Alaska Department of Fisheries

JUNEAU, ALASKA [redacted]

Annual Report for 1952

PAULS BASIN FISHWAY

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1952
ANNUAL REPORT

Alaska Fisheries Board

and

Alaska Department of Fisheries

Ernest Gruening
Governor

J. P. Valentine
Chairman

C. L. Anderson
Director

REPORT NO. 4

JUNEAU, ALASKA

To:

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

Herewith is submitted the Fourth Annual Report of the Alaska Fisheries Board, created by the 19th Territorial Legislature and approved March 21, 1949.

This report covers the activities of the Board and the Alaska Department of Fisheries based on the calendar year January 1 to December 31, 1952.

C. L. ANDERSON, Director

J. P. VALENTINE, Chairman

J. HOWARD WAKEFIELD, Member

IRA H. ROTHWELL, Member

W. O. SMITH, Member

KARL BRUNSTAD, Member

FOREWORD

This report, which is Number 4 in the series, reviews the activities of the Alaska Fisheries Board and the Alaska Department of Fisheries for the calendar year 1952. The financial statement, however, covers the biennium April 1, 1951 to March 31, 1953. Following the custom established in previous reports, a resume of the progress of each division is presented in some detail.

The staff of the Biological Research Division continued its investigations of the troll salmon fishery of Southeastern Alaska and the king salmon runs of the Taku River. In connection with the latter study much valuable information was collected on the runs of the other species of salmon ascending this river. The blackcod research was expanded to include a large scale tagging experiment covering the area from Dixon Entrance to Middleton Island.

The Inspection Division again assisted the enforcement program of the Fish and Wildlife Service by supplying 25 temporary inspectors during the 1952 salmon fishing season.

Hair seal control measures were continued in the Stikine River area and intensified on the Copper River Flats, where the depredations of these animals cause an annual loss of many thousands of dollars to the gill net fishermen. Control efforts, by means of a paid seal hunter, were also instituted in the Taku River district.

The Sport Fish Division showed marked progress during the year with the establishment of a hatchery near Fairbanks. Rainbow trout were successfully hatched, reared and planted for the first time in the interior of Alaska. All previous attempts had met with failure. Excellent cooper-tion has been received from the various sportsmen's organizations. The Anchorage group has shown their confidence in the sport fish program by raising a fund of $7,000.00 for the construction of a trout hatchery in that area.

The Watershed Management Division completed its first major project to increase salmon production by the construction of the Pauls Basin Fishways on Afognak Island. Upon its completion silver salmon passed through the ladders successfully into the watershed above. This extensive area contains several fine spawning grounds and hundreds of acres suitable for the rearing of young salmon. It is expected that this species will populate these formerly unproductive waters without further assistance. In the case of red salmon artificial stocking must be continued for several years before they will maintain themselves naturally.

A historical review of the herring fisheries of Alaska has been incorporated in this report and the statistical tables revised and brought up-to-date.

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FISHERIES BOARD

During the calendar year 1952 one special meeting and two regular meetings of the Alaska Fisheries Board were called. All were held at the department's office in Juneau.

SPECIAL MEETING, FEBRUARY 15-16, 1952

This special meeting was called to confer with Mr. Wm. C. Herrington, special fisheries assistant from the Department of State, Washington, D C., to discuss the proposed Tripartite Fisheries Convention between the United States, Canada and Japan. An open meeting was held on the afternoon of February 15, to which had been invited representatives of the fishermen and industry from all parts of Alaska. At this session Mr. Herrington explained the general features of the proposed treaty and answered questions.

After a thorough discussion of all aspects of the proposed fisheries treaty, the board issued the following statement as its official stand:

> "It is recognized that the proposed treaty is not what Alaskan fishermen desired or expected, since it does not give the broad protection of all our coastal fisheries that is so important for the future development of Alaska. However, as pointed out by Mr. Herrington, the present American policy declares for freedom of the high seas; for refusal to recognize sovereignty of the seas beyond the three mile limit; and for assistance to Japan in its economic rehabilitation. Furthermore, as he explained, matters of tariffs and import quotas are distinct problems from those of fisheries conservation and regulation. In view of these facts it is felt that the fishery treaty as proposed is, perhaps, the best that it was possible to negotiate. The Alaska Fisheries Board, therefore, endorses this treaty and urges it adoption."

REGULAR SPRING MEETING, MARCH 24-29, 1952.

Mr. J. P. Valentine of Ketchikan was elected as chairman of the board for the ensuing year. Following reports by the director and members of the staff, a tentative work outline for the 1952 season was adopted.

A cooperative inspection and enforcement program with the Fish and Wildlife Service was authorized as during past seasons, with emphasis on the protection of red salmon streams. A continuation of the hair seal control operations on the Stikine and Copper River Flats was agreed to, also to inaugurate control measures in the Taku district. The proposals for the other divisions, likewise, called for continuation of past projects, with the starting of such new ones as available funds would allow.

The director and staff then presented their recommendations for a proposed budget request for the 1953-1955 biennium. After discussion by the board it was adopted with some minor alterations. The director was authorized to make such further changes as circumstances might require before final presentation to the Legislature.

An interesting feature of this spring meeting was the presentation of two talks by Dr. W. F. Thompson, Director of the Fisheries Research Institute, University of Washington, Seattle, covering his fishery research in Alaska. One, on the afternoon of March 27, covered his red salmon studies, principally in Bristol Bay; and the other, in the evening, dealt with the pink salmon investigations of Southeastern Alaska. Both lectures were open to the general public with a special invitation to fishermen.

The presentation and acceptance of the financial report covering the past fiscal year completed the meeting.

REGULAR FALL MEETING, NOVEMBER 17-23, 1952.

The staffs of the several divisions presented detailed reports to the board covering their activities for the summer field operations. These are covered quite thoroughly in other sections of this report.

The proposed changes in the fishing regulations for the 1953 season were discussed with officials of the Fish and Wildlife Service. Several fishermen appeared before the board to present their views and numerous letters on the subject were read. Thereupon, the board instructed the director to prepare a brief to the Fish and Wildlife Service incorporating its recommendations and thoughts for the coming season. This brief reads as follows:

DEPARTMENT OF FISHERIES
Box 350 — Juneau, Alaska

C. L. Anderson, Director

J. P. Valentine, Ketchikan, Chairman	Territory
J. H. Wakefield, Port Wakefield	of
Ira H. Rothwell, Cordova	Alaska
Karl Brunstad, Kodiak	Ernest Gruening
W. O. Smith, Ketchikan	Governor

November 28, 1952

Mr. Albert M. Day, Director
Fish & Wildlife Service
Washington, D. C.

Dear Mr. Day:

During its recent annual fall meeting the Alaska Fisheries Board discussed at some length many problems pertaining to the regulation of the Alaska fisheries. Expressions of opinion from resident fishermen were received, both orally and in writing. The results of much past and present research, so far as available, were examined. Local officials of the Fish & Wildlife Service attended a joint session at which your proposals for 1953 were given full consideration.

However, before presenting its specific recommendations for next year the Alaska Fisheries Board wishes to reiterate its past unanimous stand for the elimination of salmon fish traps. The wishes of the people of Alaska should be given due consideration by your service. So long as this fact is ignored, the proper utilization and management of the fisheries will remain exceedingly difficult. Fishing regulations and laws are no different than other laws, be they national or local in scope. Without the consent and support of the people affected, observance of a law will not be good and enforcement will always be a problem. It is only necessary to recall the federal prohibition law. The people of Alaska are no different than those in the States.

This condition now exists in Alaska so far as many of the fishery regulations and laws are concerned. It is not being corrected, but, on the contrary, is being aggravated by certain changes made in recent years and by certain proposals for next year. Reference is made expecially to the prohibition of the less effective types of gear without restrictions on the more effective trap. Under the guise of conservation this has been done in the past and similar proposals are again being made for 1953.

The types of gear available to the fishermen of Alaska are constantly being limited, but at no time has a restriction of any kind been placed on the operation of traps. Observance of the law will certainly get no better under such a policy and proper management of the fisheries may remain unfeasible.

PART 102 – GENERAL PROVISIONS

Sec. 102. 28 – Recommendations have been made in the past by this Board and by others that an opening in trap leads be mandatory during all closed periods. In fact the Service itself made such a proposal in 1951, but nothing came of it. The Board once again strongly recommends such a regulation for 1953.

Sec. 102. 51 – The Board is aware of some hardships that have arisen due to the present wording of this section on personal use fishing. This is especially true in the Bristol Bay area. It is therefore suggested that this regulation be so altered as to alleviate these hardships.

PART 104 – BRISTOL BAY AREA

Sec. 104. 3 – Judging from the recent pack records alone, there might be some justification for a complete closure of the Nushagak district during the main red salmon season. However, the Board is not in accord with such drastic action in a district where the economic repercussions will be so severe, unless the evidence is airtight. Such is not true in this case. The prediction of future salmon runs has not yet reached the point where it is infallible. Past experiences will bear this out. The Board therefore recommends that some form of limited fishing be established in the Nushagak district for the 1953 season. The Service can always exercise its prerogative of halting fishing operations should a failure develop as predicted.

Sec. 104. 7 – This provision, which limits commercial salmon fishing solely to gill nets should be amended to permit the use of trolling gear. The advent of power in Bristol Bay has already led to some individual ownership of fishing boats and there will be more of this in the future. These fishermen are naturally anxious to lengthen their operating season. Since there is some reason to believe that trolling, especially for king salmon, may be feasible in certain parts of Bristol Bay, there does not seem to be any reason for continuance of present regulations which prohibit a possible new fishery.

The Board therefore recommends the same trolling seasons for Bristol Bay as in other areas now open. In fact this should apply to all other areas now closed to trolling. Just because a certain type of gear is not presently being used is not, in itself, a valid reason for its prohibition.

Although not in the nature of regulations, the Board recommends that a long overdue study of the predator situation in Bristol Bay be inaugurated at the earliest opportunity by the Fish & Wildlife Service.

PART 105 – ALASKA PENINSULA AREA

Sec. 105. 4 – This proposal to extend the fishing season in the Port Moller district is in accord with the Board's general policy that wherever possible fishing seasons should be lengthened.

Sec. 105. 5 — This again is in accord with the Board's past and present thoughts. If additional protection to certain salmon runs is necessary this should be done by longer weekly closures rather than by shorter seasons.

A recommendation of a general nature is that further emphasis be placed on enforcement in this area.

PART 107 — CHIGNIK AREA

Sec. 107. 6 — It is again recommended that this section be deleted on the grounds that it serves no conservation purpose, since the catch of red salmon is regulated by the weir count. Furthermore, it is discriminatory to the lesser types of gear, namely purse seines and drift gill nets, while allowing traps.

This section in combination with Sec. 107. 7 which limits the size of seines, encourages the building of the so-called 'Jitney rigs', which are ideally suited for 'creek robbing'. Under the present regulations a Kodiak purse seiner wishing to fish the Chignik area must modify his present seine or make a new one to fit the Chignik specifications. Upon his return to Kodiak he is perfectly equipped for 'creek robbing'. Conversely a Chignik seiner going to Kodiak is already outfitted.

Almost the same situation exists with respect to Kodiak and the lower part of Cook Inlet around Port Dick and adjacent bays.

Sec. 107. 13 & 107. 14 — Without going into a detailed repetition of its previous statements relative to traps in this area, the Board wishes to reaffirm all past recommendations. These can be found in our previous briefs.

PART 108 — KODIAK AREA

Sec. 108. 2(c) — It is recommended that the Karluk district be extended to Black Cape on Afognak. This will make it possible to give further protection to the migrating runs of salmon enroute to Karluk and Red River.

It is further proposed that a sub-district be set up to include the part from Cape Karluk to the old N. W. Fisheries Dock, (Uyak P. O.), near the entrance to Uyak Bay. If poor runs of both reds and pinks develop to the Karluk River, this sub-district could then be kept closed. The balance of the Karluk district could remain open to harvest the pink runs of Uyak and other bays.

Sec. 108. 2(e) — It is also recommended that a sub-district be set up within the Afognak district. This should include Litnik Bay and the immediate vicinity. Special regulations for this sub-district could provide for utilization of the Litnik Bay runs of red salmon.

Sec. 108. 3b — The suggested change in the opening date in the Afognak district from June 16 to July 10 meets with approval with one exception. An early opening date should be set for the above proposed Litnik sub-district. Some limited fishing of these red runs should be provided. If the anticipated good showing should not materialize, immediate closure by field announcement would be in order.

Sec. 108. 23(q)(2) — The Board is certainly in accord with the Service's policy to close unused trap areas in the interests of conservation, and believes that such a policy should be adhered to more closely in the future than it has in the past.

PART 109 — COOK INLET AREA

Sec. 109. 2a — Under present authority the regulation of the catch by lengthening or shortening of the weekly closed period appears to be the only practical method. The use of a graph based on the average seasonal catches by days accomplishes essentially the same purpose as would a weekly quota system, which was proposed by the Board last year. Details of this 'graph system' have not been made available to the Board, but it is assumed that some over-all limit to the pack has been established for each year based on past cycles. If such has not been done, it would seem advisable to do so.

With the information now available to the Service it might be possible to set up some kind of a formula to adjust the weekly closures as needed. Using the average amount of gear for the past three years as a norm; variations above or below this could be compensated for by adding to or subtracting from the weekly closure time according to this prearranged formula. This formula should be prepared far enough in advance so that it could be incorporated in the printed regulations. In this way fishermen would be made aware, before entering the area, of the consequences of an influx of gear.

Sec. 109. 4 — For reasons discussed under the Chignik area, this section should be deleted so as to allow purse seines, at least in the lower part of the Inlet. Size of purse seines could be in line with those used in the Kodiak area.

Sec. 109. 6 — The Board is opposed to the prohibition of drift gill nets north of the latitude of East Foreland. Some are now being operated in that section of the Inlet. To abolish these and still allow traps would just add more fuel to the fires of resentment now so prevalent among resident fishermen.

Sec. 109. 13 — In 1951 the Service proposed to increase the distance interval between traps from 2, 500 feet to one mile. This was not done and no satisfactory reason has been given. Certainly no objection was raised by Alaskan fishermen. The Board therefore recommends that the Service proceed with its 1951 proposal and incorporate this change in the 1953 regulations.

PART 110 — RESURRECTION BAY AREA

Sec. 110. 51 — This proposal to regulate personal use fishing in the waters tributary to Resurrection Bay is in accord with past statements of the Board. As civilization encroaches, protection must be given to the salmon during their fresh water existence.

PART 111 — PRINCE WILLIAM SOUND AREA

Sec. 111. 2 — Judging from the information made available to the Board, it would seem advisable to give even more protection to the pink runs than that proposed by the Service. It is therefore recommended that there be no general pink season. Instead, it is proposed that a late season be inaugurated to start on August 12 and continue until September 18 or thereabouts. Since the runs after August 12 are largely chums, it is further suggested that fishing be limited to the bays and north shore of Prince William Sound from Point Freemantle on the West to Sheep Point on the East. This section comprises the principal chum grounds of the Sound and being considerably restricted in area enforcement would be easier.

This proposed season would give almost complete protection to the pinks, especially the vital peak runs. It has a further advantage, for should an unexpected large run develop, and this might well happen, general fishing could be opened by field announcement as soon as sufficient escapement was assured into the streams. The economic repercussions of such a drastic curtailment would not be nearly so severe as in certain other areas. This would be especially true if the Board's recommendation for a continuous season on the Copper River is accepted.

Sec. 111. 5b — For reasons stated on many previous occasions the Board is opposed to this proposal to prohibit gill nets, except in the Eshamy district.

PART 112 — COPPER RIVER AREA

Sec. 112. 2 — The Board was in accord with the Service's proposal in 1951 for a continuous season from July 10 to September 18 for the 1952 season. This was done and so far as known proved very satisfactory. The Board now proposes that further relaxation be made in 1953 by having a continuous season from May 1 to September 18. In fact it is believed no harm would result from a September 30 closure. If anyone wishes to fish that late let them go to it. The period from June 20 to July 10 has been closed for a number of years. By now the runs passing through between these dates should be rebuilt, so that they could be fished for the limited weekly periods now in force previous to August 10.

PART 113 — BERING RIVER AREA

Sec. 113. 3 — Your proposed seasons for this area appear in order. However, consideration again might be given to a final closing date of September 30 as suggested for the Copper River Area.

PART 114 — YAKUTAT AREA

The Board has no recommendations for this area, but suggests additional patrol if funds will so allow.

PART 115-124 — SOUTHEASTERN ALASKA AREA

Sec. 116. 6d — The Board recommends that a new closed area be established to prohibit all commercial fishing for herring, except for human food and bait purposes in Tongass Narrows and adjacent waters from Point Alava on the South to Loring on the North. Unrestricted fishing in these waters might lead to decimation of the herring runs, which have been so essential to the Ketchikan bait herring industry.

Early Season — June 24 — July 10

The Board is opposed to this early season which would allow fishing by both traps and seines for four days per week. It is not believed that the early runs have been rebuilt sufficiently to withstand this heavy a fishery. However, in line with its suggestions of last year, the Board would go along on this early season if limited to seines and for three days only per week.

Main or Pink Salmon Seasons.

The Board will concur in the Service's proposals for staggered seasons in the various districts. It does not believe this is the correct answer, but will go along on an experimental basis for next year. Unless the Service is reasonably sure that 1953 will be a banner pink year, consideration should be given to limiting fishing to four days per week. With the seasons as proposed, there is apt to be considerable concentrations of gear in certain districts.

Offshore Seining Season — July 20 — September 2

If the seiners believe they can catch salmon in the prescribed sub-district between the above dates, they should certainly be given that opportunity.

Fall Chum Season - September 24 — October 1

The Board is in accord with this proposal, except that an extra 24 hour closure be added to the statutory 36 hours. Experiences of the past season, especially in Cholmondeley Sound, seem to indicate this is necessary in order to secure a reasonable escapement.

If it is impractical, because of enforcement or other reasons, to open the entire area for fall seining, the Board recommends the opening of as many additional bays as possible.

Taku Inlet — Port Snettisham

In view of the Department's investigations of the Taku River salmon runs, the Board recommends a continuous season from April 1 to October 15 with 72 hours closure per week. The Department's biologists will be happy to go over all pertinent data with officials of the Juneau office of your Service.

Some of the Taku River fishermen have submitted a proposal to start the weekly closed period at 12 noon Friday, and end at 12 noon Monday. This change is largely for the convenience of the fishermen and the Board will endorse such a move. However, if this is done in the Taku District, it should be made uniform throughout all the gill net districts of Southeastern Alaska. Otherwise confusion might arise.

Being aware of the possibility of a considerable influx of gear into the Taku fishery, a formula for adjusting the week end closure is offered for your consideration:

1. Base the proposed 72 hour closure on an average of 40 boats fishing per day. This would be computed over the actual fishing days per week.

2. During any weekly fishing period that the average exceeds 40 boats per day, further time would be added starting at noon on Monday. This additional time should be allotted on the basis of 6 hours for each five boats over the norm of 40.

Sec. 116.12 — The elimination of the closed season on Dungeness crabs in the Icy Strait district is in line with previous recommendations of the Board relating to this fishery.

In conclusion, we again assure you of our full cooperation as in the past.

Respectfully submitted by,

C. L. Anderson, Director for the Alaska Fisheries Board:

J. P. Valentine, Chairman, Ketchikan, Alaska
J. H. Wakefield, Port Wakefield, Alaska
Ira H. Rothwell, Cordova, Alaska
Karl Brunstad, Kodiak, Alaska
W. O. Smith, Ketchikan, Alaska

ADMINISTRATION

All general routine business of the entire department is taken care of by this division, such as accounting, requisitions, vouchers, personnel records, general files and clerical work. All activities of the director are also covered in this division.

In order that the people of the Territory may become acquainted with the work of the department, the director travels widely, meeting with fishermen, sportsmen and other groups. Members of the staff are called upon from time to time to participate in these gatherings to present in considerable detail their various projects. A general discussion period after these meetings brings forth many ideas useful to the work of the department.

The director has worked very closely with the Pacific Marine Fisheries Commission and has attended all regular fall meetings. The department's research program on the king salmon troll fishery is closely correlated with the work being done in the Pacific Coast States and British Columbia. Since the king salmon migrations cover such a long expanse of seacoast it is highly desirable that equitable regulations be established along the entire coast. The same close cooperation between the several fishery agencies is being maintained in the biological investigations on the blackcod (sablefish) fishery.

Of special interest to Alaska fishermen was the visit to Juneau in February of Mr. Wm. C. Herrington, as mentioned in the section 'Fisheries Board'. It is believed that this meeting served to impress upon the State Department the keen interest of Alaska fishermen in the terms of the North Pacific Fishery Treaty and their desire to be represented on the membership of the commission when it is appointed.

A new administrative policy was inaugurated in 1952 with the appointment of a permanent man in Ketchikan to handle Watershed Management and Inspection programs of the department in that district. In order that this man may become thoroughly familiar with the problems of his district, an advisory committee was appointed to work closely with him. This committee is representative of resident commercial fishermen, fish workers, packers and the sportsmen. It is planned to make similar appointments in all major ports as funds become available.

As extra official duties, Director Anderson served as president of the Southeastern Alaska branch of the American Associationfor the Advancement of Science and, as such, was on the Executive Committee of the Alaska Division of this association. He also served as organizing chairman for the section on Fisheries at the Third Alaska Science Conference held at Mt. McKinley Park in September.

Based on preliminary explorations and assistance from this department, the Olympic Seafood Co. of Douglas carried forward in 1952 with a very productive year for shrimp and crabs. Further expansion of their activities resulted in an exploratory crab fishery in the ocean near Yakutat. Although this did not prove successful from a financial standpoint because of poor transportation and lack of cold storage facilities, it did demonstrate the presence of crabs in good abundance and of large size. It would, therefore, appear that the establishment of a properly equipped crab processing plant in Yakutat would be a feasible undertaking in the near future.

BIOLOGICAL RESEARCH

The research program of this division was continued along the same general lines as in 1951, with studies being confined to the troll salmon fishery of Southeastern Alaska, the salmon runs of the Taku River, and the blackcod (sablefish) fishery extending from Middleton Island in the Gulf of Alaska to Dixon Entrance and including both the offshore and inside waters. One permanent addition was made to the biological staff in 1952.

BIOGRAPHICAL SKETCH

EDGAR J. HUIZER was born September 15, 1923, in Newark, New Jersey, where he attended grade school and graduated from high school. After two years of schooling at the Middlebury College, Vermont, he entered the U. S. Navy. Upon his discharge two and one-half years later he had attained the grade of Ensign.

Coming to Alaska shortly thereafter, his education was continued at the University of Alaska. He graduated in 1948 having received a B. A. degree with a major in Geology and a minor in Biology. Graduate work in Fisheries and Wildlife was also taken at the University of Alaska. His summer vacation periods were spent in commercial halibut fishing and salmon seining out of Petersburg, Alaska. He joined the staff of the department on April 1, 1953, as a junior biologist being assigned to the Taku River king salmon investigation.

The following reports on the progress of biological investigations in 1952 represent the combined efforts of all members of the biological staff:

Walter Kirkness, Senior Biologist
Robert R. Parker, Senior Biologist
Quentin A. Edson, Junior Biologist
Edgar J. Huiser, Junior Biologist
Kenneth N. Thorson, Junior Biologist
Carl Weidman, Jr., Biological Aide

TAKU RIVER INVESTIGATION

The Taku River investigation on king salmon was continued during 1952. This program was started in 1951 and a preliminary report has been given in the annual report for that year. In addition, the program was expanded to include studies on the other four species of salmon (reds, pinks, silvers, and chums). The fish wheel was used to establish a catch index useful for measuring the comparative escapement of these fish on a yearly basis. A map of the Taku River watershed and waters adjacent to its mouth is presented in Figure 1. Statistics of the gill net catches of all species for 1945 to 1952 are presented in Tables 1 to 5.

KING SALMON

As in 1951 the mechanics of the king salmon run were again studied. These were: (1) size of the total run, i. e. catch plus escapement, (2) the length frequency and sex ratio of the run as it entered the river, the subsequent selective removals by size and sex of the gill net fishery with the resulting length frequency and sex ratio of the escapement, and (3) the

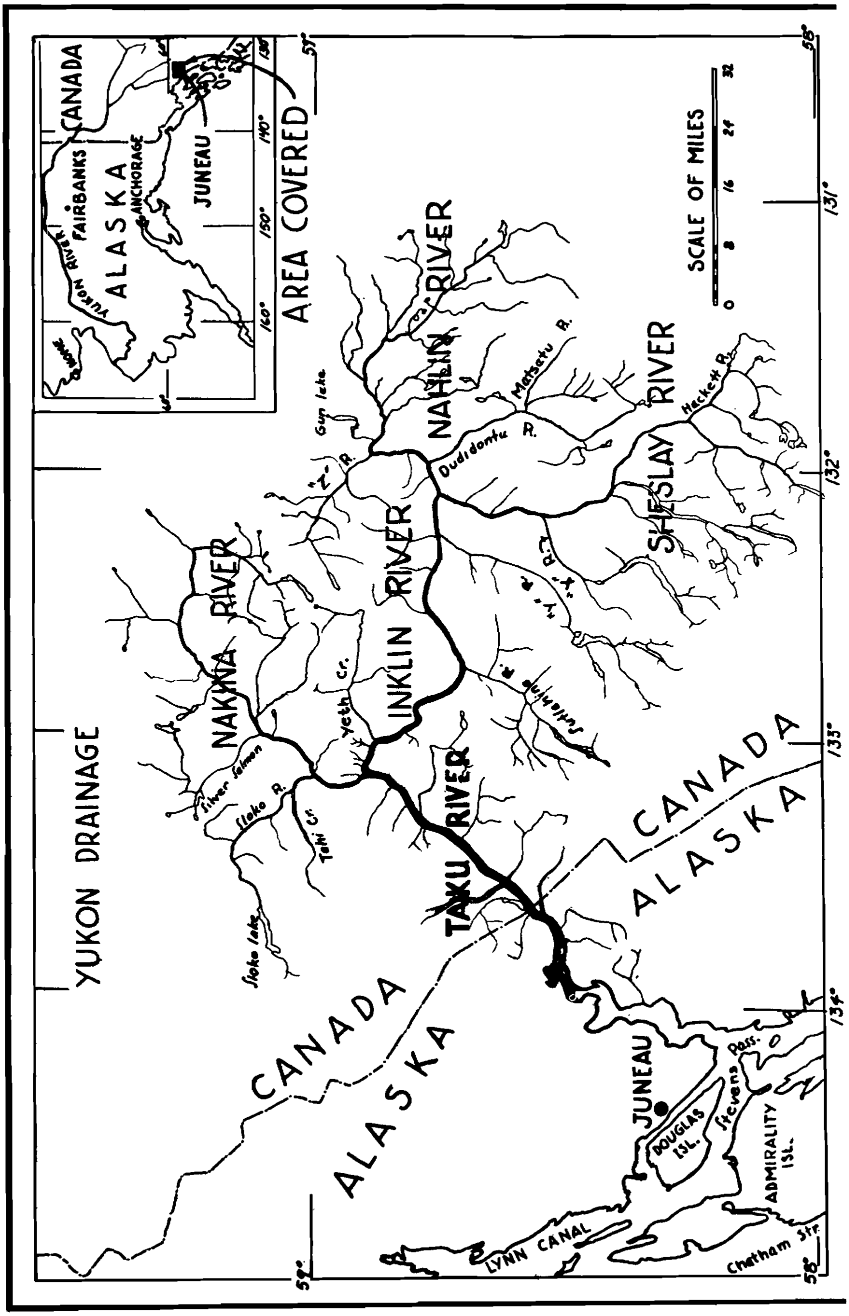

Figure 1. A MAP OF TAKU RIVER WATERSHED AND WATERS ADJACENT TO ITS MOUTH.

TABLE 1. CATCHES OF KING SALMON BY SEVEN DAY PERIODS
TAKU RIVER GILL NET FISHERY, 1945 to 1952. †

		1945	1946	1947	1948	1949	1950	1951	1952
May	1-7	0(0)‡	782(6)	361(6)	324(4)	580(6)	754(6)	183(1)	403(6)
	8-14	581(4)	1,527(6)	570(6)	1,607(6)	1,080(6)	1,364(6)	1,422(6)	2,523(6)
	15-21	1,257(6)	2,576(6)	1,203(6)	909(6)	2,092(6)	2,319(6)	1,402(6)	3,488(6)
	22-28	1,788(6)	1,572(6)	1,194(6)	2,110(6)	1,497(6)	1,955(6)	4,737(6)	3,210(4)
	29-4	483(3)	247(2)	244(3)	367(2)	472(2)	950(3)	1,315(3)	537(1)
June	5-11	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
	12-18	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	205(1)
	19-25	18(1)	5(1)	13(1)	90(1)	36(1)	0(0)	60(1)	1,446(5)
	26-2	52(6)	82(6)	132(6)	359(6)	360(6)	535(6)	287(6)	672(5)
July	3-9	69(6)	75(6)	75(6)	188(6)	225(6)	320(6)	135(6)	296(4)
	10-16	6(5)	45(6)	63(6)	64(6)	79(6)	118(6)	131(6)	71(4)
	17-23	2(1)	19(6)	19(6)	15(6)	38(6)	81(5)	100(6)	68(4)
	24-30	7(6)	3(6)	36(6)	2(6)	10(6)	28(5)	13(6)	11(4)
	31-6	0(6)	0(6)	2(6)	0(6)	2(6)	12(6)	6(6)	11(6)
August	7-13	0(6)	2(6)	0(6)	0(6)	1(6)	7(6)	0(6)	0(6)
	14-20	0(5)	0(3)	0(4)	0(4)	1(4)	0(5)	1(5)	0(4)
	21-27	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(6)
	28-3	0(2)	0(2)	0(3)	0(3)	0(3)	0(2)	0(1)	0(6)
Sept.	4-10	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)
	11-17	0(5)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(5)
	18-24	0(3)	0(3)	0(3)	0(4)	0(2)	0(3)	0(3)	0(5)
	25-1	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(5)
TOTALS		4,263	6,935	3,932	6,035	6,473	8,443	9,792	12,941

† Data by courtesy of U. S. Fish and Wildlife Service, Juneau office.
‡ Figures given in parenthesis indicate number of days fished during the seven day period.

TABLE 2. CATCHES OF RED SALMON BY SEVEN DAY PERIODS
TAKU RIVER GILL NET FISHERY. 1945 to 1952. †

		1945	1946	1947	1948	1949	1950	1951	1952
May	1-7	0(0)‡	0(6)	0(6)	0(4)	0(6)	0(6)	0(1)	0(6)
	8-14	0(4)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)
	15-21	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)
	22-28	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(4)
	29-4	0(3)	0(2)	0(3)	0(2)	0(2)	0(3)	0(3)	0(1)
June	5-11	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
	12-18	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	996(1)
	19-25	190(1)	442(1)	403(1)	469(1)	313(1)	0(0)	1,518(1)	9,724(5)
	26-2	2,549(6)	3,276(6)	2,994(6)	2,252(6)	5,862(6)	5,396(6)	12,394(6)	4,007(5)
July	3-9	2,750(6)	1,938(6)	2,825(6)	2,921(6)	3,682(6)	4,862(6)	8,848(6)	5,913(4)
	10-16	823(5)	1,572(6)	3,105(6)	2,916(6)	4,064(6)	4,257(6)	9,680(6)	6,290(4)
	17-23	130(1)	1,720(6)	1,791(6)	1,375(6)	4,821(6)	2,050(6)	6,196(6)	8,908(4)
	24-30	2,115(6)	1,106(6)	2,210(6)	1,358(6)	5,212(6)	3,733(5)	12,482(6)	5,178(4)
	31-6	3,726(6)	1,486(6)	2,358(6)	7,685(6)	4,210(8)	9,797(6)	9,901(6)	3,109(6)
August	7-13	661(6)	386(6)	5,572(6)	3,489(6)	2,719(6)	6,460(6)	2,383(6)	593(6)
	14-20	213(5)	233(3)	2,187(4)	495(4)	2,682(4)	1,961(5)	261(5)	387(4)
	21-27	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	74(6)
	28-3	15(2)	8(2)	413(3)	4(3)	0(3)	16(2)	3(1)	35(6)
Sept.	4-10	65(6)	44(6)	873(6)	5(6)	0(6)	11(6)	7(6)	11(6)
	11-17	51(5)	22(6)	116(6)	0(6)	0(6)	20(6)	7(6)	5(5)
	18-24	12(3)	0(3)	28(3)	0(4)	0(2)	2(3)	5(3)	2(5)
	25-1	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	1(5)
TOTALS		13,300	12,233	24,875	22,969	33,565	38,565	63,687	45,233

† Data by courtesy of U. S. Fish and Wildlife Service, Juneau office.
‡ Figures given in parenthesis indicate number of days fished during the seven day period.

TABLE 3. CATCHES OF PINK SALMON BY SEVEN DAY PERIODS
TAKU RIVER GILL NET FISHERY. 1945 to 1952. †

		1945	1946	1947	1948	1949	1950	1951	1952
May	1-7	0(0)‡	0(6)	0(6)	0(4)	0(6)	0(6)	0(1)	0(6)
	8-14	0(4)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)
	15-21	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)
	22-28	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(4)
	29-4	0(3)	0(2)	0(3)	0(2)	0(2)	0(3)	0(3)	0(1)
June	5-11	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
	12-18	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(1)
	19-25	16(1)	2(1)	217(1)	2(1)	105(1)	0(0)	264(1)	83(5)
	26-2	930(6)	32(6)	2,206(6)	218(6)	5,719(6)	150(6)	4,913(6)	415(5)
July	3-9	1,670(6)	176(6)	3,304(6)	2,832(6)	3,962(6)	692(6)	20,391(6)	1,490(4)
	10-16	638(5)	375(6)	2,250(6)	6,170(6)	2,839(6)	1,409(6)	29,885(6)	8,348(4)
	17-23	14(1)	648(6)	1,252(6)	1,421(6)	1,938(6)	921(5)	11,431(6)	15,339(4)
	24-30	256(6)	179(6)	370(6)	451(6)	1,064(6)	1,526(5)	4,810(6)	7,730(4)
	31-6	119(6)	46(6)	870(6)	762(6)	784(6)	1,470(6)	2,728(6)	5,519(6)
August	7-13	46(6)	17(6)	2,137(6)	409(6)	725(6)	214(6)	472(6)	45(6)
	14-20	10(5)	4(3)	1,035(4)	53(4)	329(4)	102(5)	30(5)	228(4)
	21-27	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	7(6)
	28-3	0(2)	12(2)	623(3)	6(3)	45(3)	3(2)	91(1)	6(6)
Sept.	4-10	0(6)	8(6)	281(6)	3(6)	96(6)	0(6)	4(6)	83(6)
	11-17	0(5)	32(6)	57(6)	0(6)	33(6)	0(6)	4(6)	0(5)
	18-24	0(3)	7(3)	7(3)	0(4)	3(2)	0(3)	4(3)	0(5)
	25-1	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(5)
TOTALS		3,699	1,538	14,609	12,327	17,822	8,487	75,027	39,293

†Data by courtesy of U. S. Fish and Wildlife Service, Juneau office.
‡Figures given in parenthesis indicate number of days fished during the seven day period.

TABLE 4. CATCHES OF SILVER SALMON BY SEVEN DAY PERIODS
TAKU RIVER GILL NET FISHERY. 1945 to 1952. †

		1945	1946	1947	1948	1949	1950	1951	1952
May	1-7	0(0)‡	0(6)	0(6)	0(4)	0(6)	0(6)	0(1)	0(6)
	8-14	0(4)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)
	15-21	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)
	22-28	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(4)
	29-4	0(3)	0(2)	0(3)	0(2)	0(2)	0(3)	0(3)	0(1)
June	5-11	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
	12-18	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(1)
	19-25	0(1)	0(1)	3(1)	1(1)	0(1)	0(0)	0(1)	0(5)
	26-2	0(6)	0(6)	8(6)	3(6)	0(6)	0(6)	47(6)	4(5)
July	3-9	0(6)	0(6)	0(6)	26(6)	0(6)	0(6)	21(6)	40(4)
	10-16	6(5)	0(6)	7(6)	161(6)	302(6)	0(6)	60(6)	77(4)
	17-23	8(1)	0(6)	5(6)	73(6)	673(6)	152(5)	243(6)	359(4)
	24-30	85(6)	0(6)	96(6)	223(6)	865(6)	366(5)	1,089(6)	440(4)
	31-6	381(6)	15(6)	324(6)	1,074(6)	814(6)	900(6)	1,214(6)	488(6)
August	7-13	112(6)	177(6)	274(6)	1,555(6)	672(6)	1,069(6)	1,283(6)	626(6)
	14-20	72(5)	201(3)	399(4)	620(4)	986(4)	1,343(5)	383(5)	761(4)
	21-27	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	2,361(6)
	28-3	290(2)	953(2)	2,917(3)	6,629(3)	1,067(3)	4,246(2)	756(1)	3,483(6)
Sept.	4-10	8,071(6)	5,316(6)	12,116(6)	11,556(6)	8,746(6)	4,388(6)	6,218(6)	5,131(6)
	11-17	14,196(5)	8,338(6)	2,787(6)	6,253(6)	6,383(6)	22,511(6)	9,857(6)	4,687(5)
	18-24	2,489(3)	2,395(3)	457(3)	7,210(4)	506(2)	3,326(3)	6,369(3)	6,732(5)
	25-1	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	4,676(5)
TOTALS		25,710	17,395	19,393	35,384§	21,014	38,301	27,540	29,865

† Data by courtesy of U.S. Fish and Wildlife Service, Juneau office. Catches are in number of fish.
‡ Figures in parenthesis indicate number of days fished during seven day period.
§ Data incomplete.

TABLE 5. CATCHES OF CHUM SALMON BY SEVEN DAY PERIODS
TAKU RIVER GILL NET FISHERY. 1945 to 1952. †

		1945	1946	1947	1948	1949	1950	1951	1952
May	1-7	0(0)‡	0(6)	0(6)	0(4)	0(6)	0(6)	0(1)	0(6)
	8-14	0(4)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)
	15-21	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)
	22-28	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(6)	0(4)
	29-4	0(3)	0(2)	0(3)	0(2)	0(2)	0(3)	0(3)	0(1)
June	5-11	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
	12-18	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(1)
	19-25	0(1)	0(1)	0(1)	0(1)	0(1)	0(0)	0(1)	9(5)
	26-2	2(6)	0(6)	0(6)	0(6)	5(6)	0(6)	9(6)	15(5)
July	3-9	8(6)	7(6)	25(6)	0(6)	5(6)	9(6)	15(6)	50(4)
	10-16	5(5)	24(6)	37(6)	0(6)	12(6)	35(6)	31(6)	74(4)
	17-23	2(1)	48(6)	55(6)	28(6)	37(6)	40(5)	32(6)	181(4)
	24-30	46(6)	37(6)	15(6)	37(6)	91(6)	22(5)	106(6)	106(4)
	31-6	45(6)	25(6)	187(6)	55(6)	100(6)	64(6)	90(6)	224(6)
August	7-13	16(6)	12(6)	61(6)	91(8)	86(6)	91(6)	75(6)	26(6)
	14-20	7(5)	7(3)	121(4)	53(4)	67(4)	107(5)	12(5)	57(4)
	21-27	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	101(6)
	28-3	61(2)	221(2)	1,194(3)	732(3)	402(3)	637(2)	84(1)	442(6)
Sept.	4-10	2,469(6)	1,718(6)	3,172(6)	2,572(6)	4,976(6)	1,771(6)	887(6)	1,669(6)
	11-17	7,272(5)	5,586(6)	788(6)	3,287(6)	3,869(6)	13,931(6)	3,120(6)	6,542(5)
	18-24	1,987(3)	5,796(3)	125(3)	724(4)	621(2)	4,024(3)	3,131(3)	6,489(5)
	25-1	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	7,960(5)
TOTALS		11,920	13,481	5,780	7,579§	10,271	20,731	7,582	23,945

† Data by courtesy of U.S. Fish and Wildlife Service, Juneau office. Catches are in number of fish.
‡ Figures in parenthesis indicate number of days fished furing seven day period.
§ Data incomplete.

racial components and their timing in the fishery.

Sampling of the troll fishery at the entrance to Taku Inlet was conducted from three trollers during the period from May 10 to 25. Those kings that were considered to be in excellent condition were tagged to determine the percentage of Taku and non-Taku king salmon in the trolling area. A total of 555 fish were tagged and 117 were killed and sampled for sex and maturity. Table 6 presents the results of the tagging experiment, and ably demonstrates that the May troll fishery in this area fishes on a predominantly mature Taku River stock. Of the 100 tag recoveries, 83 were recovered in the Taku River, 6 in other rivers, and 11 in salt water from Icy Strait to Dixon Entrance.

TROLL FISHERY

TABLE 6. RECOVERIES THROUGH DECEMBER 31, 1952, OF 555 KING SALMON TAGGED IN THE VICINITY OF TAKU INLET DURING MAY 1952.

AREA RECOVERED	NUMBER RECOVERED
Taku River gill net fishery	57
Canyon Island research station	20
Taku River spawning grounds	6
Chilkat River	3
Stikine River	2
Stephens Passage	2
Lynn Canal	3
Icy Strait	2
Frederick Sound	1
Salisbury Sound	1
Dixon Entrance	2
Skeena River, B. C.	1
TOTAL	100

The troll samples contained fish from 14 to 46 inches fork length. Figure 2 contains a bar graph derived from 558 measurements of mature fish taken aboard the three trollers. The total length of each column denotes the percentage of the entire sample falling in each 2. 5 inch size group. Each size group is further divided into the percentage of males and females in that group. The most numerous sizes taken were from 30 to 37. 5 inches with another peak at 25 inches. The very small (under 27. 5 inches) and the very large kings (over 40 inches) are almost entirely males while the fish comprising the peak (32. 5 to 37. 5 inches) are predominantly female. The sex ratio of females to males in the sample of mature fish was 1 to 1. 4.

The age composition of the troll sample is given in Table 7. The catch was composed almost entirely of five, four, and three year olds in that order of importance. Two and six year olds were practically absent from the sample.

TABLE 7. AGE COMPOSITION OF SAMPLES OF KING SALMON TAKEN BY TROLL AND GILL NET GEAR AND ON THE SPAWNING GROUNDS, IN PERCENTAGE OF SAMPLE.

AGE	TROLL	GILL NET	SP. GRDS.
2	0. 4	0	6. 4
3	26. 6	4. 1	42. 9
4	30. 4	33. 8	20. 4
5	40. 4	59. 4	28. 8
6	2. 2	2. 7	1. 5
TOTALS	100. 0 N=558	100. 0 N=1770	100. 0 N=265

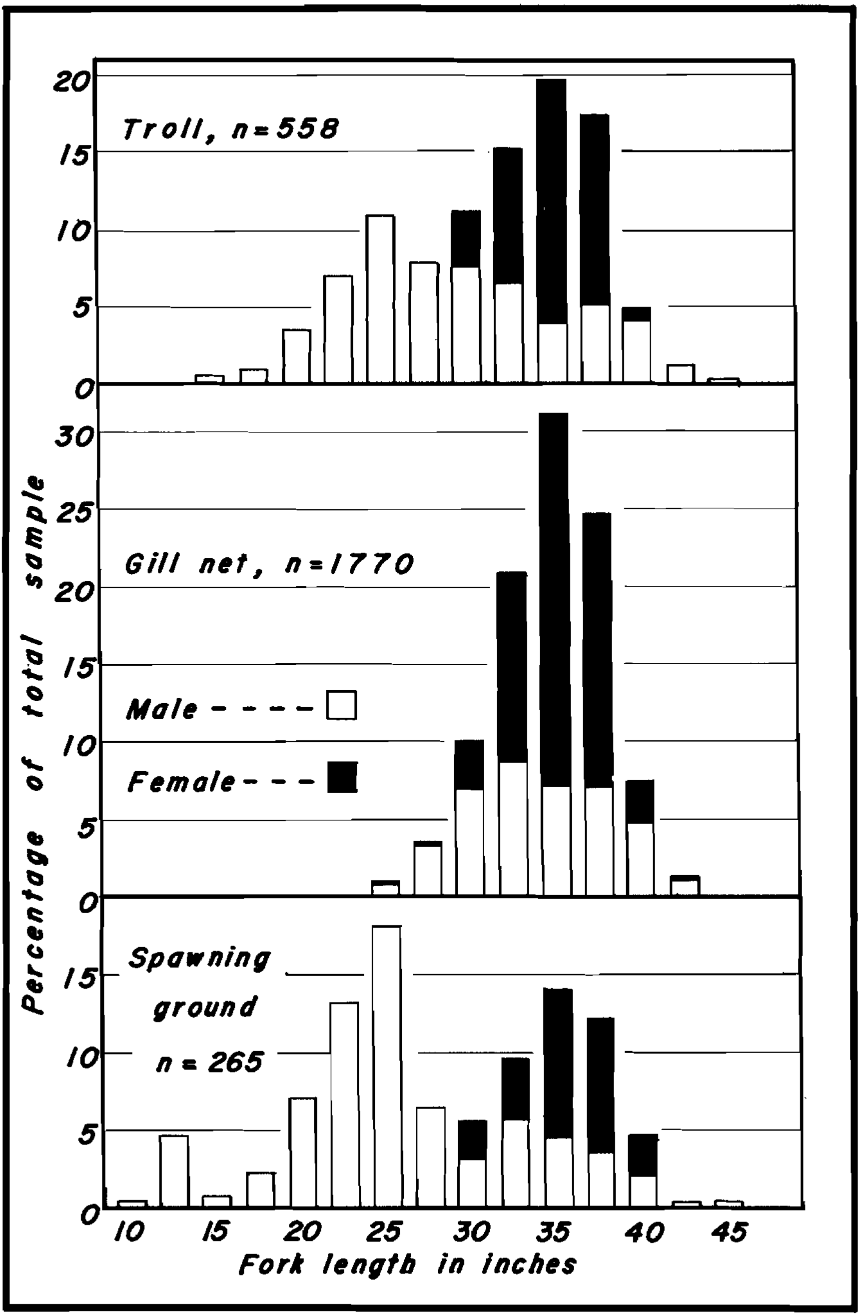

Figure 2. BAR GRAPH COMPARING THE LENGTH FREQUENCIES OF KING SALMON TAKEN IN THE TROLL, GILL NET, AND SPAWNING GROUND SAMPLES. THE DISTRIBUTION OF MALES AND FEMALES WITHIN THE FREQUENCY BARS IS ALSO SHOWN.

The gill net fishery (Plate 1) in 1952 took 12,941 king salmon during May, June, and early July. This is the largest catch of king salmon on record. Catch statistics were first compiled on the Taku River gill net fishery in 1945. Table 1 presents the Taku River gill net king salmon catches since 1945. The 1952 king salmon season began May 1 and ended May 31; during this time a weekly closure of 36 hours was in effect the first three weeks and 86 hours the last two. When the fishery reopened on June 18, the effort was directed toward catching red salmon and 6 inch mesh was used, however, considerable numbers of king salmon were taken after June 18.

GILL NET FISHERY

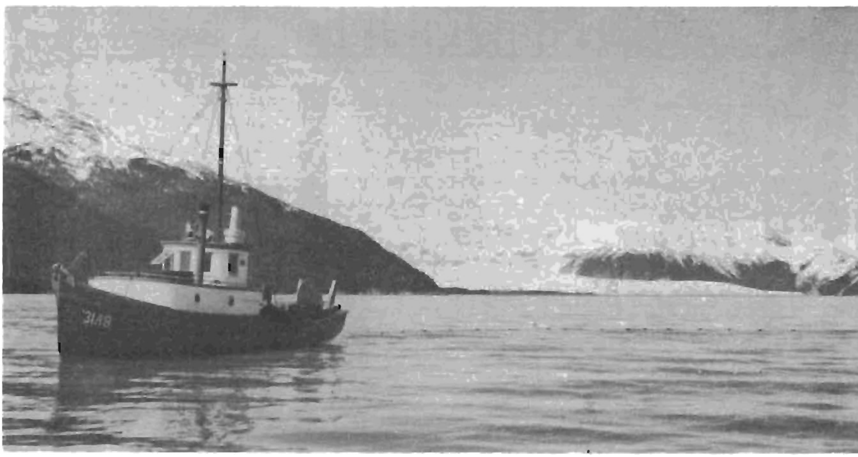

Plate 1. TAKU RIVER GILL NETTER. TAKU GLACIER IS IN THE BACKGROUND.

A biologist was stationed at the buying scow in Taku Inlet during the king salmon fishery in May. He recovered tags from the fishermen and sampled the catches for length and sex and took scale samples for age analysis. A total of 57 tags from the troll tagging (Table 6) were recovered in the gill net fishery, 54 in May and 3 in June.

A total of 1,770 king salmon were sampled from the gill net fishery in May as to size and sex. The May catch was 10,161 fish, therefore about 1 fish of every 6 caught was sampled. The fish ranged in length from 24 to 47 inches. Figure 2 presents the length frequency of the sample with the bars of the graph divided into the percentage of males and females in each 2.5 inch cell. The gill net fishery takes fish from 32.5 to 37.5 inches in the greatest numbers. King salmon under 30 inches formed less than 10 per cent of the sample. The gill net fishery is definitely selective to the larger fish as the mesh size commonly used by the fishermen in May is 8 3/4 inches. As the majority of the fish in the size range 32.5 to 37.5 inches are females, the gill net fishery is also selective as to sex. The ratio of females to males in the sample was 1 to 0.67.

The age composition of the gill net sample is given in Table 7. Five year olds were by far the most numerous, being 59 per cent of the total sample, with the four year olds forming the bulk of the remaining catch. Threes and sixes were only of minor importance and no two year olds were taken.

CANYON ISLAND SAMPLING STATION

As in 1951 the king salmon escapement was sampled at Canyon Island, 17 miles above the gill net fishery, principally by means of a set net fished from May 9 to July 10 (Plate 2). The purpose of the Canyon Island Research Station was (1) to get a daily catch index of the escapement, and (2) tagging to differentiate the various races of king salmon. The catch index was designed to be used as a comparison of escapement from year to year. A 35 foot set net of 9 inch mesh was fished in the same location daily for a period of 12 hours, from 7 A.M. to 7 P.M. A biologist tended the net at all times and as soon as a fish hit the net it was carefully removed and placed in a live box, then measured, scale samples taken, tagged and released. 1,632 kings were taken in the set net. Table 8 presents the Canyon Island daily catch index adjusted to the daily catch of 50 feet of net per 12 hour day.

Plate 2. RELEASING A KING SALMON WHICH HAD BEEN CAUGHT IN THE SET NET AND TAGGED.

It was found that any large daily rise in the water level tended to delay or slow the migration of the king salmon. The daily catch index also indicates a larger catch at Canyon Island after the week-end closure in the gill net fishery. However, by the time the fish reach Canyon Island there has been so much mixing of fish that came through the fishery before, during, and after the closed season that the closed period escapement is not evident until the data is refined to a considerable extent.

King salmon were tagged from both the set net and fish wheel, the total being 2,124. Various color combinations of tags were used for visual identification on the spawning grounds — the basic colors being red, yellow, blue, and green. The color combinations were achieved by using 5/8 inch tags and 3/8 inch baffles of the four colors. The baffles were affixed to the outside of the tag in any desired combination, which was changed weekly.

TABLE 8. 1952 CANYON ISLAND SET NET CATCHES OF KING SALMON, COMPUTED TO A STANDARD UNIT OF EFFORT EQUAL TO A 50 FOOT NET FISHED 12 HOURS PER DAY.

DAY	MAY	JUNE	JULY
1	----	68	26
2	--	70	22
3	--	46	9
4	--	70	--
5	--	97	--
6	--	91	11
7	--	77	10
8	--	61	6
9	8	41	7
10	8	36	4
11	12	54	
12	7	54	
13	4	41	
14	1	66	
15	6	51	
16	5	43	
17	7	66	
18	11	64	
19	31	49	
20	23	41	
21	26	19	
22	8	53	
23	21	58	
24	44	47	
25	59	24	
26	114	31	
27	139	21	
28	44	26	
29	19	33	
30	16	50	
31	44	--	
Total	657	1,548	95
TOTAL FOR 1952 SEASON			2,300

The two types of gear used for sampling at Canyon Island were both selective as to sizes. The set net, being selective to larger fish, took king salmon in the size groups 27.5 to 37.5 inches in the largest numbers with a peak at 32.5 inches. The fish wheel, being selective to the smaller fish, took king salmon from 12.5 to 25.0 inches in the largest numbers. Very few fish over this size were taken by the fish wheel. Two peaks of abundance appeared in the fish wheel catches — at 15.0 and 22.5 inches. As the fish were released alive no breakdown as to sex was made. Four year old fish were of the greatest abundance in the set net catch with fives next in importance. The fish wheel took primarily king salmon in their third and second year.

Spawning ground surveys of the two main clearwater tributaries, the Nahlin and Nakina Rivers, were carried on in late July and the first half of August to recover tags, estimate numbers of fish on the spawning grounds, and to sample the escapement for length frequency and sex ratio.

SPAWNING GROUND SURVEYS

On the Nahlin River and its tributaries, the Dudidontu and 'Z' Rivers, only scattered groups of spawning king salmon were observed. The seeding appeared to be very sparse on this system in 1952. A total of 36 of the color coded tags from Canyon Island were observed on the Nahlin River.

The Nakina River had an even larger escapement than in 1951 and the spawning grounds appeared to be adequately seeded. A total of 89 color coded tags were observed on the Nakina River.

The tag observations on the Nahlin and Nakina Rivers showed no difference in the time of arrival of fish of these two tributaries into the lower river. In fact, a complete overlap of timing was shown.

Dead king salmon on the spawning grounds were sampled for length and sex. Figure 2 presents the length frequency of the 265 fish sampled and the percentage of males and females present in each 2. 5 inch cell. The largest peak is at 25. 0 inches with a second smaller one at 35. 0 inches. The troll fishery, which is believed to be non-selective to fish over 20 inches, took fish in the 35. 0 inch group in the greatest number, indicating the removal of a substantial percentage of the larger fish by the gill net fishery. The large escapement of fish under 27. 5 inches, of course, gave an overabundance of males on the spawning grounds. The ratio of females to males was 1 to 2. 6.

The age composition of the spawning ground sample is given in Table 7 by percentage of sample. The three year olds were by far the most numerous being 42. 9 per cent of the sample, while the five year olds, which were second in abundance, formed only 28. 8 per cent.

Various differences occurred in the 1952 Taku River king salmon run compared to that of 1951. The gill net catch was greater by 3,149 fish and the escapement in 1952 was also larger than that of the previous year.

CONCLUSIONS

There was a considerable difference in the length frequency and age composition between 1952 and 1951 as measured by the troll, gill net and fish wheel samples. The length frequencies of these three types of gear in 1951 and 1952 are graphically portrayed in Figure 3. Table 9 presents the age composition for both years. King salmon below 35 inches formed a greater percentage of the sample in 1952 in both the troll and gill net samples than in 1951. As would be expected with the change in the length frequency of the 1952 king salmon run, the three and four year old fish were in greater abundance than in 1951, while the five year olds were of relatively less importance. The fish wheel samples for 1951 and 1952 effectively demonstrate the difference in the length frequencies and age composition for the smaller size groups between the two years. In 1951 by far the majority of the fish taken were from 13 to 16 inches. In 1952 there was a peak in this same size group but not of the same magnitude, while a second large peak occurred in the size range 18 to 25 inches which did not occur in 1951. In 1951 two year olds formed 60. 7 per cent of the sample and only 32. 6 per cent in 1952. It is evident that the peak caused

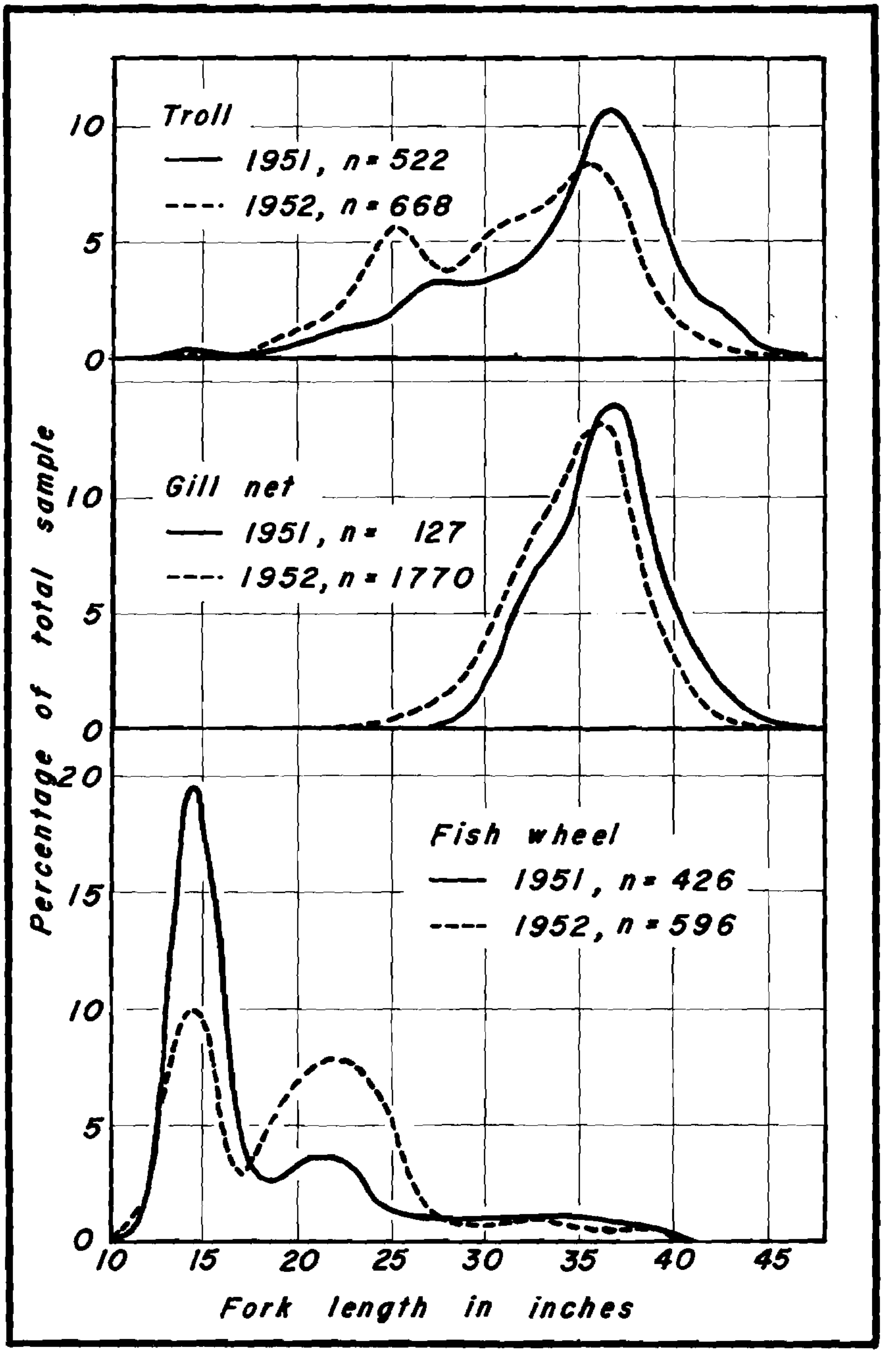

Figure 3. A COMPARISON OF THE LENGTH FREQUENCIES OF THE 1951 AND 1952 TROLL, GILL NET, AND FISH WHEEL SAMPLES OF KING SALMON.

TABLE 9. COMPARISON OF THE AGE COMPOSITION OF THE 1951 & 1952 TROLL, GILL NET, AND FISH WHEEL SAMPLES OF KING SALMON IN PERCENTAGE OF SAMPLE.

AGE	TROLL		GILL NET		FISH WHEEL	
	1951	1952	1951	1952	1951	1952
2	0.8	0.4	0	0	60.7	32.6
3	8.2	26.6	0.1	4.1	25.6	57.6
4	24.2	30.4	17.2	33.8	7.6	5.8
5	65.1	40.4	80.6	59.4	6.0	3.8
6	1.7	2.2	2.1	2.7	0.1	0.2
Totals.	100.0 N=522	100.0 N=558	100.0 N=127	100.0 N=1770	100.0 N=426	100.0 N=596

by the 13 — 16 inch fish was composed mainly of two year olds. In 1952 three year olds were in the majority, being 57.6 per cent of the sample, while they were only 25.6 per cent in 1951. The peak from 18 to 25 inches is composed mainly of three year olds. It can be expected then that the length frequency and age composition of the run will change from year to year, depending on the success of the spawning of each year's brood stock and the rate of survival of the resulting progeny.

OTHER SPECIES OF SALMON

All five species of salmon of the eastern North Pacific are present in the Taku River as spawning runs and the gill net fishery fishes upon all of these. Tables 2 and 5 present the statistics of the catches since 1945 of red, pink, silver, and chum salmon. The regular gill net season (after the king season May 1 to 31) was from June 18 through September 30. A weekly closure of 72 hours was in effect until June 30. From July 1 until July 31 the weekly closure was 96 hours. During August and September the weekly closure varied from 36 to 96 hours. During 1952 the fish wheel at Canyon Island was fished from May 12 through October 1 to establish an index of escapement of all species, useful for comparisons to be made from year to year (Plates 3 and 4). The weekly fish wheel catches are presented in Table 10.

Plate 3. LOOKING DOWNSTREAM AT THE FISH WHEEL, CANYON ISLAND.

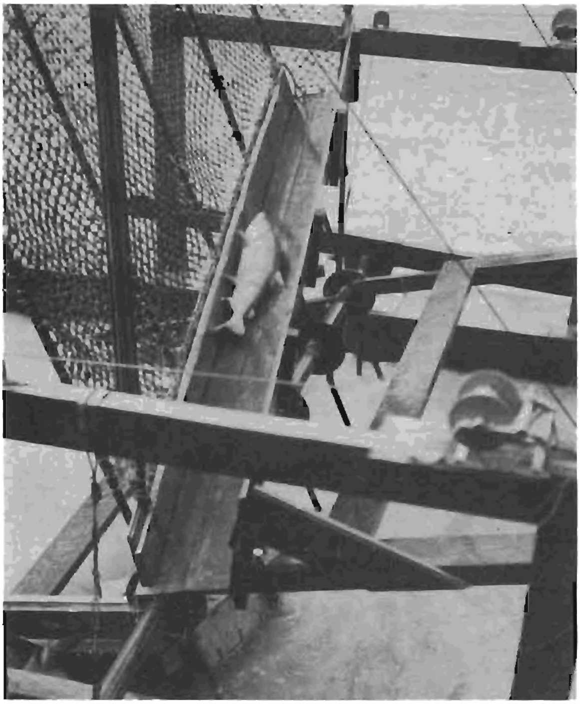

Plate 4. THE FISH WHEEL WITH A CHUM SALMON COMING DOWN THE SLIDE.

TABLE 10. 1952 FISH WHEEL CATCHES OF RED, PINK, SILVER, AND CHUM SALMON BY SEVEN DAY WEEK PERIODS COMPUTED TO A STANDARD UNIT OF EFFORT OF 24 HOURS PER DAY. †

		Nos. REDS	Nos. PINKS	Nos. SILVERS	Nos. CHUMS
June	5-11	5			
	12-18	77			
	19-25	261	1		
	26-2	208	113		
July	3-9	151	815		
	10-16	125	286	22	
	17-23	277	6,290	75	7
	24-30	318	2,583	77	4
	31-6	255	2,964	117	4
August	7-13	47	149	67	10
	14-20	36	33	118	23
	21-27	10	7	169	46
	28-3	4	4	268	80
Sept.	4-10	2	0	83	139
	11-17	0	0	32	38
	18-24	1	8	401	571
	25-1			514	1,165
TOTALS		1,777	13,253	1,943	2,087

†The wheel was inoperative on the following days: June 14, July 5, August 8 and 9, September 14, 15 and 16

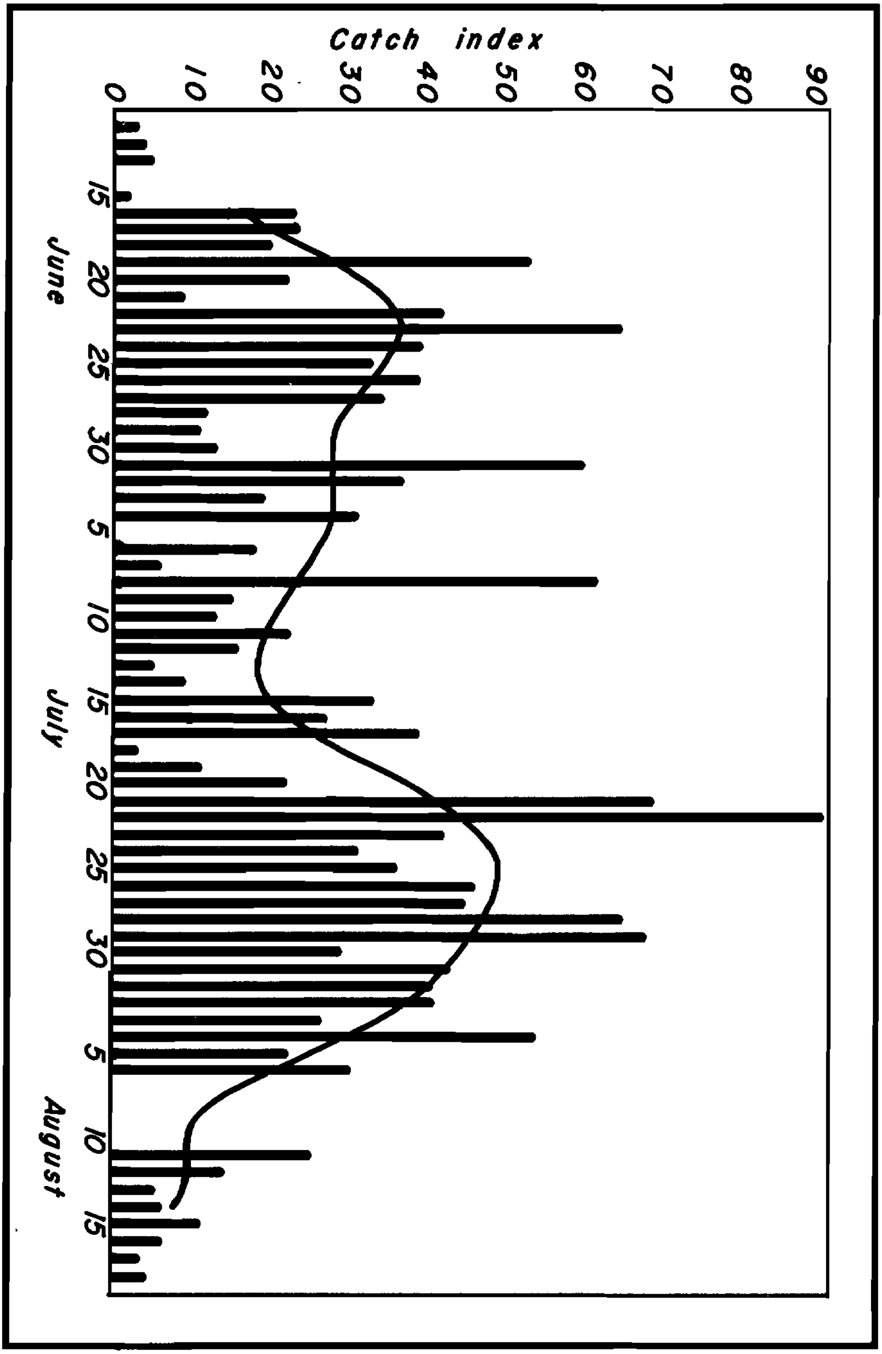

Figure 4. BAR GRAPH SHOWING THE DAILY FISH WHEEL CATCHES OF RED SALMON. THE SMOOTHED CURVE OF THE CATCH IS ALSO SHOWN.

The statistics for the red salmon catches since 1945 are given in Table 2. Red salmon are taken in numbers by the gill net fishery from the middle of June until the middle of August. Two peaks are apparent in the catch, one in the middle or later part of June and the other the last part of July. The red catches have fluctuated since 1945 with a low of 12,233 in 1946 and the highest catch being 63,687 in 1951.

RED SALMON

Table 10 presents the weekly fish wheel catch index of red salmon. The daily catch is graphically portrayed in Figure 4 where the catch index is shown unsmoothed and smoothed. The unsmoothed data is in the form of a bar graph, each bar representing the daily catch, while the smooth data is the curve. The smoothed line demonstrates the two peaks in the run as it passes Canyon Island; one being June 20 to 27, and the other from July 20 to August 5. The regular peaks and depressions in the unsmoothed data projecting above and below the smoothed curve occur usually from four to eight days apart and correlate closely with the weekly closed and open periods of fishing.

Spawning red salmon have been observed in Silver Salmon Lake on the Nakina River drainage and 'X' and 'Y' Lakes on the Inklin River drainage. Smaller populations have been seen on the Nakina, Nahlin, and Dudidontu Rivers. These are evidently river races for neither the adults or young enter any lake system. There is also a small spawning population in a lake tributary to the main Taku River a few miles above the Canadian border.

Pink salmon first appear in numbers in the gill net fishery in the last week of June and by the end of August the run is practically over; the peak occurring between the last week of June and the third week of July. Table 3 gives the catches since 1945. The catch has shown great fluctuations with a low of 1,538 fish in 1946 and a high of 75,027 fish in 1951.

PINK SALMON

The fish wheel catch index is presented in Table 10. Large periodic fluctuations are apparent in the catch index. These fluctuations are caused by many factors among which are (1) the timing of the various races, (2) differential escapement during the open and closed weekly periods, and (3) the rise and fall of the water level. That there is a different time of arrival in the lower river for pinks bound to different spawning areas is apparent as the Nakina River run which spawn from 65 to 80 miles from the mouth of the river are on the spawning grounds actively spawning by the first of August, while the gill net fishery is still taking pinks in fair numbers. The differential escapement during the open and closed weekly periods would hardly cause such large fluctuations, as the total catch is usually small compared to the escapement. In one tributary alone, the Nakina River, the escapement in both 1951 and 1952 was about ten times as large as the total catch. The gill net fishery is not designed to take pink salmon, but reds. Six inch or larger mesh is used throughout the period the pinks are in the river. This mesh size is too large to effectively fish the pinks. The rise and fall of the water level, however, does have a direct correlation with the movement of pink salmon in the river. Figure 5 compares the daily fish wheel catch with the daily change of the water level from the previous day at Canyon Island. The fluctuating line represents the daily fish wheel catches while each bar represents that day's change of water level from the previous day. The bars above the base line denote increases in the water level while those below denote decreases. Any large rise in the water level practically brought the upriver movement of pink salmon to a stop, while on decreasing or steady water levels the pink salmon continued their normal migration.

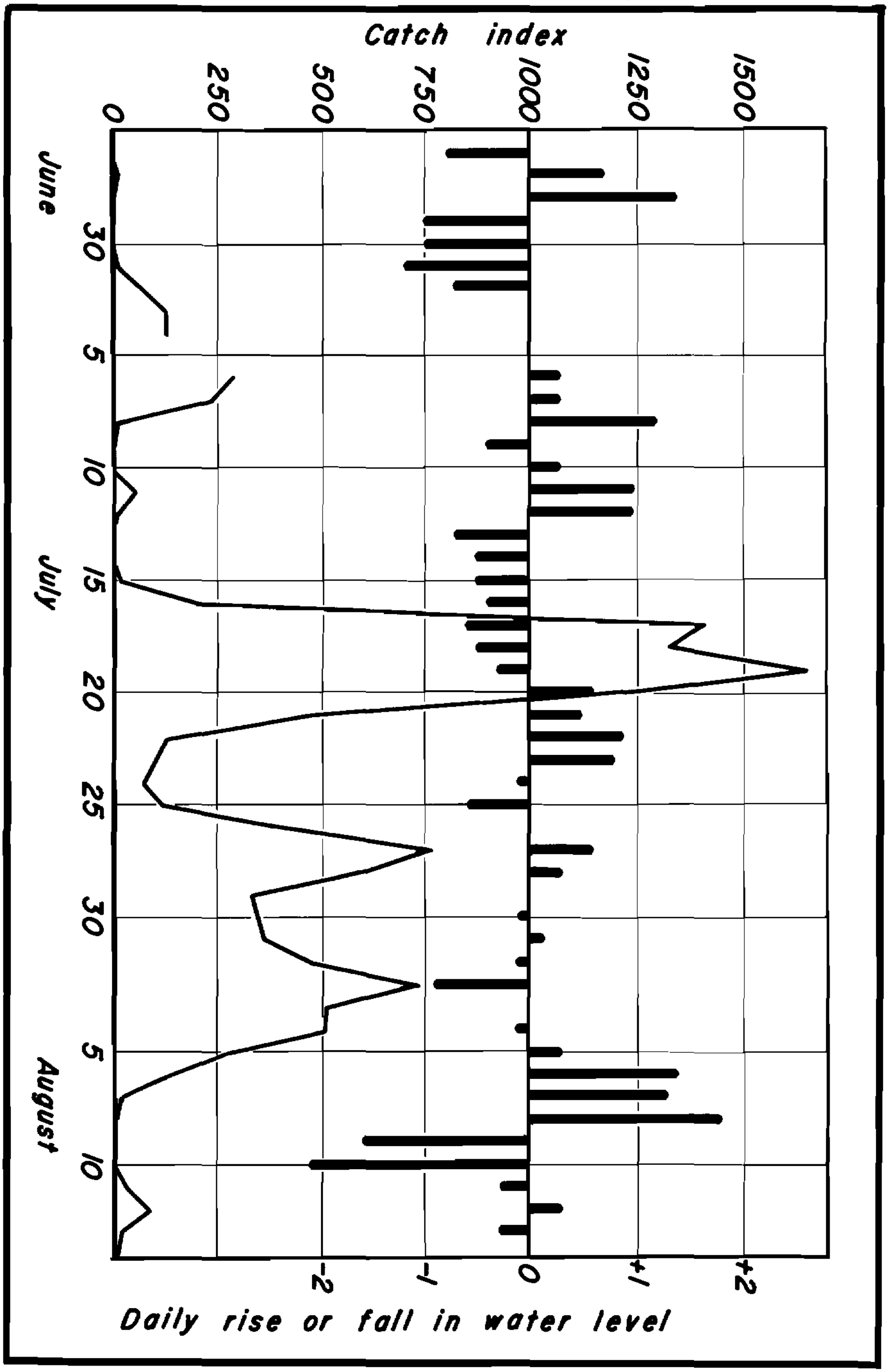

Figure 5. THE DAILY FISH WHEEL CATCH OF PINK SALMON COMPARED TO THE DAILY RISE OR FALL IN THE WATER LEVEL AT CANYON ISLAND.

Pink salmon spawn in most of the tributaries to the Taku River from the mouth to the Inklin River. The largest population is in the Nakina River from its junction with the Sloko River and upriver a distance of about nine miles. Here a falls effectively blocks further pink migration except to a few. However, king, red, and silver salmon successfully jump this barrier. No pink salmon have been seen in the Inklin River or any of its tributaries.

SILVER SALMON

Table 4 presents the silver salmon catches since 1945. The gill net fishery takes silver salmon from the third week of July until the season closes. In 1952, for the first time since statistics have been kept (1945), the season was extended through September 30. The highest daily catches were made after September 20 in 1952. The catches of silver salmon since 1945 have been relatively stable with a low of 17,395 in 1946 and a high of 38,301 in 1950.

The fish wheel catch index for silver salmon is presented in Table 10. The first silver was taken at Canyon Island on July 10, and on October 1 when the wheel was stopped silver salmon were still going by Canyon Island in fair numbers. No clearly defined correlation between the fish wheel catch index and the weekly closed period in the gill net fishery could be shown. There is a holdup of upriver movement of silvers at extreme rises in the water level, but this is not nearly as pronounced as for pink salmon.

Silver salmon spawn in nearly all of the available clear water tributaries from the mouth of the Taku River to the headwaters of the Nahlin, Dudidontu, and Sheslay Rivers. In the first part of September, silvers can be seen moving up into the high plateau country of the upper Nahlin and Dudidontu Rivers above where the kings spawn. Here the streams are sluggish and wind in and out through the tundra country. The upper Nakina River is blocked by a falls in the canyon to all salmon as reported for king salmon in the 1951 annual bulletin.

CHUM SALMON

Chum salmon are taken in the gill net fishery from July 1 until the seasonal closure. However, they do not appear in any numbers until the first week of September. The statistics of the chum catches since 1945 are presented in Table 5. The possibility exists that the season before 1952 closed too early (September 20) to catch the main body of chum salmon. The largest catch since 1945 was 23,945 in 1952 and 12,145 of these were caught in the eight days fishing after September 20. The smallest catch was 5,780 in 1947.

Table 10 presents the fish wheel catch index for chum salmon. The catch index was low until September 20 and then raised steadily until on October 1 when it was at its highest peak of the season. The fish wheel was removed from the river on this day.

CONCLUSIONS

It is apparent from the sampling by fish wheel at Canyon Island that the upriver movement of all the species of salmon is held up to some degree by sudden rises in the water levels, the pink salmon to a high degree and the other species somewhat less. Whether this is due to changes in current velocities or to a rise in turbidity (which accompanies the rise in water levels) or both, is unknown. The main portion of the red salmon escapement comes during the weekly closed period. There is not such a pronounced difference between the escapements during the weekly closed and opened seasons (or there is a greater mixing) in the other species. The pink salmon fishery is at a low rate of exploitation, mainly due to the fishery concentrating on reds with a mesh too large to effectively catch pinks. The season closure on September 20 has probably been too early to crop the greater portion of the chum run.

TROLL FISHERY INVESTIGATIONS

The troll fishery investigations of 1952 give promise of completing one phase of these investigations, namely the offshore troll tagging experiments. With the additional data gathered in 1952 from the area west of Cape Spencer, it appears that sufficient data have been gathered to conclude experiments in that area, and thus conclude such investigations of the offshore troll fishery.

RESULTS OF EARLIER TAGGING

During 1950 and 1951, tagging experiments were conducted in the area west of Cape Spencer. The preliminary data indicated that the stocks of fish in that area were composed largely of immature fish. Being immature, these fish did not immediately follow the migration pattern of other more mature stocks found in outside waters south of the Cape, and were therefore not recovered in comparable numbers at the outset. The early tag recoveries indicated that the mature elements of these stocks behaved in essentially the same manner as the kings to the south, but these mature tagged fish were not recovered in numbers deemed sufficient to be conclusive. Consequently, in 1952 a third tagging program was conducted to secure enough additional data to conclude the investigations in this area.

OFFSHORE TAGGING IN 1952

As the previous tagging experiments were conducted principally during July and August, the 1952 tagging was carried out during May and June, thus giving full seasonal coverage in the area. As in previous years, most of the tagging was conducted aboard commercial trollers. However, in order to secure full coverage of all sections of the area, it was necessary to charter a troller during the month of June.

SOUTHEAST ALASKA RECOVERIES

The best fishing was found in May when 105 kings were tagged, while in June 53 kings and 46 silvers were tagged. Three of the silvers were recovered, showing the same wide scattering effect that has previously been reported (Alaska Department of Fisheries Annual Report No. 2, 1950), one each being taken at Cape Cross, Cape Decision and at Point Retreat. The initial recoveries of the tagged king salmon followed, with two notable exceptions, a similar pattern to those previously tagged in the area. The first exception was that two of the fish tagged in May were recovered by Alaska Department of Fisheries biologists on their spawning ground surveys of the upper Taku River. This is the first such instance of any of the offshore king salmon being definitely identified with an Alaskan river.

The other exception was that the percentage of first year tag recoveries of these fish were higher than in any of the previous tagging experiments in the area (8.2% in 1952 as against the previous high of 4% in 1950).

AGE ANALYSIS

This is believed to be partly due to the fact that tagging was conducted early in the season and thus the tagged fish were available to the fishery over a longer season, and partly due to a slightly more mature stock of fish inhabiting these waters during May and June than was found later in the season. This is shown in Table 1. In this table the age analysis of all three years of sampling are listed in order of the time of year that the samples were drawn. By so doing it becomes more readily apparent that the percentages of fish four years old and older decrease as the season progresses.

TABLE 1. COMPARISON OF AGES OF KING SALMON SAMPLED WEST OF CAPE SPENCER DURING 1950, 1951, and 1952, EXPRESSED AS PER CENT OF YEARLY TOTALS.

Date of Tagging	No. Of Fish	% 2yr. Olds	% 3yr. Olds	% 4 yr. Olds	% 5yr. Olds	% 6 yr. Olds	Total
May, June (1952)	174	1	10	63	25	1	100%
July (1950)	177	8	29	59	4	--	100%
August (1951)	99	2	46	42	10	--	100%

As previously mentioned, this comparatively immature stock of kings tagged west of Cape Spencer were not immediately recovered along the migration route taken by the kings to the south of the Cape. However,

ORIGIN OF THE STOCKS

by combining all tag recoveries of the western kings, and comparing these to the tag recoveries of the southern kings, it may be seen that their origins are, like the southern kings, principally from rivers to the south. This is shown in Table 2 where recoveries of all tagging west of Cape Spencer, including the 1952 recoveries are combined and compared with the recovery data gathered from the 1950 tagging in the waters south of Cape Spencer.

TABLE 2. COMPARISON OF RECOVERIES OF KING SALMON TAGGED WEST & SOUTH OF CAPE SPENCER DURING 1950, 1951 AND 1952. ALL RECOVERIES TO DEC. 31, 1952.

	AREA AND YEARS OF TAGGING	
RECOVERY AREA	West of Cape Spencer 1950, 1951 and 1952 n= 405 KINGS	S. of C. Spencer 1950 n= 561 KINGS
Cape Cross to Sitka Sound	7	6
Sitka Sound to Dixon Entrance	1	10
Inside Waters, Southeast Alaska	3	1
British Columbia Coast	6	17
Northern British Columbia Rivers	0	11
Fraser River	3	13
Washington, Oregon Coast	3	13
Columbia River	17	24
TOTALS	40	95

The balance of the 1952 trolling season was spent on an investigation of the troll fishery in the northern portion of the inside waters of Southeastern Alaska. The stocks of king salmon inhabiting the inside waters had previously been shown to differ from the stocks in outside waters in degree of maturity, origins and in migrations (Alaska Department of Fisheries Annual Reports #2, 1950, and #3, 1951). A majority of the inside fish were found to originate in Alaskan and northern British Columbia rivers. This is illustrated by Table 3, which gives the recovery data from tagging operations conducted in Behm Canal during the winter of 1950-51, and which have not previously been reported.

PREVIOUS INSIDE TAGGING

TABLE 3. RECOVERY AREAS OF KING SALMON TAGGED IN BEHM CANAL, WINTER 1950-51.

AREA RECOVERED	NUMBER RECOVERED
Southeastern Alaska Rivers	2
Northern British Columbia Rivers	3
Area of Tagging	7
Inside Southeast Alaska Waters	9
Hecate Strait	1
Fraser River	0
Columbia River	0
Washington, Oregon Coast	0
TOTAL	22

The earlier investigations were quite localized, being carried out principally in Stephens Passage and in Behm Canal. Therefore, in 1952 the operations were expanded to include the waters of Lynn Canal, Icy and Chatham Straits, Seymour Canal, and the various bays and inlets contiguous to these waters.

THE 1952 TAGGING PROGRAM

In all, 617 kings were sampled. Of these, 370 were tagged and 90 were sampled for sex, maturity and feeding habits. The rest were carefully recorded and released, as they were adjudged too small to successfully carry a tag for any length of time. This tagging took place on a predominantly immature stock of fish, and so late in the year that the greater number of trollers had finished for the season. Therefore, the few tagged fish recovered in 1952 did not generally have time to move out of the area of tagging, and thus the data are insufficient for a detailed analysis at this time.

BLACKCOD RESEARCH

Research on blackcod (Anoplopoma fimbria) in Alaska was initiated in 1950 by the Alaska Department of Fisheries. This program is in cooperation with Canada and the Pacific Marine Fisheries Commission to conduct a coastwide study of this species. The first year was devoted to gathering all available information of the fishery and obtaining market samples for further study.

During 1951, blackcod were tagged for the first time in Alaskan waters. This operation was carried on during March, October and November of that year in Northern Chatham Strait. A total of 989 blackcod were tagged during these months from commercial long-line vessels. The tags were affixed to various parts of the fish to determine the most suitable method of tagging. Different types of tags were also employed during this experiment. Two plastic discs attached to the opercle by a pure nickel pin appeared to be the most satisfactory means of tagging.

1951 TAGGING

From this first tagging, six recoveries were made during 1952. These fish, which were free an average of 335 days, showed an average migration of 14 miles from the point of tagging. One of the reasons for this low recovery is probably due to the low fishing intensity in this area caused by the unattractive prevailing price of blackcod to the fisherman. This condition held true in all areas for blackcod during 1952.

1952 TAGGING

The tagging program was intensified during 1952 with operations extending from Middleton Island, in the Gulf of Alaska, to southern Chatham Strait. All tagging was conducted from a commercial long-line vessel from August through October. The number of tagged blackcod released in each area is given in Table 1. The Middleton Island area includes the waters adjacent to that island and westward to the Seward Gully. The Cape Spencer area includes the outside waters from Cape Cross northwestward to Icy Point. Chatham Strait has been arbitrarily divided into two tagging areas, north and south, at its junction with Peril Strait.

TABLE 1. NUMBER OF BLACKCOD TAGGED DURING 1952 BY AREA

AREA OF TAGGING	NUMBER TAGGED
Middleton Island	969
Cape Spencer	1,455
North Chatham Strait	935
South Chatham Strait	1,974
TOTAL	5,333

As each fish was landed aboard the fishing vessel, it was carefully examined for any injury which might have occurred from the gear. Only those blackcod considered to be in excellent condition were used for tagging. The remainder of the fish caught were sampled and marketed. Measurements and scale samples were taken for age and growth analysis. Area, depth, weather and sea conditions were also recorded. Fishing was conducted in depths ranging from 180 to 400 fathoms.

Only two tags were recovered during 1952 from this tagging, one off Cape Spencer and the other in southern Chatham Strait. Both tags were taken in the same area in which they were liberated and were free four days and 30 days, respectively. Since tagging was carried on until late fall and since the fishing intensity was low, few tag recoveries were expected.

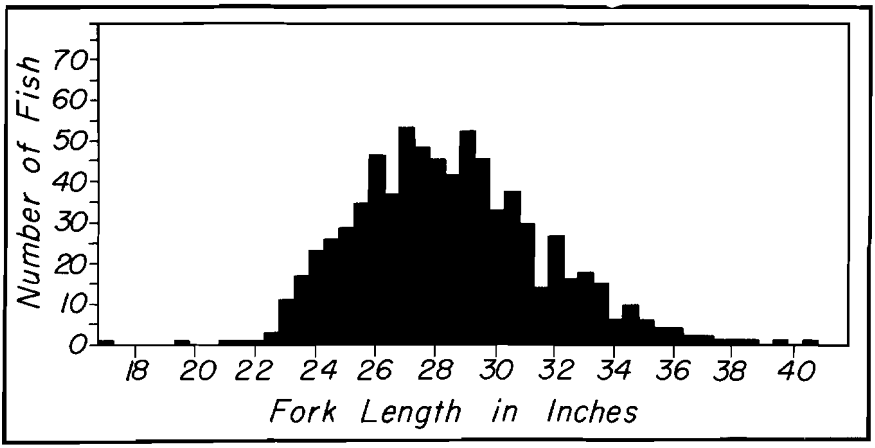

Figure 1. LENGTH FREQUENCY OF BLACKCOD CAPTURED IN THE MIDDLETON ISLAND AREA.

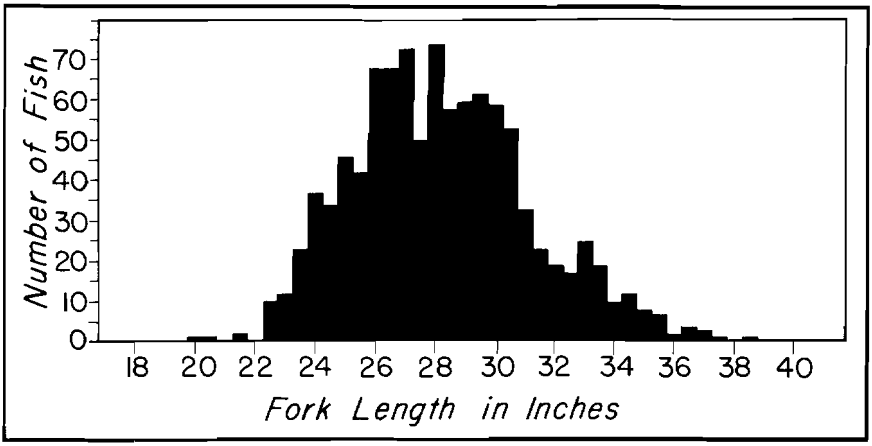

Figure 2. LENGTH FREQUENCY OF BLACKCOD TAKEN IN THE CAPE SPENCER AREA.

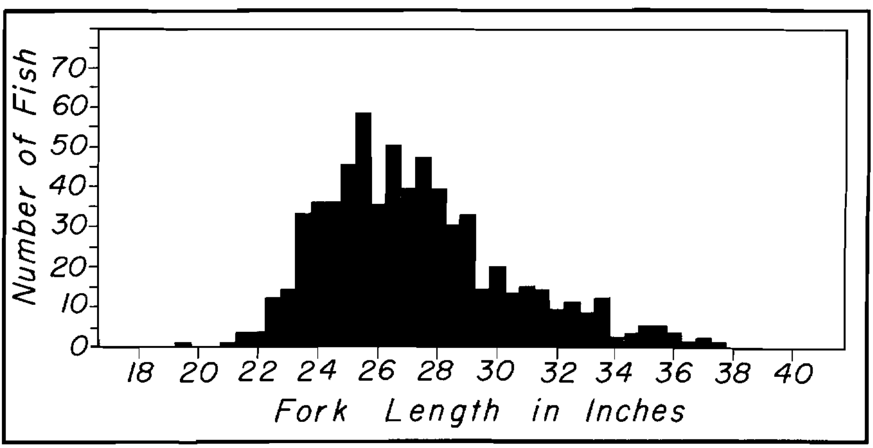

Figure 3. LENGTH FREQUENCY OF BLACKCOD FROM CHATHAM STRAIT.

From measurements taken of all blackcod landed, length frequency graphs were compiled and are presented as Figures 1, 2, and 3. While the size range of the samples from each area is fairly similar, the outside fish are larger than the inside stock. This difference of size composition is further demonstrated by the mean length as presented in Table 2. The two outside areas are very nearly equal but the mean length for the inside area is significantly less to indicate a separation of stocks might exist.

SIZES OF COMMERCIAL CATCH

The sex ratio and maturity, also presented in Table 2, are other factors indicating a difference of the outside and inside areas. Since the majority of the blackcod sampled were mature, the sex and degree of maturity were easily distinguishable.

SEX RATIO AND MATURITY

TABLE 2. MEAN LENGTH, SEX RATIO AND MATURITY OF BLACKCOD TAKEN IN 1952, BY AREA.

AREA	Mean Length In Inches		Percentage of Males & Females		Percentage Mature	
	Males	Females	Males	Females	Males	Females
Middleton Island	25.93	29.34	26.16	73.84	94.92	98.02
Cape Spencer	25.64	29.35	29.99	70.01	93.11	97.89
Chatham Strait	25.14	28.47	38.07	61.93	87.95	86.17

Before it can definitely be established that separate stocks of blackcod exist within Alaskan waters, results from the tagging program, age and growth analysis and other data must first be procured. Many of these results will be obtained in the forthcoming year.

INSPECTION

Since its creation in 1949, the Alaska Department of Fisheries has cooperated with the enforcement section of the Fish and Wildlife Service by furnishing them with temporary men during the fishing seasons in the various fishing areas of the Territory. During 1952, 25 men were employed, being distributed as follows:

13 inspectors in the Southeastern Alaska area;
1 inspector in the Yakutat area;
4 inspectors in the Copper River and Prince William Sound areas;
3 inspectors in the Cook Inlet area; and
4 inspectors in the Kodiak area.

The enforcement activities of these men are under direct supervision of officials of the Fish and Wildlife Service, which is charged with the promulgation of regulations and the enforcement of all fishery laws and regulations. In addition to their enforcement duties, all Territorial inspectors are instructed to gather general information in their districts on salmon runs and escapement, stream flows, weather conditions and other data that may be of value to the Biological Research and Watershed Management Divisions of the department.

The department has requested that these inspectors, as far as possible, be placed near the mouths of red salmon streams so as to give added protection to this most valuable species. After the red salmon runs have passed, some of the men are moved to important pink salmon streams for the balance of the season.

PREDATOR CONTROL

The following report was prepared for presentation to the 1953 legislative committees dealing with appropriations. Since its contents should prove of interest to the fishermen and general public, it is herewith presented in its entirety.

"For many years the Territory of Alaska has expended large sums of money in payment of bounties on hair seals. This was climaxed when the 1949 session of the Territorial Legislature set the bounty at $6.00 and covered all the Territorial waters from Dixon Entrance to Demarcation Point. An appropriation of $100,000.00 was made to cover bounty payments. Within less than a year this entire amount was disbursed, but the seal scalps kept pouring in to the Territorial Treasurer, who was in charge of bounty payments. It became necessary for the 1951 Legislature to make a deficiency appropriation of nearly $200,000.00 to cover all bounty claims for the 1949-51 biennium.

A study of the records revealed that the greater part of this total of nearly $300,000.00 was paid for hair seal scalps turned in from the northern and western coastal sections, where there are no important salmon fisheries and where this animal is an article of food and commerce among the natives.

There is ample evidence to show that hair seals are predatory on salmon at the mouths of many streams. In certain rivers having important gill net fisheries these animals also do considerable damage to the gear. The Copper and Stikine Rivers are notable examples. Gill netters in both these districts can give abundant testimony from their own experiences relating to damages by hair seals.

However, when one deals with areas removed from these and other similar locations, damage to the salmon runs by hair seals is problematical. All the available information seems to point to the contrary. While an occasional salmon may be taken, the bulk of the hair seal's food consists of fish and shellfish, largely bottom types and mostly non-commercial.

In view of the above the 1951 Legislature decided to make some changes in the set-up. Although reluctant to eliminate entirely the old established bounty system, they did reduce the amount of the bounty from $6.00 to $3.00. Furthermore, the bounty area was drastically reduced, so that, except for a section of the coast adjacent to the Seward Peninsula, only the major salmon fishing areas were covered. In addition $50,000.00 was appropriated to the Alaska Department of Fisheries for the control of hair seals, sea lions and other fish predators during the 1951-53 biennium.

Since the U. S. Fish and Wildlife Service was also planning on some predator control work a meeting of officials of the Federal and Territorial agencies was called to avoid any duplication of effort. By mutual consent the Fish and Wildlife Service agreed to confine its work principally to sea lions and the Alaska Department of Fisheries to hair seals.

Available information seemed to indicate that hair seal herds are of a local nature and do not make long migrations like the fur seal. It therefore appeared logical that efforts to reduce and control their numbers should be limited and concentrated in the areas of greatest damage to the salmon runs. Accordingly, the Stikine and Copper River districts were selected for the initial experiments on hair seal control. Success of such projects would minimize the damage from these predators and save the Territory money as well.

STIKINE RIVER DISTRICT

On one or two occasions in the past the local fishermen had hired hunters to reduce the hair seal herds on the Stikine River delta. Although results were encouraging, the amount of funds available was insufficient to do a thorough and continuing job. However the efficacy of such a method was demonstrated.

Accordingly, two expert hunters were hired in the spring of 1951 to conduct the control campaign. Each man was paid $500.00 per month for a period of 4 1/2 months from the first of May to the middle of September. The hunters furnished their own equipment, supplies, and food, including outboard boats, motors, gas, oil, camping outfit, rifles and ammunition. Since a large percentage of the seals sink upon being shot no special attempt was made to recover the bodies to obtain the scalps. To do so would have slowed up the operation immeasurably. After all the prime purpose of the control is to destroy seals and not to recover scalps. However, whenever a body is easily recovered the scalp is removed and the animal opened to note the stomach contents. The hunters' word must be taken on the number killed. Each man was carefully selected and the integrity of each vouched for by the fishermen of Wrangell. The reported kill for the 1951 season was 946 hair seal.

The same two men were hired for the 1952 season for the period April 15 to September 15. They were employed under the same conditions as during 1951 with a pay increase of $25.00 per month. The seal population seemed to be somewhat less in 1952, and the total take was less in spite of a season one month longer. The reported kill was 768 seal and 18 sea lions, which were shot incidental to their hair seal operations. This made a total of 1,714 hair seals for the two year period.

COPPER RIVER DISTRICT

Because of the larger area and greater concentration of hair seals, it appeared that the hiring of hunters would not prove as effective as it might in the Stikine district. Some preliminary experiments by bounty hunters seemed to indicate that the use of dynamite "depth bombs" might prove quite effective. It was, therefore, decided to give this method a thorough test and results have proven highly successful.

Since "bombing" might prove disastrous to salmon, no seal expeditions have been conducted during the actual salmon runs. The first trial was started on October 16, 1951. This was preceded by an aerial survey on October 13 to fix the location of the larger herds.

A local seine boat with skipper and four men were hired at Cordova for this initial experiment. Two large skiffs with 25 H.P. outboards completed the expedition. The seine boat served as headquarters, while the actual "bombing" was carried out from the skiffs, which were capable of high speed.

On the Copper River flats the hair seals haul out on the sand bars in great numbers, sometimes as many as 1,000 in a herd. Upon the approach of a boat the seals habitually slide off the bar into the relatively shallow water of the channels. Success of the "bombing" method depends essentially on this habit of the seal.

The dynamite was prepared in advance by fastening from 10 to 30 sticks into one bomb, with a fuse and cap for igniting. As the skiff raced down the channel the bombs were lit from a blow torch and thrown overboard among the seals as they came off the bars. After the "bombing run" the skiff was run back over the channel at slow speed to allow the men to pick off the cripples with a shotgun. Most of the carcasses sank or drifted out to sea. Those that washed up on the bars were opened to examine the stomach contents and the scalps were destroyed.

In this first experiment it was estimated that 500 seals were killed in a period of 6 days. Since then five more expeditions have been conducted. The men have gained experience and details of method have been perfected, such as increasing the size of the dynamite bombs to 50 or more sticks.

After each "bombing run" an actual count was made of the floating carcasses and from this an estimate made of the total kill. The combined total of the six expeditions was estimated at 6,789 seal.

The men employed for this work have been paid at the rate of $25.00 per day with the skipper receiving $50.00 per day to compensate for use of his seine boat. To date expenditures by the Department have been as follows:

Salaries & Wages	$11,727.00
Purchase of dynamite, caps & fuses . .	11,221.36
Purchase of outboard motors, gas, oil, miscellaneous supplies, charters, etc.	4,943.22
	$27,891.58

In addition, approximately $5,000.000 has been expended by the Cordova Seal Committee. This group composed of representatives of the fishermen and packers collected this amount from the cannery interests and fishermen's union of the Cordova district. This money was pledged on the basis of matching $1.00 for each $5.00 allotted by the Alaska Department of Fisheries. Cooperation by the Cordova people has been excellent.

TAKU RIVER DISTRICT

The Department was extremely fortunate in its selection of a fishery inspector for the Taku River district during the 1952 season. In addition to being a capable enforcement officer he is an excellent shot. While on his patrol work and during occasional trips up the river he accounted for 123 hair seals. Only the cost of the ammunition was charged to the predator control fund.

Although the seal population of Taku Inlet is relatively small compared with the other two districts, depredations by these animals have at times been annoying to the gill netters of the Inlet.

RESULTS

Circumstances have not permitted making an accurate seal census before and after instituting control measures. Results can only be judged by the apparent greater scarcity of the seals and by remarks from the fishermen. In all three districts they have expressed themselves as being well satisfied with results to date and many have indicated that the control program of the Department has been vastly more effective than the bounty system.

SUMMARY OF HAIR SEAL BOUNTIES PAID BY THE TERRITORY

Biennium	First Division	Second Division	Third Division	Fourth Division	Total
1947-49	6,985	150	5,292	3	12,430
1949-51	12,219	24,440	12,582	291	49,532
1951-53	5,137	9,150	2,741	194	17,222
				Total	79,184

NOTE:

During the 1947-49 biennium the bounty payment was set at $3.00 and covered the following coastline: the southern coast of Alaska and east of the 152nd Meridian, and the waters of Bering Sea, and lying within a line drawn from the tip of Cape Darby to Port Safety.

During the 1949-51 biennium the bounty was $6.00 and covered the entire coastline from Dixon Entrance on the south to Demarcation Point (Canadian boundary) in the Arctic.

During the 1951-53 beinnium the bounty was again set at $3.00 and covered the following coastline: the southern coast of Alaska east of the 152nd Meridian, and the waters of Bristol Bay and the coastal waters within three miles off the mainland from Stebbins to Cape Krunzenstern, inclusive. "

SPORT FISH

The year 1952 marked the first successful hatchery operation and stocking of trout in the interior of Alaska. It also became possible to expand the sport fish program to the Anchorage-Palmer area during the year. Another experienced sport fish biologist was employed with permanent headquarters in Anchorage to handle this phase of the work.

BIOGRAPHICAL SKETCH

ALEX H. McREA was born December 28, 1916, in Whatcom County, Washington, where he completed his grade and high school education. His academic training was at the University of Washington, Seattle, where he received a Bachelor of Science degree in fisheries in June, 1942. During summer vacations he fished commercially for salmon and did biological work for the Fish and Wildlife Service in the Columbia River Basin and on the Pribilof Islands.

Upon his graduation he joined the staff of the Washington State Department of Game. He worked in one of their trout hatcheries until late in 1942, when he was called into active service as a member of the U.S. Naval Reserve. He was discharged in 1945 with the rank of Lieutenant, Senior Grade, when he was again employed by the Washington State Game Department, this time as district fish biologist, being stationed in the Grays Harbor district. Later he was transferred to the Whatcom-Skagit Counties district, and remained there until joining the Alaska Department of Fisheries in April, 1952.

SPORT FISH

by
E. S. Marvich and Alex H. McRea

The recent population increase in Alaska has caused a marked depletion in sport fish stocks. This has been particularly true in the lakes and streams adjacent to the larger population centers. Wherever lakes or streams are available by road from Fairbanks or Anchorage, there has been a sharp decline in the sport fish populations. As the decimation in the sport fish stocks became apparent, the angler was forced to travel farther and farther afield to obtain good fishing. Angling in the remote watersheds remains excellent since the expenses involved in time and travel preclude a heavy sport fishery. The problem in management and rehabilitation in Alaskan waters is, therefore, acute and immediate in waters available by road or boat from the cities. As time goes on and Alaska's population increases, the more remote waters will be affected.

In 1951 the department inaugurated a program of lake rehabilitation in Alaska. This program was discussed in detail in the department's annual report for that year. Basically, the program entails the complete eradication of an undesirable fish population in a lake by the use of a rotenone bearing substance. After the toxic rotenone has dissipated, the lake is stocked with game fish. Since it is difficult for the layman to visualize that which occurs beneath the surface of the water, it might be pertinent to strike a correlation between the lake rehabilitation program and farming. A farmer clears his land, plants a crop and reaps a harvest. The department cleans a lake of trash fish by the use of rotenone, stocks small game fish at a nominal cost per thousand and expects the angler to reap the harvest. Lost Lake, a 94 acre lake about 55 miles southeast of Fairbanks on the Richardson Highway, was cleaned by the use of rotenone in September 1951.

Cleaning out a lake of all fish life necessitates the development of a source of small sport fish for stocking. In the spring of 1952, Lost Lake was free of all fish life; the toxic material had dissipated and the food chain had built up to its maximum. Lost Lake was ready for stocking.

Two sources of sport fish were available. The trapping of local stocks either for direct stocking as fry or for spawn taking purposes provided one solution; another solution was the importation of desirable fish eggs. The cost in manpower and capital outlay for the construction of trapping locations for local stocks of either fry or eggs made this approach economically unsound due to the small number of fry required. Sport fish trapping, because of its uncertainness, was another disadvantage. The purchase of eggs from an outside source appeared to be the best solution.

During the winter and spring months of 1952, a sport fish hatchery was built at the outlet of Birch Lake, 55 miles southeast of Fairbanks on the Richardson Highway, in order to handle the sport fish eggs. Observations had been made on this water supply for a six month period prior to the start of construction. With such meager data on water flows and temperature recordings, it was considered wise to construct the hatchery as economically as possible. In the states, observations would have been made for several years before fish hatchery construction would have been attempted.

The hatchery building was built using reclaimed lumber. A shell of 2x4's and shiplap, covered over with aluminum siding, was used to house the hatching troughs. The building was constructed 12 feet by 16 feet in size with the idea in mind for placing four troughs in operation during 1952. (Plate 1.) If warranted, the building could accommodate seven troughs in 1953.

Plate 1. **FAIRBANKS HATCHERY.**

The Birch Lake outlet, which was used for the hatchery water supply, flowed approximately one mile into a large gravel pit pond adjacent to the Richardson Highway. This pond dumped through four culverts under the highway where the outlet flowed another several hundred yards before emptying into the Tanana River. The hatchery water intake box and pipe were placed in the large pond. This pond served to settle out any sediment or debris that may have been discharged down the outlet. One hundred ninety-two feet of four inch aluminum tubing was used for intake pipe from the pond to the hatchery head trough. The pipe led from the intake box in the pond, through the culvert under the Richardson Highway, and down to the hatchery which was located on the Tanana River side of the highway. There was sufficient head in the pond to insure adequate gravity flow of water through the hatchery.

Four aluminum hatchery troughs 10 feet long, 12 inches wide and 8 inches deep were used for egg incubation and fry development during the first part of the season. As the summer progressed, it was necessary to build an additional trough from spruce in order to accommodate the rapidly growing fish.

Rainbow trout were selected for introduction into Lost Lake and other interior Alaska lakes for the following reasons:

(a) Rainbow trout have a broad temperature tolerance and have the ability to adapt themselves to varied ecological conditions.
(b) Rainbow trout are easily handled in a hatchery and during fry transportation.
(c) Rainbow trout have produced sport fishing in lakes with ecological conditions similar to those found in interior Alaska.
(d) Rainbow trout are a highly desirable sport fish.

The procurement of good rainbow trout eggs presented a problem. Native Alaska rainbow eggs were the first choice; however, the establishment of a trap and egg eyeing station to handle the Alaska stock made this approach economically unsound. The requirements were for 105,000 eyed rainbow trout eggs; these could be purchased in the states for $300.00. It would have been impossible to trap and handle this number of eggs from native stock for the amount of money involved.

Eyed rainbow trout eggs were ordered from the states. The "eyed" egg stage is a phase in the egg's development in which the egg is partially incubated and very resistant to shock. (Plate 2.) This stage is readily distinguishable by the deposition of dark eye pigment on the developing embryo. The eggs were shipped in a well insulated packing case with the eggs arranged in trays. On top of the trays of eggs was a tray of ice; as the ice melted, the eggs were continually covered by a film of water. This water film kept the eggs cool and provided a medium through which oxygen could be absorbed and carbon dioxide could be discharged by osmosis.

The eyed eggs were ordered from a supplier that had broodstock maturing at three years of age. Eggs were desired from three year old maturing broodstock since their progeny would have a minimum of precocious males maturing in one year. The broodstock were late spring spawners, they had a rapid rate of growth, and they had a high resistance to parasitic infection.

Two shipments of eyed rainbow trout eggs were received at the hatchery. The first shipment of 30,000 eggs arrived on May 20, 1952, while the last shipment of 75,000 eggs arrived on June 16, 1952. The eyed rainbow trout eggs were placed in the hatching baskets in the troughs where egg incubation continued until all the eggs had hatched. (Plate 3.) The hatching basket was held off the bottom of the trough by wire rods. Water entered at the head of the trough and continually bathed the eggs so that the living egg could absorb oxygen and discharge its waste products. The baskets were made with a special wire weave so that the cylindrical egg was retained in the basket. As soon as the elongated yolk sac fry hatched, it dropped through the wire slots in the basket and down to the bottom of the hatchery trough. When the eggs were all hatched, the egg baskets were removed so the fry had full utilization of the entire hatchery trough. The first lot of eyed rainbow trout eggs hatched in 17 days while the last lot took 11 days. The decrease in hatching time for the last lot of eggs was due to the increase in water temperature as the season progressed; warmer water caused an increased development rate in egg incubation.

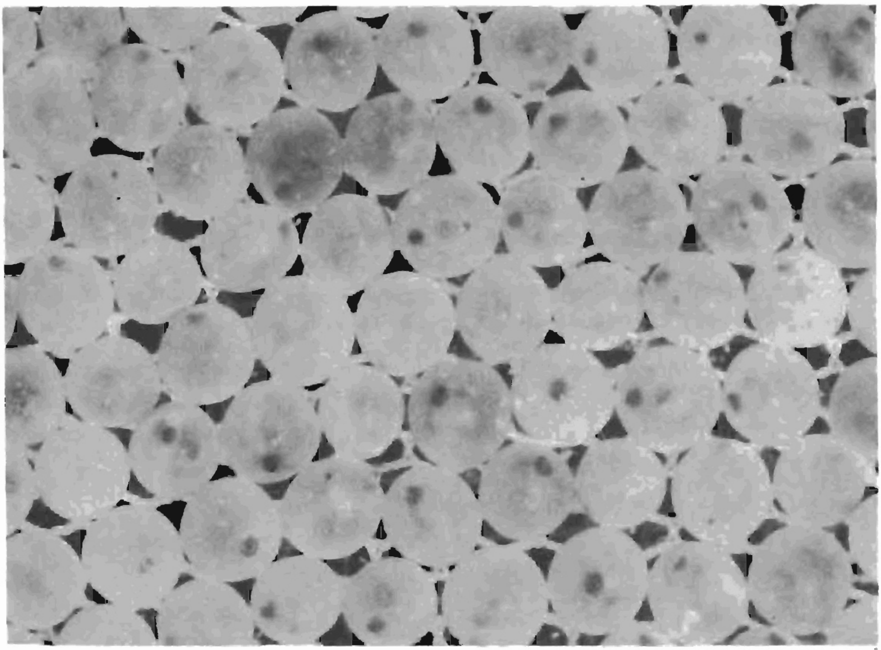

Plate 2. EYED RAINBOW TROUT EGGS, NOTE EYE SPOTS ON DEVELOPING EMBRYO, TWO TIMES NATURAL SIZE

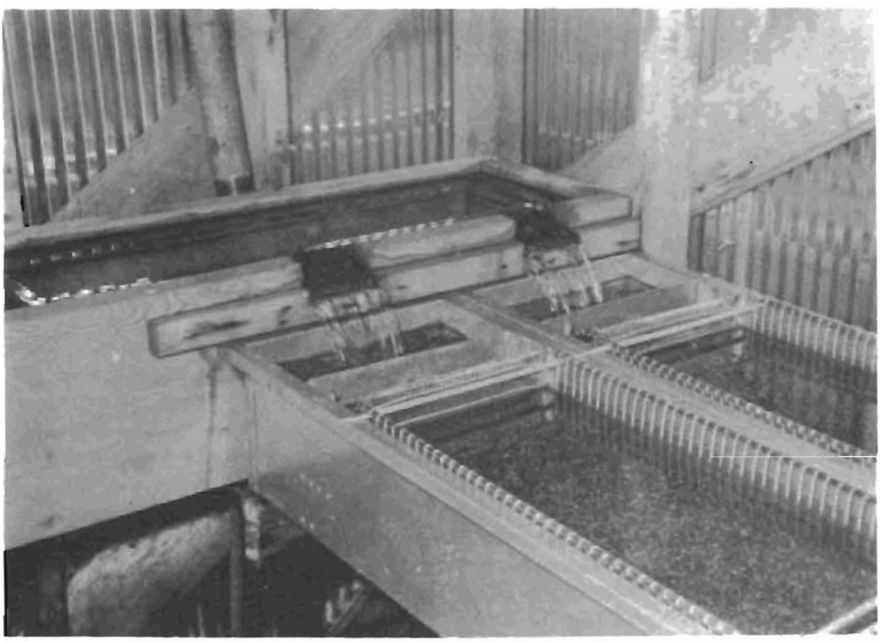

Plate 3. HATCHERY TROUGHS SHOWING HEAD TROUGH, EGG BASKETS AND INCUBATING RAINBOW TROUT EGGS.

Trout fry, on hatching, are almost transparent and have a huge yolk sac from which they receive their nourishment. They take no outside food during this stage which usually lasts for several weeks, depending on the water temperature. Warmer water accelerates yolk sac absorption and fry development. During this stage in their development the trout are known as "yolk sac fry". (Plate 4.) These yolk sac fry are delicate creatures that remain at the bottom of the trough, maintaining their position against the current in a cumbersome manner since they are burdened down by the yolk material. As the yolk is absorbed, pigment is deposited so the fry soon becomes opaque, the musculature of the abdominal wall grows over the yolk sac and the ventral abdominal slit closes. The fry are now no longer burdened down with the yolk material so they swim up off the bottom of the trough searching for food. Yolk absorption took three weeks for the first lot of fry and two weeks for the last lot.

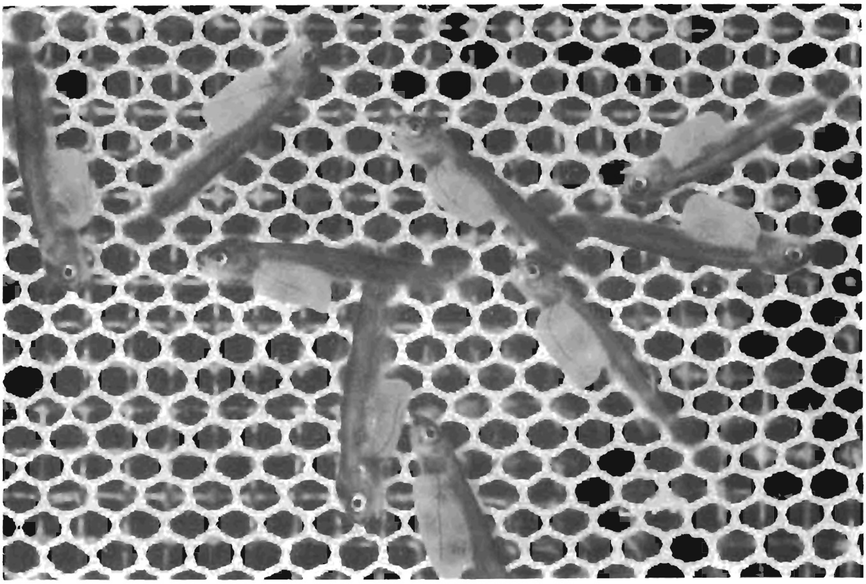

Plate 4. YOLK SAC RAINBOW TROUT FRY, TWO TIMES NATURAL SIZE.

The rainbow trout fry were fed a mixed diet of finely ground beef liver and dried salmon meal. The trout were fed five times a day. Frequent feedings were necessary due to high hatchery water temperatures coupled with almost continuous daylight. The fish fed voraciously. The rainbow trout were fed a minimum of six days and a maximum of 36 days prior to stocking.

In the states, trout hauling is, for the most part, accomplished by tank loaded trucks. Aeration is accomplished by circulating the water by means of a gasoline driven centrifugal pump. Water is picked up from the bottom of the tank and sprayed through small apertures in the tubing at the top of the tank. Gas exchanges are accomplished when the water is finely broken up during the spraying process. Truck tanks, such as the one described, were impractical for our use in Alaska. Their capacity would be far too great for current needs, they would be too bulky and heavy, and the tank

Plate 5. HAULING RAINBOW TROUT FRY USING AERATED FISH TANK.

Plate 6. PLANTING RAINBOW TROUT FRY IN LOST LAKE.

with its gasoline motor could not be shipped long distances via air freight. There was a need for a light portable fish tank that would carry a heavy load of rainbow trout fry.

A portable fish tank was designed and built for hauling rainbow trout fry by either automobile or air freight. (Plate 5.) This tank utilized four 5-gallon cans for carrying the fish and water; aeration was accomplished by using a reciprocating air pump powered by a 6-volt hotshot battery. The air was pumped through rubber tubing into the cans of water containing the trout. A 5-cell 6-volt hotshot battery operated the air pump for an average of two and one-half hours. The tank loaded with trout weighed 206 pounds. From 6,000 to 10,000 rainbow trout fry, depending on their size, could be shipped in a tank load.

A total of 68,308 rainbow trout fry were shipped from the department's Fairbanks hatchery and stocked in waters in the Fairbanks and Anchorage areas. A complete list of all rainbow trout plantings can be found at the end of this report. Lost Lake was stocked with a total of 20,812 rainbow fry on July 4 and 13. (Plate 6.) The fry averaged 2,650 per pound at the time of planting. By October 14, 1952, three months later, the Lost Lake rainbow trout were 5 1/4 inches in total length and weighed 17 per pound. This rate of growth was considered good.

During the construction of the Richardson Highway in interior Alaska, great quantities of gravel were dug from pits adjacent to the highway. Many of these pits are several acres in size and have depths ranging up to 15 feet. Normally, this depth of water would provide insufficient dissolved oxygen storage to sustain fish life during the seven month winters of the interior; however, there is an exchange of water between the Tanana River and the gravel pits by subsurface seepage. This exchange of water maintains the dissolved oxygen content in the pits at a sufficiently high level to sustain fish life. The pits fluctuate in water level with the rise and fall of the Tanana River. During the winter months the ice on the pits may be broken up several times by this fluctuation in water level. The pits have no inlet or outlet through which fish can migrate. A few of the pits were indiscriminately stocked with fish in the past; one pit has a population of suckers that were mistakenly planted as grayling. These suckers have wintered over for two years.

Eight gravel pits, barren of fish life, were stocked with rainbow trout fry. These pits had an abundance of trout feed; microscopic crustaceans as well as insect larvae abounded in the pits. A total of 8,842 rainbow trout fry were planted in the gravel pits adjacent to the Richardson Highway. By October 14 the trout in the gravel pits were up to 5 inches in total length. It is hoped that some trout production may be realized from this stocking of barren waters.

Prior to May 1952, one biologist worked on the sport fish problem for the department. His activities were largely confined to interior Alaska due to the expense and time involved in traveling to other areas. It was advisable to concentrate on one locality, aiming at specific accomplishments, rather than to gain superficial knowledge from a broad area. In May 1952, an additional biologist was hired with Anchorage as his headquarters. He was assigned to work the Anchorage, Seward, Palmer, Copper Center, Valdez and adjacent areas.

In the Anchorage-Palmer area, with a rapidly expanded population reported to be in excess of 60,000 people, the available fishing waters were badly depleted of sport fish stocks. The numerous lake and stream systems readily reached by road were rapidly being "fished out". Sport fishing in the area consisted of lake and stream fishing for rainbow trout, mackinaw (lake) trout, grayling and dolly varden trout. There was heavy seasonal angling for steelhead trout, sea-run dolly varden trout, silver salmon, king salmon and reported catches of red salmon. A winter fishery could be found on some of the lakes where trout, ling and whitefish were taken through the ice.

The species of fish supporting the sport fishery in other areas varied. Grayling and mackinaw trout were the most important sport fishes in the upper Copper River drainage. On the coast between Valdez and Cordova, the range of the cutthroat trout was encountered. This fish, both resident and sea-run, made up an important part of the catch. Despite the variation in the species found in different parts of the areas discussed, the same pattern of depletion was evident.

Lake and stream systems recently opened to automobile travel showed varying degrees of depletion. The decrease in fishing success on these waters, in general, appeared to be in direct proportion to the length of time the waters were available by road. For example, the Cottonwood-Wasilla chain of lakes in the Matanuska Valley have been accessible by road for a number of years. Angling in these lakes and connecting streams was poor. The Fish Creek and Meadow Creek system, consisting of Big Lake and several smaller lakes near the Matanuska Valley, has been open to automobile travel for three years. The catch per fishing day has shown a marked decline in that time and has reached the level where the lakes were being utilized because they were accessible rather than for the excellent fishing previously found there. While no exact records were in existence, it appeared that the fishing intensity in the system was on the decline.

The Kenai Peninsula, by far the largest accessible fishing area recently opened by road, has very extensive lake and stream systems. It has been, and is, a fisherman's paradise. Both resident and anadromous salmonoids can be found there in great numbers. The peninsula was opened to general travel by automobile a year ago. The wonderful sport fishing found there attracted a high percentage of the Cook Inlet anglers. Already a decline in the fishing success has been noted.

There were insufficient data available that would enable the biologist to evaluate the decline of the sport fish stocks on a factual basis. It was recognized that the ecological conditions found in one body of water were undoubtedly different than those found in other waters in the same general area. A logical explanation could be drawn up for the decline of the sport fish stocks in some instances.

The apparently "inexhaustible" numbers of sport fish found in some of the lakes and streams were, in reality, few in number when one took into account the vast acreage of lake or stream production necessary to produce these fish. The fish, when taken, were usually congregated in a small area for spawning, feeding or migratory purposes. This concentration of fish represented the production of a large body of water. The sport fish harvested by the angler were, for the most part, adult stock. These broodstock dominated that portion of the water's productivity which they were holding for their own species. They furnished spawn in excess of the number necessary for the replacement of natural losses. The removal of broodstock by the angler set up a chain reaction that could be felt throughout the entire system. The decimation of the broodstock resulted in an inadequate number of replacements. Other species of fish took up more and more of the water area because of the decreased numbers and less effective competition of the sport fish. The end result was poor sport fishing for the angler — a lake or stream abounding with trash fish.

Proper regulatory measures can halt the downward trend of a sport fish population at some point higher than a completely non-restricted fishery would leave it. Regulations in most cases, however, spread fewer and fewer fish over more and more fishermen. They tend to make for a more equitable catch among the anglers. If a sport fish harvest is to be realized, regulations cannot be expected to bring the numbers of large adult fish back to their former unexploited level of abundance. There is little recreational value in maintaining a population of sport fish in a water system if the regulations imposed prohibit all sport fishing.

In many instances suitable and adequate facilities are not available in the lakes for the natural reproduction of trout. Angling in these lakes has reduced the trout populations to insignificant numbers of fish. A program of trout stocking has been initiated in an attempt to bring these lakes back into sport fish production.

Rainbow trout fry were available from the Fairbanks hatchery for the experimental stocking of some of the lakes in Anchorage and the adjacent areas. Following is a list of the five lakes stocked with rainbow trout during 1952:

Lake	Area	No. Rainbow Trout Stocked
Hidden	Anchorage	2,125
Sand	Anchorage	1,750
Upper Fire	Anchorage	16,779
Falk	Palmer	5,250
Frank and Jerry's	Glen Allen	8,500

The need for a trout hatchery in the Anchorage area soon became apparent. The long distances necessary to transport the trout fry from the Fairbanks hatchery to the Anchorage lakes made this type of stocking program time consuming and relatively expensive. There was a dire need for trout fry in the Anchorage area. Depending on the Fairbanks hatchery to supply both areas was a risky business. There was a lack of flexibility in the hatchery program. If, by some unforeseen accident, the Fairbanks hatchery production failed, both Fairbanks and Anchorage would lose its source of fish supply. A hatchery in the Anchorage area could provide sport fish for stocking local waters and would insure that a source of fish stock was available for the Fairbanks waters in case of a casualty to the Fairbanks station.

With these thoughts in mind, considerable time was spent reviewing possible locations for hatchery construction. The requirements for a successful trout hatchery were stringent. Water with temperatures from 50-60 degrees Fahrenheit, no silt or debris and well aerated was desired for the hatchery supply. An open year-around road, electricity, a well-drained level area for the hatchery building, and sufficient head from the intake to the hatchery troughs to provide for the gravity flow of water was desired. Upper Fire Lake Creek near Anchorage, and the outlet creek between Twin Lakes in the Matanuska Valley appeared to be the most suitable of the locations investigated. The final choice of a hatchery location rests on information to be gathered during the winter of 1952.

Insufficient departmental funds were available for the construction of a trout hatchery in the Anchorage area. The Anchorage Sportsmen's Association, realizing that a trout hatchery was necessary, promoted a "Fish Unlimited" campaign in order to raise the money. The hatchery building will be constructed by the sportsmen. The department will equip and operate the station. It is hoped that the construction of the hatchery will be completed in 1953 and the station will be in operation in 1954.

As the biological work progressed, it became evident that many lakes were controlled through private ownership of the entire shoreline. Before any amount of department funds could be expended to produce sport fishing, it was necessary to obtain a public access agreement with a property owner on the lake. This agreement would insure access to the lake for the sport fishermen. Since the department was unable, under Territorial law, to make a legal and binding agreement with a property owner, verbal access agreements were obtained on several lakes. A request was made to the 1953 Territorial Legislature for powers to make legal binding access agreements.

Public information and education has been an integral part of the sport fish program. Cooperation between the biologists and the people in Alaska is mandatory if a progressive fisheries management program is to be realized. Working with the various organizations, the biologist can accomplish a great deal more work with the funds available. Sportsmen have demonstrated their willingness to cooperate. The Tanana Valley Sportsmen's Association in Fairbanks has assisted with many labor parties in fish planting, lake rehabilitation and lake surveying. The hatchery installation in Anchorage will be a direct result of the assistance rendered by the Anchorage Sportsmen's Association.

FAIRBANKS HATCHERY
1952 RAINBOW TROUT PLANTS

DATE	LAKE	PLANTED NO.	No. of FISH PER POUND	AREA
July 4	Lost	10,880	2,720	Fairbanks
July 13	Lost	10,332	2,583	Fairbanks
July 13	Gravel Pit, Mile 55	350	2,583	Fairbanks
July 13	Gravel Pit, Mile 51	1,292	2,583	Fairbanks
July 17	Gravel Pit, Mile 37	1,375	2,750	Fairbanks
July 17	Gravel Pit, Mile 31	1,375	2,750	Fairbanks
July 22	Gravel Pit, Mile 38	1,375	2,750	Fairbanks
July 22	Gravel Pit, Mile 29	300	2,750	Fairbanks
July 22	Gravel Pit, Mile 24	1,000	2,750	Fairbanks
July 22	Gravel Pit, Mile 20	1,375	2,750	Fairbanks
July 31	Upper Fire	10,404	2,448	Anchorage
August 7	Donnely Dome	3,500	1,750	Big Delta
August 8	Upper Fire	6,375	1,700	Anchorage
August 8	Hidden	2,125	1,700	Anchorage
August 10	Sand	1,750	1,750	Anchorage
August 10	Falk	5,250	1,750	Anchorage
August 14	Small lake near Summit Lake	750	1,500	Gulkana
August 14	Frank & Jerry's	8,500	1,300	Glen Allen
	TOTAL	68,308		

WATERSHED MANAGEMENT

The basic research data obtained by the biological staff can be used by the department in two distinct ways. First, with this fundamental information it becomes possible to make recommendations for changes in the laws and regulations that will perpetuate our fisheries on a sustained yield basis. Second, this basic information is especially valuable in increasing the production of our waters, especially in the utilization of barren lakes and streams.

The initial project in barren area production was undertaken at Pauls Basin on Afognak Island near Kodiak. Two lakes, with their tributary streams, were opened to salmon production by the construction of several fishways around natural barriers which prevented the ascent of spawning salmon and trout. A small run of silver salmon had, in the past, been ascending to the main barrier. Here a 12-foot falls had completely stopped further ascent. Upon completion of the fishways in 1952, silver salmon successfully surmounted the falls and spawned above the barrier.

Preliminary work in opening up barren areas in the Ketchikan district was started during the 1952 season. Reconnaissance surveys and token plantings of eyed salmon eggs were made. A permanent employee, with headquarters in Ketchikan, was assigned to take charge of this work.

BIOGRAPHICAL SKETCH

STANLEY D. SWANSON is also from the State of Washington, having been born in the town of Fife near Tacoma, where his elementary and high school training was received. After serving two and one-half years in the Navy, he enrolled at the University of Washington, receiving a Bachelor of Science degree in Fisheries in June 1951.

During summer vacations and part time while attending school, he worked for the Fisheries Research Institute under Dr. W. F. Thompson. Upon graduation he was employed by that organization on a full time basis until he entered the employ of the Alaska Department of Fisheries in April 1952. His service with the Fisheries Research Institute was in connection with biological investigations of the pink salmon runs of Southeastern Alaska, such as tagging, estimation of escapement, observing conditions of stream environment, etc.

KODIAK AREA

by

Clinton Stockley and Detrick Cooter

1. PAULS LAKE WATERSHED

INTRODUCTION

After surveying all of the potential non-productive waters in this area that appeared suitable for stream improvement, the decision was made to concentrate on the Pauls Lake watershed (Figure 1). Pauls Basin is a semi-mature valley located on the east shore of Perenosa Bay along the northeast coast of Afognak Island. There are three lakes located in the valley. Pauls Lake comprising 81 acres, with a maximum depth of 78 feet, at an elevation of 20 feet, lies one-eighth mile upstream from the head of Pauls Bay. Pauls Lake possesses a natural population of red, silver and pink salmon. Laura Lake lies two-thirds of a mile

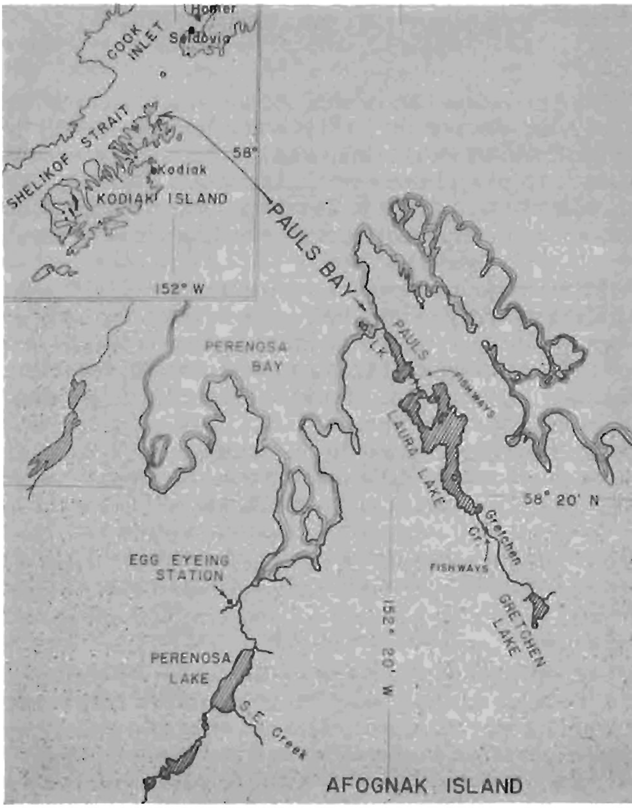

Figure 1. PAULS LAKE WATERSHED.

south of Pauls Lake beyond a series of falls blocking further migration of salmon and is situated at an elevation of 156 feet, has an area of 555 acres and a maximum depth of 138 feet. Gretchen Lake lies three miles south of Laura Lake. There is a barrier 2,100 feet upstream from Laura Lake. Gretchen Lake has an area of 53 acres, is at an elevation of 275 feet and possesses a maximum depth of 48 feet. There are two small tributary streams to Gretchen Lake which are suitable for salmon spawning.

Pauls Lake has a natural high production of trout and salmon. Laura Lake lies beyond a series of barrier falls causing it to be non-productive of salmon. A series of observations comparing Pauls Lake, Perenosa Lake (a neighboring salmon producing lake), and Laura Lake, indicate that Laura Lake has a comparable food productive capacity. The secchi disc sampling of the three lakes indicates a similar, but slightly lower plankton production in Laura Lake, which would be expected because the other two lakes are salmon producers and enjoy the annual deposition of salmon carcasses, which contribute to the fertility of the lakes. An examination of the resident trout in the three systems indicates that the condition of the fish in length, weight and age is similar. All three lakes develop a similar thermal stratification as was determined from vertical water temperature sampling.

PHYSICAL CHARACTERISTICS

Laura Lake offers many desirable features for red and silver salmon rearing. The lake has adequate acreage for food production. The depth of the lake is satisfactory for the wintering of young fish. Gretchen Creek, the main tributary stream, possesses extensive spawning areas. The winter flow of the stream is adequate to prevent freezing of the eggs during their incubation.

The goal of such a project as this is to establish a red salmon run in a hitherto non-productive lake system which has the physical characteristics necessary to support a run of eventual commercial value.

In an effort to establish a brood stock of red salmon in this unremunerative area 213,000 green and eyed eggs were planted in the gravels of Gretchen Creek in August and September of 1951. On June 20, 1952, red salmon fry were seined from the mouth of this creek, indicating success in the first artificial introduction of salmon to the area.

Hydrographic engineering surveys for a fish ladder were made in the fall of 1951. During the winter of 1951-52 plans for fishways were developed. Invitations for contractors to bid on the project were announced in March of 1952. The Waterways Construction Co. of Juneau was the successful bidder and in May undertook the construction of the ladders.

ENGINEERING

The Waterways Construction Co. established a beachhead at Pauls Bay on May 12, 1952. Equipment and supplies were moved in to the sites. A camp was erected at the south end of Pauls Lake.

CONSTRUCTION

The first barrier, a waterfall 6.5 feet in height, is located 400 feet upstream from the inlet to Pauls Lake. In the interest of economy the falls was bisected by drowning out half its height with a concrete dike constructed across the pool at the foot of the falls. This created two 3.25 foot falls from pool surface to pool surface. To alleviate the necessity of building forms for the dam the concrete, after mixing, was sacked in cotton cement sacks, then placed in position and spiked together with 12 inch wire nails. The first three layers were placed double width as a foundation and bearing surface for the dam. All the water was flumed around the site during construction. Work began on June 17 and was completed on June 23. Plate 1 illustrates the first dike during low summer flow.

The second obstruction, located 1,205 feet upstream from Pauls Lake, is a 6 foot cataract. The rock was drilled and blasted so as to form a series of pools with 2 foot jumps between them. The work on the second barrier began on June 27 and was completed on July 1. Plate 2 shows the fishway at the second barrier during low flow.

The third barrier, located 2,680 feet upstream from Pauls Lake, was made up of a combination of a 12 foot falls and a 9 foot cataract, 30 feet further upstream. The fishways surmounting this barrier consists of a rock cut varying in width from 8 to 19 feet and extending in an arc along the east bank of the stream for 143 feet. Progressing upstream from the pool at the foot of the falls, the rise to each successive level is 3.6, 3.7, 3.6, 3.0 and 1.9 feet, respectively. Five concrete dikes were erected to create the pools in this fishway. The pools vary from 20 to 35 feet in length. The work on the third barrier was completed on August 12. Plate 3 illustrates the third fishway.

The fourth barrier, located 150 feet downstream from the outlet of Laura Lake, was a fall 5 feet high with a curving chute at its base. A

Plate 1. THE FIRST LADDER.

Plate 2. THE SECOND LADDER.

Plate 3. THE THIRD LADDER – LOOKING UPSTREAM, SHOWING LADDER AND PART OF ORIGINAL STREAM.

Plate 4. LADDER AT THE FIFTH BARRIER.

pool was blasted in the chute below the fall and another in the rock in the mid-point of the falls to create two steps where there had been but one.

The fifth falls, 9 feet in height, is located 2,100 feet upstream from the inlet to Laura Lake on the main tributary, Gretchen Creek. The fishway consists of a step trench cut in the west bank of the stream bed. This trench is 5 feet wide at the pool surfaces with pools 10 feet in length. Two concrete dikes 3 feet in height with notches 2 feet in length and 8 inches deep were erected in the cut. This provides three pools with a 3 foot fall from each. The work on the last barrier was completed on August 22, 1952. Plate 4 illustrates the fishway at the fifth barrier site.

In September 1952, silver salmon which had utilized the lower stream to the foot of the main falls in the past were seen ascending the fishways and entering the lake. The first fish to pass up the stream leaped the dikes with no difficulty. Several fish were timed through the large third fishways and appeared to require approximately an hour in ascent. In early September silver salmon were seen spawning above the outlet of Laura Lake where no salmon had spawned before.

RESULTS

A temporary egg eyeing station was constructed on a small tributary stream of Perenosa Creek, one-half mile upstream from the head of Perenosa Bay (Figure 1.). The station consisted of a lean-to shelter with two 16 foot standard hatchery troughs and one vertical drip incubator. The station has a 500,000 egg capacity. Red salmon eggs were taken from the spawning stock of S. E. Creek of the Perenosa Lake system (Figure 1.). The eggs were incubated at the eyeing station to the eyed stage and then transported to Pauls Basin for planting in Gretchen Creek above the falls and ladders. 352,000 eyed red salmon eggs were planted in August of 1952 in Gretchen Creek, utilizing the tube method as developed in 1951.

FISH CULTURE

2. STREAM SURVEYS

Routine salmon spawning counts were carried on in Perenosa Creek and reported to the Fish and Wildlife Service and Fisheries Research Institute.

FRAZER LAKE

The Frazer Lake Basin is located on Kodiak Island at latitude 57° 15' north and longitude 154° 10' west. It is approximately 10 miles southwest of Karluk Lake. Frazer Lake is situated 8 miles up the left fork of the Dog Salmon River from Olga Bay. A half mile below the outlet of the lake there is a 31 foot falls which prevents the ascent of salmon to this vast fallow basin. Pink, chum, and silver salmon utilize the river to the foot of the falls. The lake is about 8 miles long, 1 mile wide, and has a surface area of approximately 5,000 acres. In the six tributary streams to the lake there is a potential spawning area of over a half million square feet. About one-third of the lake shore possesses beaches suitable for spawning.

On August 29, 1951, approximately 200,000 fertilized red salmon eggs were planted in the creek which enters the lake at its northwest side. On June 26, 1952, red salmon fry were recovered with a sampling seine at the mouth of this stream. Again on July 23, 1952, 313,000 fertilized red salmon eggs were introduced to the gravels of the central stream on the west shore of the lake. By digging up one of the artificial nests on December 9, 1952, representative alevins (yolk-sac fry) were recovered from the gravel indicating positive results from the freshly fertilized egg plantings. Thus far salmon fry have been produced in a formerly non-salmon rearing body of water; if these fish thrive in the lake, follow their urge of migration to the sea, and then later return to the foot of the barrier falls as mature salmon, the first step will have been completed. The next step will be to open the area with fishways to provide access for the salmon.

BROWNS RIVER

Browns River is located on Uyak Bay of Kodiak Island at 57° 32' north and 153° 48' west. This river is suitable for stream improvement through extension of the spawning area for the existing species of salmon. Laddering of the falls at the 3.5 mile point of the stream, which is located in a quarter mile long canyon, would permit passage of salmon to a small lake and provide some four miles of spawning stream beyond the lake. Modification of the 5 and 15 foot falls would at least double the salmon spawning capacity of the stream where there was a counted escapement of 136,390 pinks, 25 reds and 300 silvers in 1952.

FALLS CREEK

Falls Creek is located in the valley to the south of Karluk Lake. This stream formerly entered O'Malley River just below its outlet from O'Malley Lake from the east. It provided some 1-1/2 miles of ideal spawning area for red salmon. In July 1926, W. H. Rich reported from 20,000 to 25,000 red salmon spawning in this stream. † C. H. Gilbert considered this stream to be the most valuable spawning stream in this watershed. ‡

During the mid 1940's the stream cut through its banks in the upper reaches above the meanders, and ran straight to O'Malley Lake. The red salmon appear to have lost the stream and only use the new channel to a very minor extent at present. It appears that the erection of a 30 foot diversion dam at the point where the stream changed its course would restore the stream to its former bed and thus materially increase the spawning area for the watershed.

CONCLUSION

The stocking program is underway. One ladder has been constructed to provide access for salmon to formerly non-productive waters. Now with the passage of time the value of this undertaking may be evaluated in terms of the fish produced.

†Gilbert, C. H. and W. H. Rich
Investigations Concerning the Red Salmon Runs of the Karluk River, Alaska, Bureau of Fisheries Document 1021, U. S. Department of Commerce, July 1927, p. 23, notes of July 19, 1926.

‡Ibid., p. 18, notes of August 21, 1922.

KETCHIKAN DISTRICT

by

Stanley D. Swanson

Southeast Alaska, and the Ketchikan area in particular, abounds in large lakes supporting thriving trout populations but not producing salmon due to impassable falls in their outlet streams. Many of these lakes lie at relatively low altitudes and have barriers to salmon which could be removed by the construction of low-cost fishways.

POTENTIAL SYSTEMS

For the purpose of gathering information on these numerous lake systems and to select those most suitable for salmon production, a preliminary survey was conducted during the period from late June through August. Foot surveys were made on outlet streams, hiking the stream beds from salt water. When the distance involved was not too great, the inlet streams to the lakes and the shoreline areas were explored by foot. On the larger systems, airplane travel was necessary to provide access to the lake inlet streams, important in that they provide the greater proportion of spawning facilities for red and silver salmon. Lake spawning of red salmon occurs in areas where gravel composition, water flow and temperature are suitable. A total of 21 systems were surveyed.

Old Frank's Lake system on Prince of Wales Island proved to be one of the most favorable of those surveyed. The four lakes have a total area of 872 acres. Their uneven shorelines with numerous small shallow bays offer a great potential rearing area for young salmon. To test the salmon rearing potential of the Old Frank's Lakes, green and eyed red salmon eggs were planted in the system. Sixty thousand green eggs were planted on October 9. Thirty-five thousand eggs were eyed out in a small station erected on a tributary to Ward's Lake near Ketchikan and were planted in the Old Frank's system on October 22. It is planned to make annual plants in the system and to maintain a close watch for returning migrants.

STREAM IMPROVEMENT

Improvement of spawning facilities for reds and other species was accomplished at the major red salmon spawning stream of the Naha River system. A log dam erected during the period of operation of the Fortmann Hatchery, and not used since 1927 was blasted out along the left bank to permit passage of upstream migrants. Plate 1 illustrates the dam intact and Plate 2 shows the cleared passage. Subsequent salmon counts revealed that, on a basis of utilization by the spawning fish, the total spawning area of this stream had been increased by approximately 20 per cent. Assistance on this project was received from the U. S. Forest Service. Transportation to and from the site was provided by the Fish and Wildlife Service.

STREAM SURVEYS

Throughout the summer and fall season, information was collected on spawning escapements and the fish counts were presented to the Fish and Wildlife Service and the Fisheries Research Institute. Because of the excellent early escapement of chum salmon in the streams of the east coast of Prince of Wales Island observed during the fall surveys, an earlier opening date in the Cholmondelay, Moira Sounds, and Kassaan Bay area was accomplished.

Plate 1. LOG DAM INTACT.

Plate 2. CLEARED PASSAGE ALONG LEFT BANK OF LOG DAM.

An advisory group was appointed by the director to assist the district biologist in gathering information on the local fishery. The group was composed of members of the fishing industry.

ADVISORY GROUP

Herbert Hetherington — Ketchikan King Salmon Derby Committee Member
J. K. Johnson — New England Fish Co.
Joe Krause — President of Boat Owners Association (Chairman of Group)
Walter McCall — Purse Seiners Union
W. O. Smith — Troller
James Stinson — Boat Owners Association
Joe Williams — Alaska Native Brotherhood

The viewpoint and interest of all concerned is expected to yield cooperative and beneficial results.

PLANTING RECORD

Afognak Island:
August 17 to 25, 1952 — Gretchen Creek: 351,973 eyed red salmon eggs.

Kodiak Island:
July 23, 1952 — Frazer Lake Tributary #5: 312,830 fertilized red salmon eggs.

Ketchikan District, Prince of Wales Island:
October 9, 1952 — Old Frank's Creek: 60,000 fertilized red salmon eggs.
October 22, 1952 — Old Frank's Creek: 35,000 eyed red salmon eggs.

Juneau District:
December 17, 1952 — Montana and Spring Creeks: 60,000 eyed king salmon eggs.*

*This is the third of a series of experimental plantings of fall run king salmon eggs from Washington State to attempt to determine whether our coastal streams are suitable and will support the fall run king salmon.

HISTORY OF ALASKA HERRING FISHERY

by

E. J. Huizer

PART I. LIFE HISTORY AND BIOLOGY OF THE PACIFIC HERRING

The Pacific herring, Clupea pallasii, is a member of the family Clupeidae, which is also represented on the Pacific Coast of North America by the shad, Alosa sapidissima, and the pilchard or California sardine, Sardinops caerulea. The herring and pilchard are native to this area, however, the shad was introduced in 1871 into the Columbia and Sacramento Rivers from the Atlantic Coast. Since that time it has become well established, and its range now extends from southern California to Cook Inlet, Alaska. The shad also differs from its Pacific relatives, which spawn in salt water, in that it is anadromous, ascending rivers in the spring to spawn.

On the Atlantic Coast the family is represented by the Atlantic herring, Clupea harengus, the menhaden, Brevoortia tyrannus, and the shad, as well as numerous other species of minor importance.

The family Clupeidae is a large one with 16 genera and 38 species to be found on both Coasts of North America, of which 10 species are commercially important. It is characteristic of the fishes of this family to occur in enormous schools, which fact is used to full advantage by fishermen all over the world. The catches of menhaden on the Atlantic Coast of the United States make this fish the number one commercial species by volume for the United States, and the catches of Atlantic herring by North European and Icelandic fishermen make this species the most important in the world.

Technically, there are minor anatomical and behavioristic differences between the Atlantic and Pacific herring, but these in general are so slight and so variable as to be undistinguishable to the casual observer. Indeed, it has been suggested that the two species are one and the same, related to each other by means of a connecting link extending across northern Siberia.

Perhaps the most striking difference between the two species lies in the time and location of their spawning. The Atlantic herring spawn on rocky, gravelly, or sandy bottom in water up to 100 fathoms deep far from land or along the shore, whereas the Pacific herring spawn in the intertidal zone from just below the high tide level to a few feet below low tide. This trait of the Pacific herring results in heavy mortality of the eggs due to predation by water fowl and also to the washing action of waves during storms, which deposits large numbers of eggs on the beaches above the high tide level.

The eggs of the Pacific herring are small, 1 to 1.5 mm. in diameter, pale, amber and translucent. When laid, the eggs are highly adhesive, causing them to stick readily to any material that is present. The preferred material is eel grass, but seaweed, dock pilings, rocks or gravel, nets, and waterlogged branches will serve. It is a common practice of the natives of Southeastern Alaska to submerge spruce boughs in the water when herring are spawning. The spawn is deposited on the boughs by the fish, then the boughs are removed from the water and allowed to dry, eggs and all. Thus preserved, the eggs are used for human consumption and are considered a delicacy.

The time of spawning for the Pacific herring varies greatly, beginning in the middle of December at the southern limit of the range in California and starting progressively later with increasing latitude, until over the northern part of its range near the Seward Peninsula, Alaska, they can be found spawning in the middle of June. In any one locality the spawning activity will last from one to four weeks, and only one spawning a year will take place. Atlantic herring, on the other hand, spawn either in the winter or the spring. Biological research has demonstrated that the abundance of herring is very closely related to the success or failure of the spawning.

The number of eggs deposited by the female varies directly with her weight and age; the older and larger the female, the more eggs she will produce. Counts have been made and the number varies from 8,000 to upwards of 40,000. Observations indicate that herring spawning is a group activity with little or no pairing of males and females. The spawning starts simultaneously throughout an entire school of herring with the females depositing the adhesive eggs upon eel grass or whatever else is handy and the males emitting their milt over the eggs in a somewhat random manner until the water in the entire area becomes a cloudy, milky white.

The duration of the period of incubation depends upon the temperature of the water, running from 10 days in warm water to 20 days in colder water. Two weeks might be considered an average figure. At hatching, the larvae are about 1/4 inch long, eel-like in shape, and, despite their constant wriggling, do not have great power of locomotion because their fins have not yet developed. At this early stage, the larvae are largely at the mercy of currents and remain so until a month or six weeks have passed when they have developed sufficiently to enable them to control their own movements, at which time they form into dense schools. For the first two years, the herring remain in schools composed entirely of fish of the same age. After this time they join schools of older fish in which all age classes are present.

In Alaska herring usually mature at 3 or 4 years of age, while in Washington it has been found that a large percentage mature at 2 years. After the first spawning the fish normally do not die but recover rapidly and spawn each spring thereafter for the remainder of their life span. Herring 12 years old are common, but individuals of 17 years have been recorded. As with other characteristics, the growth rate varies considerably over the range of the species. Growth, in general, is slower in the southern and eastern parts of the range, and in enclosed bodies of water than in the northern and western locations.

The young fish increase rapidly in size during the first 3 or 4 years of life, then growth gradually tapers off as they become older. Lengths of 18 inches have been attained at Kodiak Island, but such large sizes are rare.

The food of herring consists of minute plant and animal organisms, known collectively as plankton, found in enormous numbers in the seas. In general, zooplankton, or the animal organisms, are much preferred to phytoplankton, or plant organisms.

Herring constitute one of the fundamental sources of food for almost the entire gamut of marine animals. The vulnerable eggs are eaten by fishes and waterfowl; the larvae by countless invertebrates, fish and waterfowl; and the adults by waterfowl, fish, seals, sea lions and other marine mammals.

At the present time almost the entire catch of Alaska herring is taken by purse seines. In the early days of the fishery, however, beach seines, traps, gill nets, and the old Norwegian method of seining were used extensively by small operators in Southeastern, Central and Western Alaska. Today beach seines and traps are illegal and gill nets are used only by trollers and sport fishermen for obtaining fresh bait and by individuals who desire herring for personal use. Jigs and rakes are also used for securing herring in limited quantities.

While beach seining was the principal early method of fishing, the first reduction plant, at Killisnoo on Admiralty Island, used the old Norwegian method of seining from 1882, when operations started, until 1924. This method was still employed as late as 1927 by one herring fisherman at Big Port Walter.

In practice, the Norwegian method used two large skiffs, each manned by about eight men, in which a seine 200 fathoms in length was equally divided. The two boats, spaced 20 to 30 feet apart, rowed about in search of a school of herring. When a school was located, the skiffs rowed in opposite directions around it, paying out the seine from each skiff until the body of fish was encircled by the net. Pursing was done by hand, and the fish were brailed directly into a large mother ship, which was standing by.

Purse seining from power boats was introduced shortly after 1900, and it was not long before the majority of fishermen were using this method, which was faster and much less laborious, thus enabling the fishermen to make more hauls in a day.

Over the years there has been a gradual change from small to large boats, from gasoline to diesel power, and in the general efficiency of the gear. Today large modern boats, diesel powered and capable of carrying up to 1200 barrels of herring (rated at 250 pounds per barrel) are in general use. In the early years of the fishery all the work was done by human labor. Now, in almost all the operations of setting and hauling back the seine, the fishermen are assisted by the boats' power.

Essentially, modern purse seining for salmon and herring are similar. However, the herring seine is deeper, longer and heavier than the salmon seine; a wire cable is used as a purse line instead of a rope; and, because of its greater weight, it must be hauled aboard the boat by use of the boat's boom and winch.

In actual practice the seine is piled on a turntable rigged on the stern of the boat with the corks on one side and the leads on the other. Unlike a salmon seine, in which the leads, rings, straps and purse line are all coiled together, the rings of a herring seine are laid aside and the purse line is wound up on two drums. The free end (the end on top of the pile) is attached to a seine skiff, which serves to pull the seine off the turntable when setting around a school of herring. After the seine has been set, the bottom is pursed up, enclosing the fish in the net. Next, all the net except the bunt, made of heavier web in which the fish are pocketed, is hauled aboard the boat. The fish are then brailed from the bunt by means of a large dip net into the boat's hold. The bunt is piled on the turntable and the boat is ready for another set. When traveling to and from different grounds the seine skiff is placed on top of the seine on the turntable.

Plate 1. POCKETING HERRING IN THE BUNT OF A COMMERCIAL PURSE SEINER.

Fishing is usually conducted most intensively at twilight and dawn when the herring rise to the surface and make their presence known by breaking the water in an action called "flipping". All the boats now carry as standard equipment electronic depth finders which not only record the bottom but also record recognizable echoes of schools of fish. This enables the boats to locate and set on schools of herring which are not visually apparent.

In British Columbia the herring fishery is carried on in the winter, while in Alaska the fishery is conducted during the summer months when the herring have a greater oil content and are found closer to the surface.

Gill nets, as mentioned earlier, are now used only to secure small amounts of herring for bait and personal use. When the curing of herring was an important industry in Alaska, gill netting was used in Central Alaska to secure the desired large fish for this operation. Fishing was mainly by set nets about 50 fathoms long in inland waters, in opposition to the European method in which the practice was to drift on the open ocean using hundreds of fathoms of netting. This method was tried in Alaska in the 1920's but was unsuccessful. The failure was attributed to the fact that there were no large offshore bodies of herring to be found in Alaska; rather, the population was divided into a number of local races.

PART III. UTILIZATION OF HERRING.

In Alaska there have been four main uses of herring: (1) halibut, sablefish, and salmon bait; (2) reduction to oil and meal; (3) Norwegian and Scotch curing; and (4) dry salting. In addition, there have been several minor methods of processing, usually of a local nature, which are of little importance in the over-all picture. These include kippered herring, canned kippered herring, canned oil and mustard herring, canned sardines, and fresh and fresh-frozen herring.

Of the four major industries, only the bait and reduction fisheries are of any consequence today. At this time there is no dry salting or curing of herring being done. In addition, the reduction fishery, plagued by labor management troubles and the scarcity of fish is now producing only a fraction of the output of the peak years in the late 1920's and early 1930's.

1. The Bait Fishery.

Since its start in 1895, the Alaska long line halibut fishery has used herring almost exclusively for bait. The bait fishery in Alaska, thusly, has grown as the halibut fishery has grown. As late as 1931 halibut fishing was carried on 8 or 9 months of the year and the availability of a constant supply of herring was of major importance to the halibut fisherman. It was natural, therefore, that there should develop in the halibut fishermen a deep seated distrust of the reduction industry, which by its very nature requires tremendous quantities of herring for economical operation. The halibut fishermen believed that the operations of the reduction industry would result in serious depletion of the supply of herring so important to them.

The introduction into Southeastern Alaska in 1910 of a cold storage plant by the New England Fish Co. did much to insure a constant year around supply of bait herring for the long liner. Fresh herring is considered superior to frozen for bait purposes and is highly desired and sought for by the halibut fleet.

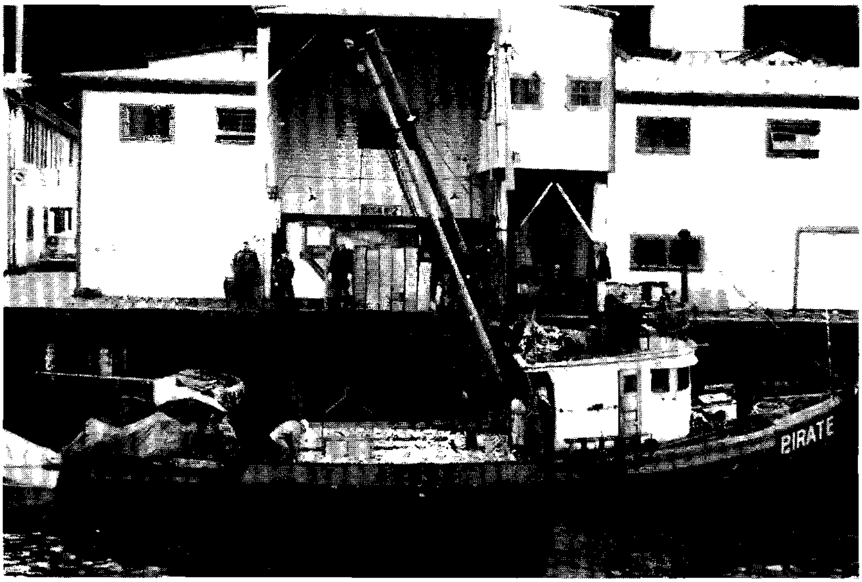

Plate 2. UNLOADING A CAPACITY LOAD OF BAIT HERRING AT A KETCHIKAN COLD STORAGE PLANT.

Winter herring are best for bait because they are firm and stay on the hooks better than fat summer herring. They are caught by purse seine and immediately frozen into blocks weighing about 50 pounds and kept in cold storage until needed.

Today the halibut fishery is limited to a little over two months in late spring and early summer. Bait herring for freezing are seined near Sitka, Ketchikan, Petersburg, and Juneau. In addition, live herring are impounded at Auke Bay, near Juneau, in the early spring and are greatly esteemed for bait as long as they are available.

There is a sablefish or blackcod fishery of a desultory nature, the intensity of which depends greatly upon the market price of the fish, which also uses herring as bait. This fishery is conducted in the spring, summer, and fall, but is of minor importance at present.

Herring are also used for bait by commercial trollers in Alaska.

TABLE I. PRODUCTION OF BAIT HERRING IN ALASKA.

YEAR	SOUTHEASTERN		CENTRAL		WESTERN	
	Fresh	Frozen	Fresh	Frozen	Fresh	Frozen
1922	300,000	1,803,415	524,600	860,600	--	--
1923	403,000	3,354,139	1,437,386	--	--	--
1924	150,000	2,061,600	1,387,750	--	--	--
1925	2,821,750	4,235,090	30,000	--	--	--
1926	24,823	1,220,165	989,950	--	--	--
1927	2,801,385	4,612,270	336,250	--	--	--
1928	2,640,325	3,572,901	--	340,000	--	--
1929	4,043,990	4,352,495	457,800	23,600	--	43,000
1930	2,966,255	5,957,960	273,300	--	100,625	--
1931	1,910,100	4,675,060	946,762	46,625	29,250	--
1932	2,806,210	2,687,605	993,000	--	--	--
1933	2,413,220	1,496,370	562,300	--	--	--
1934	2,117,160	3,009,765	1,241,625	--	--	--
1935	2,059,055	3,626,670	273,750	--	--	--
1936	2,649,400	3,057,915	4,700	--	--	--
1937	2,674,260	2,506,787	57,125	--	--	--
1938	2,826,404	3,316,114	1,250	--	--	--
1939	2,135,010	3,138,660	5,000	--	--	--
1940	1,038,467	5,236,930	9,500	--	--	--
1941	326,600	6,077,438	--	--	--	--
1942	1,278,325	6,102,850	--	--	--	--
1943	1,675,800	4,550,400	--	--	--	--
1944	260,800	4,920,700	28,750	--	--	--
1945	697,800	5,114,900	--	--	--	--
1946	2,530,300	3,455,850	6,750	3,914	--	--
1947	2,397,100	3,097,600	90,000	96,324	--	--
1948	382,200	4,806,975	22,500	241,692	--	--
1949	1,537,000	4,217,300	108,042	215,000	--	--

2. The Reduction Fishery.

The reduction fishery has developed and been conducted independently in three major districts in Alaska: (1) Southeastern Alaska, (2) Prince William Sound, and (3) Kodiak. Each district will be discussed separately.

The first commercial utilization of herring in Alaska was in the Southeastern Alaska District. In 1882 a herring reduction plant was established at the site of an old whaling station at Killisnoo on the western shore of Admiralty Island. This plant, the Northern Trading Co., later the Alaska Oil and Guano Co., was the only operator until 1919, in which year three additional reduction plants were constructed in Chatham Strait. In the early years of this company's operation, chum and pink salmon, which were considered at that time to be unfit and unprofitable for canning, were processed in addition to herring. There was much local resentment against the Alaska Oil and Guano Co., especially by halibut fishermen and people who thought it improper that a food fish should be used for reduction purposes. This resentment has carried through to the present day.

SOUTHEASTERN ALASKA DISTRICT

The reduction industry in Southeastern Alaska began to expand rapidly in the early 1920's, so that by 1927 there were 18 large plants operating in the district. The peak of production was reached in 1929, when 630,000 barrels of herring were processed. The productivity remained at a fairly high level until 1938, at which time there was a sharp drop in yield. In 1938 only five of the reduction plants in the district operated. In 1939, because of evidence of severe depletion of herring, regulations were enacted prohibiting all commercial herring fishing except for bait purposes in the vicinity of Cape Ommaney. The Cape Ommaney population long had been the mainstay of the Southeastern District, contributing 80% of the total catch for the district for the 12 year period from 1927 to 1938.

Subsequent large catches in 1939 of herring from the Cape Ommaney population in the Sitka region necessitated further drastic curtailment and commercial fishing for herring other than for bait purposes was prohibited in the entire district after August 2, 1939. Despite the shutdown of the Southeastern District, the production of herring oil and meal in 1939 for Alaska was the second largest in the history of the industry because of the large catches in the Prince William Sound and Kodiak districts.

Under the regulations for 1940, the taking of herring in the Southeastern District for reduction purposes was prohibited. Strong objections were voiced by the industry against the ruling and after a careful review and prolonged discussion a plan was decided upon whereby a single plant would, as representatives of the industry, engage in limited fishing operations. An amendment providing for this limited fishing was issued. Five seine boats took part in the operations, but no catch whatsoever was obtained and the plant closed on October 9.

Limited operations were again conducted in 1941. Results were discouraging, as only 24,220 barrels of the 50,000 barrel quota were caught by the three boats fishing the area. Because of the poor results in 1940 and 1941 the entire district was closed in 1942 in order to give the stocks of fish a chance to rebuild.

From 1943 to the present time there has been a yearly catch quota set by the Fish and Wildlife Service for the Southeastern District. Starting at 100,000 barrels in 1943, it rose to 400,000 barrels by 1948 under the influence of the gradually increasing abundance of herring. The scarcity of fish in 1948 and following years caused the quota to fall back to 100,000 barrels by 1951. Today the abundance of herring is once again at a very low level.

Plate 3. HERRING REDUCTION PLANT AT WARD COVE, ALASKA.

In the fall of 1952, the Fish and Wildlife Service exploratory vessel "JOHN N. COBB" conducted a search for possible unexploited reserves of herring in the Southeastern District. At the same time limited commercial fishing was allowed in the extreme southern portion of the district in an attempt to determine if schools of herring similar to those so successfully being exploited by British Columbia fishermen in the fall and winter were present in Alaskan waters. Results of both experiments were negative, as neither one brought to light large bodies of unexploited fish.

PRINCE WILLIAM SOUND DISTRICT

The herring fishery in Prince William Sound began in 1913. Initial expansion occurred during the first World War when the cessation of imported herring caused a greater demand for the domestic product. Curing of herring, was the major industry in this district until 1930, with reduction being limited to waste products of the curing operations and fish unsuitable for curing. Under an intensive fishery the large fish necessary for curing were seriously reduced in number, which brought about cutbacks in the curing industry in the late 1920's.

However, small fish were still extremely abundant, and in 1930 the first large scale reduction plant was installed in the district. There was further expansion of the reduction industry up to 1939, at which time there were seven large plants operating. The resulting increased intensity of fishing pressure coupled with the generally poor spawnings since 1931 brought about a period of reduced abundance which was climaxed in 1942 when six boats were able to catch only 4% of the average annual take during the 1930-34 period of peak abundance.

As in the southeastern District, a catch quota has been in effect since 1939. After the 1942 failure, the quota was made drastically low in 1943 to discourage fishing with the result that a negligible catch was made in that year. The quota was again low in 1944, but good fishing outside the quota area accounted for the increased output of that year.

In addition to great fluctuations in the abundance of fish, the industry has also experienced costly strikes by the fishermen. Failure of agreement between fishermen and the industry over the price of herring caused complete shutdowns of operations in 1947 and 1949.

From 1944 to 1951 the output of oil and meal from Prince William Sound has gradually risen. In 1952, however, the catch again dropped to a negligible amount. Price disputes forced the fleet to sit idle most of the season, and, in addition, few fish were available when operations were commenced.

KODIAK DISTRICT

Operations in the Kodiak District were confined to Scotch curing until 1935, at which time reduction operations were started. Abundance remained high as late as 1940. By this time the effects of over-fishing and poor recruitment to the supply of herring were felt. In 1939, the year of peak production, six reduction plants were operating in this district.

TABLE 2. PRODUCTION OF HERRING OIL AND MEAL IN ALASKA

ENTIRE ALASKA		
YEAR	OIL (gals.)	MEAL (lbs.)
1912	235,000	2,580,000
1913	260,000	2,400,000
1914	192,662	1,926,000
1915	130,028	1,238,000
1916	188,926	1,750,000
1917	205,992	2,074,000
1918	138,012	1,290,000
1919	169,374	1,712,000
1920	681,067	6,078,000
1921	84,938	892,000

	SOUTHEASTERN		CENTRAL	
YEAR	OIL (gals.)	MEAL (lbs.)	OIL (gals.)	MEAL (lbs.)
1922	333,941	2,526,000	91,300	766,000
1923	724,998	5,170,445	161,114	1,212,000
1924	974,918	8,079,625	169,754	1,280,000
1925	2,061,398	15,176,646	289,754	1,995,381
1926	2,857,299	21,699,635	108,372	1,009,246
1927	1,948,145	13,883,590	86,522	590,980
1928	2,303,374	18,425,424	240,226	1,578,740
1929	3,120,307	23,872,093	220,872	1,627,161
1930	2,943,915	19,502,823	601,507	3,908,200
1931	1,910,242	14,000,276	242,464	1,822,700
1932	2,057,695	15,298,178	448,014	3,920,300
1933	2,509,573	17,534,860	595,248	4,496,000
1934	2,615,898	19,956,468	1,094,450	7,954,000
1935	2,239,730	18,108,962	1,552,679	12,014,194

	SOUTHEASTERN			PRINCE WILLIAM SOUND			KODIAK		
YEAR	OIL (gals.)	MEALS (lbs)	Plants Oper.	OIL (gals.)	MEAL (lbs.)	Plants Oper.	OIL (gals.)	MEALS (lbs.)	Plants Oper.
1936	1,421,470	12,974,000	-	1,426,323	11,092,000	-	975,344	6,036,000	-
1937	2,024,315	17,450,000	8	2,175,423	14,204,000	6	1,388,300	7,618,000	4
1938	901,109	7,278,000	5	2,403,797	17,694,000	6	1,224,273	7,032,000	3
1939	882,317	6,484,000	4	2,227,087	15,676,000	7	1,729,127	10,944,000	6
1940	No fishing –	area closed.	-	1,290,857	9,440,000	3	808,822	5,946,000	6
1941	80,500	1,110,000	1	1,221,242	10,816,000	6	1,592,506	11,554,000	4
1942	No fishing –	area closed.	-	62,518	540,000	3	770,000	5,140,000	1
1943	241,000	2,106,000	1	-	-	1	1,395,529†	10,668,820†	4
1944	707,281	5,309,400	2	-	-	1	1,588,754†	10,934,378†	4
1945	1,062,973	9,014,000	5	295,951	3,082,000	2	1,328,249	10,280,000	4
1946	1,307,409	13,720,000	5	453,962	4,132,000	2	1,731,536	13,884,000	4
1947	1,732,648	13,454,000	8	No fishing –	strike	-	2,014,399	15,010,000	6
1948	597,814	5,262,000	8	912,939	5,948,000	4	1,934,428	14,156,000	7
1949	601,186	7,216,000	4	No fishing –	strike	-	No fishing –	strike	-
1950	557,720	5,388,000	4	847,950	6,610,000	4	1,531,182	15,390,000	4
1951	457,269	3,630,000	-	797,143	6,566,000	-	85,957	1,578,000	-
1952	685,467‡	9,180,000‡	3	-	-	2	-	-	1

† Includes Prince William Sound.

‡ Includes Prince William Sound and Kodiak.

As in the other districts, a quota has been in effect since 1939. Kodiak, likewise, has been beset with fishermen-industry troubles, which resulted in the complete shutdown of operations in 1949.

The fluctuations in abundance which so characterize the other two districts have been apparent in this district since 1940. In recent years the scarcity of fish has become most noticeable, with almost complete failure in 1951, and the total failure in 1952.

3. Curing Industry.

The greater part of Alaska herring processed for human consumption has been prepared by three methods: dry salting, Norwegian curing, and Scotch curing. Although a few barrels of herring were salted in various localities previous to 1900, the curing industry may be said to have commenced about that time at Petersburg. Instead of building shore plants, the fishermen packed on scows which they towed from place to place with their power boats. Operations were extended to Chatham Strait by 1916.

During the early years of the industry in Southeastern Alaska, fishing was conducted mainly in the spring and fall chiefly because the fishermen did not understand the curing of the "feedy" summer herring. Herring are at their best for curing in July and August. During these months, however, they feed largely on small crustaceans locally known as "red feed". If a fish is killed when its stomach is filled with "red feed", the flesh rapidly decomposes, especially the belly.

In 1912, Captain A. W. Thomas of Ketchikan tried the plan of holding the herring alive for a time in an enclosure. At the end of three days the objectionable red feed had been entirely digested and the herring were in good condition to be cured. This method, known as impounding, proved to be the only successful method of handling the problem. Impounding became widely used in order to clean herring of red feed. It also offered the curing plants a means of holding herring alive and in good condition during periods of over-supply when facilities were overtaxed. This meant better utilization and less waste of the resource.

Many companies and individuals attempted to cure herring for the market during the early 1900's. For several reasons the market remained restricted and the Alaska product could not compete with herring prepared on the eastern seaboard or imported from Iceland, Scotland, Holland, and Norway. During these years herring were prepared by a method known as Norwegian curing. In this process the fish were poorly gutted, carelessly graded and packed, and heavily salted, all of which resulted in an unattractive pack. Prevailing low prices, difficulty of transportation, high freight rates, and neglect to put up a careful pack (many operators were too impatient to bother with the impounding process) offered further difficulties to expanding the market.

The industry received its first major impetus during the first World War. Importation of Dutch and Norwegian herring were greatly limited and there was an unprecedented demand for Alaska cured herring in the United States. In order to stimulate production and enable the packers to prepare a commodity acceptable to the general trade, the government secured the services of Aug. H. D. Klie, a recognized expert in the preparation of herring by the Scotch cure method. Early in May 1917 he was sent to Alaska, which was regarded as the most promising location for exploitation and development. He was authorized to demonstrate the

Scotch method and give instructions to designated assistants who were to aid and encourage herring packers in Southeastern and Central Alaska. Packers were requested to make a determined effort to utilize a much neglected food fish.

In the Scotch method herring are carefully graded into sizes, properly gutted, salted lightly, and neatly packed into special barrels. Extreme care must be taken to insure a suitable pack. In 1917 the greater part of the pack was put up according to the old Norwegian formula, although two of the largest companies in Southeastern Alaska did put up a pack of Scotch cured herring. The hesitance of the industry to accept the new method was due to the fact that the Scotch formula required much more work, greater care, and special barrels.

The new method did attract considerable attention, however, so that by 1918 several additional packers were prepared to follow that method. The market for the 1917 Scotch cure pack remained firm while the pack of Norwegian cured herring was not in much demand and some difficulty was experienced in disposing of it.

In 1918 the pack of Scotch cured herring exceeded the Norwegian cured pack by one million pounds. When the 1918 pack of Scotch cured herring arrived in Seattle it was found that some of the packers had been careless in their methods and a product which was hardly marketable was the result. The 1919 Scotch cured pack fell below that of 1918 because of economic reasons, while Norwegian curing fell to one quarter of the Scotch cured pack. Difficulty was again experienced in disposing of the pack in 1919 because the ending of the war lessened the demand for Alaska Scotch cured herring. The Norwegian cured pack was virtually unsalable. By this time packers in the Territory recognized the superiority of the Scotch method and the greater part of the Alaska pack of cured herring from this time has been prepared by the Scotch formula.

The curing industry for Prince William Sound had its initial expansion in 1918. The larger fish of this district gave the Prince William Sound packers an advantage over those of Southeastern Alaska in disposing of their product. Curing in Southeastern Alaska declined after 1918 as the scarcity of large fish became more acute, but the industry continued its expansion in Prince William Sound.

1922 saw the spread of large scale curing operations to the Kodiak District, and from that year the Kodiak and Prince William Sound curing industries have closely paralleled each other.

Curing operations in 1925 were the largest in the history of the Territory, with Prince William Sound and Kodiak being the biggest producers.

The outstanding feature of the Alaska herring industry in 1928 was the development of curing operations in the eastern part of the Aleutian Islands. Dutch Harbor for the first time became an important producing center as the stocks of large fish in its vicinity were utilized. The Western District was the only area that held up its production in 1929 when the scarcity of large herring in Prince William Sound, Kodiak, and Southeastern Alaska districts resulted in the smallest pack of Scotch cured herring since the introduction of the method in 1917.

In the years prior to World War II there was a sharp curtailment in the production of Sctoch cured herring in the Territory. Unfavorable market conditions and the scarcity of herring suitable for curing were primarily responsible for the decline. The second World War increased the demand for Alaska cured herring but production did not increase greatly because curing-size fish were scarce. After the war production fell off and there has not been any commercial curing of herring in the Territory since 1948.

4. Dry Salting.

For many years herring preserved by the dry salt method were much in demand as a cheap food for the Oriental market, and large shipments of this product were made annually from British Columbia. The partial failure of the British Columbia fishery during 1910 and 1911 brought the attention of the buyers to the possibilities of Southeastern Alaska as a location for similar industry. In 1910 a large saltery was built in Ketchikan and 3,000,000 pounds were dry salted there in 1911. More competitors entered the field in 1912 and over 13,700,000 pounds were prepared.

In 1913, in spite of increased efforts, production fell to 8,700,000 pounds and in 1914 most of the operators went out of business. The fall in production resulted from the prevailing low prices and lack of satisfactory transportation arrangements. Since that time, 1918 has been the only year in which the dry salted product has exceeded 1,000,000 pounds. No herring have been dry salted for the market since 1941.

TABLE 3. PRODUCTION OF CURED AND SALTED HERRING IN ALASKA.

YEAR	SCOTCH CURE	NORWEGIAN CURE	NO. OF PLANTS OPERATING IN ALASKA
1917	7,622 bbls.	13,576 bbls.	27
1918	9,744,175 lbs.	8,968,515 lbs.	58
1919	7,718,985 lbs.	2,216,120 lbs.	27
1920	8,223,490 lbs.	344,619 lbs.	14
1921	14,523,441 lbs.	406,250 lbs.	18

YEAR	SOUTHEASTERN			CENTRAL			WESTERN			No. Of Plants
	Scotch Cure	Norwegian Cure	Dry Salt	Scotch Cure	Norwegian Cure	Dry Salt	Scotch Cure	Norwegian Cure	Dry Salt	Oper. In Alaska
1922	7,290,009	22,400	--	28,616,941	215,450	24,000	88,600	--	--	36
1923	2,591,450	203,250	--	10,386,183	250,200	--	69,800	--	--	32
1924	3,518,512	7,200	17,200	15,353,538	--	75,250	148,600	11,400	--	49
1925	4,641,625	232,000	273,000	29,243,190	133,225	404,705	41,160	--	--	64
1926	1,576,050	19,400	11,440	14,053,180	15,300	--	--	120,800	--	80
1927	3,353,000	165,925	--	11,050,390	19,000	15,750	139,000	--	--	52
1928	4,420,100	262,400	--	4,912,170	55,950	215,750	6,724,325	27,500	--	90
1929	1,244,250	91,165	--	200,250	--	--	5,100,625	37,400	150,000	30
1930	1,382,895	90,250	--	3,011,375	11,500	--	3,686,975	43,625	150,750	39
1931	1,759,475	200	--	2,960,350	29,500	--	3,291,225	138,800	73,050	29
1932	2,680,825	--	--	8,342,150	--	--	1,770,250	--	145,470	29
1933	3,874,703	31,250	--	7,177,000	6,000	--	1,599,625	253,700	54,200	40
1934	2,137,075	21,790	--	3,251,875	--	--	2,020,250	208,750	80,400	27
1935	2,187,000	--	--	9,343,325	4,000	--	3,412,425	--	314,775	41
1936	759,250	--	--	8,162,525	2,125	--	2,491,450	--	--	29
1937	72,750	--	--	1,995,415	--	--	29,875	--	--	8
1938	--	--	--	1,634,000	--	--	552,150	192,800	--	9
1939	--	--	--	2,233,563	32,550	63,200	624,300	--	--	10
1940	--	--	--	3,690,300	10,200	50,250	616,575	--	20,000	23
1941	--	--	--	1,788,187	--	155,125	167,725	--	--	7
1942	--	--	--	660,725	--	--	--	--	--	4
1943	5,750	--	--	1,123,625	--	--	--	--	--	5
1944	27,175	--	--	926,685	--	--	--	--	--	4
1945	--	9,660	--	1,848,125	--	--	150,000	--	--	5
1946	--	--	--	1,992,275	--	1,000	62,375	12,000	--	7
1947	45,750	--	--	2,013,675	7,995	--	--	--	--	5
1948	--	--	--	550,150	--	--	--	--	--	2
1949	--	--	--	--	--	--	--	--	--	--

STATISTICS

The first three tables of this section deal with Alaska's most valuable species of fish, salmon. The catch, pack and value of the pack is presented in the same manner as in the previous reports and give the latest available data. Tables 4 and 5 cover all species of fish and shellfish taken in Alaska. Table 4 presents the landings of the various species and the value to the fisherman, while Table 5 gives the poundage of the products of these species as prepared for market with their respective values. Table 4 has not previously been published in the department's reports, but is now presented separately to avoid any possible confusion between the poundage of raw fish landings and their products as prepared for market.

As in the past the districts of the Territory embrace the same area. The Southeastern district includes the area from the southern boundary of Alaska north to Yakutat; the Central district extends from Yakutat westward, including the entire area south of the Alaska Peninsula; the Western district includes that area north of the Peninsula and the Kuskokwim and Yukon Rivers.

The source of the material presented in this section is from the United States Fish and Wildlife Service publications "Fishery Statistics of the United States" and "Current Fishery Statistics". Use of these data are hereby gratefully acknowledged.

TABLE 1. 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
	$ 11.94	$ 7.54	$ 7.90	$ 15.44	$ 15.04	$
1943	2,006,841	6,878,028	18,225,882	844,440	29,868,438	57,823,629
	12.05	7.37	8.00	15.75	15.23	
1944	2,258,738	7,525,672	16,749,448	583,009	24,079,273	51,196,140
	12.12	7.68	8.04	16.70	15.51	
1945	2,457,242	5,312,270	18,007,700	720,196	18,260,272	44,757,680
	17.30	10.53	10.67	21.25	19.55	
1946	3,250,249	6,421,647	21,895,235	805,199	20,784,864	53,157,194
	18.24	17.95	18.72	21.08	24.19	
1947	2,689,888	8,229,464	32,210,755	1,112,539	35,739,285	79,981,931
	25.96	21.10	24.24	26.70	27.51	
1948	5,732,253	15,082,926	31,445,485	1,435,578	44,964,049	98,660,291
	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	26,753,868	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
	TOTAL VALUE ALL SPECIES, 1905-1952 —					$1,813,629,203

TABLE 2. TOTAL SALMON PACK IN CASES (48 ONE-POUND CANS) AND NUMBER OF OPERATING SALMON CANNERIES BY DISTRICT.

Year	Pack Southeastern	No. Can.	Pack Central	No. Can.	Pack Western	No. Can.	Total Pack	Total No. Can.
1943	1,892,868	34	2,167,306	35	1,368,095	14	5,428,269	83
1944	1,972,552	36	1,877,381	43	1,043,126	15	4,893,059	93
1945	1,548,543	41	2,091,739	44	713,287	11	4,354,569	96
1946	1,476,326	45	1,772,318	51	711,966	20	3,960,610	116
1947	1,056,878	32	1,786,629	43	1,414,895	15	4,260,394	90
1948	1,277,773	34	1,316,494	53	1,374,254	17	3,968,521	104
1949	2,493,709	37	1,281,212	51	588,550	29	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

TABLE 3. NUMBER OF SALMON TAKEN IN 1951, COMPILED BY FISHING GEAR, SPECIES & DISTRICT.

Gear and Species	Southeast Alaska	Central Alaska	Western Alaska	All Districts
SEINES:				
Number of Units	472	651	57	1,180
% of Total Catch	32	45	11	33
Silver	231,777	65,757	1,755	299,289
Chum	2,428,284	1,286,276	287,813	4,002,373
Pink	7,093,837	3,937,110	20,863	11,051,810
King	1,751	4,298	866	6,915
Red	145,064	628,121	295,122	1,068,307
Total	9,900,713	5,921,562	606,419	16,428,694
GILLNETS:				
Number of Units	594	4,353	1,475	6,422
% of Total Catch	3	25	89	18
Silver	254,100	365,205	74,037	693,342
Chum	48,386	232,786	166,433	447,605
Pink	163,762	197,904	64	361,730
King	20,400	149,979	101,080	271,459
Red	394,700	2,331,583	4,402,074	7,128,357
Total	881,348	3,277,457	4,743,688	8,902,493
TRAPS:				
Number of Units	252	134	---	386
% of Total Catch	57	30		44
Silver	821,699	214,002	---	1,035,701
Chum	1,622,396	520,472	---	2,142,868
Pink	14,785,641	2,049,588	---	16,835,229
King	1,029	58,831	---	59,860
Red	278,359	1,176,297	---	1,454,656
Total	17,509,124	4,019,190	---	21,528,314
LINES:				
% of Total Catch	8	---	---	5
Silver	2,002,653	87	---	2,002,740
Chum	23,944	---	---	23,944
Pink	167,880	---	---	167,880
King	451,180	128	---	451,308
Red	1,498	---	---	1,498
Total	2,647,155	215	---	2,647,370
TOTAL:				
Silver	3,310,229	645,051	75,792	4,031,072
Chum	4,123,010	2,039,534	454,246	6,616,790
Pink	22,211,120	6,184,602	20,927	28,416,649
King	474,360	213,236	101,946	789,542
Red	819,621	4,136,001	4,697,196	9,652,818
Grand Total	30,938,340	13,218,424	5,350,107	49,506,871

TABLE 4. COMPARATIVE ANNUAL LANDINGS OF FISH AND SHELLFISH BY POUNDAGE AND VALUE.

SPECIES	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952
Salmon	457,306,822	393,318,474	402,635,233	391,689,076	381,807,676	338,369,670	388,345,160	264,918,844	276,588,312	282,966,799
	$14,587,552	$14,527,257	$15,564,474	$17,088,935	$19,570,408	$23,143,760	$32,662,497	$22,637,117	$32,368,160	$31,020,258
Herring	90,549,450	113,278,500	139,769,328	198,231,250	187,889,562	174,449,254	33,061,172	165,366,843	81,624,700	45,802,151
	$530,399	$1,141,663	$1,355,738	$1,982,312	$2,077,314	$1,852,972	$414,072	$2,067,085	$1,003,292	$444,461
Halibut	35,122,645	36,663,562	33,398,004	35,010,441	34,016,781	34,960,888	35,196,343	38,636,402	32,045,000	33,390,807
	$4,523,537	$3,517,067	$4,020,358	$4,082,000	$5,676,630	$5,095,063	$5,157,902	$5,776,224	$4,117,608	$4,533,808
Sablefish	6,628,031	7,384,883	8,351,129	9,019,257	1,228,431	6,512,346	5,753,724	954,901	5,815,405	1,804,417
	$493,410	$803,539	$914,542	$739,600	$110,559	$707,734	$427,374	$35,791	$529,368	$141,364
Cod	69,724	1,645,161	1,722,479	2,531,630	2,347,514	2,337,770	2,185,547	858,318	---	---
	$4,752	$31,112	$34,013	$126,820	$81,405	$73,860	$54,639	$22,676	---	---
Sharks and Skates	1,198,163	3,654,217	2,744,224	6,445,025	1,975,664	2,250,474	1,507,325	18,883	11,008	3,550
	$65,915	$128,919	$71,176	$60,180	$23,264	$36,358	$24,333	$105	$110	$53
Miscellaneous Bottom Fish†	512,971	1,237,902	1,774,992	1,500,545	82,900	408,989	192,157	20,604	25,264	377,414
	$24,419	$71,811	$105,317	$136,849	$12,462	$17,387	$12,281	$528	$1,620	$22,325
Clams: Butter	209,248	476,444	713,035	412,458	11,176	15,644	5,652	---	80	23,116
	$7,571	$9,647	$14,925	$36,965	$838	$939	$339	---	$8	$1,828
Razor	1,833,989	1,646,353	1,705,947	1,804,679	606,540	1,222,649	1,699,695	2,201,717	2,355,681	1,272,454
	$123,794	$111,129	$115,151	$162,421	$57,621	$128,378	$203,693	$264,206	$347,574	$165,419
Crabs: Dungeness	690,251	1,272,700	1,857,720	2,438,600	1,392,611	1,222,326	1,428,401	4,119,425	5,482,416	3,749,412
	$25,065	$53,072	$59,692	$131,436	$69,630	$63,217	$80,716	$277,382	$478,387	$331,433
King	44,696	15,208	---	22,600	752,668	2,133,354	1,206,945	1,519,249	1,993,912	2,772,833
	$2,097	$1,238	---	$960	$31,988	$96,001	$72,417	$91,155	$227,622	$388,197
Shrimp	438,915	540,846	1,263,291	2,248,900	1,657,299	2,834,803	2,267,934	2,158,260	1,707,816	1,952,777
	$6,583	$8,112	$23,757	$56,222	$215,449	$226,784	$181,434	$172,661	$179,301	$181,609
Miscellaneous Shellfish‡	4,617	13,197	37,918	27,425	23,917	7,329	19,630	73,200	44,193	23,021
	$1,026	$1,714	$2,100	$2,447	$2,078	$733	$1,348	$4,392	$3,596	$2,081
Miscellaneous Fish*	35,149	51,450	78,360	64,128	16,855	174,467	19,596	1,445,976	32,909	45,424
	$2,109	$3,087	$5,793	$9,932	$1,953	$38,116	$1,564	$22,304	$3,594	$5,548
Miscellaneous Livers, Oil & Viscera	$107,712	$4,158	$1,112	$5,377	$50,589	$13,503	$4,396	---	---	---
TOTALS	594,644,671	561,198,897	596,051,660	651,446,014	613,809,594	566,899,963	472,889,281	482,292,622	407,726,696	374,184,175
	$20,505,941	$20,413,525	$22,288,148	$24,622,456	$27,982,188	$31,494,805	$39,299,005	$31,371,626	$39,260,240	$37,238,384

† Includes Rockfish, Flounders, Lingcod.

‡ Includes Cockles and Oysters.

* Includes Trout, Smelt, Albacore.

TABLE 5. COMPARATIVE ANNUAL PRODUCTION OF FISHERY PRODUCTS AS PREPARED FOR MARKET BY POUNDAGE AND VALUE

SPECIES	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952
Salmon	278,281,780	252,469,262	235,409,519	218,653,709	224,862,543	210,608,877	232,616,358	174,765,212	189,100,990	194,611,255
	$60,363,015	$53,875,712	$48,917,141	$59,090,973	$93,145,456	$101,193,919	$86,112,666	$87,091,068	$85,887,641	$80,054,432
Herring	32,404,362	39,628,151	47,444,544	63,883,821	63,249,923	58,388,893	15,081,412	52,106,111	28,213,195	15,995,582
	$1,829,491	$2,458,154	$2,973,500	$6,573,416	$6,533,778	$5,694,889	$944,106	$3,819,994	$2,069,608	$944,667
Halibut	14,117,723	29,209,837	26,757,711	27,944,512	26,795,227	27,566,134	27,513,244	27,401,794	23,607,098	25,591,753
	$2,649,432	$4,656,817	$4,390,183	$5,460,111	$5,989,188	$6,615,876	$5,425,754	$6,081,896	$4,198,542	$4,730,643
Sablefish	4,379,989	5,601,482	6,289,757	6,841,983	934,435	4,943,507	4,281,771	680,301	4,170,292	1,297,365
	$681,014	$888,799	$1,239,929	$1,153,025	$143,250	$968,100	$529,935	$51,579	$548,426	$161,812
Cod	28,527	510,000	543,680	921,114	819,822	786,931	660,664	519,035	----	-----
	$1,938	$56,000	$80,255	$152,660	$163,498	$85,389	$74,680	$65,347	----	----
Sharks and Skates	371,780	492,494	251,688	277,038	164,276	177,847	153,777	2,104	1,321	426
	$81,957	$116,850	$80,397	$153,241	$59,572	$82,016	$42,019	$125	$155	$170
Miscellaneous Bottom Fish†	304,719	880,126	1,253,417	1,097,973	68,261	240,463	140,167	14,804	20,298	372,809
	$24,513	$79,660	$110,733	$91,342	$19,404	$24,115	$14,938	$689	$2,170	$22,591
Clams: Butter	211,590	372,608	382,964	261,681	2,700	13,452	5,916			
	$72,275	$145,949	$135,744	$171,947	$1,985	$3,584	$1,219			
Razor	584,310	570,312	538,096	680,555	259,690	428,551	613,140	805,276‡	670,706‡	404,479‡
	$431,481	$426,974	$403,688	$752,783	$247,801	$498,469	$680,171	$869,819	$813,031	$505,542
Crabs: Dungeness	183,958	312,614	480,749	585,280	345,583	302,972	375,908			
	$146,032	$248,306	$352,222	$640,908	$326,958	$293,550	$349,693			
King	10,120	3,802	----	5,421	195,433	572,107	499,121	1,757,699§	2,530,603§	1,657,670§
	$10,360	$3,900	----	$8,172	$168,507	$684,260	$272,905	$1,603,688	$1,881,036	$1,562,498
Shrimp	114,120	140,620	214,806	346,811	350,375	493,271	521,703	500,566	427,096	507,857
	$57,256	$118,439	$177,400	$323,372	$326,467	$523,750	$473,790	$443,410	$434,201	$485,153
Miscellaneous Shellfish¶	4,671	8,538	9,619	6,780	4,899	1,026	4,356	----	----	----
	$2,052	$5,572	$6,113	$5,800	$2,949	$684	$3,504	----	----	----
Miscellaneous Fish*	21,089	38,588	63,233	41,504	12,587	181,390	14,249	55,441	20,658	30,963
	$2,859	$5,919	$9,547	$8,558	$2,435	$50,827	$3,481	$16,508	$4,391	$9,941
Miscellaneous Livers, Oil & Viscera	354,434	164,487	9,633	74,275	199,967	417,704	23,337	529,963	----	----
	$68,207	$141,833	$1,112	$433,575	$66,701	$149,906	$4,396	$39,149	----	----
TOTALS	331,373,118	330,402,921	319,649,416	321,622,457	318,265,721	305,123,125	282,505,123	259,138,306	248,762,257	240,470,159
	$66,421,882	$63,228,884	$58,877,964	$75,019,883	$107,197,949	$116,869,334	$94,933,257	$100,083,272	$95,839,201	$88,477,449

† Includes Rockfish, Flounders, Lingcod. ¶ Includes Cockles and Oysters. * Includes Trout, Smelt, Albacore. ‡ Includes both Butter and Razor Clams.

§ Includes both Dungeness and King Crabs.

FINANCIAL REPORT

ALASKA DEPARTMENT OF FISHERIES

EXPENDITURES, APRIL 1, 1951 — MARCH 31, 1953

FUNDS ALLOTTED BIENNIUM APRIL 1, 1951 – MARCH 31, 1953:

SPORT FISH PROPAGATION	$ 50,000.00
FISHERIES BOARD EXPENSES	10,000.00
ADMINISTRATION	48,200.00
INSPECTION	120,000.00
WATERSHED MANAGEMENT	59,200.00
BIOLOGY	121,300.00
FEDERAL O.A. TAX ON EMPLOYEES WAGES	972.00
	$409,672.00
PREDATOR CONTROL	50,000.00

ADMINISTRATION	Expenditures	Allotted biennium April 1, 1951 - March 31, 1953	Balance
Salary of Director, Administration		$ 20,000.00	None
Other Salaries of Administration		12,000.00	$ 317.00
Other Expenses of Administration		16,200.00	972.78
		$ 48,200.00	$1,289.78
Salaries & Wages	$31,683.00		
Transportation	2,424.81		
Subsistence & Lodging	1,464.80		
Office Expense	674.30		
Telephone & Telegraph	479.17		
Postage, Freight & Express	245.75		
Printing	2,696.30		
Rent	4,669.19		
Industrial Insurance	395.22		
Other General Expense	352.32		
Operating Expense	635.71		
Office Equipment	713.25		
Matching Money for Federal Old Age	87.29		
Utility Equipment	389.11	46,910.22	
		$ 1,289.78 Balance	
FISHERIES BOARD		$ 10,000.00	$2,882.36
	Expenditures		
Transportation	$ 2,436.30		
Subsistence & Lodging	4,506,30		
Office Expense	8.00		
Telephone & Telegraph	103.15		
Postage, Freight & Express	60.83		
Other General Expense	3.06	7,117.64	
		$ 2,882.36	
INSPECTION			
Salaries & Wages		$ 79,570.00	$3,965.96
Other Expenses of Inspection		40,430.00	4,306.85
		$120.000.00	$8,272.81
	Expenditures		
Salaries & Wages	$75,604.04		
Transportation	7,016.35		
Subsistence & Lodging	1,530.33		
Office Expense	219.75		
Telephone & Telegraph	26.95		
Postage, Freight & Express	93.88		
Printing	22.00		
Industrial Insurance	1,015.27		
Other General Expense	455.45		
Operating Expense	4,553.39		
Office Equipment	464.00		
Floating Equipment	15,527.20		
Utility Equipment	4,552.06		
Matching Money for Federal Old Age	646.52	111,727.19	
		$ 8,272.81	

EXPENDITURES, APRIL 1, 1951 – MARCH 31, 1953 (cont.)

	Expenditures	Allotted biennium April 1, 1951 - March 31, 1953	Balance
WATERSHED MANAGEMENT			
Salaries & Wages, Watershed Mgmt		$ 19,200.00	$ 182.50
Other Expenses of Watershed Mgmt		40,000.00	4,391.23
		$ 59,200.00	$4,573.73
($10,000 allotted by Department for Falls Creek Project was taken from "Other Expenses of Watershed Mgmt.")			
Salaries & Wages	$19,017.50		
Transportation	4,791.85		
Subsistence & Lodging	6,230.50		
Office Expense	1,097.35		
Telephone & Telegraph	38.01		
Postage, Freight & Express	681.96		
Printing	22.00		
Rent	360.00		
Industrial Insurance	165.18		
Other General Expense	6,527.69		
Operating Expense	8,482.74		
Office Equipment	2,345.79		
Floating Equipment	1,328.29		
Utility Equipment	3,449.28		
Matching Money for Federal Old Age	88.13	54,626.27	
		$ 4,573.73	
Falls Creek Project		10,000.00	2,022.97
Total Expenses Including Salaries	7,977.03	7,977.03	
		$ 2,022.97	
BIOLOGY			
Salaries & Wages, Biology		$ 62,730.00	$ 352.31
Other Expenses of Biology		58,570.00	5.92
		$121,300.00	$ 358.23
Salaries & Wages	$62,377.69		
Transportation	9,383.11		
Subsistence & Lodging	11,926.25		
Office Expense	594.35		
Telephone & Telegraph	25.36		
Postage, Freight & Express	241.26		
Printing	61.15		
Industrial Insurance	519.26		
Other General Expense	1,346.97		
Operating Expense	27,747.07		
Floating Equipment	3,422.02		
Office Equipment	2,096,19		
Utility Equipment	925.65		
Matching Money for Federal Old Age	275.44	120,941.77	
		$ 358.23	
PREDATOR CONTROL — General Expenses		$ 50,000.00	$ 110.50
Salaries & Wages	$28,817.82		
Transportation	887.24		
Subsistence & Lodging	162.00		
Office Expense	23.50		
Postage, Freight & Express	657.51		
Telephone & Telegraph	8.02		
Printing	14.50		
Industrial Insurance	141.69		
Other General Expense	285.58		
Operating Expense	16,725.22		
Floating Equipment	1,909.78		
Matching Money for Federal Old Age	256.64	49,889.50	
		$ 110.50	

		Allotted biennium April 1, 1951 - March 31, 1953	Balance
SPORT FISH PROPAGATION			
	General Expenses	$ 50,000.00	$ 2.68
	Expenditures		
Salaries & Wages	$24,324.33		
Transportation	1,797.83		
Subsistence & Lodging	5,240.47		
Office Expense	284.04		
Telephone & Telegraph	182.74		
Postage, Freight & Express	423.70		
Rent	108.33		
Industrial Insurance	155.67		
Other General Expense	625.73		
Operating Expense	8,141.37		
Office Expense - Equipment	1,364.67		
Floating Equipment	597.70		
Utility Equipment	6,544.22		
Matching Money for Federal Old Age	206.52	49,997.32	
		$ 2.68	

LOOKING FORWARD

In looking forward to operations for the coming year the several divisions of the department will continue their work programs along the lines outlined in the past, with such additions as may become possible within the funds appropriated by the 1953 session of the Legislature.

BIOLOGY DIVISION

All previous attempts to develop runs of salmon in barren areas that have been attempted by this and other fishery agencies on the Pacific Coast have been largely by the trial and error method. Some have been successful, while others have been failures and the reasons therefor have seldom been determined.

Since Alaska has numerous opportunities for utilizing barren lakes for salmon production, it seems advisable that some basic research on the subject should be initiated as soon as possible. Preliminary to stocking one of these waters, it should be surveyed and classified as to its physical and chemical properties, presence and amount of suitable food (plankton) for young salmon, presence of injurious predators and competitors, and other related factors. Based on these findings a race of salmon from waters of similar characteristics can be selected for transplanting. Having made the proper selection, the next question is whether the stocking should be done by the use of green eggs, eyed eggs, fry or will it be necessary to rear them to the fingerling or larger sizes.

BASIC RESEARCH ON BARREN AREA SALMON PRODUCTION

Plans call for a series of carefully controlled experiments in planting by each of the above methods. Results will be determined by placing traps in the outlet streams to capture the downstream migrants on their way to the sea.

The complete project will be broken down into two sections: one on red salmon and the other on silver salmon. The red salmon experiments will be carried on in the Kodiak area, where some preliminary work has already been done. The district around Ketchikan has been selected for conducting the research on silver salmon because it seems to offer one of the best potentials in Alaska for increasing the production of this species. The entire project must of necessity be of a long range nature, so the sooner it can be started the better.

During the past three years extensive investigations of the troll salmon fishery, both kings and silvers, have been conducted especially in the offshore waters. The migration patterns, age groups, home streams, and related information have been fairly well established for these offshore waters. However, the picture is still not clear so far as the king salmon of the inside waters is concerned. Considerable more tagging will be necessary to discover their migration patterns and home streams. Since these inside waters appear to have a large percentage of small king salmon, data should be collected to determine the proper minimum size limit based on the balance between growth and natural mortality. Information should also be gathered to determine whether seasonal and area closures are necessary from the standpoint of protecting immature fish

KING SALMON TROLL FISHERY OF SOUTHEAST ALASKA

and providing more prime fish for the industry.

The Taku River king salmon studies will be continued during the 1953 season and should be carried on for several more years. The basic biological facts regarding the king runs of this river are being accumulated in order that sound recommendations may be made for control of the fishery on these stocks. By the use of a fish wheel and set nets near the mouth of the river, methods are being perfected to ascertain the relation of catch to escapement and the effect of the commercial fishing operations of the future king salmon runs of the river. The results of the lower river studies must be correlated with observations on the spawning grounds later in the season.

TAKU RIVER KING SALMON INVESTIGATIONS

Although the king salmon studies will remain the primary consideration, an opportunity will be afforded to gather valuable information on the runs of other species: red, pink, silver and chum salmon. It is planned to operate the sampling station from early spring until late fall, thus covering all salmon runs on this river. As the data accumulates it will be possible to set up a management policy that will provide the greatest possible catch on a sustained yield basis. If successful in developing and perfecting this technique, the same methods can be applied to similar rivers all over Alaska.

The comprehensive blackcod tagging program undertaken during 1952 will not have to be repeated in 1953. However, it is planned to conduct minor tagging operations in the inside waters of Southeastern Alaksa, principally on immature fish, which frequent many of the bays during the summer months. The returns from these experiments together with other pertinent information on the age composition, weight-length-maturity relationship, catch statistics, etc. will give a good picture of the present condition of the fishery and what type of regulations, if any, are required. This is especially important in view of the impending formation of an International North Pacific Fisheries Commission.

BLACKCOD INVESTIGATION

The various minor fisheries for crab, shrimp, and clams are carried on largely by resident fishermen and as such contribute materially to the economy of the Territory. Practically no research is being done on these species at the present time. It is therefore advisable that some studies be started at the earliest opportunity, especially on crab and shrimp. The general objective would be to determine the logical limits of commercial exploitation of these species and to establish management principles to contain the developing fisheries within these limits.

SHELLFISH INVESTIGATIONS

INSPECTION DIVISION

Cooperation with the Enforcement Section of the Fish and Wildlife Service will continue to be a function of this division. However, since the federal agency is now receiving additional funds for the employment of seasonal enforcement men, it would therefore seem expedient that more of the territorial funds be expended for other activities of this division. There is much work that can be done and much valuable information gathered that can be used to good advantage by the Biology and Watershed Management Divisions. Fishery inspectors assigned to important salmon streams can make daily observations on the presence and numbers of downstream migrants in the spring and upstream spawners later in the season; on stream flows, weather conditions and other related factors.

PREDATOR CONTROL

The hair seal control program will be continued as during the past two years with coverage of the Stikine, Taku and Copper River districts, and such additional rivers as funds and manpower will provide. This program is not aimed at extermination of this animal, but merely to reduce their numbers in the selected areas so that damage to the salmon runs and to the gear of the fishermen will be negligible.

Plans call for a study of the beluga whale in Bristol Bay to determine if this animal is a serious predator on salmon. If this should prove true, some practical method for reducing their numbers must be formulated.

SPORT FISH DIVISION

The general work program, which was successfully inaugurated in 1951 and 1952, will be continued and expanded during 1953. Biological surveys will be conducted on accessible lakes to determine their suitability for stocking with sport fish. If predators or competitors are present in the selected lakes, these waters must then be treated with a toxicant to destroy all the undesirable fish. After a brief rest period the lakes will then be planted with rainbow trout fry of proper size from the Fairbanks hatchery of the department.

NEW HATCHERY
ANCHORAGE AREA

With funds provided by the Anchorage Sportsmen's Association a trout hatchery will be built on the outlet creek of Upper Fire Lake. This location, which was selected by biologists of the department, is adjacent to the main Anchorage-Palmer Highway so it will be readily accessible to the general public. Construction will be of a permanent nature, with provision for expansion as the need arises. This installation, while primarily for the immediate Anchorage-Palmer area, will be used for stocking all suitable waters in The Third Division.

WATERSHED MANAGEMENT

The 1953 season will call for the continuation of the planting experiments started at Pauls Basin on Afognak Island and at Frazer Lake on Kodiak Island. Both green and eyed red salmon eggs will be buried in the gravel and allowed to hatch under natural conditions. In attempting to develop runs of this most valuable species of salmon, it will be necessary to continue the egg planting program for at least a full cycle of five years.

The fishways constructed at Pauls Basin in 1952 are already being used by silver salmon, which were native to the waters below the barrier. Construction of a fish ladder at the falls on Frazer River must await appropriation of funds. In the meantime, engineering surveys must be made and plans drawn for an economical and practical type of fishway. Other possibilities in the Kodiak-Afognak area must be checked from both the biological and engineering standpoint.

The Ketchikan district will continue to receive attention to determine the most feasible locations for future projects to increase production of barren areas. Limited red salmon egg plants, started last year, will be continued utilizing both green and eyed eggs. A small temporary installation suffices for eyeing out the eggs. Further biological and engineering surveys of the potential salmon producing waters must be made.

STOCKING FALL KING SALMON

The year 1953 will mark the fourth year of an experiment to introduce fall run king salmon into the waters of Alaska. The first planting of eyed eggs from Puget Sound was made in December 1950. Since this variety has a four year cycle, the 1953 plant should complete the experiment. If this initial trial proves successful it may be possible to start runs of fall kings in many of the smaller streams of the Territory, which are unsuitable for our spring run stocks.

ALASKA FISHERIES BOARD

The members of the board will welcome at all times suggestions of the fishermen of Alaska, both commercial and sport, as to general policies and for recommendations for changes in the regulations. The latter will be especially helpful to the board in the preparation of its annual brief to the Fish and Wildlife Service outlining the board's views on changes in the fishing regulations for the ensuing year.