwater", the river is glacial from spring runoff to fall freeze-up.

Figure 3. Small river boat on Chutine Lake used to survey Chutine River.

The Chutine River system is known to support a run of king and silver salmon, though the magnitude of the run is unknown. During August, in an attempt to determine the size of the runs and location of their spawning grounds, an initial survey was made of the Chutine River and its tributaries. A small river scow with an outboard motor was used to survey the river to Chutine Lake.

Chutine River flows from a glacial lake down a "U" shaped valley. The wide river bed is composed almost entirely of shifting gravel bars typical of glacial streams. The upper four miles of the river is a stretch of treacherous white, boulder-strewn waters. Adding to the Chutine's glacial conditions are four large glacial tributaries: Dirst, Triumph and Pendant Creeks entering from the south; and Berrington River, the largest tributary, entering from the north.

It was impossible to see live salmon in the glacial water of Chutine River and its tributaries. Only two dead king salmon and one dead chum salmon were found. Both black and grizzly bear activity is high in this remote area, their feasting on dead salmon leaves few to be observed.

Methods other than visual observation will have to be developed in order to arrive at an accurate estimate of the salmon spawning population of the Chutine River System.

Iskut River, B. C.

Iskut River, B. C., the largest single tributary of the Stikine River system, heads in a chain of lakes on the central plateau of British Columbia and flows over 100 miles before joining the Stikine 35 miles above saltwater. The Iskut, a clear water river at its headwaters, becomes a heavily silt-laden glacial river within its first 10 miles. Two extensive blocks 40 and 100 miles up the Iskut render the clear headwater lakes and streams inaccessible to salmon.

During late fall and early winter silver salmon use portions of the lower Iskut drainage for spawning, particularly Craig River or South Fork of the Iskut. In an attempt to learn of these spawning grounds, a reconnaissance trip was made by river scow as far as the first obstruction, and side trips were made of the navigable tributaries, including Craig River.

The Iskut River and its tributaries revealed few of their secrets due to their glacial condition. As in the case of the Chutine River, methods other than visual observation will have to be employed on these large glacial streams in order to arrive at a reliable escapement figure.

COASTAL ACTIVITIES

Exploration

Exploratory coastal surveys were continued during 1958 to add to the catalogue of information on salmon producing and non-producing waters within the District, to locate barriers to salmon migration, to seek out lakes with potential great enough to justify lake rehabilitation, and to locate a source of brood stock for introduction into barren or rehabilitated waters.

Mainland stream surveys extended from Mill Creek, 12 miles from Wrangell to Windham Bay, a shore line distance of approximately 250 miles, thus completing the initial survey of the District's 400 mile mainland coastline. Figures 4, 5 and 6 depict typical blocks to salmon migration existing in most of these coastal streams.

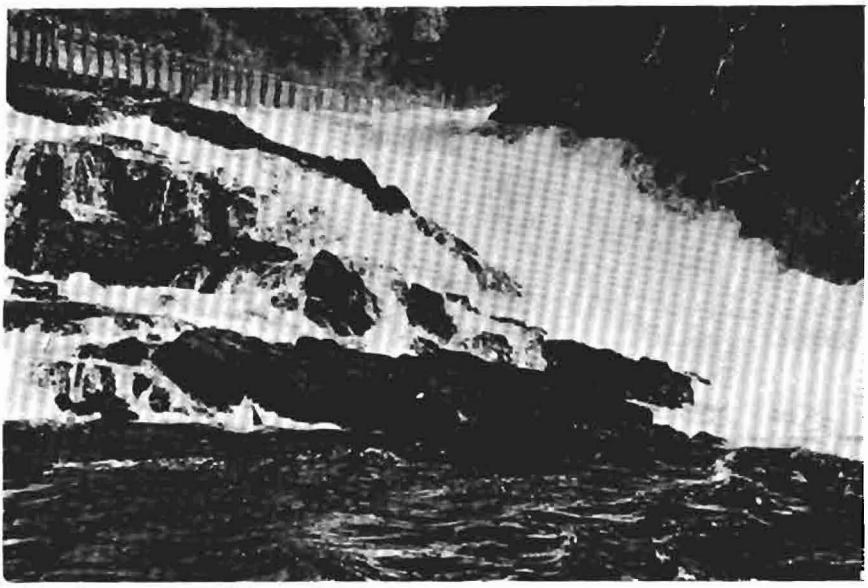


Figure 4. Mill Creek Falls at half-tide. The lake of 670 acres is .7 mile from this fall.

Figure 5. Crittenden Creek Falls, above which are six miles of excellent spawning and rearing areas.

Figure 6. Falls on stream in North Arm of Farragut Bay, ⅓ mile from salt water.

Lake rehabilitation projects were begun on Harvey Lake, Woewodski Island, and on June, Sand, Hill and Crane Lakes, Mitkof Island.

Lake Rehabilitation

Harvey Lake, Woewodski Island, a 173 acre lake located ½ mile from saltwater, has been blocked to anadromous fish by a 7-foot log dam since the gold rush days of Alaska. By blasting out the dam, this system has been reopened to anadromous fish. Figure 7 illustrates the dam intact; Figure 8 shows the channel after blasting.

June, Sand, Hill and Crane lakes, Mitkof Island, were selected as a site for rearing silver and red salmon under various environmental conditions. Though these four lakes lies in close proximity, they represent three separate drainages. Two of the drainages, Sand Lake drainage and Hill and Crane Lake drainage, have open access to the ocean and presently support populations of Dolly Varden and cutthroat trout, stickleback and sculpin. though in past years both of these drainages produced runs of silver salmon. The third drainage, June Lake drainage, supports the only populations of Dolly Varden and cutthroat trout, stickleback and sculpin, Anadromous fish are blocked from this drainage by a cascade 1/3 mile above salt water.

During the last week in August these three drainages were chemically treated with toxaphene (chlorinated camphene) to eradicate all existing fish life. Physical features of these lakes and the concentration of toxaphene used appear in Table IV.

Figure 7. Seven-foot dam blocking access to 173-acre Harvey Lake.

Figure 8. Channel in Harvey Lake outlet after blasting dam.

TABLE IV.
PHYSICAL FEATURES OF JUNE, SAND, HILL & CRANE LAKES, MITKOF ISLAND

	Surface Acres	Volume Acre Feet	Depth in Feet			Surface Temp.	p.p.m. Toxaphene
			Maximum	Average	Median		
June Lake	63.7	1,054	33	16.5	14.2	59°F.	.006
Sand Lake	41.5	521	25	12.6	10.0	60°F.	.01
Hill Lake	8.5	72	17	9.6	8.2	62°F.	.012
Crane Lake	29.5	800	44	27.0	29.8	62°F.	.006

Silver and red salmon fry will be planted in these four rehabilitated lakes in the spring of 1959. Growth rate and survival will be studied in an effort to determine the effect of predator and competitor fish upon silver and red salmon fry. The rate of reinfestation in the two open drainages by predator and competitor fish from estuarian waters will be watched closely.

It has been demonstrated that runs of salmon can be established or re-established by use of hatcheries or by salmon egg plants in gravel. In many instances however, these methods are not feasible due to logistics involved, and lack of hatchery facilities and manpower.

A New Management Tool?

In an effort to provide an additional method of establishing salmon runs, it was conceived to transport fully mature salmon by air to the desired location where the salmon could then spawn naturally. As a preliminary step in perfecting this technique, fully gravid silver salmon were anesthetized with M. S. 222 (tricaine Methanesulfonate) and packed and held in crushed ice for varying periods of time, up to one hour, before being returned to the water to revive. The revived salmon were placed

in a holding pen for further observation. Results were so encouraging that it is planned during the fall of 1959 to carry this experiment to an actual salmon plant. If successful, this techinique will add a new and useful tool to salmon management.

KODIAK DISTRICT

The Pauls Lake System project, initiated in 1951, may now be considered successful. In June, 1958, a run of 7400 red salmon ascended the Laura Lake system — and utilized spawning grounds that previous to the project could not be reached by salmon.

The Pauls Lake drainage on Afognak Island (see previous annual reports), formerly had a series of falls and cataracts that blocked salmon from 555-acre Laura Lake and 83-acre Gretchen Lake, as well as valuable tributary streams to these lakes.

In 1951 red salmon eggs were planted above the falls. In 1952 fishways were constructed and more red salmon eggs planted. Eggs were planted from 1953 through 1955.

Returns of adult red salmon in 1955 (the first salmon ever to reach Laura Lake), 1956 and 1957 from the egg plants made in 1951, 1952 and 1953 fluctuated between 200 and 500 adult fish yearly. The annual planting ranged from 210,000 to 450,000 eggs.

Finally, during the last week in June of this year, the run of 7,400 adult reds ascended to Laura Lake, a return on the 1954 plant of 450,000 eggs.

Scale samples revealed that these fish returned in their fourth year of life, having migrated to sea in their second year (4-2's). An estimated 6 percent of the run consisted of jacks returning in their third year (3-2's). Jacks are precociously mature males returning in to spawn one year earlier than the rest of their age group.

Survival of adults was approximately 1.52 per cent of the eggs stocked in 1954 in Gretchen Creek, the main tributary to Laura Lake. These eggs were taken from 257 female and 191 male spawning red salmon in the Penenosa (Portage Lake) watershed and incubated in an eyeing station for approximately 30 days before planting.

The Laura Creek fishway proved itself adequate by accomodating a large number of ascending salmon in a brief period — an estimated 5,000 reds attempted to climb it an one time. Jack salmon, though much smaller than normal-sized red adults, exhibited the surprising ability to jump each of the steps the first try.

Two steps of the seven steps and pools slowed migration somewhat, and these two parts of the fishway will be modified as time and money permit. Few mortalities occurred because of this slight fault in design, however, and the run eventually moved upstream to Laura Lake.

The fish lay in Laura Lake until the first week in August when they started their spawning run up Gretchen Creek.

One half mile up this stream is the site of a fishway installed in 1952; however it was removed by high water and ice during winter 1952-53.

Some of the eyed eggs stocked in 1954 were planted upstream from the washed-out fishway, so some of the returning fish were expected to attempt negotiation of the block.

Because of this two 10-foot sections of a modified Deneil type fishway were temporarily installed at the old ladder site. The contour of ground at this point would accomodate but 20 feet of fish pass, and it was feared that a satisfactory structure could not be erected. This was because the fish were ripe and ready to spawn, and much weaker than fish fresh from salt water that fishways are normally designed for. Figures 9 and 10 illustrate this fishway.

Figure 9. Upstream view of fishway installed in Gretchen Creek.

The elevation from the pool below the block to the pool above is six feet. The theoretical maximum gradient the Denil type fish pass is functional at is one foot of rise to ten feet of lateral distance. In this case it was decided to try a gradient of two feet in ten, which was done by suspending the lower end of the pass in the lower pool from a log felled across the pool until the bottom of the pass was level with the pool surface.

Next a log and board dam was erected at the lower end of the lower pool so as to raise the water sufficiently to submerge the end of the fishway. The flow from the fishway created an attraction for the salmon, which is usually a major problem in fishway installation.

In the upper pool a diversion dam was constructed that changed the flow of water so as to run out of its normal channel and enter the lower pool from the side in a thin film over a rock wall. The upper end of the fishway was put into position in the rock cut of the original ladder, which put it about two feet below and at a 90° angle to the diversion dam. A temporary dam or dike was built around the upstream end of the fish pass so that sufficient water would flow through the pass. Because of the gradient of four feet of rise in twenty of lateral distance, the upper end had to be completely submerged so that the lower part of the fish pass would operate.

At the time of installation fifteen adults were attempting to leap the block, and approximately fifty more were immediately below them. Water was high at the time. The morning following installation 37 red salmon were observed to ascend the fishway.

From 60 to 160 red salmon were observed spawning in upper Gretchen over a period of three weeks. An estimated 800 passed through the fishway and spawned upstream.

A permanent fishway will be installed at this point, with the successful experience of the past year as a guide. This will make available upwards of two miles of good spawning gravel in upper Gretchen Creek.

It was obvious that some productivity would be lost in the half mile of spawning area below the fishway to the lake. Several thousand red salmon were using the area for egg deposition at one time under relatively high water conditions. Some of the nests or redds would undoubtedly have gone dry when the stream fell to its normal level for August. In addition, many others in the shallow areas, particularly along the stream banks, would have gone dry or frozen during the winter low flow period.

For this reason approximately 100,000 eggs were taken from these fish, artificially fertilized, and transferred to the Kitoi Bay Research Station to be used for research.

Since 1951, as work on the Pauls Basin project progressed, many techniques were altered. One in particular was the method of stocking eyed eggs in gravel of streams (See Annual Reports for 1951 and 1955). Much valuable information has been learned that will be useful in other areas where non-producing yet fertile lake systems will be put into salmon production by constructing fish passes over waterfall blocks. In an economic sense the returns on this project have been high. It is believed that in the future a sustained annual catch of 10,000 red salmon, with an escapement of 7,000 is a logical goal for this watershed.

Likewise an annual silver salmon catch of 5,000 with an escapement of 5,000 would appear to be a reasonable goal for the Pauls Basin drainage.

Frazer Lake

Frazer Lake, of about 5,000 surface acres, lies on the southern end of Kodiak Island near the famed red-salmon-producing Karluk Lake. Its outlet, which drains into Olga Bay, has a 31-foot falls impassable to salmon.

From 1951 through 1956 the Department planted red salmon eggs above the falls in this drainage. Returns from these eggs have been en-

couraging, though not spectacular. A fishway is planned for the impassable falls, which is the only impediment to salmon in the drainage.

Once opened to salmon the six tributary streams to the lake have a potential spawning area of over half a million square feet and about one-third of the lake shore has beaches suitable for spawning.

In 1958 an adult salmon weir was erected below Frazer Falls for the third consecutive year in order to sample the returning red salmon as to age and numbers. Between June 12th and July 11th, 76 reds entered the trap. A scale sample and length measurements were taken from each fish. All of the fish were carried above the falls and released so they could complete their spawning run. Analysis of the scale samples revealed the following age composition:

4-2's (in their 4th year, having gone to sea in their 2nd year) — 5.3%
5-2's (in their 5th year, having gone to sea in their 2nd year) — 29.0%
5-3's (in their 5th year, having gone to sea in their 3rd year) — 26.3%
6-3's (in their 6th year, having gone to sea in their 3rd year) — 39.4%

Tributary streams of the Frazer were not stocked with eyed eggs this year because of adverse conditions at the previously used eyeing station in Olga Bay. Instead 42 live, ripe, red salmon (30 females, 12 males) that were preparing to spawn in East Creek of Red Lake, a drainage adjacent to Frazer, were flown to Midway Creek, a tributary stream of Frazer Lake.

A 15-gallon steel drum was installed in the passenger space of a Piper Supercub. Four one-pound blocks of ice were put in the drum with about 10 gallons of water. This brought temperature down to 41° F., which made the salmon somewhat sluggish and easier to handle when unloading.

Eight to ten salmon, seined from East Creek, were added to the drum, the remaining space filled with water, and the lid tightly fastened. The plane left immediately and at the end of a five minute flight the fish were removed from the drum by hand and released in Midway Creek.

Temperature difference between the two streams was but 0.5°F; from 48°F. in East Creek to 47.5°F. in Midway Creek.

The transplanting was apparently acceptable to the salmon, as later surveys revealed that all the females had spawned but one that was injured in the move. It is assumed that there were sufficient males to adequately fertilize the eggs.

Commercial shrimp fishing and processing became a reality in Kodiak during 1958 with the installation of three shrimp peeling machines at King Crab, Inc.

Shrimp

Much exploratory fishing has been done in Marmot Bay, Shelikof Strait and Chiniak Bay as well as most of the bays on the west side of Kodiak Island. The east side remains to be explored.

Several local fishermen have indicated that they would like to fish shrimp on a year-round basis, even foregoing the salmon fishing season.

Catches of shrimp that would be considered phenomenal elsewhere have been taken regularly in Kodiak waters. Trawls have been taking from 1,000 to 6,000 pounds per hour of towing.

There is little doubt remaining about commercial quantities of shrimp being available in the Kodiak area. Several different firms have plans for shrimp operations in the near future, and full scale production is anticipated for 1959.

The two species comprising the bulk of the commercial catch thus far are: **Pandalopsis Dispar** (sidestripe) and **Pandulus borealis** (pink). Some catch areas have greater concentrations of one species than the other but generally the two species are taken together.

The entire catch is canned at present in three different meat sizes plus broken shrimp. The three are medium count (6-9 meats/oz.), small count (10-17/oz.), and tiny count (17 and over/oz.); broken meats are canned separately.

The canned product is very much in demand for shrimp salads and cocktails as well as other dishes. Figure 11.

Figure 10. Part of catch of shrimp being trucked from boat to cannery.

Another shrimp taken in this area in lesser quantities is the spot shrimp **(Pandalus playtyceros)**. These crustaceans attain considerable size, with some specimens up to 14 inches long, and they could be utilized as a prawn or frying shrimp in a premium pack. They are inhabitants of rock bottoms, usually in considerable current, consequently few are taken in otter trawls. There is a possibility of a pot fishery being made on the spots.

Salmon Catch

Salmon fishing continued to be relatively poor during the 1958 season in the Kodiak area. The amount of salmon fishing gear again established a new high in numbers, reaching 565 units. (counting each licensed fishing device as a single unit). The total catch was 5,280,147 salmon. The season was closed one week early.

TABLE V.

KODIAK SALMON CATCH IN 1958 IN NUMBERS OF FISH AND UNITS OF GEAR

Gear	Kings	Reds	Cohos	Pinks	Chums	Total	% of Total
22 Traps	294	36,700	8,082	976,451	106,326	1,127,853	24.1
386 Purse Seines	1588	172,232	10,557	2,615,168	694,458	3,494,003	66.1
30 Beach Seines	35	8,796	1,016	132,836	110,596	253,279	4.8
127 Set Nets	25	70,286	900	314,483	19,318	405,012	7.7
Total	1942	288,014	20,555	4,038,983	930,698	5,280,147	100.0

It is interesting to note that if traps had not fished during the 1958 season there would have been over one million more fish available to the rest of the fishing gear, or approximately 2,000 more fish per unit.

TABLE VI.

TOTAL CATCH OF SALMON IN THE KODIAK AREA FROM 1953 - 1958 AND THE UNITS OF GEAR FISHED*

Year	Units of Gear	Catch
1953	384	5,799,254
1954	509	9,851,499
1955	521	11,478,121
1956	500	4,370,514
1957	534	6,113,205
1958	565	5,280,147

*Figures courtesy U. S. Fish & Wildlife Service

COOK INLET

This is the first year a fisheries biologist has been stationed in the Cook Inlet area. Work has been mainly exploratory, and confined to the lower Inlet, south of the Forelands.

Preliminary surveys were made of a number of potential salmon producing lakes, which, due to blocks in outlet streams, are presently inaccessible to salmon. Other lakes, mostly along the Sterling Highway in the Kenai-Homer area, were sampled to determine their present stocks of fish.

Much time was spent observing and talking to fishermen in various parts of the Inlet. Beach seines, drift nets, set nets, and traps are used in Cook Inlet, and unique and multiple problems exist for each type of gear. Imminence of state control of the fisheries makes an overall understanding of these problems imperative.

This year's red salmon and king salmon catch in Cook Inlet was very poor. The king pack was slightly over 6,500 cases, which is a considerable decrease from the 25,000 case average of the past 20 years or so. Likewise the red salmon pack of 38,000 cases was only approximately one-third of the average pack of 113,000 cases.

A bright spot in the 1958 catch was the 172,000 case pack of pink salmon; average pink pack is 71,000 cases.

Normal packs of 63,000 cases of chum salmon and 20,000 cases of Cohos were made.

The lower Inlet is presently supporting a growing shellfish industry of shrimp and king crab. Although the king crab catch has declined since the peak years of 1955 and 1956, this fishery is very important to the winter economy of the lower Inlet.

A king crab research program for this area was initiated in 1957 by the U.S. Fish and Wildlife Service and the University of Southern California. Objectives of the study are to gain information on the biology of the king crab, as well as statistics on the fishery. This program continued through 1958.

Local fishermen have for many years been aware of the presence of large quantities of shrimp in the lower Inlet. Their presence was confirmed by exploratory work done by the U.S. Bureau of Commercial Fisheries vessel "John N. Cobb" during summer, 1958.

The "Cobb's" otter trawl drags in Kachemak Bay yielded shrimp at rates of 1,480 to 3,540 pounds an hour. These catches were composed of pink shrimp averaging 150 to the pound (counts head on) and a good

quantity of large sidestripe and coonstripe ranging from 27 to 53 to the pound. These reports, coupled with other favorable developments, gave rise to the Inlet's first commercial shrimp operation of significant size during the last two months of 1958.

Whitney and Company, formerly Seldovia Bay Packers, at Seldovia, installed a Skremetta type shrimp peeling machine, and local fishermen started delivering large quantities of shrimp with the majority of the catch being small pinks.

The Halibut producers Co-op of Seward is now installing a Peelers shrimp peeling machine and expects to start operations in Resurrection Bay early in 1959.

BRISTOL BAY DISTRICT

In addition to continued work with the Nushagak king salmon, the 1958 activities of the Commercial Fisheries Division in Bristol Bay were extended to provide coverage of the fishery throughout the entire area Figure 12. Available records have been studied, and the importance of this year's fishery are discussed against the background of their long-term significance.

RED SALMON

In 1958 the total red pack dropped to a level which has been previously experienced only once in the history of the fishery — in the sharply curtailed operation of 1935 when only 220 gillnet boats were fished in all Bristol Bay. In no previous year has the catch been so indicative of an actual scarcity of fish in the majority of fishing areas.

There are many factors common to all red salmon producing areas in Bristol Bay, yet it is necessary from the standpoint of adequate biological management to consider each as a separate entity. The variations observed during the past season have again clearly demonstrated this.

Nushagak District

Despite greatly reduced production in Bristol Bay as a whole, the Nushagak district catch was comparable to that of the better seasons within the last ten years. The total red run was officially listed at 2,196,000, with the catch of 1,091,000 exceeded slightly by the escapement.

But just as the major districts of the Bristol Bay fishery must be studied separately, so must the Nushagak Bay (Figure 13) productions also be viewed with the understanding that four river systems unite to produce this catch. Though the proportion contributed by each varies from season to season, the Wood River system has indisputably made up by far the greatest share of the total in recent year. Coverage of this area has been provided for a number of years by the Fisheries Research Institute, and their estimate of 963,000 red salmon passing their Wood River counting towers may be accepted with confidence. The 1958 escapement, in combination with favorable distribution throughout the drainage, is one of the better seedings of recent seasons.

Escapement into the Igushik River system was enumerated this year by the means of towers for the first time. The Igushik system has contributed the second-largest number of fish in the Nushagak Bay total of recent years. The 1958 escapement of 100,000 was a drastic reduction from the numbers noted by State biologists since 1956.

In contrast, escapement into the Tikchik Lake system, where personnel of this Department have made observations since 1953, showed a marked increase. Though estimates have sometimes not exceeded more than a few thousand salmon during the intervening period, 1958 again saw a return comparable to that noted in the first survey. In spite of the presence of well over 100,000 fish, optimum seeding of this vast area was still far short of attainment.

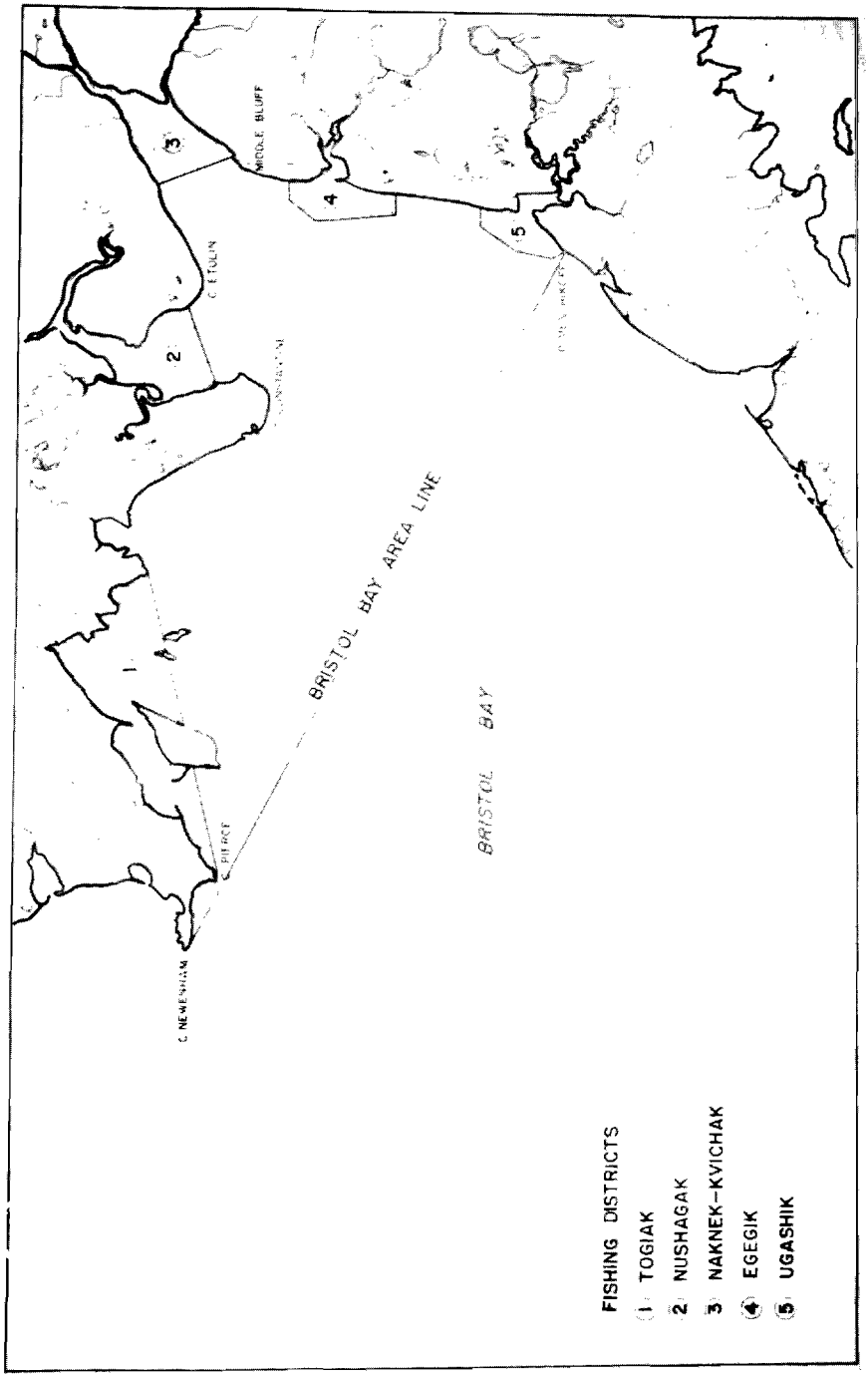


Figure 11. Map illustrating Bristol Bay watersheds and fishing district.

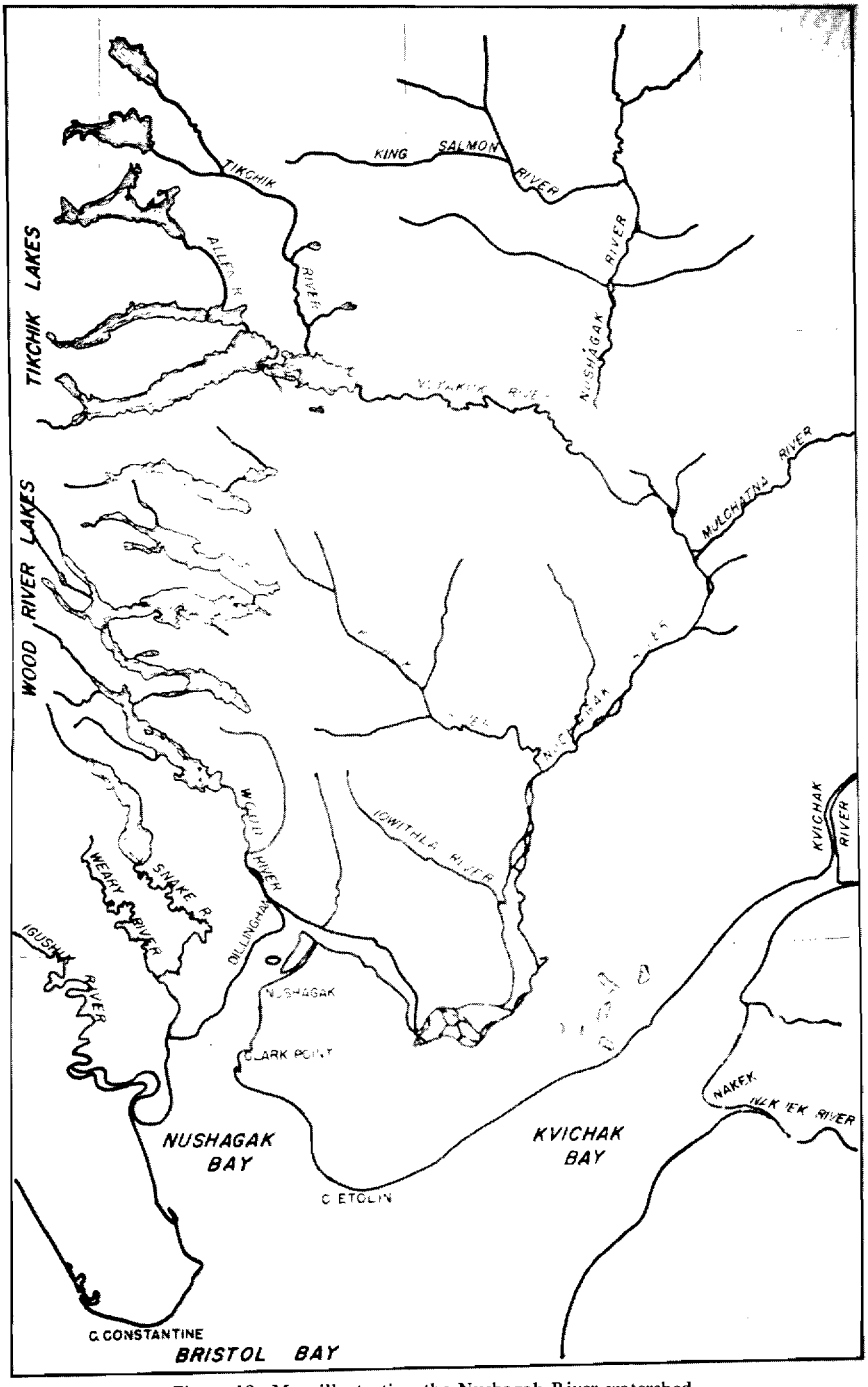


Figure 12. Map illustrating the Nushagak River watershed.

Reliable counts in the Nushagak River proper were precluded by high and turbid water both during and after the peak of spawning.

The Snake River Lake escapement again proved disappointingly small. Aerial surveys failed to show enough fish to warrant an estimate of total escapement in excess of 9,000 reds, in spite of excellent visibility during the surveys.

Further comment should be made regarding potential of the currently less-important streams of the Nushagak Bay complex. Reports of early fishery workers strongly suggest that the main Nushagak River, the Tikchik system, and the Snake River system were not originally the inconsequential producers that they have been in late years. These watersheds offer a fertile field for a variety of rehabilitation measures.

Naknek-Kvichak District

It was in this fishing area, which usually provides the major portion of the Bay's red salmon pack, that the depletion was most serious. This year's total run of 1,801,000 fish is an indication of the levels to which the less-productive year classes are now reduced. The catch of 923,000 fish is the lowest on record since the formative years of the industry.

As in the Nushagak, production of the Naknek-Kvichak fishing area must also be studied in the light of its integral parts. Division of the 878,000 escapement total into each of the three contributing drainages as obtained from counting tower computations was as follows: Kvichak River, 61%; Naknek River, 31%; Branch River, 8%. These small spawning populations give little promise for the improvement of future cycle years.

Egegik and Ugashik Districts

The 1958 Egegik River run totalled 747,000 fish, which includes an escapement of 246,000. Major fluctuations have long been observed in this fishery. This year's return was one of the poorest of its history. In the Ugashik area, a combined catch and escapement of 729,000 salmon marks the fourth successive year in which this system has failed to produce a substantial return. However, to evaluate apparent trends of the respective systems requires more than a comparison of present and past catch and escapement statistics.

In early years of the fishery much of the take was confined to the estuarial portions of the rivers. The fleet gradually began to extend its fishing area beyond the river mouths and along the coast. Catches within the presently defined fishing areas unquestionably include fish bound for neighboring rivers. In any discussion of the statistics of the eastern portion of Bristol Bay, this mixing, which has been amply demonstrated, must be taken into consideration.

A portion of the large Naknek and Kvichak runs pass through the Egegik and Ugashik fisheries. The catch totals from these fisheries include fish other than local stock. Intermingling of stocks between the fisheries of the two areas make this a confused problem. Since the degree to which this mixture occurs is unknown from year to year, accurate computation of the separate runs of fish is not possible — despite much escapement data. This factor helps to mask the true state of any occuring depletions. Improved and consistent returns cannot be anticipated in these systems until stronger year classes are firmly reestablished. A method must be found for determining and insuring the attainment of optimum escapement goals.

Togiak District

In the Togiak area, most westerly of the major Bristol Bay rivers, the catch was similar in quantity to that of the previous year, with a reported take of about 36,000 fish. Fishing effort also remained at about the 1957 level. An attempt by the U.S. Fish and Wildlife Service to enumerate escapement by means of counting towers placed along the

bank of the river was unsuccessful because of extremely high water during the adult migration.

Little reliable information is available from which to evaluate the numerical strength of this run closely.

The fishing area was enlarged in 1958 to permit harvesting of stocks returning to the Osviak and Matogak Rivers, minor Togiak Bay tributaries. There is little indication that fishing practices were altered to take advantage of benefits offered by this boundary extension. No survey of these smaller rivers was made this year, though preliminary observations in 1957 revealed strong populations of chum salmon.

PINK SALMON

Considerable attention has been accorded the noteworthy catches of pink salmon which were made in Bristol Bay in 1958. Statistics show that this year's take of 1,135,542 fish for the entire area did not exceed peak catches of earlier years. The Nushagak district is by far the largest pink producer of all Bristol Bay, though worthwhile packs are on record from the Kvichak. In 1958 this status was further accentuated by the greater fishing pressure applied to Nushagak stocks.

Nushagak District

An understanding of how the 1958 catch in the Nushagak district materialized from a level so low for the past few decades as to be of little importance hinges upon several factors:

1. The imperfectly explained but well-known characteristic of pink salmon populations to fluctuate widely in unmbers. This year's return was unquestionably a bumper crop by any standards.
2. Demand for pink salmon in the early years of the fishery was slight. Therefore, pack statistics are undependable as a measure of abundance, Extensive waste of this species is reported by early observers.
3. In 1922, regulations intended to protect late reds were instituted which prohibited fishing for a number of days after July 25. In recent years much of the run has apparently passed during this closed period. This regulation was repealed in 1954.
4. The common use of a large size mesh relatively speaking has insured that only the larger males have been readily subject to capture. In 1958, a relaxation of the 5½ inch mesh restriction was permitted after the end of red season. A number of nets whose mesh size ranged down to 4¾ inch were then placed in service. The catch per unit of effort of these nets was far above that of the 5½ inch gear which still predominated in that fishery.

   An examination of the record also shows that, prior to 1958, all pink catches approaching a million fish were made while traps were still operated in this area.

   From the above, we may infer that the inefficiency of legal gear has also contributed toward the masking of large runs which may have occured.

In summary, we may conclude that this crop has continued to be available in varying degree each even numbered year varying downward somewhat in quantity from the 1958 run. With the return of a sufficient demand for this product and regulations allowing an effective fishing effort, circumstances once again combined to revive the Nushagak pink fishery and place it in a new position of importance.

One outstanding characteristic of the Nushagak pink population of this year was the specificity which it exhibited in the selection of its spawning areas. Virtually the entire escapement crowded into the forty-

odd miles of the Nuyakuk River, (Figure 14), a major Nushagak tributary which drains the Tikchik Lake system. A portion of the earlier segments did pass on through the Tikchik Lake to spawn in the Tikchik River, and the major connecting rivers of the Wood River System were also observed to be utilized to some degree, but nowhere else was such a concentration to be found as occurred in the Nuyakuk. Every suitable portion throughout the entire length of the river was occupied. Fish were even observed spawning amid large rocks and at depths as great as 12 to 14 feet. Overcrowding occurred, particularly in many of the more suitable stretches, as evidenced by the tremendous numbers of loose eggs observed drifting in the current and scattered profusely over the bottom.

Figure 13. Spawned-out pink salmon on the bank of the Nushagak River.

The sex ratio of the catch was heavily in favor of males, due to the tendency of the 5½ inch gear to enmesh only the largest fish. The reverse was true of those fish which reached the spawning grounds, though to a lesser degree, owing to the greater magnitude of the escapement as compared with the catch. Inasmuch as the pinks first appeared early in the red season and continued to pass through the area of the fishery until early September, they were subjected to widely varying degrees of fishing pressure. Differences indicative of these variations were observed in sex ratios and length-frequency data from different portions of the spawning grounds. An accurate estimate of the size of the total run on the basis of a comparison between sex ratios in the escapement and sex ratio in the known numbers of the commercial catch is thus precluded. However, from surveys of the Nuyakuk area extending over a monthlong period, a minimum estimate of 2,500,000 spawners is conservative.

In future seasons it can be expected that much more gear specifically adapted for pink salmon will be in readiness to intercept the runs than was the case this year. Because of this, particular attention must be given to the task of assuring a proper balance between catch and escapement.

It should be possible to maintain this important fishery in a healthy state.

NUSHAGAK KING SALMON

The 1958 catch of 85,219 fish, continued the upward trend begun a few years ago after two decades of sharply curtailed fishing effort toward this species. Despite a 1½ day reduction in fishing time and the limiting of nets to 28 meshes in depth, this year's catch showed roughly a 5% increase over the 1957 take. It was also about 5% above the long-term average of the mature fishery's early years. Figure 15 shows a drift gillnet fishing during some normal Bristol Bay weather.

Figure 14. View of king salmon drift gillnet fishing.

During 1958 this Division: 1. Continued sampling the commercial fishery; 2. Made spawning ground and escapement observations which were designed to facilitate a population estimate when such an operation becomes possible; and 3. Did a preliminary sampling of the smolt migration to add to the knowledge of early life history.

Information on size and composition of the catch and the relationship between its various components has resulted from the sampling program.

Catch Sampling

Nushagak king salmon are present in the fishing area in quantity from late May until early July, with reduced numbers occurring outside these extremes. Fishing effort specifically directed toward king salmon, using 8½ inch mesh gear, usually begins during the first week in June and ends on the official opening of the red salmon season approximately June 25.

There is evidence that the peak of adult migration of the combined Nushagak races generally occurs near the second week of June. The continuance of the run into the red season introduces complications through the difference in efficiency of the fishery with respect to this species. This difference stems from the changes in fishing schedule, and the type and amount of gear which accompany the transition into the red fishery. These changes are responsible for drastically altering the nature of both the catch and escapement from the latter portion of the king run.

The facts obtained on age and sex composition of the catch during both king and red season add to the expanding picture of the life history of this race. The 1958 sampling continues to bear out the importance of four and five year old age-groups in the 8½ inch mesh catch. Respectively these comprised 34% and 59% of the king catch prior to the red season. This compares closely with the 1957 data.

The sharp rise in percentage of three-year olds in the catch with the onset of the red fishery was again noted. From a mere 2-5% of the take prior to use of small-meshed gear, this group increases to as high as 50% of the total red season catch of king in numbers of fish. A corresponding shift in the sex ratio also occurs, because the three-year fish have thus far invariably been males. Thus the 1958 king season's male-to female ratio of 1:1 changed to a 2.8:1 catch ratio in favor of the males at the advent of red season.

The most pressing needs in the analysis of the Nushagak king fishery are: 1. an accurate escapement count, and 2. determining when fish bound for specific spawning areas pass through the fishery. In order to make a preliminary population estimate, a weir count of kings entering the Iowithla River was attempted. On July 3, 33 kings passed through the weir. Two more were counted on July 6, and on the following day high water damaged the weir extensively and counting operations were suspended.

Escapement Studies

Though an incomplete count resulted, the date of return of this particular segment of the king population was accurately established.

High water prevented aerial counts of kings in the important Mulchatna drainage.

Aerial counts made this year in index areas are not comparable to the two previous seasons, due to contrasting climatic conditions. The 1958 counts, do, however, support the conclusion that this year's total run compared very favorably with those of the preceding two years.

Additional information is needed on the early life history of the Nushagak kings. This year an effort to add to the current knowledge was made by sampling the king smolt outmigration. Snag Point, near Dillingham, was chosen as site for this work. A fine-meshed seine 25' long by 4' deep was used and sampling was carried on at intervals of a few days during the two month period from mid-April to mid-June. Though a few smolts of this species were found to be present intermittently over the full extent of the 1958 operations, a major outmigration was not intercepted. Kings having completed one winter in fresh water were predominant, but some fry from the current season's hatching were also taken.

Early Life History

Silver salmon (**O. Kisutch**) were found to be present in the estuary during the dates of the preceding work, and an obvious high point in the outmigration of this species occurred during the first half of May.

SPORT FISH

PERSONNEL

Several changes occurred with personnel in the Division during 1958. Robert Simon, Biologist at Kodiak, resigned on October 1st to go into the cattle business. Two new men were recruited to fill vacancies existing in the Division. A biographical sketch on each of the two new biologists is herewith provided.

LOUIS BANDIROLA was born in Richmond, New York in January 1933. He attended grade and high schools in that state. He took his advanced training at the University of Alaska and the University of Washington and obtained a Bachelor of Science Degree in Fisheries in 1958 from Washington. Lou started to work for the Department as a summer student employee in 1954. He worked at the Fairbanks and Fire Lake Hatcheries, planted fish, and assisted with lake surveys during his college summer vacations in 1954, 1955, 1956, and 1957. Lou joined the staff of the Sport Fish Division as a Junior Biologist immediately after graduation from the University of Washington on April 1, 1958 and is assigned to Fairbanks.

DR. ROGER REED was born in Pennsylvania in June 1929. He received his grade and highschool training in that state and attended the University of Pittsburgh, receiving his Doctor of Philosophy Degree in 1956. From 1956 to 1958 he worked for the Pennsylvania Fish Commission as a Regional Fishery Manager. Dr. Reed joined the staff of the Sport Fish Division in September as an Associate Biologist and is assigned to Kodiak where he replaced Robert Simon.

The following report covers the activities and progress of the Sport Fish Division and represents the combined efforts of the following staff:

E. S. Marvich, Senior Biologist — R. Reed, Associate Biologist

A. H. McRea, Senior Biologist — L. Bandirola, Junior Biologist

PROBLEM

Alaska has had a tremendous population expansion during the past 15 years. This has resulted in an increased demand for sport fishing. The sport fishing impact has been largely felt in those lakes and streams bordering the highway systems and is particularly true close to the population centers. In many cases sport fish stocks have been sorely depleted. The Alaska Fish and Game Commission, realizing that maximum benefits would be obtained by restricting their efforts to the depleted waters, confined the authorized work projects to the readily accessible lakes and streams.

BIOLOGICAL RESEARCH DISCUSSION

The Sport Fish biologists have been concerned with lake survey and creel census studies near the population centers since the inception of the sport fish program. The objectives of this survey were to determine the physical and biological characteristics of lakes which were being subjected to heavy angling pressure along with an evaluation of the production to the sportsmen of sport fish.

One of the points of immediate concern to the staff was the ability of the lakes to support fish during the long rigorous Alaskan winters. Dissolved oxygen determinations were made in lakes of questionable character and the quantity of free oxygen in the water was carefully ascertained. Results of these determinations classified lakes as unsuitable, questionable, or practical for supporting fish insofar as oxygen was concerned.

Fish sampling in the lakes was of primary consideration in the lake inventory program. Anglers were checked for catch composition and fishing success. Graduated mesh gill nets were used for sampling the standing crop of fishes in the lakes. These nets, 125 feet long by 6 feet deep, consist of graduated gill net mesh material. They are capable of taking fish from about 4½ inches in length to fish well over 25 inches long. Fish sampling indicated that certain of the lakes which were non-productive insofar as the sportsmen were concerned were actually saturated with large numbers of trash fish such as suckers or stickleback.

Although no new lakes were rehabilitated in 1958 it might be well here to mention that the biologists have been using this tool in sport fish management. Lake rehabilitation includes the eradication of trash fish populations by a fish toxicant and the subsequent restocking of the lake with desirable sport fish such as trout as soon as the toxicant material has dissipated. The program is aimed at eliminating fish competition and predation by undesirable or trash fish, thereby concentrating all of the production in a body of water toward rearing sport fish for the anglers. The Territory has been using rehabilitation as a tool in sport fish management since 1951. Thus far, 21 lakes with a combined area of 1,636 acres, have been treated.

The Territory does not consider a fish hatchery as being a panacea for the production of sport fish. It is felt, however, that the fish hatchery provides an essential tool in the management program. The fish hatchery produces sport fish for planting lakes treated by a fish toxicant, is used in establishing sport fish in virgin waters and can serve to provide stocks of sport fish in lakes with no natural spawning facilities. The hatcheries do not produce any fish for "put and take" purposes. A fish hatchery's output consists of small fish which are stocked in the lakes; rearing is accomplished in the lake environment. The department cannot foresee the day when "catchables" will be produced at its stations. Such a program would be prohibitively expensive and has no practical application insofar as Alaska is concerned.

Studies were continued on the mechanics of hauling trout fry from the hatchery. Trout hauling was accomplished by three different types of equipment. The back pack can, the first type, consists of a 5 gallon specially constructed container which fits nicely on a pack board. This equipment is used for stocking hike-in lakes that are off the highway. About 2,000 trout fry, or one pound of fish, can be carried in this container. A portable fish planting unit, the second type, consists of a light steel frame which has four 5 gallon cans for carrying the fish. An air pump powered by a 6 volt dry cell battery provides a continuous source of air to the cans of fish. Ceramic diffusers are attached to the end of the air hoses and break the air into thousands of minute bubbles which insure gas exchange between the entering air and the water. The entire unit loaded with about 8,000 trout fry weighs 206 pounds. Excellent success was experienced in transporting fish in the portable fish planting units for a period of 2½ hours. The unit was loaded on a commercial airlines plane at the Fairbanks or Anchorage airports and sent unattended by air freight to its destination. This unit provided cheap fish transportation from the hatchery to the outlying communities served by the airlines. Trout were also hauled in an aluminum tank mounted on a three quarter ton pickup truck (Figure 1). The tank, with a capacity of 250 gallons of water, is capable of hauling up to 40,000 trout fry per load for periods of up to 10 hours. Air is supplied to the water during fish transportation by means of a piston air pump powered by the truck battery.

Figure 1. Pickup truck equipped with trout hauling tank.

Experiments were conducted on the three types of hauling equipment to determine the numbers and pounds of trout fry that could be carried. Varying numbers and pounds of fish were loaded in each of the units and held for different lengths of time, then the fish were placed in live boxes and held at the lakes for a week to check on possible delayed hauling mortalities. These experiments established safe hauling loads for each piece of hauling equipment. No attempt was made to over-extend the safe carrying capacity of the fish planting gear.

FAIRBANKS HATCHERY

The Fairbanks trout hatchery was constructed during the spring of 1952. It contains 14 troughs and is located 56 miles southeast of Fairbanks on the Richardson Highway. The hatchery utilizes the outlet of Birch Lake as its water supply. A dam was built at the outlet of Birch Lake so that approximately 18 inches of water could be impounded in this 850 acre lake, thus insuring a constant flow of water down the outlet to the hatchery intake. A total of 199 thousand rainbow and steelhead trout fry were planted in 11 lakes and pits in Interior Alaska from the Fairbanks hatchery. A list of the waters stocked from this station can be found at the end of this report.

FIRE LAKE HATCHERY

The Fire Lake Hatchery is a 40 trough station located 17 miles from Anchorage on the Glenn Highway and utilizes the outlet of Fire Lake for its water supply. One of the problems in connection with the operation of this station, is the high mid-summer water temperatures. Each year the water temperature reaches 70° Fahrenheit or more. The success of egg incubation and fry rearing at this station is closely correlated with the water temperature. Excessive mortalities are experienced if the water temperature remains at a high level for any appreciable length of time. The department is currently making plans to take water directly from Fire Lake for the Fire Lake hatchery instead of using the Fire Lake outlet stream. By taking water below the surface in the lake, ranges in temperature for fish incubation and rearing can be improved. Current plans are to provide a submerged intake with vertical adjustment which it is be-

lieved will insure a water supply to the hatchery of about 60°F. water during the summer months and will in no case be as high as 65° Fahrenheit. The new intake will also materially assist in alleviating the serious icing problem encountered when the creek water source is used during the winter months. A total of 736 thousand rainbow and steelhead trout and silver salmon were stocked in 35 lakes in the Cook Inlet, Matanuska Valley, Glenn Highway, Homer, and Valdez areas from this station in 1958. A complete list of the fish plantings made from the Fire Lake Hatchery can be found at the end of this report.

KODIAK CONSERVATION CLUB HATCHERY

The department cooperates with the U. S. Navy and the Kodiak Conservation Club in the operation of the Kodiak Conservation Club Hatchery. This station is located at the Kodiak Naval Operating Base on Kodiak Island. Steelhead trout are the only fish produced at this station. Eggs are taken from a steelhead run in the Karluk River and incubated at the hatchery. Some of the eggs are sold to the U.S. Fish and Wildlife Service and the Territory. The remaining eggs are utilized for stocking on Kodiak and Adak Islands and are provided free for stocking of the waters of these two islands. A list of the waters, along with the number of steelhead trout planted from the Kodiak Conservation Club Hatchery, can be found at the end of this report.

INTERIOR ALASKA LAKES DISCUSSION

Since the start of the sport fish program by the Territory in 1951, considerable effort has been expended in a biological appraisal of the lakes in interior Alaska. Dissolved oxygen determinations in the lakes were made as well as studies on fish composition, physical surveys of the lakes, and others.

Boleo Lake

Boleo Lake is located at Fort Greeley, near Big Delta. The lake comprises approximately 100 surface acres and has a maximum depth of about 26 feet. The water level in this lake fluctuates a great deal. The ability of the lake to carry fish over the winter is contingent upon a high water surface level when the lake freezes over during October of each year. During the winter of 1957-58 a partial winter fish kill was experienced in the lake. As a result, due to the loss during winter kill, the lake provided a modest sports fishery during 1958.

Deadman Lake

Deadman Lake, near Northway, produced very few rainbow for the sport fishermen during 1958. This lake, rehabilitated in 1954, became recontaminated with northern pike. The northern pike became re-established in the lake through lack of a complete kill in the marginal areas, recontamination through the outlet, or by the promiscuous stocking of fish by laymen. In spite of the heavy trout plants in the lake, 44,000 rainbow in 1957, the survival of small trout was negligible in 1958. Another factor which could contribute to the poor survival of stocked fish in Deadman Lake is the low dissolved oxygen concentration found in the lake during the winter months. Deadman Lake has an average depth of 12 feet and dissolved oxygen concentrations as low as 2.0 ppm have been recorded there prior to breakup. The rainbow trout taken in the lake were of large size with an average of 3 pounds apiece (Figure 2).

Figure 2. Rainbow trout catch from Deadman Lake.

During the construction of the Richardson Highway and the improvement of the Fairbanks railroad yard, great quantities of gravel were dug from pits in order to provide coarse material for the road and yard installations. The pits filled with water from subsurface springs and have been stocked with trout by the department. These waters have been discussed in detail in past Annual Reports. The pits continued to produce good trout fishing for the anglers during the past six years. The pits at Mile 20, 30, 80 and 81 lying along the Richardson Highway produced fine catches of small rainbow trout for the anglers. The gravel pits adjacent to the railroad yard in Fairbanks, rehabilitated during 1955 and stocked in 1956, were closed to sport fishing during 1957. These were opened to fishing in 1958 and provided fine rainbow trout fishing for the Fairbanks anglers. Trout in the Railroad Pits ran from 6 to 9 inches in length and averaged 7½ inches. The series of gravel pits on Eielson Air Force Base, located 26 miles from Fairbanks on the Richardson Highway, were stocked with 6,500 rainbow and steelhead trout fry in 1957. By the fall of 1958, these fish averaged 10½ inches in length. The pits were stocked again in 1958 with 21,000 rainbow and steelhead trout. They supported a modest sport fishery during 1958. It is hoped that the Eielson Pits will carry fish over during the coming winter; they should provide a significant sport fishery during 1959.

Gravel Pits

Harding (Salchaket) Lake was stocked with 15,000 rainbow trout in 1958. This lake, located 45 miles southeast of Fairbanks via the Richardson Highway was stocked in a continuation of experimental fish planting initiated in 1956. This large body of water contains an indigenous northern pike population. The trout stocking is being done to determine if trout can be successfully introduced in a large lake containing northern pike. Thus far, no survival of the introduced trout has been confirmed by either sportsmens catch or gill net sampling. It is doubtful that the trout will be able to escape the predacious pike.

Harding Lake

Jan Lake, located one mile off the Alaska Highway at Milepost 1353½, was first stocked with trout in 1955 and has been stocked each succeeding

year. Jan Lake contained no fish prior to stocking by the Territory. The planting of trout in Jan Lake was an outstanding success. The fact that trout had been planted in the lake was published in 1957 and anglers swarmed to the lake and harvested the bulk of the standing crop of trout. Unfortunately, due to budgetary limitations, the department was unable to ascertain the total catch taken from Jan Lake. The lake continued to produce trout during 1958 in great numbers. During the winter of 1957-58 Jan Lake provided more recreational sport fishing than any other lake in Interior Alaska. Jan Lake is a fine example of what can be done on an intensively managed body of water.

Jan Lake

Lost Lake, located 57 miles from Fairbanks on the Richardson Highway, produced spotty fishing during 1958. Rainbow trout from 6½ to 19" in length were taken from the lake. Gill net sampling in the fall of the year indicated a good survival of the 1958 fish stocking. It is hoped that the lake will provide a significant sport fishery during 1959. The good survival of 1957-58 fish plants are attributed largely to the increased size of the fry stocked during these two years. Prior to 1957 the fish stocked in Lost Lake have averaged smaller than 1200 per pound. The 1957-58 rainbow and steelhead trout plants ran from 250 to 400 per pound.

Lost Lake

WESTERN ALASKA LAKES DISCUSSION

Beach Lake, located near Birchwood, has been stocked with small numbers of rainbow and steelhead trout from 1955 to 1958. Historically, the lake has produced a modest sport fishery of "land-locked" silver salmon. During the last decade this sport fishery has declined to negligible proportions. The lake has a heavy population of stickleback. The department's efforts at stocking trout fry in the face of the heavy stickleback population has been unsatisfactory. An attempt was made in 1958 to stock rainbow trout at a larger size than those stocked during previous years. A total of 3,000 rainbow, running 220 to the pound, were introduced in the lake. As a comparison, Beach Lake during the past years was stocked with trout from 650 to 3,000 per pound. It is hoped that the larger trout fry stocked in 1958 will be able to compete successfully with the stickleback for food.

Beach Lake

Clunie Lake is located in the Eagle River flats area near Chugiak. The lake was rehabilitated and stocked with rainbow trout in 1956 and closed to sport fishing during 1957. Clunie Lake was open to sport fishing in 1958 and produced substantial numbers of rainbow trout to the Cook Inlet anglers. The trout averaged a little over 12 inches in length and weighed approximately one pound apiece.

Clunie Lake

Long Lake, located in the middle of the Matanuska Valley, comprises 105 acres and has a maximum depth of 56 feet. This lake was rehabilitated in June 1956 and stocked after the toxicant had dissipated during July and August of the same year with rainbow and steelhead trout. Long Lake was closed to sport fishing during 1957. The Lake was opened to sport fishing in the spring of 1958 and provided a satisfactory sport fishery during the year.

Long Lake

Lucille Lake near Wasilla was rehabilitated and stocked during 1956 and closed to angling during 1957. The lake was opened to sport fishing during the spring of 1958 and produced large fish with silver salmon ranging up to 19" in length and rainbow trout up to 23" in length (Figure 3). As discussed in the 1957 report, stickleback had reinfested this lake after rehabilitation. The survival on the introduced rainbow trout was not up to expectation, however the rate of growth can be considered excellent.

Lucille Lake

Figure 3. A nice catch of rainbow trout and silver salmon taken at Lake Lucille.

Mirror Lake

Mirror Lake located at Mile 25, Palmer Highway, was rehabilitated in 1956 and stocked the same year. The lake was opened to sport fishing in 1958 and provided an excellent fishery. The survival on the stocked trout was very good; large numbers of fish were taken from this lake by the Cook Inlet anglers.

Marking Experiment

The department has been stocking trout fry from two sources of parent stock: domesticated rainbow trout and Karluk River steelhead. An experiment was initiated in 1956 designed to determine the comparative rate of growth and the survival of of these two stocks of trout when planted in small intensively managed lakes. The trout were held at the Fire Lake Hatchery and marked by the removal of certain fins so that they could be readily identified when recovered.

Three lakes were stocked in the marked domesticated rainbow-steelhead experiment; Rocky, Sundi and Hidden Lakes were selected because, among other considerations, they are completely land locked. All three lakes had populations of trout in them at the time of planting the marked fry. Rocky Lake was stocked with unmarked fry in 1956 and contained previous year classes as well; Sundi Lake did not receive any stocking of trout fry other than the marked fish in 1956 but contained previous year classes of trout; and Hidden Lake received only a marked trout planting in 1956 and contained very few trout of former year classes.

In order to obtain rainbow and steelhead trout of as equal size as possible at the time of stocking, the steelhead were graded twice and the largest steelhead at the hatchery were marked. The rainbow were graded three times; those classed as hatchery "mediums" were marked by the removal of the adipose fin and those classed as hatchery "smalls" were marked by the removal of the right ventral fin.

The preliminary findings indicate that the domesticated rainbow trout broodstock fry plantings resulted in a faster rate of growth and somewhat better survival as compared to the Karluk River steelhead. The unit of sampling effort in the following summary of the results of this experiment consists of one overnight set of one graduated mesh gill net 120 feet long by 6 feet deep.

MARKED TROUT EXPERIMENT: SUMMARY OF RECOVERIES

ROCKY LAKE, Surface Area — 60 acres.

Marked Trout Planted Oct. 8, 1956:

500 rainbow @180 per lb.; Adipose fin removed.
2000 rainbow @290 per lb.; Right ventral fin removed.
2000 steelhead @343 per lb.; Left ventral fin removed.

Recoveries: Oct. 11, 1957; 2 units of sampling gear; 7.5 marked fish per unit.

2 rainbow, ad. mark; Av. weight 0.35 lbs.; 0.40% of plant recovored.
5 rainbow, RV mark; Av. weight 0.31 lbs.; 0.25% of plant recovered.
8 steelhead, LV mark; Av. weight 0.15 lbs.; 0.40% of plant recovered.
31 unmarked trout, mixed ages, average weight 0.33 lbs.

HIDDEN LAKE, Surface Area - 7½ acres.

Marked Trout Planted Oct. 10, 1956:

500 rainbow @143 per lb.; Adipose fin removed.
500 rainbow @286 per lb.; Right Ventral fin removed.
500 steelhead @347 per lb.; Left Ventral fin removed.

Recoveries: Sept. 4 - Oct. 7, 1957; 28 units of sampling gear.

4.07 marked fish recovered per unit of gear.
53 rainbow, ad. mark; Av. weight 0.69 lbs.; 10.6% of plant recovered.
12 rainbow, RV mark; Av. weight 0.50 lbs.; 2.4% of plant recovered.
49 steelhead, LV mark; Av. weight 0.23 lbs.; 9.8% of plant recovered.
9 unmarked trout, 2½ - 3½ years old, Average weight 2.90 lbs.

SUNDI LAKE, Surface Area - 14 acres.

Marked Trout Planted Oct. 10, 1956:

1500 rainbow @286 per lb.; Right Ventral fin removed.
1500 steelhead @347 per lb.; Left Ventral fin removed.

Recoveries: Sept. 8 - Oct. 16, 1957; 28 units of sampling gear:

12 marked fish recovered per unit of gear.
186 rainbow, RV mark; Av. weight 0.23 lbs.; 12.5% of plant recovered.
148 steelhead, LV mark; Av. weight 0.12 lbs.; 9.9% of plant recovered.
1 unmarked steelhead, 19.5 inches, 2.5 lbs.

KODIAK AREA DISCUSSION

Lake and stream investigations were continued in the Kodiak area. Steelhead eggs were taken from the Karluk River through a cooperative effort of the U.S. Navy, Kodiak Conservation Club and this department (Figures 4 and 5). Following is a breakdown of the 1958 steelhead egg take:

Figure 4. Seining the Karluk River during the steelhead egg take.

Figure 5. Sorting steelhead during the Karluk River steelhead egg take.

1958 Karluk River Steelhead Egg Take

TRAP INSTALLED: APRIL 20, 1958

TRAP REMOVED: MAY 7, 1958

Number of Female Steelhead Used:

DATE	FEMALES
April 26	13
April 30	45
May 1	22
May 3	56
May 5	38
May 7	20
Total	194

TOTAL NUMBER EGGS TAKEN: 967,062

AVERAGE NUMBER OF EGGS PER STEELHEAD: 4,985

In the Kodiak area studies were continued on the stickleback in relation to their effect on steelhead and trout production. This investigation is designed to determine the effects of competition in the lake by large numbers of stickleback on introduced steelhead trout fry. At the time of writing this report no conclusive results can be drawn from this study.

PUBLIC ACCESS

The department has continued to investigate public ingress to the lakes and streams. The Alaska Fish and Game Commission has established a policy that provides that public access to a body of water must be assured before the department can expend any money in investigations or rehabilitation. In addition the Commission has instructed the staff to make every effort to insure public access to the lakes and streams of Alaska.

1958 FAIRBANKS HATCHERY TROUT PLANTS

Date	Lake	Number Planted	Number of Trout per Lb.	Species	Area
June 28	Boleo	60,000	1,500	Rainbow	Big Delta
June 20	Deadman	27,000	1,800	Rainbow	Northway
Aug. 28	Gravel Pit	21,000	200	Rainbow, steelhead	Eielson, AFB
Aug. 26	Gravel Pit	19,000	400	Rainbow	Fairbanks, ARR Yards
July 13	Gravel Pit	1,000	600	Rainbow	20 Mile
July 13	Gravel Pit	1,000	600	Rainbow	30 Mile
July 21	Gravel Pit	1,000	400	Rainbow	80 Mile
July 21	Gravel Pit	1,000	400	Rainbow	81 Mile
July 4	Harding	15,000	700	Rainbow	Fairbanks
Aug. 2	Jan	21,000	400	Rainbow, steelhead	Dot Lake
Aug. 26	Lost	32,000	400	Rainbow, steelhead	Fairbanks
	TOTAL	199,000			

1958 FIRE LAKE HATCHERY FISH PLANTS

DATE	LAKE	NUMBER PLANTED	NUMBER OF TROUT PER POUND	SPECIES	AREA
August 18	Beach	3,000	220	Rainbow	Birchwood
August 27	Beluga	4,000	194	Rainbow	Homer
July 30	Blueberry	16,000	1,200	Rainbow, steelhead	Valdez Summit
July 24, Aug.17	Bradley	16,000	1,000	Rainbow, steelhead	Matanuska Valley
June 17	Clunie	24,000	2,000	Rainbow	Eagle River Flats
July 16	DeLaney	8,000	1,000	Rainbow	Spenard
July 24	Falk	2,000	500	Rainbow	Matanuska Valley
June 20	Frank & Jerry's	9,000	1,800	Rainbow	Mile 149, Glenn Highway
July 16	Green	8,000	1,000	Rainbow, steelhead	Elmendorf Air Force Base
June 16	Gregory	34,000	2,000	Rainbow	Elmendorf Air Force Base
August 1	Irene (Unnamed)	9,000	1,700	Rainbow, steelhead	Matanuska Valley
August 13	Jewel	12,000	500	Rainbow, steelhead, Silver Salmon	Spenard
August 17	Keppler	31,000	1,500	Rainbow, steelhead	Matanuska Valley
July 16	Knik	24,000	1,200	Rainbow, steelhead	Knik
August 17	Long	45,000	1,500	Rainbow, steelhead	Matanuska Valley
June 20	Long	23,000	1,800	Rainbow	Mile 86, Glenn Highway
August 31	Lost	8,000	75	Silver Salmon	Fairbanks
August 17	Lower Bonnie	38,000	2,000	Rainbow	Mile 84, Glenn Highway
August 15	Lower Fire	30,000	1,200	Rainbow, Steelhead	Anchorage
August 14	Lucille	142,000	1,500	Rainbow, Silver Salmon	Wasilla
August 16	Matanuska	38,000	1,800	Rainbow, Steelhead	Matanuska Valley
September 2	Meier	12,000	1,200	Rainbow, Silver Salmon	Matanuska Valley
September 2	Mirror	58,000	1,000	Rainbow, Steelhead, Silver Salmon	Chugiak
June 17	Otter	26,000	2,000	Rainbow	Fort Richardson Army Base

(Continued) 1958 FIRE LAKE HATCHERY FISH PLANTS

DATE	LAKE	NUMBER PLANTED	NUMBER OF TROUT PER POUND	SPECIES	AREA
August 16	Ravine	8,000	1,200	Rainbow	Mile 84, Glenn Highway
July 31	Robe	11,000	1,800	Steelhead	Valdez
August 1	Rocky	25,000	1,800	Rainbow, Steelhead	Matanuska Valley
July 16	Sand	13,000	900	Rainbow	Spenard
August 20	Scout	3,000	750	Steelhead	Cordova
August 12	Sportsman's	5,000	500	Rainbow	Soldatna
July 31	Summit No. 1	8,000	1,300	Rainbow, Steelhead	Valdez Summit
June 27	Sundi	6,000	1,600	Rainbow	Spenard
July 31	Tex Smith	13,000	1,800	Rainbow, Steelhead	Mile 161, Glenn Highway
August 18	Thompson	1,000	200	Rainbow	Fort Richardson Army Base
August 16	Wiener	23,000	1,800	Rainbow, Steelhead	Mile 88, Glenn Highway
	Total.....	736,000			

1958 Kodiak Conservation Club Hatchery Steelhead Trout Plants

Date	Lake	Number of Trout Per Pound	NUMBER PLANTED
August 22	Anton Larson No. 3	1,300	1,000
Sept. 12	Base No. 18	700	20,000
Sept. 12	Base No. 19	700	20.000
August 18	Bells Flats No. 20	940	2,000
August 18	Bells Flats No. 21	1,000	6,000
August 29	Bells Flats No. 23	800	2,000
August 29	Bells Flats No. 24	1,100	6,000
August 29	Bells Flats No. 25	800	2,000
August 19	Bells Flats No. 80	900	5,000
August 22	Broad Point No. 40	1,000	6,500
Sept. 15	Buskin	700	121,000
Sept. 6	Cape Chiniak No. 44	800	5,000
Sept. 1	Cape Chiniak No. 45	800	5,000
Sept. 2	Cape Chiniak No. 46	800	6,000
August 19	Cliff Point No. 29	900	2,000
August 19	Cliff Point No. 34-35	900	2,000
August 19	Cliff Point No. 38	900	1,000
Sept. 6	Dark	700	4,500
August 25	Long Island No. 72	800	3,000
August 26	Narrow Cape No. 53	800	1,000
August 26	Narow Cape No. 54	800	1,000
August 23	Spruce Cape No. 11	800	500
August 19	Spruce Cape No. 12	1,300	8,000
August 23	Spruce Cape No. 13	800	12,500
Sept. 6	Spruce Cape No. 15	700	4,500
August 25	Woody Island No. 61	1,000	12,000
August 27	Woody Island No. 62	800	10,000
August 28	Woody Island No. 63	800	5,000
	Total	274,500	

INSPECTION

The Division of Inspection was established in the year of the Department's creation in 1959. This was in line with the Legislative aim to have basic divisions experienced and functioning in the Department ready to assume control of the fish and game resources when Alaska achieved statehood.

During the first years from 1949 to 1954, the Department bolstered the perennially understaffed Fish and Wildlife staff with up to 25 temporary inspectors and enforcement officers for protection of the fisheries and spawning streams. After this year, due to the pressure of the Department's own demands, and because additional Federal funds were being appropriated, this Territorial service to the Fish and Wildlife was reduced. Besides the use of boats, as many as 12,000 miles was flown in one season on chartered planes for the enforcement of fishery regulations. Aside from enforcement duties, information on salmon escapement, stream flows, weather conditions, etc., was gathered for the files of Biological and Watershed Management Divisions.

During 1954, 12 temporary men were hired. Besides their enforcement duties, these men assisted in egg-taking, hatchery work and egg planting. Two Inspection officers operating in the Kenai and Upper Copper River areas checked anglers for possession of Territorial Sport Fishing licenses, assisted in lake surveys, trout planting and hatchery work.

Prior to 1955 there had been no enforcement of the Territorial Sport Fishing Act passed by the Legislature in 1951. In the spring of 1955 anglers and the public were notified that inspectors and deputized Department personnel would now enforce the act. The effectiveness of this enforcement caused Territorial sport fish license sales to multiply six times.

In 1957 the Legislature passed a new sport fish and game hunting license act. This set up a new scale of license fees for sport fish and hunting as well. Yonger service was required on the part of the temporary personnel for in addition to sport fish, they now checked hunters in the fall of the year.

During 1958, three men worked for Inspection, and were aided on occasions by deputized Department personnel. Patrols were carried out afoot and by the use of boats and cars.

Wallace Fitzgerald served in the Anchorage area and in Southeastern Alaska. Bruce Graham worked in the Palmer and Kenai areas. Charles W. DeBoer checked licenses and performed other duties in the Upper Copper River Watershed and in Interior Alaska. Fall hunting extended the work season so that the last inspection work did not terminate until December 10th.

DIVISION OF GAME

By James W. Brooks

This division will be responsible, when control of resources is transferred from the Federal government, for management of all mammals and birds, and for conducting research to provide a sound basis for such management. Present functions are designed to equip the division to assume the above responsibilities and, in the interim, to contribute new knowledge about Alaska's game resources.

At the close of the year, the division staff consisted of James W. Brooks, Senior Biologist, and Wilbur L. Libby and Albert W. Erickson, Associate Biologists. Brooks, formerly head of the Division of Predator Investigation and Control, was placed in charge of the new Division of Game upon its creation in 1957; Libby joined the Department in January and Erickson in March.

BIOGRAPHICAL SKETCHES

James W. Brooks was introduced in a biographical sketch which appeared in the 1955 Annual Report. In the interim, he has obtained additional schooling at the University of British Columbia, and has continued his investigations of marine mammals and their effects on commercial fisheries.

Albert W. Erickson was born in Chicago in 1929 and grew up in Michigan's upper peninsula. Following service in the Marine Corps from 1947 to 1950, he entered Michigan State University and obtained the B.S. degree in 1954. Having begun an investigation of the bobcat while still a senior, he wrote a thesis on that animal and received his M. S. degree in 1955. Following this he began research on the black bear in Michigan and also was employed as a biologist by the Game Division of the Michigan Department of Conservation, and as an instructor at Michigan State. He completed most of the course work for the Ph. D. degree, which he will receive on completion of his thesis. He established a Division of Fur and Game office in Anchorage upon his employment by the Department in March.

Wilbur L. Libby, born in Vanceboro, Maine, in 1922, obtained the B.S. degree from the University of Maine in 1949. He was employed as a biologist by the Maine Department of Inland Fisheries and Game before coming to Alaska to attend the University of Alaska on a fellowship with the Cooperative Wildlife Research Unit there. Writing a thesis on beaver, which is the basis for Alaska's management program for this important furbearer, he received his M.S. degree in wildlife management in 1955. Following this, he was employed for a time by the U.S. Fish and Wildlife Service, and by the University of Alaska. In the latter position he worked on the classification of wildlife habitat in connection with a grant to the University by the U.S. Air Force. He was placed in charge of the Division's Fairbanks office upon his employment in January.

ACTIVITIES

As a new division, formed in 1957, a considerable part of the program in 1958 consisted of reconnaissance-type surveys to reveal problems which would warrant more intensive study. Nevertheless, certain activities were more specific in nature and are reviewed below.

Mr. Brooks devoted the spring and summer months primarily to marine mammal investigations and the introduction of Mr. Calvin Lensink to these projects. Most of this work is now Mr. Lensink's responsibility and is presented elsewhere in this report (Predator Investigation and Control). Additional comments on walrus and belugas are presented here.

Walruses

During the period June 23 to June 28, 1958, Brooks, in company with Dr. Francis H. Fay of the Arctic Health Research Center, Anchorage, and Mr. Karl W. Kenyon of the Bureau of Sport Fisheries and Wildlife, visited Round Island, which is the easternmost island of the Walrus Island group. These islands, located in Bristol Bay, are each summer occupied by several hundred adult bull walruses. The animals crawl out on the beaches in large herds and can be approached very closely by humans. In similar fashion, walruses formerly crawled out on land in several places in Alaska. With excessive killing and harrassment, however, they abandoned all of these except the Walrus Islands, which remain the sole place in Alaska where they regularly leave the water and ice floes and spend lengthy periods on land. As a result, these islands are of great importance to all who have an interest in walruses and who wish to see, study, and photograph the animals.

While the investigators were on Round Island, about 1500 walruses were present; a great majority of them were adult males though a few young young bulls were also observed. Thirty-two dead animals were found on the beach, from 30 of which the tusks had been removed: from discussion with people residing in adjacent areas and from examination of carcasses, there was strong suggestion that the animals had been killed solely for their ivory.

Three walruses were collected by the investigators for scientific study. They averaged 3,177 pounds in weight with the largest weighing 3,432 pounds. Blood accounted for 8.4 percent of the total weight, which is roughly comparable with that found in land animals. Many of the walruses were molting and appeared grey-white in color after being in the water for a time: upon lying out on the beach the color changed to pink. It was also noted that a rather large number (perhaps 15 percent) of the animals had broken tusks.

Twelve walruses were tagged on the hind flippers with metal cattle ear tags. Most of these tags were placed on the walruses while they slept, which indicates how closely humans can approach with reasonable caution. The object of such tagging was to gain new information on the distribution of these animals at other times of year: the success of this undertaking is contingent on the somewhat remote possibility that tags will be recovered by walrus hunters elsewhere and reported to this or some other conservation agency.

The abandonment of the Walrus Islands by walruses in future years is almost certain unless protection from killing and excessive disturbance is afforded. It is therefore recommended that the islands be dedicated to the preservation of this last remaining walrus retreat in Alaska by making some or all of the islands in the Walrus Islands group a walrus sanctuary. This action could provide the needed protection and assurance that this highly interesting and important segment of Alaska's game resources would be perpetuated indefinitely for the benefit of all.

Belugas

In connection with the beluga investigation in Bristol Bay it was convenient to take a few animals alive in response to requests for such specimens by the New York Zoological Society and Pacific Ocean Park of California. No belugas had been held in captivity for over half a century and there appeared to be an opportunity here to acquire much information of scientific value.

Techniques for live capture of belugas were developed by Brooks and his assistant, Mr. Charles Wilson. Three methods proved satisfactory in that they permitted capture of the animals either without injury or injury so slight as not to jeopardize later survival. All three methods depend upon the selection of small animals, preferably yearlings, and the chasing or herding of them into water four feet or less in depth.

The first capture technique involves harpooning the beluga, with a small toggle-type harpoon head fixed to a sharpoon shaft, in such a manner that the harpoon head penetrates only the skin and lodges in the underlying blubber. It is possible to bring the chase skiff sufficiently close to an animal held in this way to allow a choke collar to be placed over the beluga's head. By sliding this collar back to a point just anterior to the fore flippers, fairly positive control of the animal is obtained.

The second method involves laying a salmon gill net from a fast-moving skiff completely around an animal in the manner of a purse seine. The beluga becomes entangled in the net and a collar or harness can rather easily be placed on it.

The third and last method, and the one to be preferred because it causes no injury, is for a man to jump upon the animal from a moving boat and place the choke collar or harness on it. It was found that once the harness was in place, the animals were reasonably tractable and could be held and directed without much difficulty even by a man wading. Belugas captured by the above described methods were beached, rolled on to a stretcher and carried by four men into a freshwater pond for holding prior to shipment.

Two belugas were captured in June, transported to the King Salmon Airport by boat, and then shipped by air to Anchorage. Unfortunately, one of these animals died in Anchorage before it could be flown on to New York. The other animal died minutes before the aircraft landed in New York. The cause of this mortality can be credited to lack of knowledge concerning proper care of the animals while they are out of water. Two facts of importance were revealed by this undertaking: (1) The animals must be supported on very soft mattresses, and (2) the animals must be kept moistened at all times to avoid desiccation of the skin and to promote cooling and proper temperature regulation by the whale.

During August, three belugas (one calf and two yearlings) were captured for shipment to California and New York. Two of these were taken by the salmon net method and one was subdued by pure manhandling in shallow water. After holding for a few days in a freshwater pond, the animals were taken by boat to King Salmon and shipped by air to Santa Monica, California. The calf was subsequently flown on to the New York Aquarium where it died within a few days. Mortality was apparently due to skin desiccation and damage during shipment. The remaining animals continue to thrive in Pacific Ocean Park and have shown themselves to be very adaptable to confinement and training.

Many thousands of people have already observed the performance of these belugas which involves retrieving batons, tooting horns, leaping out of water on command, towing small boats, etc. As might be expected, food is the reward given during training. It is remarkable and indicative of a great innate intelligence that the animals have been quick to learn a variety of activities which are altogether unrelated to behavioral patterns displayed in their natural environment.

Moose

The Division participated with the Bureau of Sports Fisheries and Wildlife and the Territorial Sportsmen Association in the transplant of moose from the Susitna River area near Anchorage to the Berner's Bay area in Southeastern Alaska. Mr. Erickson and Mr. Libby both assisted in the capture of 17 moose calves. The animals were transported to Southeastern Alaska by the Alaska National Guard in a DC-3 aircraft. After being held for several weeks near Juneau, they had put on sufficient growth to warrant release with reasonable prospect of survival (Figures 1 and 2).

During late August, the Bureau of Sports Fisheries and Wildlife and the Territorial Sportsmen Association cooperated in transporting the

Figure 1 — Transplanted moose calves feeding in corrals on Lena Loop near Juneau.

Figure 2 — Small lad giving moose calf a tid-bit.

animals to the Berners' Bay area (Figure 3). Subsequent checks indicate the moose were thriving and the prospect for success of this transplant appears excellent.

Figure 3 — Moose calves being released at Berner's Bay.

Caribou

In late May and early June Mr. Libby, acting in concert with Bureau of Sports Fisheries and Wildlife personnel, conducted post-calving composition counts of the Steese-40 mile caribou. These counts, conducted in the vicinity of Eagle Summit as the animals crossed the Steese Highway, indicated that the 1958 initial calf production was approximately 74 calves per 100 adult cows. A total of 17,360 caribou were counted as they crossed the road: this figure included 11,076 adult (including yearlings), and a calculated (based on observed ratios) 6,284 calves. An early calf mortality of about 19 per cent was indicated. The peak of the movement across the highway occurred between the 10th and 15th of June.

Beaver

Mr. Libby inaugurated beaver management studies during 1957 that were based on work previously done by the Alaska Cooperative Wildlife Research Unit at College. This involved flying over selected check areas during late September or early October to observe the number of live beaver colonies.

Another facet of the beaver study dealt with an analysis of beaver affidavits which revealed the number of beaver taken and the average number of beaver taken per trapper for each game management unit. The greatest value of such data is realized when comparisons are made

on an annual basis, for trends in the beaver population therefore become evident.

The following table based on data from the Bureau of Sports Fisheries and Wildlife and the Cooperative Wildlife Research Unit depicts the total harvest figures for the past ten years. It will be noted that a declining number of trappers has resulted in an increasing number of beaver taken by each trapper.

TABLE I.

BEAVER HARVEST DATA FOR THE YEARS 1949 THROUGH 1958

Year	No. of Trappers	No. with Limit	Percent with Limit	No. of Beaver	Average No. of Beaver per Trapper
1949	3,202	1,509	47.07	23,812	7.43
1950	2,966	1,499	50.53	22,571	7.60
1951	2,444	1,203	49.22	18,192	7.44
1952	2,119	1,124	53.04	16,313	7.70
1953	1,991	934	46.91	15,359	7.71
1954	1,873	896	47.84	15,192	7.42
1955	1,986	853	48.28	17,455	8.79
1956	1,648	599	36.35	16,259	9.86
1957	1,351	519	38.41	14,344	10.62
1958	1,940	609	30.50	24,506	12.27

PELT PRIMENESS STUDY

For the purpose of setting seasons on fur animals a fairly precise knowledge of the time of the year that the skins of these animals are prime and at a maximum market value is essential. Eventually it will be necessary to have such information on all types of fur animals in all parts of Alaska, but as a first step attention was limited to mink and marten in the Interior region of Alaska.

This investigation required the taking of specimens, prior to, during and after the regular open season and the grading of such pelts according to primeness, pattern, color, sheen, hair length, wear and size.

Mr. Val Blackburn of Lake Minchumina was hired to do the actual collecting while Mr. Libby was responsible for the grading of pelts and the overall conduct of the investigation.

The results thus far indicate that mink in the Minchumina area are fully prime and acceptable in all respects by November 10. The pelts of marten were found to be fully prime by October 20 but were definitely superior peltage, having longer guard hairs and a better sheen after November 1.

These are preliminary results only and more work will be necessary before variations due to weather, age of animals and locality can be confidently established.

PREDATOR INVESTIGATION AND CONTROL

by Calvin J. Lensink

This division is responsible for the investigation and control of predation that appears seriously detrimental to human interests. Harbor seals, sea lions, belugas, gulls, Dolly Varden trout and wolves are the principal

predator species with which the Department of Fish and Game is concerned. The important prey species include salmon, halibut, black cod, herring and Sitka deer.

The general policy of the Department with respect to predation may be found in the 1954 Annual Report, and as below in abbreviated form: "Control of predation by any species will be conducted only subsequent to establishment of the need for the control and the methods employed will be those that are most efficient and at the same time, the least destructive of animal life having natural or other values. Under no circumstances will control be carried to the point where any species is threatened with extinction."

The Department of Fish and Game is pleased to acknowledge the continued co-operation and assistance extended by the Cordova Seal Committee, The U.S. Fish and Wildlife Service, and the numerous commercial fishermen who have replied to our sea lion questionnaires or otherwise rendered valuable aid.

Several changes have occurred in the permanent staff of the division during the past year. James W. Brooks, Senior Biologist, in charge of the division was assigned to the Division of Fur and Game which he now heads. Calvin J. Lensink was employed as Associate Biologist to continue the work on marine predators that had been initiated by Brooks. Harold Z. Hansen, Deputy Seal Hunter in Cordova, resigned when he chose to be a candidate for the First State Legislature. Mr. Hansen deserves most of the credit for the development of techniques and the conduct of the seal control on the Copper Delta. Paul Garceau continued his work on wolves in Southeastern Alaska, and thus, at the end of the year was the oldest employee in terms of experience within the division.

Nine men were employed on a temporary basis. Of these, special mention should be made of Stanley Miller who is our seal hunter in the Stikine district, Charles S. Wells who continued his excellent work in the Copper River seal control program, and Charles F. Wilson who was the mainstay of the beluga investigations in Kvichak Bay.

HARBOR SEAL CONTROL

The control of harbor seals in the gill net fisheries of the Stikine, Taku, and Copper Rivers was continued as a small but important segment of the Division's activities. The take of seals by Department hunters in 1958 and the total take since the start of the seal control program are listed below by locality:

	1958	TOTAL
Stikine River	1058	4,999
Taku	49	914
Copper River	1350	30,250

The number of seals killed in the Stikine River Delta is the record take for this area during one fishing season, and represents an almost dawn-to-dark schedule of hunting inclusive of many weekends by Mr. Stanley Miller of Wrangell, Mr. Miller had killed 998 seals before July 19 when he acquired an infection known as "spekk" finger, or seal finger, which resulted from contamination in a small cut in his hand. This infection became so serious that it was feared for a time that amputation of a hand might become necessary. We are fortunate indeed that such was not the case.

All persons who hunt seals should know that the danger from infections incurred when handling seals or other marine mammals is very real and that such infections may not respond to the usual treatment with antibiotics. Spekk finger is common among Norwegian seal hunters in the North Atlantic area, but has so far been rare in Alaska.

It was believed that Miller's early season work had been so effective that it would not be necessary to employ another hunter for the remainder of the season. By early September, however, depredations by seals became so severe that Charles S. Martin was employed for the duration of the fishing season. This is the second year in which hunting was stopped in midseason in the Stikine area, and in both years it became necessary to resume operations. These results point out two important considerations: First, the seal population that uses the Stikine area as a feeding ground is not seriously reduced by hunting at the present level of intensity — this being indicated by the immediate return of seals to the area when hunting stops, and also by the record number of seals taken in this, the eighth year of hunting. Secondly, seal control on the Stikine may be affected fully as much by the continual harrassment of the rifle fire as it is by the actual death of the seals. Both factors may be an essential phase of the control work.

A minimum of seal control work is required in the Taku area where a brief period of hunting just prior to and during the early part of the fishing season appears to prevent most depredations.

An evaluation of the seal control program in Southeastern Alaska and on the Copper River Flats is revealing in that it shows that depredations by seals can be effectively prevented by localized control programs restricted to the period just prior to and during that in which depredations normally occur. On the other hand, bounty of hair seals which results in the destruction of many more individuals during all seasons, is far more costly and has nowhere resulted in adequate control of damages.

A considerably greater effort has been required to protect the Copper River gill net fishery than for those on the Stikine and Taku Rivers. Shooting and harrassment are impractical in such an extensive area, and recourse to large scale destruction of seals proved necessary. Since 1951, a total of over 30,000 seals have been killed. Although each year the number taken decreases, a continued pressure will have to be exerted upon the seals in this area. Such continued pressure will not only assure protection of the fishery, but will avoid the expensive repetition of the large scale control operation needed in the earlier stages of the program.

WOLF CONTROL AND INVESTIGATIONS

The Department continued its co-operative program with the Fish and Wildlife Service on the control and study of wolves in Southeastern Alaska. Control operations are under the direction of the Fish and Wildlife Service and are confined to areas selected on a priority system which takes into consideration the abundance of deer and the condition of the deer range.

The investigational phase of this program is being conducted by Paul Garceau. Primary emphasis has been on the relationship between deer and wolf populations. There is at present little close association between the populations of the two species — areas of high deer population may have few or many wolves. The Sitka deer is the primary food of wolves in Southeasern Alaska. Deer remains were found in 68 of 83 fecal samples found at a den; beaver remains were found in 12, and mouse remains in 6. Of the 68 samples containing deer remains, at least two-thirds could be identified as those of fawns. Similar percentages were obtained from examination of 15 samples found on trails during the summer. All this seems to indicate that wolves are opportunists, and that in the summer at least, wolves rely on the animals which are easiest to get — the fawns. The importance of the predation on weak animals is conjectural, and we cannot safely extrapolate our summer data to the fall and winter months when the fawns are larger and better able to escape. Evidence from other sources suggests, however, that even in winter wolves may depend to a considerable extent on the weakest animals such as those which may have been injured or those which are poorly nourished because of over-utilization of their range.

SEA LION INVESTIGATIONS

The investigation of sea lions was less extensive this year than previously because of the extensive changes in personnel. Some work on food habits and reproductive biology was continued, and largely confirmed earlier observations. A wide range of food has been found in sea lion stomachs, and the evidence indicates that depredations of sea lions is usually of concern only when they rob long lines or trolling gear of cod, halibut or salmon. Sea lions are also a nuisance around salmon traps and purse seining operations in certain localities.

The Department considers the depredations of sea lions to be a serious problem, and the work on sea lions will be extended as personnel and funds permit.

BELUGA INVESTIGATIONS AND CONTROL

Previous investigations have revealed that Bristol Bay belugas prey heavily on migrating salmon. This predation is considered to have its most harmful effects when it involves the Kvichak River downstream migrating red salmon smolts of year classes that are already extremely small. It is believed that the most serious depredations occur where the salmon are concentrated and confined in the channels of the river, and that the depredations become less severe as the smolts move into the outer portions of the bay.

Because of the nature of the depredations, the Department has attempted to control belugas by driving them from the river. This harassment of belugas has been previously accomplished with a fast outboard driven skiff. During the same operation about 160 belugas have been harpooned to obtain data on food habits, reproduction, and other information of biological interest. During the 1958 smolt migration, most belugas remained almost 40 miles downstream from where they normally could be found at this time.

Because harassment with a skiff is hindered by weather, tides and darkness, other means are being sought to frighten belugas from the river. In one experiment, small charges of dynamite were set off as the belugas moved up the river. These were not so large or so close to the animals as to cause them serious injury, but were adequate to give quite a jar, and we hope a fright that would be remembered. The indications for success from this method are considerable, and further use of explosives will be attempted. Sonic devices are also to be tried.

The only two belugas living in captivity are a by-product of the work in Bristol Bay. In June, two belugas were captured in the Kvichak River for air shipment to the New York Aquarium, but both died enroute. A second attempt was made in August when three belugas were shipped by air to Pacific Ocean Park in California. One of these animals was later shipped to New York where it died after a few days, but the two left at Pacific Ocean Park still survive. A more detailed account of these captives belugas is presented elsewhere in this report. (Division of Game).

PREDATOR CONTROL WITH THE BOUNTY SYSTEM

By Calvin J. Lensink

The first Territorial Legislature established a $10 bounty on wolves in 1915 as an initial step in the conservation of Alaska's game animals. Since then eight other species of birds, mammals and fish have been on the bounty list: the bald eagle second in 1917, and then hair seals* in 1927, coyote in 1929, Dolly Varden trout in 1933, and wolverine in 1953. Bounties now cost Alaskans over $125,000 annually, and the total cost of bounties since their establishment is nearly $3,000,000 apportioned to the various species as follows:

* Includes the harbor seal, ringed seal, ribbon seal, and the bearded seal.

Wolf and Coyote	$1,530,743
Bald Eagle	164,561
Hair Seals	1,174,084
Dolly Varden Trout	96,344
Wolverine	31,875
TOTAL	$2,997,607

Two species have been removed from the bounty lists: the Dolly Varden trout in 1941 when it was discovered that many salmon were being bountied as trout, and the bald eagle in 1953 when public sentiment resulted in federal legislation which made killing of eagles unlawful.

Although bounties on predatory animals were initiated as a protection for valuable game animals and fishes, recent justification of bounties has emphasized the "welfare" aspect of bounty payments to natives and other residents of less prosperous localities. A bounty system is thus necessarily judged on both its merit in protection of fish and wildlife, and as a relief measure.

The Cost of Bounties: A glance at the bounty appropriations listed in Tables I, IV and VI for wolves, wolverines, and hair seals will provide a clear picture of the high cost and characteristics of bounty payments. Bounties on wolves and coyotes reached a peak in the late 1930's when over $80,000 annually was spent in an attempt to reduce their numbers. This peak however was not so much a measure of wolf numbers as it was of trapping intensity, because weasels, mink, fox, lynx, and muskrat were all taken in record numbers during this period. At the onset of World War II, trapping intensity declined and is reflected in the parallel decline in wolves and coyotes bountied. Since the war, the bounties have again gradually increased as a result of aerial hunting, and Alaska's present annual expenditure on wolf and coyote bounties is about $65,000.

Wolverines have only been on the bounty list since 1953, but already over $31,000 has been spent on their destruction. The wolverine is not a serious predator of any game animal, but suffers from an exaggerated reputation for destruction of trappers' cabins and equipment. It is doubtful that all of the damage done by wolverines since the purchase of Alaska would equal the amount spent since 1953 to destroy them.

The appropriations for hair seal bounties have risen gradually until at present about $60,000 is expended annually for their scalps. The only significant exception to this trend of increase came in the biennium of 1949-50 when a $6 bounty was in effect over the entire coastline. These two years cost Alaskans $298,000 for seal bounties alone.

There are other aspects to consider in evaluating the cost of bounties. Table V shows the annual harvest of wolverines before and after the initiation of the bounty. The expected increase in the wolverine harvest under the bounty system did not materialize, and we find that there have been consistently fewer wolverines taken than there were previously. The decreased harvest of wolverines can be attributed to the recent lack of trapping caused by low fur prices on other furbearers. The $15 wolverine bounty does not provide sufficient inducement to trap for this animal alone. The significant point is the fact that we are paying $10,000 a year for wolverines which would be trapped anyway for the value of their fur.

Contrary to the case for wolverines, there is little doubt that the wolf bounty significantly increases the kill of wolves. However, we know also that many wolves would be taken without the bounty — probably at least half. In this group "taken anyway" we can include nearly all wolves taken by sportsmen and many of those taken by natives and white trappers. To

be specific, about $35,000 annually is paid for bounties on wolves, coyotes, and wolverines that would be killed if we had no bounty. This does not sound like good economics. The situation is similar when related to hair seals. To get a true picture of the cost of the bounty per animal, it is thus necessary to add the costs incurred as above to the costs for those animals for which the bounty was the primary inducement. Doing so just about doubles the actual cost of each animal killed.

The Efficiency of Bounties as a Means of Predator Control: If the bounty is an effective means of controlling predators, it would appear that the number of animals bountied should gradually decrease. This decrease has not taken place and we seem to have been merely harvesting the annual crop and to have left the breeding population intact. If we could crop our deer or caribou in the same fashion, we would consider it good game management. Harvesting only the annual surplus, however, is not adequate management for predators if protecting big game or fish is necessary.

Other data is available to corroborate this suggested lack of efficiency in the bounty system. The lack of efficiency in wolverine bounties has already been mentioned. Table II shows the bounty claims for wolves on a regional basis. These claims indicate that in areas where the Fish and Wildlife Service has conducted intensive predator control programs the number of wolves is much reduced, and as a consequence the number of bounty claims has diminished. It thus appears that the bounty system alone does not result in any appreciable control on wolf numbers.

Results of the Alaska Department of Fish and Game seal control programs on the Stikine and Copper River Deltas show a striking contrast with the results of the bounty system. Although many seals were killed annually by bounty hunters in these areas, losses to the gill net fishery were extremely high. Since initiation of Departmental control, about 5,000 seals have been killed on the Stikine fishing grounds and about 30,000 on the Copper Delta fishing grounds (Table VII). In both localities, the major portion of damages to fishermen was soon relieved. The reasons for the success of the Department's seal control program as compared to the bounty is that all efforts are concentrated in those areas where damages are being inflicted. Department hunters can stay at work on these problem areas at seasons when most shot seals sink and cannot be retrieved, or when seals get wild and difficult to shoot instead of moving on as a bounty hunter must do.

The characteristics of the seal control operations on the Stikine and Copper Flats are quite different. On the Stikine Flats, a single hunter equipped with a high velocity rifle manages by continual harassment of seals on the fishing grounds to keep damages to a minimum despite the fact the over-all seal population in the region has probably not declined greatly. This year, the eighth of the operation, a record number of 1,058 seals were killed at a cost of only two-thirds that of the same number killed for bounty. The difference is even greater in results. On the Copper Flats, however, control operations are spread over a large fishing area, and they seem to have resulted in a significant decrease in the population (Table VI) so that early intensive control efforts have been much reduced. Thus, both reduction of the seal population and harassment of seals during the fishing season have contributed to the reduction of damages. The short-term cost of each seal taken on the Copper Flats under the operation may exceed that of the bounty cost per seal, but since the population is being constantly reduced, the cost diminishes whereas the record for the bounty system is that costs remain constant or even tend to increase. Again, the greatest difference is in results.

It seems evident in the above examples that the bounty system is not providing adequate protection from depredations by either wolves or seals, and that planned programs can do the job with smaller expenditures. Control of wolverines is unnecessary because damages by wolverines are specific to individual animals, and the trapper at the scene is best equipped to prevent them.

The Efficiency of Bounties as a Means of Distributing Welfare: Evidence pertaining to the efficiency of bounty payments as a means of welfare can be obtained from bounty claims and from reports submitted by the certifying officers.

Table III shows the distribution of bounty payments for coyotes, wolves, and wolverines among different types of hunters for the period from September, 1954, to April, 1956. During this time, $94,945 was paid in bounties for these animals. Less than 30% of these payments can in any way be considered to have contributed to welfare — this only by including all native hunters. The top 10 wolf hunters, all of whom used airplanes (certainly not a sign of destitution) received $25,675, or more than 40% of all wolf bounties paid. The second and third most successful of these hunters were non-residents from Minnesota who collected $5,500.

The case of the hair seal bounty as a means of distributing welfare payments is perhaps slightly better than that for wolves, notably in the northern area and in portions of Southeastern Alaska. As in the case for wolves, however, the largest payments go to professional hunters least in need of welfare. One hunter has even helped finance his vacation to Mexico with payments he received for seal scalps. During the period between May, 1956, and January, 1957, a total of $25,836 was paid in seal bounties to 307 hunters. The top 10 hunters received $10,934 or 42 per cent of all bounties paid. On the other hand, 73 hunters received only $15, or less, and 130 hunters $30 or less for bounties. Considering the same information on the basis of villages, we find that 5 villages received 60 per cent of bounty payments ($15,108) and all the rest (50 villages) only 40 per cent.

Other Implications of Predator Control with the Bounty System: The policy of the Alaska Department of Fish and Game on the control of predation is stated earlier in this report.

It should be noted that this policy does not emphasize the control of predators but THE CONTROL OF PREDATION WHICH IS GENUINELY DETRIMENTAL TO MAN'S INTEREST. This implies that the predators which are commonly subject to control are not always harmful. In fact, they are frequently of value for their fur, meat, or for their influence on the numbers of other animals. In spite of all that has been written about the role of predators, far too little is known about the exact role they play — just what damage they do, under what situations they are destructive, what harm might result from indiscriminate control, etc. We can read many statements, for instance, that predators take weak and unfit prey animals. To a certain extent we know that this concept is true and that it may be important in maintaining vigorous stocks of game, but at the same time we also can show that many prime animals or fish may be taken. Also, an animal that is not prime only because of old age may be genetically of the best stock. The situation is complicated and need not be discussed further. Examples of equally important problems that we know more about are available.

Hair seals are known to be definitely harmful in such areas as the Stikine, Taku and Copper River areas where their depredations on salmon already caught in gill nets have in the past caused serious losses to the fishery. This loss has been variously estimated at from 2 to 10 per cent of the fish caught or even more. If even the lowest estimate is considered as the loss and balanced against the costs and results of the Department's control work in these areas, we can see that this control can be justified. Elsewhere there is question as to the value of control. One hundred sixty-nine seal stomachs containing food were examined by Department of Fish and Game and Fish and Wildlife Service biologists who found that salmon were contained in 10 per cent of them. However, salmon were found only in the stomachs of seals taken on the Copper, Taku and Stikine rivers during salmon runs, but they have not been

found in seal stomachs at other seasons or in other localities. Apparently the abundance of salmon during the runs, their confinement to narrow channels or shallow water, and perhaps the turbid water of these rivers may give the seal an advantage it otherwise does not have.

In areas other than specified above, seals may actually be a benefit to the salmon fishery. For instance, we know that the tom cod and some other fishes commonly found near the mouth of streams take large numbers of small salmon when they enter salt water. Seals prey on these fish and may be of benefit to salmon here. The bounty, however, does not distinguish between these seals and those preying on salmon. In fact, most seals bountied in the northern waters are ringed and bearded seals which do not prey extensively on fish of any kind.

A similar situation exists for wolves. There is little doubt that in certain situations predation by wolves should be controlled. However, in other situations deer and other big game are their own worst enemy by becoming so abundant that they destroy their food supply and consequently starve. Such losses in bad winters may run to several thousands of animals. In such a situation, control of wolves is not warranted and, in fact, may be quite detrimental to the ultimate welfare of deer, caribou, or other game, and as a consequence results in future losses to the hunter.

The value of the predator for itself should also be considered. We have pointed out previously that control of wolverines cannot be justified. The fur of wolverines is a specialty product and is the best of all furs for parka trim. A single raw pelt may bring as much as $30 to $35, and when tanned and cut into strips its value is even higher. The destruction of wolverines at any time when the fur is unprime, or by methods by which they cannot be salvaged such as may occur in aerial hunting results in a net loss to the trapper and the State.

Wolves and hair seals also have value in themselves and should not be destroyed where it is unnecessary. Aerial hunters in northern Alaska average about $25 for each pelt that they salvage. Other trappers have sold wolf pelts to tourists at a much higher average price, and pelts from some wolves cut for parka trim may reach a value of $90. The marketing of hair seal skins is expanding, and both Alaskan and non-Alaskan fur manufacturers are interested in obtaining more pelts. Last year at least 4,000 pelts were processed in Alaska alone. In the northern area, seals are an important source of food for both humans and dogs.

The Experience of Other States: Every one of the other 48 states has tried the bounty system, so it is logical to examine the opinions developed through long experience. The directors of 37 state Fish and Game Departments that answered a questionnaire sent by the Oregon Department stated that bounties were ineffective and costly and believed that they should be abandoned. Seventeen states have done away with the bounty system. W. O. Nagel of the Missouri Conservation Department says: "Actually, any kind of bird or mammal may be destructive when it becomes overabundant or out of place, and the vegetation-eaters are most destructive of all. The very creature maligned as "predators" are actually our lowest-cost insurance against this kind of destruction. Only when they turn to destroying property themselves is it good business to cancel this insurance — and then only the destructive individual itself. Anything else will not profit us, and most often can do us only harm." Arthur W. Adams of the North Dakota Conservation Department has a similar opinion: "It is quite apparent that bounty money is paid out to a diversified group. It is also plain to see that the big majority of animals bountied would be taken if no bounty were being paid. From a game management standpoint, it is immaterial who collects the bounty as we sincerely believe that the bounty is totally ineffective in controlling predatory animal numbers." The Montana Game Department says that: "Bounties are considered unsatisfactory." From Oregon we hear that: "Most bounties in Oregon are paid to hunters who kill predators incidental to other hunting and 53 per cent bounty only one animal. It is seldom that the bounty increases the predator take by more than 30 per cent, thus making the removal of additional animals cost more than 3 times the

amount of the actual bounty paid. There is no selectivity in the bounty system, with predators living on destructive rodents bringing the same reward as those feeding on livestock and game. The State Game Commission favors the repeal of bounties." Jim Kimball, Director of the Minnesota Division of Fish and Game says that: "After studying wildlife populations for twenty years and analyzing studies made throughout the country, I'm convinced, as are other professional wildlife conservationists, that bounties are an expensive way of not controlling predators." In Wisconsin, the bounty on wolves has just been repealed; and with a complete turnabout, the wolf has been placed on the list of protected animals! We do not suggest this drastic step for Alaska, but would subscribe to changes which would permit the management of wolves or other predators so that their prey would be most benefited.

Summary: In summarizing the evidence that we have on the bounty system, we find that, at its best, it is ineffective and wasteful in that it does not provide satisfactory control of predation where it is needed, the distribution of payments is such that most do not go to those persons or communities which are most in need, and that the bulk of payments are for animals taken in areas where control is not essential. At its worst, we can add to the above the fact that animals which may have value in themselves are wastefully destroyed, and that in certain situations the destruction of predators may be harmful to the very animals that we are trying to protect.

Predator control is a necessary and valuable tool of wildlife and fisheries management. To be most useful, this tool should be applied at the right place, at the right time, and in the most efficient way possible. All of these requirements can be met by a carefully designed program, but none of them is achieved with the bounty system.

Biologist and aide examining mouth of beluga, Bristol Bay.

TABLE I.
BOUNTY APPROPRIATIONS AND CLAIMS FOR WOLVES AND COYOTES, 1915 - 1958.

BIENNIUM	BOUNTY RATE WOLF	BOUNTY RATE COYOTE	Regular Appropriation	Deficiency Appropriation	Total Appropriation	NO. WOLVES BOUNTIED	NO. COYOTES BOUNTIED
1. 1915-16	$10	none	$ 20,000	$	$ 20,000		
1917-18	15		10,000		10,000		
1919-20	"		7,500		7,500		
1921-22	"		5,000	2,000	7,000	467	
1923-24	"		8,000	2,500	10,500	700	
1925-26	"		12,000	10,000	22,000	1467	
1927-28	"		30,000	12,000	42,000	2800	
2. 1929-30	10	$ 5	25,000		25,000		
1931-32	15	15	40,000		40,000		
1933-34	"	"	25,000	4,000	29,000		
1935-36	20	20	40,000	45,000	85,000		
1937-38	"	"	80,000	85,000	165,000		
1939-40	"	"	165,000		165,000		
1941-42	"	17.50	165,000		165,000		
1943-44	"	"	75,000		75,000		
1945-46	30	25	60,000	60,000	120,000	1906	1733
1947-48	30	"	60,000	1,213	61,213	2356	2342
3. 1949-50	50	30	125,000	15,345	140,345	1229	765
1951-52	"	"	100,000	1,185	101,185	1360	844
1953-54	"	"	75,000	12,500	87,500	1239	738
1955-56	"	"	75,000	22,500	97,500	1531	922
1957-58	"	"	77,288	55,000	132,288		
TOTALS			$1,202,500	$327,243	$1,530,743		

1. Chap. 3, SLA 1915. Bounty on wolves established.
2. Chap. 117, SLA 1929. Bounty on coyotes established.
3. Chap. 18, SLA 1949. Present bounty law for wolves and coyotes.

TABLE II.

DISTRIBUTION OF BOUNTY PAYMENTS FOR WOLVES IN ALASKA BY REGIONS FOR 1947 AND 1956

REGION	Number of Wolves Bountied	
	1947	1956
Regions which include areas where the Fish and Wildlife Service has conducted intensive control measures since 1949.		
Southeastern Alaska	214	147
Alaska Peninsula	79	24
Central Alaska (Includes the Nelchina area)	190	110
Sub-total	483	281
Regions where intensive control measures have been conducted.		
Northwestern Alaska	47	490
North Central and Northeastern Alaska	143	330
Sub-total	190	820
TOTAL *	673	1101

* Total includes only those wolves that could have been assigned to one of the above regions. The total number of wolves taken in F.Y. 1947 was 793 and in C.Y. 1956 was 1226.

TABLE III.

DISTRIBUTION OF BOUNTY CLAIMS AMONG HUNTERS AND TRAPPERS DURING THE PERIOD SEPTEMBER, 1954, TO APRIL, 1956, FOR WOLVES, COYOTES, AND WOLVERINES.

Type of Hunter or Trapper	Bounties	
	Number	Percent
Natives	669	25
Sportsmen	812	31
White Professional Bounty Hunters *	994	38
Non-Residents	158	6
TOTALS **	2663	100

* The eight top professional hunters and two non-resident bounty hunters claimed $25,675 for bounties on wolves or more than 40 percent of the total bounty aid for wolves.

** Total includes bounties on 1226 wolves, 836 coyotes, and 571 wolverines, for a total expenditure of $94,945.

TABLE IV.

BOUNTY APPROPRIATIONS FOR WOLVERINES, 1953 - 1958.

Biennium	Rate	Regular Appropriation	Deficiency Appropriation	Total Appropriation
1953-54 *	$15	$ 5,000	$ 3,500	$ 8,500
1955-56	"	5,000	3,500	8,500
1957-58	"	6,875	7,500	14,375
TOTAL		$16,875	$14,500	$31,375

* Chapter 61, Section 1, SLA 1953. Bounty declared and rate set at $15.

TABLE V.

ANNUAL NUMBER OF WOLVERINES HARVESTED BEFORE AND AFTER THE ESTABLISHMENT OF A BOUNTY.

	Fiscal Year	Wolverines Killed
Pre-bounty period	1947	527
	1948	488
	1949	490
	1950	500
	1951	350
	1952	400
	Average	459
Bounty period	1953	360
	1954	300
	1955	350
	1956	200
	Average	303

TABLE VI.

BOUNTY APPROPRIATIONS AND ESTIMATED NUMBER OF CLAIMS FOR HAIR SEALS, 1927 - 7958

Biennium	Bounty Rate	Regular Appro-priation	Deficiency Appro-priation	Total Appro-priation	Estimated No Seals Bountied (5)
1927-28 (1)	$2	$ 20,000		$ 20,000	7,500
1929-30	"	15,000	$ 3,000	18,000	9,000
1931-32	"	17,500	10,000	27,500	13,750
1933-34	"	25,000	7,500	32,500	16,250
1935-36 (2)	"	25,000	10,000	35,000	17,500
1937-38	"	40,000		40,000	20,000
1939-40	$3	60,000	20,000	80,000	26,666
1941-42	"	80,000		80,000	20,000
1943-44	"	60,000		60,000	16,666
1945-46	"	50,000		50,000	16,666
1947-48	"	50,000	969	50,969	16,989
1949-50 (3)	$6	100,000	198,000	298,000	49,666
1951-52 (4)	$3	100,000	18,000	118,000	39,333
1953-54	"	60,000	12,500	72,500	24,166
1955-56	"	60,000	12,500	72,500	24,166
1957-58	"	74,115	45,000	118,115	39,705
32 years		$ 836,615	$ 337,469	$ 1,174,074	358,023

(I) SLA 1927, Chap. 48, established bounty on "every hair seal inhabiting the island waters and all waters adjacent to the southern coast of Alaska and east of the 152nd meridian."

(2) SLA 1935, Chap. 62. Area considered the same as above with the addition of the "waters of Bering Sea and of Golovin Bay lying within a line drawn from the tip of Rocky Point to the tip of Cape Darby."

(3) SLA 1949, Chap. 16. Bounty extended from Dixon entrance to Demarkation Point.

(4) SLA 1951, Chap. 122. Bounty area reduced to that East of 152nd meridian, Bristol Bay and within 3 miles of mainland from Stebbins to Cape Kruzenstern.

(5) Estimates based on appropriations except that in cases where the regular appropriation was not entirely used the following appropriation, if smaller, was used as basis for estimate.

TABLE VII.

SEALS KILLED BY DEPARTMENT OF FISH AND GAME HUNTERS IN THE STIKINE AND COPPER RIVER DELTAS, 1951 TO 1958.

YEAR	SEALS KILLED	
	Stikine Delta	Copper Delta
1951	946	500
1952	768	6,800
1953	552	6,800
1954	491	4,900
1955	362	3,350
1956	426	2,100
1957	396	4,450
1958	1,058	1,350
TOTAL	5,000	30,250

Sea lion pups in rookery off south coast of Montague Island, Alaska.

ENGINEERING

The continuing program of providing engineering services to other Divisions of the Department involved many duties of varying scope during the year, from routine evaluations of technical data and materials, to surveys, and to force account and contract construction projects.

Lake bottom topographical charts were prepared and depth-volume-area computations were made for the Jennifer, Mildarm, Tsa Cove, Bold Island, Crane, Pats, Sand, June, Hill, Princess Bay, and Harvey Lakes. All data is given in relations to uncontrolled outlets at low water stages in Table I.

An upstream migrant holding tank was constructed of concrete by Department personnel at the outlet of Little Kitoi Lake for use of the Research Division (Figure 1). Provision for installation and manipulation of experimental model fishpasses was included in the tank design. The contractor began construction of the Bakewell Fishway Project at Bakewell Falls but failed to complete the work on time and was granted extensions of time until July, 1959, in which to finish the project. At the end of season shutdown on October 17th, 1958, the project work was 84.6 percent completed, the remaining work including the construction of the concrete entrance works, the erection of the steeppass fishways between resting pools, the painting and the clean-up items. All other work is substantially finished (Figures 2 and 3).

Figure 1. Holding tank of outlet of Little Kitoi Lake.

Figure 2. Bakewell Fishway Project exit structure under construction.

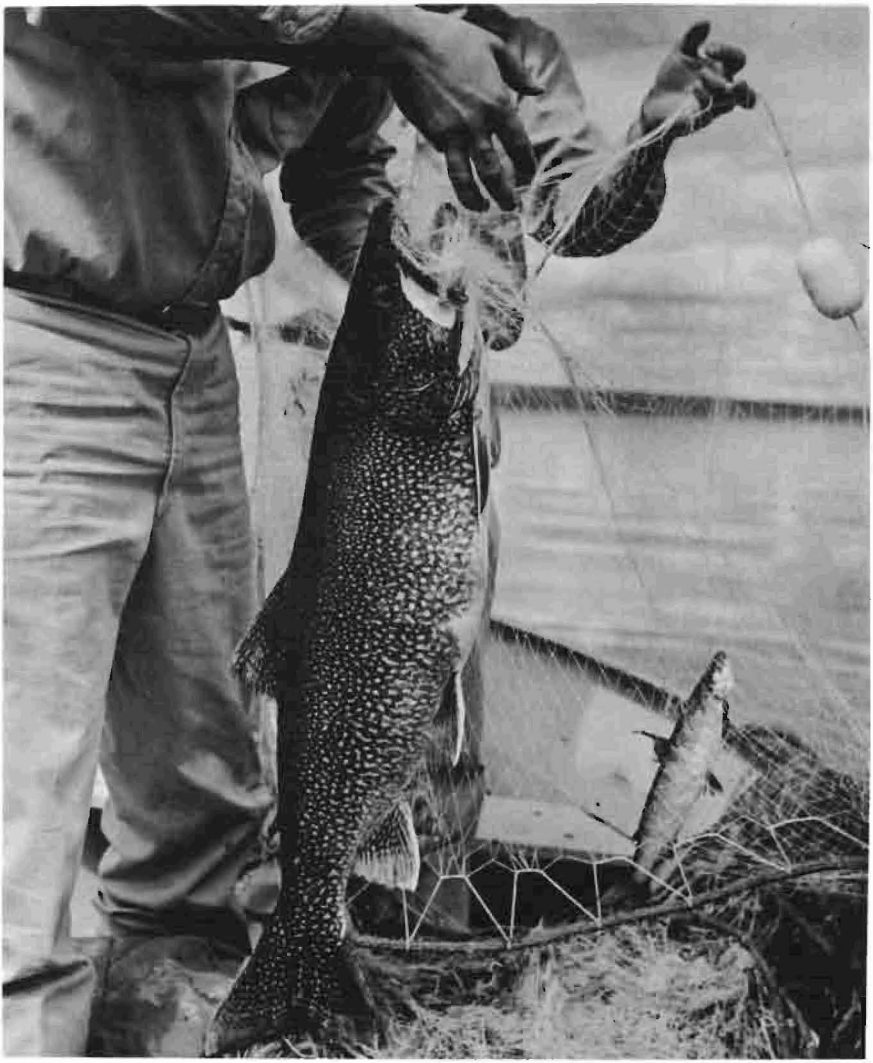
Figure 3. Bakewell Project site preparation.

Twenty lineal feet of the prefabricated plate steeppass type fishway were installed at the outlet of Little Kitoi Lake at a grade of one foot of rise in five feet of run by biologists of the Research Division, but shortages of both biological and engineering personnel precluded experimental development of this steeppass (Figure 4). It was used by upstream migrating fish without hesitation, and they appeared to navigate it with ease. Present indications tend to favor a hopeful outlook for this design. High escapement to the Laura Lake system on Afognak Island resulted in some of the migrants seeking unsuccessfully to negotiate the Gretchen Creek block which is an eight foot falls and chute. As an emergency measure late in the migrating season when the red salmon were already quite ripe, thirty lineal feet of the steeppass fishway were flown to Laura Lake by float plane, packed three-quarters of a mile through the woods by manpower, assembled, and installed temporarily in rather a make-shift fashion surmounting the block. Approximately one hundred brood fish ascended the fishway and were observed spawning in Gretchen Creek above the falls.

Figure 4. Experimental fishway installation of steeppass type fishway at Kitoi Bay Research Station.

The Research Division's attempts to secure a 100 percent sampling of ocean-bound smolts in their work at Little Kitoi Lake by use of the Wolf type screens were severely handicapped by the wide range of flow issuing from the lake, which varies from a scant second-foot to well over a hundred second-feet in relatively short periods. On occasion, their smolt screen installation has been completely drowned out by high water with a resultant loss of data. A substitute technique of sampling is being sought to remedy this defect, and, as a first approach, the Engineering Division designed, had fabricated, and installed a new type smolt screen which samples through a submerged orifice in the outlet control dam only a part of the total flow and which is believed to remain functional at all discharge stages. Once he enters the approach velocity net of the submerged orifice, the migrant smolt is committed by the velocity pattern

to passage through the orifice and over the screen, but no observed distress of the smolts is noted because of this. The design incorporates a horizontal screen of an area excessive to that required to pass all the water issuing through the orifice in the dam at the maximum expected stage. In operation, the amount of water passing through the screen is controlled by gear train operated jalousies under the screen which, as they are closed, drown out part of the screen in such a manner that some water (and the migrant smolts) always passes over the end of the screen into a collecting trough to a linebox. The amount and velocity of the passed water can be controlled to keep the smolts from contact with the screen and this avoids injury to them (Figure 5). Again, personnel shortage barred experimental development of the design and evaluation of its functional potential.



Removing large lake trout taken by sampling gill net during biological investigations.

TABLE I.

LAKE SOUNDING DATA

Name of Lake	Location	Area in Acres	Volume in Acre-Feet	Maximum Depth in Feet	Average Depth in Feet	Median Depth in Feet
Upper Jennifer	Afognak Island	100.6	3528	87	35.0	31.3
Lower Jennifer	Afognak Island	44.3	1468	86	33.1	31.9
Midarm	Afognak Island	12.8	276	40	21.6	25.3
Tsa Cove No. 1	George Inlet	40.6	1464	90	36.1	37.1
Tsa Cove No. 2	George Inlet	14.4	363	50	25.2	26.8
Tsa Cove No. 3	George Inlet	21.0	408	40	19.4	21.0
Upper Bold Island	Revillagigedo Channel	25.2	301	26	12.0	12.1
Lower Bold Island	Revillagigedo Channel	32.0	124	15	3.9	
Pats (Trout)	Wrangell Island	23.9	243	34	10.2	7.9
Crane	Mitkof Island	29.5	800	44	27.1	29.8
Hill	Mitkof Island	8.5	72	17	9.6	8.2
Sand	Mitkof Island	41.5	521	25	12.6	10.0
June	Mitkof Island	63.7	1054	35	16.5	14.2
Harvey	Woewodski Island	173.0	4098	104	23.7	18.5
Princess Bay	Revillagigedo Island	22.2	734	65	33.1	36.8

EDUCATION AND INFORMATION

The employee of this Division performed offices and field work of a routine nature for all Divisions relative to the dispensing of information about the varied Departmental activities.

Booklets, pamphlets and personal replies were used to answer an increasing number of inquiries on the fish and game resources of the Territory.

News-releases on Departmental activities were released to 250 recipients, including 36 newspapers and 13 radio and T-V stations.

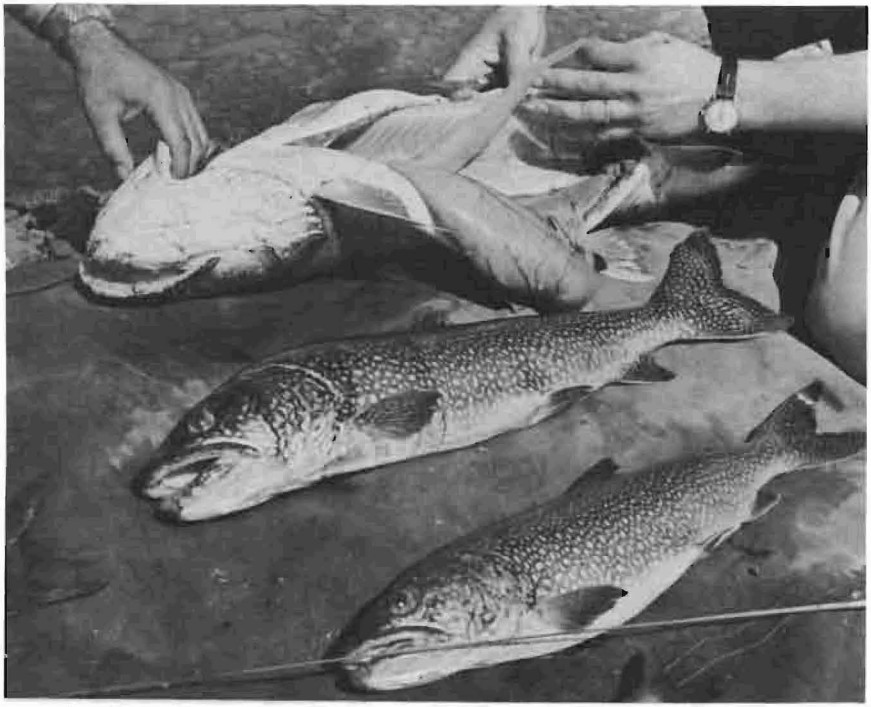
Films produced by the Department or purchased from outside sources were routed to field personnel for visual presentations to audiences in their respective districts. Requests for films from government agencies, sportsmen's groups, schools, etc. were also filled.

Photographic laboratory work such as the printing of photographs, maps and graphs was performed to supply Departmental needs.

The 1957 Annual Report was compiled and edited for printing.

Three trips were made to record in photographs and motion pictures progress in construction on the Bakewell Fishway near Ketchikan. It is planned to use some of this material in a departmental Engineering film.

Personal presentations were made by personnel, of films dealing with Departmental activities and programs before school audiences, service clubs, community groups, etc., throughout the Territory.



Biologists examining sampled lake trout for parasites, sexual maturity, food consumed and other factors.

FINANCIAL REPORT

ALASKA DEPARTMENT OF FISH AND GAME Expenditures July 1, 1957 - Mar. 31, 1959

Funds Alloted for Biennium July 1, 1957 - June 30, 1959	**Appropriated**
Fish and Game Commission	$ 12,000.00
Administration	54,355.00
Biological Research	194,000.00
Education and Information	19,000.00
Engineering	32,000.00
Inspection	34,000.00
Marine Predator Investigation & Control	73,000.00
Sport Fish	75,000.00
Commercial Fisheries	193,000.00
Construction of Fishways	120,000.00
Land Animal Predatory Investigation and Control	25,000.00
Fur and Game	25,000.00
	$856,355.00

Allotted Biennium July 1, 1957 - June 30, 1959		**Encumbrances**	**Expenditures**	**Unencumbered Balance March 31, 1959**
Fish and Game Commission	$ 12,000.00	$ 166.94	$ 6,975.53	$ 4,857.53
Administration	54,335.00	2,393.92	45,435.02	6,526.06
Biological Research*	194,025.28	4,923.15	166,442.62	22,659.51

*Refund on insurance of $25.28.

Allotted Biennium July 1, 1957 - June 30, 1959		Encumbrances	Expenditures	Unencumbered Balance March 31, 1959
Education and Information	$ 19,000.00	$ 298.52	$ 15,578.65	$ 3,122.83
Engineering	32,000.00	1,364.86	26,144.82	4,490.32
Inspection	34,000.00	67.65	25,870.22	8,062.13
Marine Predator Investigation	73,000.00	3,272.97	48,582.94	21,144.09**

**Saltonstall-Kennedy Revolving Fund still has $1,500.00 belonging to this Division, which will be transferred back by May 15, 1959.

Sport Fish	75,000.00	3.50	73,795.90	1,200.60
Commercial Fisheries	193,000.00	9,543.34	166,825.75	16,630.91
Land Animal Predator Investigation	25,000.00	1,373.55	16,716.09	6,910.36
Fur and Game Division	25,000.00	475.50	21,952.04	2,572.46
Construction of Fishways	120,000.00	28,645.50	91,354.50	———

SPECIAL FUNDS	TOTAL RECEIVED
Total collections from Department of Taxation and transferred to Fish and Game program of this department from July 1, 1957 - March 31, 1959, in accordance with Chap. 122 - SLA 1957.	$ 346,111.86

	Monies Allotted July 1, 1958	Encumbrances	Expenditures	Unencumbered Balance March 31, 1959
Fish and Game Division (Sport Fish)	$108,700.00	$ 9,287.63	$ 34,197.62	$ 65,214.75
Fish and Game Division (Game)	54,960.00	6,218.04	33,222.95	15,519.01

	Money Received	Encumbrances	Expenditures	Unencumbered Balance March 31, 1959
Money from Wakefield Deep Sea Trawlers, Inc., Seatle, Oct. 13, 1953 - Aug. 15, 1955, for King Crab research.	$ 5,000.00		$ 4,772.26	$ 227.74
Standard Oil Company, Fish and Game Fund, for Seismic work in Cook Inlet area.	5,000.00	$ 2,190.04	2,241.93	568.03
King Crab Film project in Kodiak area.	1,000.00	625.10	15.90	359.00

	Monies Allotted	Money Received up to March 31, 1959	Unencumbered Balance March 31, 1959
Contract 14-19-008-9382 June 14, 1957 - June 13, 1960. total amount for 3 yr. contract $14,640.00 or $4,880.00 each of three yrs. - King Crab Investigations	$ 14,640.00	$ 7,365.00	
Contract 14-17-008-31, investigation of removal Predators & Competing lake fish populations on Production of Introduced Red Salmon - Jennifer Lake - June 30, 1958 - June 30, 1959.	36,000.00	34,852.21	$ 1,147.79

The commercial catch of fishery products in Alaska during 1958 amounted to over 379 million pounds valued at nearly 33 million dollars to the fisherman. This represents an increase of about 7½ million pounds and 1½ million dollars compared with the volume and value of the 1957 catch. The number of persons engaged in the fishing industry decreased from 23,130 in 1957 to 20,614 in 1958. The number of wholesale and manufacturing establishments decreased from 170 in 1957 to 157 in 1958 while the value of products prepared for market increased over 1½ million dollars during the same period.

(1) Fisheries statistics in Alaska are compiled by the U.S. Fish and Wildlife Service. The gross details are included in this Annual Report in order to acquaint the readers with the magnitude and the trends in this important industry. We have drawn our material from Alaska Fisheries 1958 which is an Annual Summary, published and obtainable from the U.S. Fish and Wildlife Service. The use of this data is here gratefully acknowledged.

TABLE I.

COMPARATIVE VALUES OF CANNED SALMON GIVING INITIAL PRICE PER CASE, APPROXIMATE TOTAL VALUE PER SPECIES, AND TOTAL FOR ALL SPECIES.

Year	Silver	Chum	Pink	King	Red	Total Value
	22.00	15.00	16.00	24.00	26.05	
1949	3,781,482	7,498,382	44,147,496	1,402,934	25,581,995	82,412,289
	22.00	21.10	24.00	23.00	29.00	
1950	5,556,430	15,539,056	26,755,068	1,590,996	34,811,975	84,252,325
	25.28	15.18	20.84	28.41	31.85	
1951	8,726,587	10,925,359	32,505,086	2,489,046	24,603,107	79,249,185
	21.34	15.66	18.52	26.76	28.60	
1952	4,206,757	15,140,209	21,705,200	1,526,532	33,783,606	76,362,304
	19.67	13.43	17.59	27.64	28.50	
1953	2,511,209	10,622,248	16,613,896	1,553,585	26,877,507	58,178,445
	22.87	14.66	19.55	26.76	28.89	
1954	3,826,839	14,766,146	22,230,115	1,374,656	21,158.968	63,356,724
	26.67	17.39	21.29	28.65	31.81	
1955	3,056,498	6,322,462	26,345,976	1,369,984	19,774,011	56,868,931
	28.82	18.75	22.31	31.10	34.55	
1956	2,763,122	12,873,940	26,601,559	1,426,590	34,912,246	78,577,457
	27.40	18.49	23.04	31.95	34.99	
1957	2,391,960	15,344,031	16,945,404	1,533,286	26,694,705	62,909,383
	26.34	16.31	20.76	29.76	33.77	
1958	2,742,255	12,790,288	32,518,937	1,540,728	16,534,775	66,126,983

TOTAL VALUE FOR ALL SPECIES 1949-1958 810,294,026

TABLE II.

TOTAL SALMON PACK IN CASES (48 ONE-POUND CANS) AND NUMBER OF OPERATING SALMON CANNERIES BY DISTRICT.

Year	Southeastern		Central		Western		Total	
	Pack	Canneries	Pack	Canneries	Pack	Canneries	Pack	Canneries
1949	2,493,709	37	1,281,212	51	588,550	19	4,363,471	107
1950	1,190,174	39	1.439,029	54	643,889	15	3,273,092	108
1951	2,028,262	39	1,067,687	59	388,519	24	3,484,468	122
1952	1,320.925	40	1,456,417	46	796,786	24	3,574,128	110
1953	977,682	37	1,350,589	43	533,996	20	2,862,267	100
1954	1,302,939	29	1,394,981	43	396,833	17	3,094,753	89
1955	839,694	30	1,162,541	39	382,910	15	2,385,145	83*
1956	1,032,487	26	1,349,116	37	641,303	14	3,022,906	77*
1957	904,970	27	1.001,792	36	556,910	18	2,463,672	80*
1958	1,181,245	24	1,363,525	38	436,758	17	2,971,537	78

* Adjusted to eliminate duplication.

Moose Calf at Lena Point Feeding Station near Juneau

TABLE III.

SALMON TAKEN IN ALASKA BY GEAR & SPECIES, 1958

Gear and Species	Southeastern	Central	Western	Total
Seines				
Number of	493	700	47	1,193
Percent of Catch	142	62	16	49
King, or spring	5,330	2,480	417	8,227
Red, or sockeye	338,279	580,442	96,981	1,015,702
Coho, or silver	113,037	18,069	1,791	132,897
Pink, or humpback	4,217,328	9,316,651	673,018	14,206,997
Chum,or keta	1,610,622	2,343,382	203,827	4,157,831
Total	6,284,596	12,261,024	976,034	19,521,654
Gill Nets				
Number of:	935	2,269	2,105	5,309
Percent of catch	7	16	84	23
King, or spring	26,643	27,421	180,207	237,271
Red, or sockeye	237,527	825,865	3,362,788	4,426,180
Coho, or silver	197,890	307,761	191,167	696,818
Pink, or humpback	224,674	1,473,295	1,136,198	2,834,167
Chum, or keta	352,751	503,507	409,317	1,265,575
Total	1,042,485	3,137,849	5,279,677	9,460,011
Traps				
Number of:	146	97	———	243
Percent of Catch	45	22	———	27
King, or spring	2,204	3,217	———	5,421
Red, or sockeye	394,954	228,883	———	624,837
Coho, or silver	170,098	118,213	———	288,311
Pink, or humpback	5,343,907	3,661,729	———	9,005,636
Chum, or keta	800,506	397,514	———	1,198,020
Total	6,711,669	4,410,556	———	11,122,225
Lines				
Number of:	32,376	312	———	32,376
Percent of Catch	6	.001	———	2
King, or spring	285,921	12,018	———	297,939
Red, or sockeye	244	———	———	244
Coho, or silver	474,324	14,471	———	488,795
Pink, or humpback	50,408	489	———	50,897
Chum, or keta	2,869	3	———	2,872
Total	813,766	26,381	———	840,747
Fish Wheels				
Number of	———	———	5	5
King, or spring	———	———	1,309	1,309
Total	———	———	1,309	1,309
Aggregate, all Types gear.				
King, or spring	323,098	45,136	181,933	550,167
Red, or sockeye	971,004	1,636,190	3,459,769	6,066,963
Coho, or silver	955,349	458,514	192,958	1,606,821
Pink, or humpback	9,836,317	14,452,164	1,809,216	26,097,697
Chum, or keta	2,766,748	3,244,406	613,144	6,624,298
GRAND TOTAL	14,852,516	19,836,410	6,257,020	40,945,946

TABLE IV.
COMPARATIVE ANNUAL CATCHES OF FISH AND SHELLFISH IN POUNDS ROUND AND VALUE.

	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958
Salmon	388,345,160	264,918,844	276,588,312	282,966,799	220,276,191	247,032,557	203,674,983	269,897,525	203,437,106	241,255,043
	$32,662,497	$22,637,117	$32,368,160	$31,020,258	$21,497,532	$24,597,049	$21,614,924	$32,930,179	$25,036,218	$26,847,439
Herring	33,061,172	165,366,843	81,624,700	45,802,151	34,812,369	35,321,918	64,216,435	103,758,710	118,290,240	88,801,165
	$414,072	$2,067,085	$1,003,292	$444,461	$452,811	$472,721	$793,752	$1,280,070	$1,478,628	$1,069,024
Halibut	35,196,343	38,636,402	32,045,000	33,390,807	26,749,543	36,075,542	26,504,787	33,075,770	27,699,910	26,352,620
	$5,157,902	$5,776,224	$4,117,608	$4,533,808	$2,959,704	$4,352,759	$2,371,623	$4,803,627	$3,175,414	$3,771,565
Sablefish	5,753,724	954,901	5,815,405	1,804,417	3,547,271	4,721,750	4,171,759	2,750,200	4,966,270	———
	$427,374	$35,791	$529,368	$141,364	$250,792	$336,200	$282,089	$185,913	$274,765	———
Cod	2,185,547	858,318	———	———	———	———	119,001	6,170	15,443	12,300
	$54,639	$22,676	———	———	———	———	$2,082	$108	$772	$370
Sharks and Skates	1,507,325	18,883	11,008	3,550	2,450	2,783	———	———	———	
	$24,333	$105	$110	$53	$131	$141	———	———	———	
Miscellaneous	192,157	20,604	25,264	377,414	14,146	46,914	98,075	19,885	37,335	3,391
bottom fish [1]	$12,281	$528	$1,620	$22,325	$586	$2,217	$7,414	$625	$1,439	$153
Clams:	5,652	———	80	23,116	80,394	9,459	158,588	———	———	———
Butter	$339	———	$8	$1,828	$6,432	$643	$13,509	———	———	———
Razor	1,699,695	2,201,717	2,355,681	1,272,454	1,486,222	1,229,135	1,969,226	1,452,673	1,551,605	664,188
	$203,693	$264,206	$347,574	$165,419	$193,209	$159,788	$255,999	188,847	$201,709	$86,344
Crabs:	1,428,401	4,119,425	5,482,416	3,749,412	3,471,806	2,739,383	4,384,043	2,446,122	551,841	1,746,999
Dungeness	$80,716	$277,382	$478,387	$331,433	$312,463	$246,146	$374,567	$211,844	$27,592	$131,025
King	1,206,945	1,519,249	1,993,912	2,772,833	4,613,209	8,871,070	8,162,920	8,796,022	13,076,565	11,211,554
	$72,417	$91,155	$227,622	$388,197	$547,431	$880,465	$808,654	$864,065	$1,046,125	$896,924
Shrimp	2,267,934	2,158,260	1,707,816	1,952,777	1,733,882	1,451,929	1,828,127	3,043,598	2,380,154	7,862,366
	$181,434	$172,661	$179,301	$181,609	$225,405	$188,751	$237,657	$395,668	$309,420	$277,901
Miscellaneous	19,630	73,200	44,193	23,021	91,956	67,778	672	85,460	———	———
shellfish [2]	$1,348	$4,392	$3,596	$2,081	$8,074	$5,422	$61	$6,860	———	———
Miscellaneous	19,596	1,445,976	32,909	45,424	87,023	58,502	34,312	21,106	23,590	700
fish [3]	$1,564	$22,304	$3,594	$5,548	$12,265	$8,739	$5,241	$3,473	$2,767	$90
TOTALS	472,889,281	482,292,622	407,726,696	374,184,175	296,966,462	337,628,720	315,322,898	425,353,241	372,017,839	379,471,544
	$39,294,609	$31,371,626	$39,260,240	$37,238,384	$26,466,835	$31,251,041	$26,767,572	$40,871,280	$31,554,199	$33,196,757

(1) Includes rockfishes, flounders, lingcod.
(2) Includes cockles, oysters, tanner crabs.
(3) Includes trout, smelt, albacore, sheefish.

NOTE – The weights of oysters and clams represent the shell weight of these mollusks.

TABLE V.
COMPARATIVE ANNUAL PRODUCTION OF FISHERY PRODUCTS AS PREPARED FOR MARKET BY POUNDAGE AND VALUE.

SPECIES	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958
Salmon	210,608,877	232,616,358	174,765,212	189,100,990	194,611,255	156,657,320	174,484,964	131,280,885	160,569,980	135,849,049	155,834,969
	101,193,919	$36,112,666	$87,091,068	$85,887,641	$80,054,432	$62,067,161	$68,206,971	$60,617,136	$81,955,083	$68,157,426	$72,441,690
Herring	58,388,893	15,081,412	52,106,111	28,213,195	15,995,582	14,365,884	12,464,513	23,025,111	32,721,680	34,182,146	29,185,205
	$5,694,889	$944,100	$3,819,994	$2,069,608	$944,667	$805,260	$793,790	$1,531,354	$2,262,660	$2,356,191	$1918,887
Halibut	27,566,134	27,518,244	27,401,794	23,607,096	25,591,753	20,534,801	27,345,901	23,247,276	25,476,465	20,184,864	28,765,429
	$6,615,876	$5,425,754	$6,081,896	$4,198,542	$4,730,643	$3,261,482	$4,477,799	$3,220,205	$5,203,496	$3,570,019	$5,013,488
Sablefish	4,943,507	4,281,771	680,301	4,170,292	1,397,365	2,455,115	3,277,673	3,042,343	1,923,217	3,472,916	1,093,507
	$968,100	$529,935	$51,579	$548,426	$161,812	$271,366	$394,791	$369,866	$305,931	$380,048	$140,819
Cod	786,931	660,664	519,035	———	———	———	———	107,327	5,557	2,583	12,330
	$85,389	$74,680	$65,347	———	———	———	———	$2,655	$167	$82	3,370
Sharks and Skates	177,847	153,777	2,104	1,321	426	294	334	———	———	———	———
	$82,016	$42,019	$125	$155	$170	$131	$141	———	———	———	———
Miscellaneous	240,463	140,167	14,804	20,298	372,809	6,938	24,777	88,308	16,142	29,175	3,391
bottom fish (1)	$24,115	$14,938	$689	$2,170	$22,591	$832	$2,983	$10,231	$1,579	$80	$153
Clams:											
Butter	13,452	5,916	3,192	80	11,483	36,108	423,262(2)	82,068	———	———	———
	$3,584	$1,219	$3,073	$40	$3,303	$12,745	$502,771	$41,358	———	———	———
Razor	428,551	613,140	754,684	670,398	390,956	471,222	———	551,333	411,488	490,800	174,360
	$498,469	$660,171	$857,871	$812,791	$501,354	$607,326	———	$732,478	$545,210	$651,057	$231,074
Crabs:									¶		
Dungeness	302,972	375,908	1,130,828	1,715,967	1,037,741	723,158	2,857,599(3)	1,110,859	496,979	176,161	636,426
	$293,550	$349,693	$972,812	$1,125,419	$876,432	$921,893	$2,994,518	$881,686	444,025	$141,782	$358,691
King	572,107	499,121	626,871	812,690	618,408	1,272,524	———	2,086,565	1,628,603	3,803,944	3,279,856
	$684,260	$272,905	$630,876	$754,208	$683,882	$1,171,554	———	$1,767,923	$1,566,750	$3,504,601	$2,709,813
Shrimp	493,271	521,703	500,566	427,096	507,857	503,168	481,225	567,919	715,808	699,907	1,266,598
	$523,750	$473,790	$443,410	$424,201	$485,153	$476,469	$442,169	$405,557	$500,252	$549,278	$863,931
Miscellaneous	1,026	4,356	47,400	2,174	3,561	8,398	———	150	590	———	———
shellfish (4)	$684	$3,504	$8,875	$1,609	$3,069	$7,734	———	$80	$413	———	———
Miscellaneous	181,390	14,249	55,441	20,658	30,963	71,888	50,978	28,092	11,285	17,687	16,978
fish (5)	$50,827	$3,481	$16,506	$4,391	$9,941	$16,311	$10,482	$6,325	$1,952	$4,570	$2,967
Miscellaneous livers,	417,704	23,337	529,963	———	———	———	———	———	465,149	———	———
oil & viscera	$149,906	$4,396	$39,149	———	———	———	———	———	$67,632	———	———
TOTALS	305,123,125	282,505,123	259,128,306	248,762,257	240,470,159	197,106,818	221,411,226	185,213,236	224,442,892	199,211,431	379,471,179
	$16,869,334	$94,933,257	$100,083,272	$95,839,201	$88,477,449	$69,620,264	$77,826,405	$69,676,854	$92,855,150	$79,415,580	$33,196,757

(1) Includes rockfishes, flounders, lingcod.
(2) Includes both butter and razor clams.
(3) Includes both dungeness and king crabs.
(4) Includes cockles, oysters, tanner crabs.
(5) Includes trout, smelt, albacore, shellfish.

TABLE VI.

ALASKA PACK OF CANNED SALMON, 1878 - 1958.

YEAR	STANDARD CASES	VALUE	YEAR	STANDARD CASES	VALUE
1878	8,159	(1)	1908	2,606,972	$10,185,783
1879	12,530	(1)	1909	2,395,477	9,438,152
1880	6,539	(1)	1910	2,413,053	11,086,322
1881	8,977	(1)	1911	2,823,817	14,593,237
1882	21,745	(1)	1912	4,054,641	18,682,830
1883	48,337	(1)	1913	3,739,185	13,531,604
1884	64,886	(1)	1914	4,056,653	18,920,589
1885	83,415	(1)	1915	4,500,293	18,653,015
1886	142,065	(1)	1916	4,900,627	23,269,429
1887	206,677	(1)	1917	5,947,286	46,304,090
1888	412,115	(1)	1918	6,605,835	51,041,949
1889	719,196	(1)	1919	4,583,688	43,265,349
1890	688,591	(1)	1920	4,429,463	35,602,800
1891	801,400	(1)	1921	2,596,826	19,632,744
1892	474,717	(1)	1922	4,501,652	29,787,193
1893	643,654	(1)	1923	5,035,697	32,873,007
1894	686,440	(1)	1924	5,294,915	33,007,135
1895	686,530	(1)	1925	4,459,937	31,989,531
1896	966,707	(1)	1926	6,652,882	46,080,004
1897	909,078	(1)	1927	3,572,128	30,016,264
1898	965,097	(1)	1928	6,083,903	45,383,885
1899	1,078,146	(1)	1929	5,370,159	40,469,385
1900	1,548,139	(1)	1930	5,032,326	29,694,898
1901	2,016,804	(1)	1931	5,403,739	29,096,292
1902	2,536,824	(1)	1932	5,254,483	21,715,801
1903	2,246,210	(1)	1933	5,225,604	28,376,014
1904	1,953,756	(1)	1934	7,481,830	37,611,950
1905	1,887,801	$6,304,671	1935	5,133,122	25,768,136
1906	2,219,046	7,896,392	1936	8,437,603	44,751,633
1907	2,169,870	8,781,366	1937	6,669,665	44,547,769

ALASKA PACK OF CANNED SALMON, 1878 - 1958 (Continued)

YEAR	STANDARD CASES	VALUE	YEAR	STANDARD CASES	VALUE
1938	6,806,998	$36,636,897	1948	4,014,572	$96,522,290
1939	5,263,153	34,441,082	1949	4,391,871	81,273,153
1940	5,069,343	31,474,492	1950	3,307,717	82,346,644
1941	6,932,040	56,217,601	1951	3,484,468	79,249,185
1942	5,075,866	48,298,913	1952	3,574,128	76,362,304
1943	5,428,269	57,823,679	1953	2,862,267	58,178,445
1944	4,893,059	51,196,140	1954	3,094,753	63,356,724
1945	4,354,569	44,757,680	1955	2,385,145	56,868,931
1946	3,949,878	53,157,194	1956	3,022,906	78,577,457
1947	4,312,455	88,672,661	1957	2,463,672	62,909,386
			1958(2)	2,971,537	66,126,983

(1) Data not available.

(2) Preliminary

NOTE:—Includes data on the ack of canned, smoked, and barbecued salmon. Does not include data on the pack of Alaskan salmon canned in the Pacific Coast states. "Standard Cases" represent the various size cases converted to the equivalent of forty-eight 1-ound cans, each containing 16 ounces.

TABLE VII.

PACIFIC COAST STATES PACK OF ALASKA SALMON, 1952 - 1958

YEAR	STANDARD CASES
1952	109,249
1953	73,317
1955	112,401
1954	75,000
1956	124,182
1957	109,253
1958	11,903

NOTE:—Data for years prior to 1952 are not available. These data pertain to fish caught in Alaska, frozen, and shiped to the Pacific Coast States for canning.

Source: Branch of Statistics, Bureau of Commercial Fisheries.

TABLE VIII.

STIKINE RIVER DRIFT NET CATCH FOR 1958 BY WEEKS

WEEK ENDING	NO. OF BOATS LANDING	KINGS	REDS	COHOS	PINKS	CHUMS
April 19	1	3	———	———	———	———
May 10	48	382	———	———	———	———
May 17	35	496	———	———	———	———
May 24	40	1,223	———	———	———	———
May 31	49	1,312	———	———	———	———
June 7	52	2,048	2	———	———	———
June 14	49	1,751	12	———	———	———
June 21	67	1,664	2,588	———	184	42
June 28	66	943	2,889	10	231	366
July 5	62	582	4,411	5	590	745
July 12	65	199	4,906	142	2,307	5,313
July 19	46	107	2,735	22	3,296	5,461
July 26	54	41	2,375	107	4,090	5,285
Aug. 2	52	25	1,523	416	2,417	3,086
Aug. 9	42	11	454	771	1,284	1,294
Aug. 16	54	20	322	1,927	784	445
Aug. 23	55	8	72	7,256	227	559
Aug. 30	61	24	12	5,961	110	278
Sept. 6	79	34	15	14,878	77	260
Sept. 13	70	15	4	9,384	19	258
Sept. 20	45	9	———	3,623	1	43
Sept. 27	29	1	———	735	———	8
Oct. 4	2	3	———	11	———	———
	TOTAL:	10,901	22,320	45,248	15,617	23,443

TABLE IX.

1958 KODIAK SALMON CATCH BY SPECIES

TYPE OF GEAR	KINGS	REDS	COHO	PINKS	CHUM	TOTAL
22 Traps	294	36,700	8,082	976,451	106,326	1,127,853
339 Purse Seines	1,588	172,232	10,557	2,615,168	694,458	3,494,003
88 Set Nets	25	70,286	900	314,483	19,318	405,012
39 Beach Seines	35	8,796	1,016	132,836	110,596	253,279
Total	1,942	288,014	20,555	4,038,938	930,698	5,280,147

1958 Taku River Gill Net Salmon Catch

15,343 Kings; 17,037 Reds; 24,092 Coho; 73,405 Pinks; 39,161 Chums

1958 Nushagak River Catch in Number of King Salmon: 87,245

LOOKING FORWARD

During 1959 the Biological Research Division will experience reorganization and growth in concert with the expected augmentation of the entire Department as it prepares itself for assuming full control of the fish and game resources in Alaska.

The Research Division will consist of a team of trained scientists representing a diversity of disciplines, and while working primarily on individual problems in basic research, will collaborate and consult on matters of mutual interest in fish and game studies.

The basic projects will consist of the Research Library and its services to the entire department, and a Birds and Mammals section to continue studies on beluga whales, sea otters, sea lions, wolves, and seagulls and initiate a new program on fish and game parasites. A Sport Fish Research section will be started to determine the extent of recreational harvest and racial origin of king salmon in Southeastern Alaska. River salmon and trout studies, principally located on the Taku River, will continue and a final evaluation of the fish wheel as a device for sampling escapement of salmon above a river mouth fishery will be made.

Lake rearing of Salmon and Trout studies at the Kitoi Research Station will continue with the emphasis being on determining basic productivity of lakes and techniques for bringing barren lakes into production.

King crab research in the Kodiak region will develop further growth, age and migration information so necessary to management of that resource.

The passage of the Statehood Act by Congress clearly defined the program of the Commercial Fisheries Division for 1959 and future years. The Division will be charged with the responsibilty of managing Alaska's vast and complex fisheries. All emphasis in 1959 will be on the present employees of the Division becoming intimately acquainted with all phases of the commercial fisheries and stocks of fish involved. During the coming years, the Division can look forward to a considerable expansion and the establishing of proper personnel in the various fishing areas.

The Division of Game will continue to recruit new personnel during the coming year. As soon as competent men can be hired, studies will be initiated on marine mammals, polar bear, moose, caribou, elk, deer, brown

and grizzly bear, and game birds; studies of lesser emphasis will also be conducted on other animals. The Anchorage and Fairbanks staff will be increased and offices will be opened in Cordova, Nome and Petersburg. A coordinator of Federal Aid activities will be hired in anticipation of transfer of the activities to the State.

Proposed programs for the year of the Marine Predator Control and Investigation Division will include hair seal control on the Stikine, Taku and Copper Rivers; experiments in scaring belugas away from salmon concentrations in Bristol Bay; sea lion investigations and studies of the extent of predations by birds, dolly varden trout, etc.

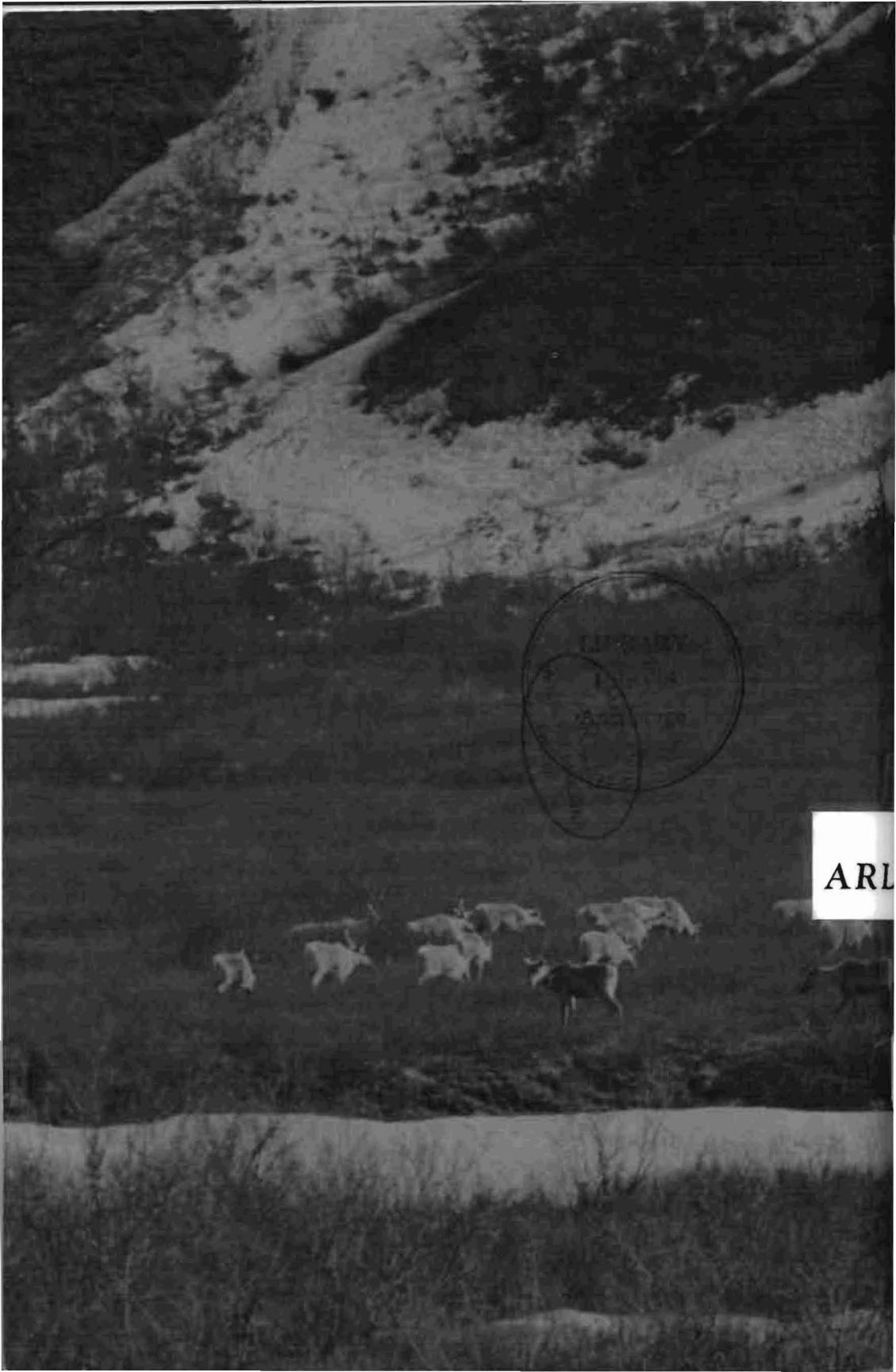
The Engineering Division contemplates completion of the Bakewell Fishway and a continuation of research looking forward to the development of a low cost steeppass fishway.

In the Inspection Division, one inspector will check licenses in the Anchorage-Palmer area during the sport fish and hunting seasons; another will take care of the balance of the areas along the main highways in the Interior with side trips to Ketchikan, Wrangell, Petersburg, Juneau, Bristol Bay and other points as time permits. In addition, these men will receive assistance from the personnel of the Divisions of Sport Fish, Fur and Game and Commercial Fisheries.

The program of the Sport Fish Division will be greatly expanded during the next year. Starting July 1, 1959 the State of Alaska will receive federal aid in fish restoration funds: Alaska will receive the maximum state apportionment permitted under this Act mainly because of the large area of the state. The Federal Aid program will be aimed at a physical and biological inventory of state waters insofar as sport fishing is concerned, a comprehensive creel census throughout the state, a biological study of the arctic grayling, and an investigation of public access and use sites for sport fishermen.

The management section of the Sport Fish Division will make preparation for providing State regulations for the conservation and wise use of Alaska's sport fish resources. The Fire Lake Hatchery water intake and pipeline will be extended from its current location in the outlet of Upper Fire Lake to Upper Fire Lake itself.

There is a need to keep the public informed on the status of Alaska's fish and game resources and of the Department's policy and programs to maintain them on a sustained yield basis. More public participation is vital for its success. It is planned in the future to expand the Education and Information Division from the present staff of one to three employees.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