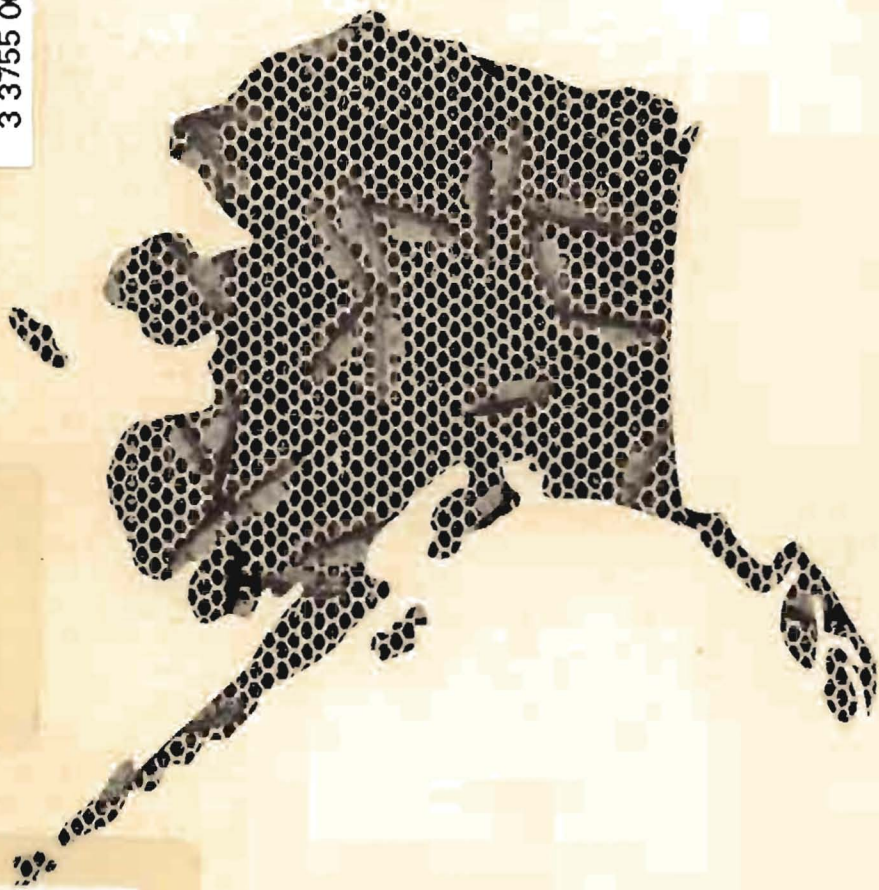
Alaska Department of Fisheries

JUNEAU, ALASKA

Annual Report for 1953



COVER: RAINBOW TROUT YOLK SAC FRY, NATURAL SIZE.

1953
ANNUAL REPORT

Alaska Fisheries Board

and

Alaska Department of Fisheries

B. Frank Heintzleman
Governor

Robert C. Kallenberg
Chairman

C. L. Anderson
Director

REPORT NO. 5
JUNEAU, ALASKA

ALASKA DEPARTMENT OF FISHERIES

ANNUAL REPORT FOR 1953

ERRATA SHEET

Page

7 — Table 5 under statistics: Change 1952 to 1953

22 — Line 4 of the last paragraph: Change "of" to "for"

38 — Table 7, June 19-25, 1952: Change 144 to 1446

38 — Table 8, June 26-2, 1949: Change 5826 to 5862

38 — Table 8, July 24-30, 1947: Change 2201 to 2210

40 — Table 11, Sept. 4-10, 1951: Change 887 to 877

86 — Table 4, Miscellaneous Shellfish, 1953: Change $8,076 to $8,074

87 — Table 5, Shrimp, 1953: Change $276,469 to $476,469

To:

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

Herewith is submitted the Fifth 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, 1953.

C. L. ANDERSON, Director

ROBERT C. KALLENBERG, Chairman

KENNETH BELL, Member

HENRY DENNY, Member

IRA H. ROTHWELL, Member

J. HOWARD WAKEFIELD, Member

FOREWORD

In presenting this Fifth Annual Report of the Alaska Department of Fisheries, a summary is given of the activities of the Alaska Fisheries Board and of the several divisions within the department. The statistical tables included in the report cover the preceding ten year period and are presented in the revised forms set up in the 1952 annual report. The financial statement covers the biennium, April 1, 1953 to March 31, 1954.

While much of the material presented represents a continuation of work started in previous years, it has been possible to inaugurate several new investigations and projects during the calendar year 1953. Among these may be mentioned:

Kitoi Bay Research Station: Construction was started in late 1953 on a small research station and experimental hatchery at Kitoi Bay on Afognak Island near Kodiak. Primary research will be directed to basic studies on the artificial propagation and stocking of red salmon. Information so obtained will be of great value to the Watershed Management Division in its program of opening up waters now non-productive of salmon. This location was selected because of the abundance of lakes and streams adjacent to the site that will be ideal for experimental purposes.

King Crab Investigation: Because of the fine financial assistance given to the department by one of the major producers, it became possible to start this research program in the latter part of 1953. Initial efforts will be confined to the king crab fisheries of the Kodiak and Cook Inlet areas. These fisheries are conducted largely by resident fishermen and for the most part take place in territorial waters.

Inspection Division: By enlarging the scope of the duties of the personnel of this division, material benefits accrued to other divisions of the department.

Anchorage Hatchery: A special word of praise is due the Anchorage Sportsmen's Association on the completion of their hatchery building in the fall of 1953. Because of its early completion the department was able to fulfill its part of the bargain, by installing the water supply line, head-trough, drains, etc. before the end of the year. This will make it possible for the hatchery to receive its first trout eggs early in the 1954 season.

Watershed Management: The outstanding event of this division was the successful production of downstream migrants in Laura Lake resulting from the 1951 plant of red salmon eggs in Gretchen Creek, a tributary of the lake. Over 1,200 migrants were caught in a trap installed in the outlet stream of Laura Lake. This lake, which formerly was barren of salmon, is located on Afognak Island near Kodiak.

Opportunities for this type of work are prevalent in all the major fishing areas of the territory. As the basic facts and techniques are learned by the Division of Biological Research, these can be applied in a practical way by the Watershed Management Division. Even with our present limited knowledge, it would appear that much can be done to increase the production of red and silver salmon.

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FISHERIES BOARD

Two regular meetings and one special meeting of the Alaska Fisheries Board were called during the year. All meetings were held in the office of the department at Juneau. A summary of each meeting follows.

REGULAR SPRING MEETING, APRIL 20-25, 1953.

Three vacancies in the membership of the Board had occurred since the fall meeting of November 17-23, 1952. Governor Heintzleman made appointments to fill these vacancies shortly after he took office. Robert C. Kallenberg, a fisherman of Dillingham, was appointed to fill out the unexpired term of Karl Brunstad of Kodiak, who had resigned. Donald M. Hamilton, fisherman from Ketchikan, was selected to replace W. O. Smith, also of Ketchikan, who had been serving on an interim basis. Paul E. Kirker, Jr., of Anchorage, succeeded J.P. Valentine of Ketchikan, whose term expired March 31, 1953. Mr. Kirker was selected as the member at large to represent the general public. As the first order of business the Board elected Mr. Kallenberg chairman to serve until the spring meeting of 1954.

In order that the three new members of the Board might become acquainted with the work of the department, the director and members of the staff reviewed in some detail the past activities of the several divisions since the inception of the department in 1949. The director then reviewed the fisheries legislation features of the 1953 session of the Territorial Legislature, mentioning the various bills, memorials, etc., affecting the operations of the department. Under the general appropriation bill the following funds were allotted to the department for the biennium April 1, 1953 - March 31, 1955;

Expenses of Board	$ 7,500.00
Administration:	
Director's salary	22,000.00
Salaries of Personnel	17,000.00
General expenses and travel	21,800.00
Biology:	
Salaries	80,700.00
General expenses	65,000.00
Inspection:	
Salaries	70,000.00
General expenses	40,430.00
Predator Control (Hair seals, etc.)	50,000.00
Sport Fish	90,000.00
Watershed Management:	
Salaries	25,000.00
General expenses	20,000.00
F.I.C.A.	972.00
	$510,402.00

The staff of the several divisions then presented their proposed work programs for the ensuing year to the Board for their consideration. The following were accepted and adopted by the Board.

BIOLOGY DIVISION

1. Taku River Investigation: This is to be continued with sampling, but no tagging, in the troll and gill net fishery. The set net and fishwheel to be operated at Canyon Island during the king runs in May and June. As many fish as possible will again be tagged at this location. After July 1, when the king runs have tapered off, the set net will be discontinued. However, the fishwheel will be continued in operation until late fall in order to gather data on the other species of salmon. The usual survey will be made in the headwaters during August to recover tagged kings and to check the intensity of the spawning.

2. Troll Salmon Studies: A mass of field data has been collected which will be worked up during the year. No additional tagging will be done this season, except such as can be done without cost from the departmental boat at Ketchikan. Some of the commercial trollers have offered to tag undersize kings--gratis.

3. Blackcod Investigation: Here again no costly tagging is planned. It is hoped, however, that a considerable number of immature blackcod can be tagged around Ketchikan and Juneau. This can be done without cost, except for the biologist's time. Working up of the field notes and other data already collected will occupy most of the time of the man assigned to this study.

4. Barren Water Production: The utilization of bodies of fresh water not now producing salmon because of blocks in the outlet streams will be investigated on a scientific basis to establish the best methods of introducing and stocking runs of salmon, especially reds and silvers. The correlation of this research with the more practical phases of the Watershed Management division is highly important.

5. King Crab Research: The Deep Sea Trawlers, Inc. had shown an interest in getting an investigation on this species started at an early date and had indicated a willingness to supply a part of the funds. The director was instructed to proceed with the proposed king crab research program if satisfactory arrangements can be made for finances and personnel.

INSPECTION DIVISION

In the past the work of this division had been concentrated largely on assistance to the Federal law enforcement program. It seemed logical to the Board that, in addition to this phase of the work, the inspectors be assigned certain other duties, which could be tied in closely with the activities of the other divisions.

Accordingly the following tentative plan was proposed for the ensuing year:

1. A full time district inspector to be stationed at Ketchikan, with a temporary assistant during the salmon runs.

2. A temporary stream inspector on the Taku River to work closely with the Biology division during the salmon season.

3. A temporary fishing inspector in the upper Copper River district and another on the Kenai Peninsula, both to work with the Sport Fish division as time permits.

4. Two temporary stream inspectors in the Kodiak area, both to work closely with the Watershed Management division.

5. Such additional inspectors, preferably on red salmon streams, as funds will provide.

PREDATOR CONTROL

During the 1953 season the hair seal control program is to be continued as in the past on the Stikine, Taku, and Copper Rivers. The chairman was asked to make a preliminary survey of the problem of predation by belugas in Bristol Bay, with a view toward formulating a program for 1954.

SPORT FISH DIVISION

1. The Fairbanks hatchery will be expanded to handle 300,000 eggs and plantings continued in that area on the same scale as last year. Surplus fry will go to Anchorage, Palmer and Cordova districts.

2. If the Anchorage Sportsmen's hatchery is completed in time, the department will install the water supply, troughs, etc. during the fall months.

3. Three or four lakes in the Anchorage-Palmer area will be treated with rotenone in 1953. If possible, early enough so they can be planted in the fall.

4. One additional biologist is to be hired and trained to take over the Fairbanks area. This will allow the present Fairbanks man, who heads the division, to devote a part of his time to other sections of the territory, preferably in Southeastern Alaska.

WATERSHED MANAGEMENT DIVISION

For the 1953 season plans call for a continuation of the planting of red salmon eggs in both Laura and Frazer Lake streams in the Kodiak area and the Old Frank's Lake system in Southeastern Alaska. The Engineering section will work on plans for the Anchorage hatchery, miscellaneous drafting for the Biology division, field surveys of future potential sites for fishways, estimates of costs, etc. The work of the Biology and Inspection divisions is to be closely correlated with that of Watershed Management.

The financial report for the biennium April 1, 1951 to March 31, 1953 was accepted by the Board as presented. After adoption of amendments to the personnel classification and salary schedule the meeting was adjourned.

SPECIAL MEETING, OCTOBER 1-3. 1953.

At the request of Mr. Wm. C. Herrington, special assistant for fisheries and wildlife to the Under-Secretary of State, a special meeting of the Alaska Fisheries Board was called for October 1-3, 1953, for the purpose of discussing various aspects of the enabling act to implement the North Pacific Fisheries Treaty.

Unfortunately two members of the Board had resigned since the annual spring meeting and no replacements had been made. As one other member of the Board was unable to attend no formal business could be conducted because of the lack of a quorum. However, discussions did proceed on an informal basis with Mr. Herrington.

Copies of a preliminary draft of "An Act to give effect to the International Convention for the High Seas Fisheries of the North Pacific Ocean" were presented by Mr. Herrington. This draft was then discussed section by section, taking note of changes that had been suggested by advisory groups in California, Oregon and Washington.

An open meeting was held on the morning of October 2 so that interested parties could meet with Mr. Herrington. A group of fishermen representative of Bristol Bay, Kodiak, Prince William Sound and Southeastern Alaska were among those present. The general features of the enabling act were explained by Mr. Herrington, after which he answered various and sundry questions pertaining to the convention itself.

Although no official action could be taken by the Board, it was agreed by the members present that the act, as amended, would be satisfactory to the resident fishermen of Alaska.

REGULAR FALL MEETING, NOVEMBER 10-18, 1953.

Two new members were appointed by Governor Heintzleman to fill the vacancies on the Board caused by the resignations of Paul E. Kirker, Jr. of Anchorage and Donald M. Hamilton of Ketchikan. Henry Denny of Saxman was named as the fishermen's representative from the Southern district and Kenneth Bell of Fairbanks as the public representative.

Detailed reports on the activities of the various divisions during the past season were presented by the staff. These are incorporated in other parts of this Annual Report.

Consideration of recommendations to the U.S. Fish and Wildlife Service for the 1954 fisheries regulations constituted the main business of the fall meeting. Letters dealing with this subject were received from various parts of the Territory and several local fishermen appeared in person to give their views. A round-table discussion was held with Juneau officials of the above Federal agency. Members of the departmental staff presented information on the particular areas with which they were familiar. The Board then adopted its recommendations and the director was instructed to incorporate these in a brief as follows:

ALASKA
DEPARTMENT OF FISHERIES
229 Alaska Office Building
Juneau, Alaska

C. L. Anderson, Director

November 24, 1953

Mr. John L. Farley, Director
U.S. Fish and Wildlife Service
Department of the Interior
Washington, D.C.

Dear Mr. Farley:

Since its creation in 1949, the Alaska Fisheries Board has submitted to the Director of the Fish and Wildlife Service an annual brief incorporating the recommendations of the Board pertaining to the regulations for the ensuing year for the protection of the commercial fisheries of Alaska.

In arriving at its conclusions, the Board endeavors to consider the best and latest available biological information; the statements and letters of commercial fishermen and operators; and the experiences of the commercial fishery members of the Board, which cover many years of active participation in the fisheries of the various areas of Alaska. In addition, a joint session is held with Juneau officials of your Service. This year the Board met with Regional Director Rhode, Assistant Regional Director Baltzo, and Enforcement Chief Ralston upon their return from the Seattle hearing.

It must be admitted by all that several areas are in such deplorable condition that drastic measures must be considered. Southeastern Alaska has in the past been the most important pink salmon area on the coast. From a high point in 1941, the annual pack has steadily declined to where it is now less than either British Columbia or Washington State. It is interesting to note that these two areas have been able to maintain their production of pink salmon at a reasonably constant level for a period of nearly 50 years.

The runs of pink salmon in Prince William Sound are in even worse condition than those of Southeastern Alaska.

The Department of the Interior, of which the Fish and Wildlife Service is one branch, is pledged to the upbuilding of the Territory of Alaska and to the furtherance of the welfare of its residents. It would therefore seem obligatory, so far as it may be compatible within the law and so far as it does not violate good biological principles, for the Service to give first consideration to the general well-being of the resident fishermen. This is especially true where drastic restrictions are being contemplated.

The following recommendations, suggestions and comments are being

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The following recommendations, suggestions and comments are being

offered by the Alaska Fisheries Board for your consideration when promulgating the Alaska Commercial Fishery Regulations for 1954:

PART 101 - DEFINITIONS

Only one type of gear has been defined in the past, namely the trap, Sec. 101.14. It is suggested that definitions for all legal types of gear be incorporated in the 1954 regulations. Furthermore, there should be some clarification as to what time in the process of setting each gear it is considered to be legally fishing, likewise when is it considered to have ceased fishing. There is a great deal of confusion and misunderstanding on these points amongst the fishermen.

PART 102 - GENERAL PROVISIONS

The Board is opposed to a general prohibition of any gear not already in use in any district, on the grounds that it is usually discriminatory on the residents and often prevents the establishment of small local industries. The Board reiterates its past stand on this subject that "unless some peculiar local conditions interfere, a general rule should be established that in any area in which the more effective types of gear are legal, then all the less effective should be legalized."

The Board is in agreement with the Service's proposal to limit leads on purse seines throughout the Territory to 75 fathoms. The Service should go one step further and place a maximum length of 250 fathoms on purse seines in all areas where a lesser length is not prescribed.

The Service's proposal to prohibit the use of more than one anchor or attachment in purse seining meets with approval--if applied only in areas where traps are prohibited.

The Board is also in agreement with your new proposal relating to the taking of crabs, new Sec. 102.40, to become effective on January 1, 1955. This would limit the catching of Dungeness crabs to pot and ring gear; and the taking of king crab to pot and trawl gear, with minimum mesh size of 12 inches in the bag and 6 inches in the wings. The return of female and undersized crabs with a minimum of injury should, of course, be mandatory.

PART 104 - BRISTOL BAY AREA

Sec. 104.2 — From the information now available, it would appear that the salmon runs to the several major rivers of this area could be managed more easily and on a better biological basis if the outer limits of the various fishing districts could be moved closer to the river mouths. This would give protection to the salmon on the milling grounds in the bay and would allow the various races to separate before being subjected to the fishery. Weekly closures would give better escapements and if additional closures become necessary they could be set up on a river to river basis as required. The fishermen of Bristol Bay have submitted proposed outer lines in each district, which seem to cover the situation quite well.

Sec. 104.3 — Under the present regulations the Bristol Bay salmon season runs from January 1 to December 31 each year, with a closed period of approximately two weeks during the latter part of July and first part of

August and with an additional provision limiting the size of the mesh to 8-1/2 inches before June 25 (June 28 in Ugashik). These two restrictions are in effect protecting only the tail-enders and the early parts of the red salmon runs, which, if we are to believe our fishery biologists, are the least productive parts of the run. It would therefore seem better management to eliminate these two restrictions and in lieu thereof impose a few extra days closure at the peak of the red run in each district. Since this may vary from district to district, and from year to year, it could be done by field announcement. Such a measure would be especially effective when combined with the inward movement of the outer limits of the several districts.

The elimination of the mid-season closure would also allow for better utilization of the pink and silver salmon runs, which are not being harvested to any extent at present.

Sec. 104.5 — The Board is in accord with the Service's proposal for a 48-hour fishing week in the Nushagak district and 84 hours in the others. Should a voluntary curtailment of gear be effected, longer periods would be in order.

Sec. 104.7 — The Board wishes to repeat its request of last year that Bristol Bay be open to trolling. There is some reason to believe that an early fishery for king salmon could be developed. The quality should be excellent and undoubtedly a premium price could be obtained on the Anchorage market. Local industries are necessary for the development of these more remote areas and encouragement should be given to all proposed projects wherever possible.

Sec. 104.8 — When a fisherman moves from one district to another it is recommended that he be required to report in person to an official of the Fish and Wildlife Service at some designated point in the new district.

Sec. 104.9 — It is suggested that this section which governs the marking of gill nets be simplified to eliminate the markings at 25 fathom intervals. Suitable markers at each end of the net should be sufficient.

Sec. 104.50 — It is realized that personal use fishing constitutes a problem that is difficult of solution, but the present regulations have been highly unsatisfactory to the residents. Supervision of personal use fishing by the local representative of the Service under a permit system, combined with the establishment of personal use fishing areas in the major villages might prove to be a suitable solution.

PART 105 - PENINSULA AREA

Sec. 105.2 — The Service's proposal to re-define the several fishing districts of this area is certainly in order.

Sec. 105.5 — It is recommended that the weekly closed period during the red salmon runs be further extended to 84 hours, the same as in Bristol Bay. A part of the Bristol Bay red salmon are subjected to a heavy fishery while passing through this area, and do need this added protection. Should it develop that this extra closure prevents full utilization of the

local red salmon runs, then additional fishing time could be allowed in the immediate vicinity of the local rivers.

Sec. 105.10 — As recommended previously under General Provisions, the maximum lengths of seines and leads should not exceed the maximum allowed in other areas, i.e. 250 fathoms for seine and 75 fathoms for lead. Weather conditions may offer some excuse for larger boats, but is no argument for larger nets.

A new subsection under 105.10, or perhaps an entire new section, should be added to prohibit the use of purse seines in the Northwest district, namely from Cape Seniavin to Cape Menshikof. A purse seine fishery recently developed in this district is undoubtedly tapping the red salmon runs of Bristol Bay. If allowed to continue and expand it will make the management of the Bristol Bay red runs very difficult if not impossible.

PART 107 - CHIGNIK AREA

The Board has repeatedly made recommendations for this area pertaining to the matter of trap measurements and the inequities of gear restrictions. Something should be done to give the resident fishermen a fair break.

PART 108 - KODIAK AREA

Sec. 108.2 — Here again a re-definition of the various fishing districts is in order.

Sec. 108.3 — The Board's original thinking was a continuous season from June 1 to September 30 with three days fishing per week with provision for extra closures or extra fishing time as conditions develop during the season. When this was discussed with representatives of your Service they objected on the grounds that they had insufficient enforcement personnel in the Kodiak area to properly police such a lengthy season. They felt that it was necessary to have a break-off period in August to give proper protection to the pink runs. On this premise then the Board will go along on a continuous season as proposed by your Service from June 16 to August 18 with three days fishing per week. However, a further suggestion is made that the fall season open on September 1 instead of September 10. This will allow for better utilization of the silver salmon runs.

Sec. 108.4 & 108.5 — Since the red salmon take is regulated by weir count in these two districts, there does not seem to be any justification for deleting the references to gill net fishing from August 13 to September 10 and August 13 to August 20.

Sec. 108.18 — Deletion of this section and in lieu thereof moving of the markers in Kafflia Bay at least 300 yards outward is agreeable.

The Board is also in agreement with the Service's proposal dealing with personal use fishing limiting salmon fishing in the streams of Chiniak, Pasagshak and Anton Larson Bays to hand rod, hook and line only with a bag limit of two salmon per day per person.

Sec. 109.2(d) — If there are runs of salmon in the outer district that are not presently being utilized, there should be no objection to the early short season that is being proposed to open July 12 and close July 17.

Sec. 109.2a — The Board is in favor of continuing the weekly closed period as in effect last season, with such adjustments as may be necessary from time to time to keep the catch in line with the pattern that has been established in the past.

It will be extremely difficult to outline a system of restrictions that will be equitable upon all types of gear. However, if the Service wishes to go ahead with such a plan the Board suggests the following:

1. Increase the distance between traps to one mile as proposed by the Service. This is double the present distance.

2. Double the distance between set nets making the new interval 1,200 feet. This is also a proposal of the Service.

At first glance it might appear that this would reduce the effectiveness of these two types of gear by 50%, but such is not the case. In the first place, it will not reduce the numbers of either type by one-half and secondly, those that remain will have their efficiency increased to a marked degree. It is doubtful if the overall effectiveness of either gear will be reduced more than 20%.

3. In view of this, the Board is therefore opposed to the Service's proposal to limit the fishing area available to the drift netter. The line that has been proposed would cause undue hardship on this type of gear. However, the Board is in accord that the drifter should also be subjected to some restrictions, so in lieu of the area restriction, it is proposed that the limit of 150 fathoms of gear be further reduced to 125 fathoms.

Adoption of the above three proposals should allow for a longer fishing period each week, but control of the catch should still be correlated to the normal production graph.

Sec. 109.8 — Here again it is believed that the markings required at each 25 fathom interval of the gill nets be eliminated.

Sec. 109.16 — It is recommended that the closed waters at the mouths of the Kenai and Kasilof Rivers be increased from one to two miles as per the Service's proposal.

Sec. 109.22 — From time to time requests have been made to remove this restriction on the use of purse seines for catching herring in Kachemak Bay. Statements have been made that the herring population of this bay has now recovered to the point where it may again stand some cropping. Since this cannot be determined without a fishery, it is suggested that a small quota be set for Kachemak Bay and allow the use of purse seines on a trial basis for a season or two.

Shellfish — The Board has agreed to go along with the general restrictions proposed for regulation of the Dungeness and king crab fisheries, but it does not concur in further restrictions as proposed for this area by the closure of Kachemak and Kamishak Bay to trawl gear for taking king crab. This is a budding industry facing stiff competition from Japan and no unsupported restrictions should be promulgated at this time.

The Alaska Department of Fisheries has assigned a man to the study of the problems connected with the king crab fishery and will endeavor to come up with the answers to some of these questions as rapidly as possible.

Sec. 109.50 — The Board does concur in the Service's proposal to the liberalization of the personal use fishing regulations as they apply in remote areas.

PART 111 - PRINCE WILLIAM SOUND AREA

The Board is in accord with the Service's proposal for a closure of the pink salmon season during the next two years. In fact, the Board suggested such a move last year. Unless a miracle happens there is no reason to believe there will be any substantial run of pink salmon in 1954 or 1955. Fortunately, total closures can be instituted in this area with less hardship upon the fishermen than in any other district, because of their ability to participate in the fisheries of other areas.

A small group of natives near Ellamar would undoubtedly suffer the most. Largely for their benefit, it is suggested that a fall season starting about August 20 be promulgated covering a limited area in the vicinity of Valdez Arm and Fidalgo Bay.

It is assumed that the gill net fishery for red salmon in the Eshamy district will be continued. The Board would not favor any great curtailment in the size of this district, which would eliminate many set net sites that have been in use for many years by the local residents. From the information at hand it would seem that the only sites that take any appreciable numbers of pink salmon are those immediately adjacent to the northern boundary near Port Nellie Juan. By moving this limit to a point on the south side of Foul Bay, the nets largely dependent upon the pink runs would be eliminated.

PARTS 112 & 113 - COPPER-BERING RIVER AREAS

The Board's recommendation in its 1952 brief provided for a long continuous season. It is, therefore, in full accord with the Service's proposal for an extended season from May 1 to September 18, in fact this could just as well be September 30. The three and one-half day weekly fishing period before August 10 is also agreeable, with the understanding that it will be varied depending on the numbers of fishermen and adequacy of escapement.

The Board is also in accord with the Service's proposal to allow an extra 100 fathoms of king gill net during the month of May and also wishes to suggest that this privilege be extended to June 15.

Here again it is recommended that the marking of gill nets at each 25 fathom interval be eliminated. A good marked buoy on each end should be sufficient.

Upon their return from the Seattle meeting, the officials of the Service presented four new proposals for consideration, as follows:

1. A reduction in the number of traps to cut their effectiveness by 50%.

2. Enlargement of closed areas near the mouths of important pink salmon streams, which in effect will decrease the effectiveness of seines.

3. A 60-hour weekly closed period.

4. A return to the fishing seasons in effect before 1946.

The Board is in full agreement with proposals 1 and 2. Its stand on traps has been stated many times in the past and any measure that will reduce their numbers is certainly acceptable. For some time now the Board has been convinced that larger protective areas are needed at the mouths of pink salmon streams, but it has been hesitant about recommending such a proposal because it would be highly discriminatory on the seine fishermen. However, when such a measure is combined with a reduction in the effectiveness of traps, it meets full approval.

The proposed 60-hour weekly closure is also a step in the right direction, but it does not go far enough. It is suggested that this be increased to 84 hours, with fishing being allowed from 6:00 A.M. Monday to 6:00 P.M. Thursday. If, contrary to your expectations, good runs of pink salmon should develop relaxation in the weekly closed period can be made on short notice.

The Board is not in accord with a return to the seasons in effect before 1946. Such staggered seasons will only lead to the concentration of gear at the very peaks of the runs in each of the several districts. A uniform opening and closing date is suggested. While it is realized that this will not prevent all movement of gear, it will have a stabilizing effect in keeping mobile gear more separated. Staggered seasons force concentration.

A long season from July 5 to October 15 was the first thought of the Board. With only three and one-half days fishing per week there should be ample escapement. However, here again the enforcement personnel of the Service felt that they would have great difficulty in policing the area for such a long season. In accord with this, the Board suggests that the main season run from July 5 - August 31.

This will allow a several week interval before the fall chum season starts, for which these dates are recommended:

Noon - September 22 - Noon - September 25
Noon - September 29 - Noon - October 2

It is believed that a four day break would be beneficial for escapement. The noon opening and closing is suggested because it will be of considerable help in policing this fishery, which takes place late in the season when the daylight hours are much shorter. Consideration should be given to opening the entire area to fall seining as was done last season. If this

Part 124 — The proposal to limit drift gill nets in Burroughs Bay to 200 fathoms meets with approval. Likewise, your proposal to prohibit all fishing in Ketchikan Creek from August 1 to September 30.

In conclusion, the Alaska Fisheries Board requests that you give these recommendations thoughtful consideration. They are given in a spirit of cooperation and helpfulness. It is hoped that many will be adopted, especially those that will improve the general welfare of the residents of the Territory.

Respectfully submitted by,

C. L. Anderson.

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

ROBERT C. KALLENBERG, Chairman, Dillingham
J. H. WAKEFIELD, Port Wakefield
IRA H. ROTHWELL, Cordova
KENNETH D. BELL, Fairbanks
HENRY DENNY, Saxman

CLA:aw

ALASKA DEPARTMENT OF FISHERIES
Juneau, Alaska

November 27, 1953

Mr. John L. Farley, Director
U. S. Fish and Wildlife Service
Department of the Interior
Washington, D.C.

Dear Mr. Farley:

Please refer to our brief of November 24, 1953, page 8, the following paragraph:

> "Several requests have been received for the opening of small drift net areas near certain red and chum salmon streams. Some of these are not now being harvested. It would therefore seem in order to open two or three of these on at least an experimental basis."

Since writing this brief some additional information has been obtained so that the Board can now offer something a little more concrete.

It is suggested by the Alaska Fisheries Board that a drift gill net season for early chums on the Unuk and Chickamin Rivers be allowed in 1954 on a trial basis. It is reported that there are sizable runs of chums to these rivers which have not been fished for many years. In order to properly utilize these early runs, some type of fishery should be allowed. The Unuk River gillnetters could well take advantage of an early season of two or three weeks on these two systems to take part of these chum runs. An observer, either from the Service or this department should be on the grounds all fishing days during this trial fishery to record the number of pinks and reds taken. It is suggested by the Board that this season be from June 25 to July 10 with three days fishing per week. The drift gill net boundaries should remain as they are on the Unuk, and on the Chickamin they should extend from Fish Pt. to a point on the northern shore of Portage Cove, thence to the northernmost point of Channel Island, thence due east to the mainland shore.

The Unuk River gillnetters have only 6 inch mesh nets which will take reds and pinks besides the chums. If considerable numbers of pinks and reds were taken during this trial season, it would probably be advisable to recommend a larger mesh size of subsequent seasons. For a trial fishery it would not be practical to recommend the larger mesh size as the fishermen don't have it and would not wish to risk buying a new net.

Sincerely yours,

C. L. Anderson

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

CLA:aw

BIOLOGICAL RESEARCH

The research program of this division was continued along the same general lines as in 1951 and 1952, with studies being confined to the troll salmon fishery of Southeastern Alaska, the salmon runs of the Taku River, and the blackcod fishery. In addition, it became possible in the latter part of the year to initiate an investigation of the king crab fishery of Kodiak Island and adjacent areas. Also, a site for a research station was selected at Kitoi Bay on Afognak Island and preliminary phases of construction started. Because of the short time involved, no progress report is presented on either of these projects.

The following reports on the progress of biological investigations in 1953 represent the combined efforts of all members of the biological staff:

Robert R. Parker, Senior Biologist
Walter Kirkness, Senior Biologist
Kenneth N. Thorson, Junior Biologist
Quentin A. Edson, Junior Biologist
Edgar J. Huizer, Junior Biologist

TAKU RIVER INVESTIGATION

The study of the Taku River and its salmon resources was started in 1951, with the major effort directed toward the king salmon. The work was intensified and expanded in 1952 to include preliminary studies on the other salmon species and has been a continuing investigation through 1953. It is the purpose of this report to present in logical sequence a condensed description of the life history of the Taku River king salmon and the effects of the fisheries that have exploited the population. Included are data pertaining to other species of Taku salmon. Some of the estimates, while considered to be of proper magnitude, are based upon incomplete evidence and may necessarily be revised in future publications of the Alaska Department of Fisheries. The estimates and conclusions, as set forth, must then be considered as "best estimates," based on carefully collected data currently available.

PHYSICAL CHARACTERISTICS OF THE TAKU RIVER

The Taku River may be said to originate in the high plateau country of Northwestern British Columbia with two separated clear water tributaries, the Nakina and the Nahlin Rivers.(1) The Nahlin, joined by the glacial Sheslay forms the Inklin, which in turn combines with the Nakina to form the Taku. The Taku River then penetrates the Coast Range in a narrow canyon and empties into Taku Inlet, an arm of Stephens Passage, a few miles southeast of Juneau, Alaska. The total watershed area contributing to the Taku River is approximately 6,400 square miles.

The discharge of the main Taku River is approximately 2,500 cubic feet per second, normal summer flow. The clearwater Nahlin and Nakina Rivers contribute only about one-fifth of the total discharge, most of the

(1) Figures 1 and 2 are presented to facilitate geographical orientation.

Figure 1. A MAP OF THE WATER APPROACHES TO TAKU RIVER, ALASKA.

remainder originates from the ice fields lying on both the eastern and western slopes of the Coast Range. Since the bulk of the water originates on the eastern slopes of the Coast Range, the heavy coastal precipitation has little effect on the stage of water level. Normally, the volume of water will increase in direct correlation to the amount of sunshine received in the summer months in the interior.

The Tulsequah River is the main exception to the normal pattern of summer flow. Situated on the headwaters of this river is Tulsequah Lake formed by a dam of ice. Periodically, usually only once a year, the pressure of the water upon the ice causes a break through and the lake empties. This phenomenon usually occurs during the summer months. The effects of the Tulsequah flood are profound upon the main Taku River and may double the flow of water at the crest of the flood.

Above the mining town of Tulsequah, situated approximately ten miles northeast of the Canadian border, the area is entirely uninhabited except for an occasional trapper or prospector. The historic Telegraph Trail, established in the 1850's, bisects the Nahlin and Nakina watersheds and serves as the only established route for travel; however, it has received little use in recent years.

Water temperatures of the Nahlin and Nakina Rivers usually rise to above 70 degrees Fahrenheit during July. Daily fluctuations closely follow air temperatures at this time. During the second week of August the optimum temperature range for spawning kings is achieved. The heighth of king salmon spawning activity has been observed to correspond with approximately 54° to 57° F. mid-day water temperatures.

Observations of the spawning grounds are unavoidably limited to the clear water streams, although successful spawning is not necessarily limited to such areas. The Nakina River is the most productive of king salmon of the entire river system, with lesser spawning populations using the Nahlin and its tributaries, the Dudidontu and "Z" Rivers, and the small King Salmon River, tributary to the main Taku. Between 80 and 90 percent of the entire king salmon escapement is estimated to use the Nakina spawning grounds.

KING SALMON

GENERAL LIFE HISTORY

The king salmon fry descend the river to salt water after only a few weeks of fresh water residence and growth.(2) After reaching salt water the movements of the king salmon are obscure. Several tagging experiments have failed to show any sustained concentration of this stock in waters adjacent to Taku Inlet or even within the range of the present troll fishery. This assertion may be further supported by the absence of healed hook scars, indicating the unavailability of the stock as immature fish.

Adult Taku River king salmon make their appearance as early as April in the waters adjacent to Taku Inlet and their entrance into fresh water is from late April to early July. While passing through the inside waters of

(2) Scale analysis has shown only a negligible portion to remain a year in fresh water.

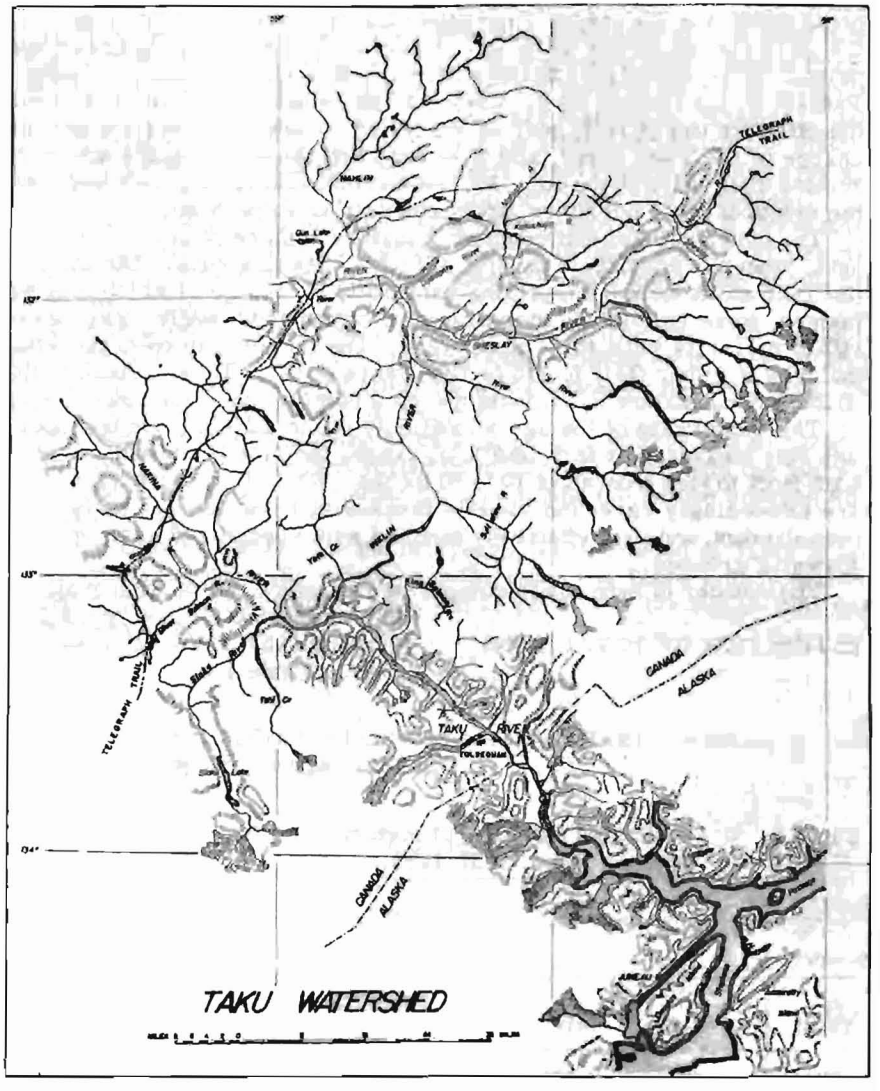


Figure 2. A MAP OF THE TAKU RIVER WATERSHED.

Southeastern Alaska they are thoroughly mixed with other king salmon populations, but the closer Taku Inlet is approached, the higher becomes the percentage of the Taku River races. The adult run is fished upon primarily in northern Chatham Strait, lower Lynn Canal, and Stephens Passage by the trolling fleet. When the run enters Taku Inlet it is beyond the effective use of troll gear as the water becomes turbid from the discharge of the Taku River, and it is here that the gill nets are allowed to remove their share of the run. All commercial fishing is prohibited above the mouth of the Taku River, approximately at Taku Point.

The individual fish that compose a mature run are of several different ages, hence the products of several different spawning runs. The males of the Taku stock exhibit surprising variability in the age at which they will mature, some individuals maturing as two year olds, while others do not attain maturity until their sixth year. The females, in contrast, attain maturity in either their fourth or fifth years of life. There remains little doubt that all mature individuals die upon completion of the spawning act.

The variability of the age at maturity of the males, when transposed into size measured as fork length,(3) causes the size of individuals of the adult stock to vary from about 10 to 50 inches. While fish above 47.5 inches are exceedingly rare, individuals measuring from 12 to 16 inches have been abundant, and were effectively sampled with specialized gear or on the spawning grounds.

ESTIMATION OF TOTAL RUNS

The number of individuals composing the entire run of adult kings has been estimated for the years 1951, 1952 and 1953. This information is given in Table 1.

Table 1. Estimated numbers of mature Taku River king salmon, by age groups, 1951-1953.

	Age Groups					
Year	II	III	IV	V	VI	Total
1951	1,430	2,430	4,980	14,220	330	23,390
1952	880	6,990	7,590	10,540	420	26,420
1953	970	3,920	18,460	14,030	730	38,110

(3) Fork length is a straight line measurement from the end of the nose to the center or V of the tail.

No suitable statistics of the troll fishery are presently available, therefore the withdrawals of mature Taku king salmon by this type of gear must be estimated from data acquired by direct observation and tagging during the time of the fishery. While the estimated catches by the commercial gear are considered reliable, no data are on hand concerning the sizable sport fishery present in the area and also exploiting this resource.

ESTIMATION OF TROLL CATCHES

The 1951 troll fishery is estimated to have removed about 5,750 mature Taku king salmon. The bulk of the catch was taken during the interval May 10-31 and by a fleet averaging about 28 boats and a high number of 60 on any single day.

Due to a cold storage strike no substantial troll catch was made in 1952, until May 26. As the season officially closed on the 31st of May, no attempt is made at estimating the withdrawals by the troll fleet, and the catch, undoubtedly small, is ignored.

The troll catch of mature Taku king salmon in 1953 is estimated at 9,020 fish. The size of the fleet varied from 20 to 70 boats with the average being approximately 50 boats fishing per day during the period between May 14 and June 12.

The estimated catches for the two years are presented in Table 2, and divided into age groups. By reference to the values in Table 1, it is demonstratable that the troll fishery removed 25 percent of the run in 1951 and 24 percent in 1953.

Table 2. Estimated troll catches of mature Taku River king salmon, by age groups, 1951-1953.

	Age Groups						Total percentage of removal
Year	II	III	IV	V	VI	Total	
1951	50	470	1,390	3,740	100	5,750	25
1952 (None)							
1953	30	900	4,490	3,420	180	9,020	24

Troll gear is definitely selective in the size of individuals taken. Fish above 20.0 inches, fork length, are probably removed without selection, but individuals smaller than 20.0 inches are not effectively sampled. The result, in terms of age classes, is a far greater relative escapement of the two year olds than of the remaining age groups.

THE GILL NET FISHERY

The gill nets employed in the Taku Inlet fishery are all of the single wall, floating type and during the height of the king salmon run, a mesh size of nine inches, stretched measure is considered standard. The red salmon run appears in substantial quantity during the third week of June and there is a quick and general change-over to the use of nets with six inch, stretched measure, meshes. During the years under consideration this change-over period has been accompanied by a closed season of variable duration. In 1951, fishing was prohibited from June 1-24, inclusive; 1952, from June 1-17, inclusive; and in 1953 from June 12-16, inclusive. As the king salmon continue to run well into July, the light red salmon nets capture considerable quantities of kings.

The gill nets are very selective to the larger sizes of fish. The nine inch mesh rarely takes king salmon less than 25 inches fork length, and the six inch mesh rarely takes fish less than 20 inches fork length. As a result, the frequency of sizes and of age groups is considerably altered as the run passes, first through the troll fishery and then through the gill net fishery.

Catch statistics for the gill net fishery have been very well kept in recent years. The total catches, separated into age groups, are presented in Table 3, together with the percentage of the total run (Table 1) removed by the gill nets.

Table 3. Estimated gill net catches of mature Taku River king salmon, by age groups, 1951-1953.

	Age Groups						Total percent of removal
Year	II	III	IV	V	VI	Total	
1951		10	1,680	7,890	210	9,790	42
1952		1,160	5,010	6,440	330	12,940	49
1953		480	8,280	7,590	430	16,780	44

A thorough comparison of king salmon gill net catch statistics is presented in Table 4, The pertinent feature of this comparison is that in spite of fluctuations in number of fishing days and units of gear, the average catch per unit of effort reflected the magnitude of the run available to the fishery.

Table 4. Catch statistics of the Taku River gill net fishery for the years 1951-1953. King salmon only.

	Days of fishing[1]			Average units of gear			Number of fish			Catch per unit of effort[2]		
Period	1951	1952	1953	1951	1952	1953	1951	1952	1953	1951	1952	1953
May 1 - 7	1/2	5	3-1/2	22.0	11.1	22.0	183	403	681	16.6	7.3	8.8
8 - 14	5-1/2	5-1/2	4	31.7	33.5	37.8	1,422	2,523	1,642	8.2	13.7	10.9
15 - 21	5-1/2	5-1/2	4	30.0	52.5	34.2	1,402	3,488	1,818	8.5	12.1	13.3
22 - 28	5-1/2	3-1/2	4	40.3	57.8	48.2	4,737	3,210	4,002	21.4	15.9	20.8
29 - 4	3-1/4	1	4	39.0	52.0	49.0	1,315	537	5,111	10.4	10.3	26.1
June 5 - 11	0	0	4	0	0	51.0	0	0	1,938			9.5
12 - 18	0	1/2	2	0	18.0	16.3	0	205	492		5.7	15.1
19 - 25	1/2	4	4	31.0	40.6	55.8	60	1,446	558	3.9	8.9	2.5
26 - 2	5-1/2	4	4	36.1	35.8	30.0	287	672	92	1.4	4.7	0.8
July 3 - 9	5	3-1/2	4	34.5	35.8	26.8	135	296	292	0.8	2.4	2.7
10 - 16	5	3-1/2	4	44.8	44.8	15.4	131	71	46	0.6	0.5	0.7
17 - 23	5	3-1/2	4	35.1	41.0	20.0	100	68	65	0.6	0.5	0.8
24 - 30	5	3-1/2	4	36.5	39.5	18.4	13	11	14	0.1	0.1	0.2
Total	46-1/4	43	49-1/2				9,785	12,930	16,751			
Average				34.6	38.5	32.7				6.1	7.8	10.3

(1) A fishing day is here defined as the 24 hour period from 6:00 P.M. to 6:00 P.M. of the following day.
(2) Catch per unit of effort is the catch in numbers of fish of one gill net for a 24 hour day.

THE ESCAPEMENT

The estimated escapements for the years 1951-1953 are presented in Table 5. The striking feature of the escapement during this period is that while, roughly, between a third and a half (depending upon the troll fishery) of the run escapes to spawn, the fisheries withdraw their catches from the older fish, and allow, practically speaking, all of the two year olds and three-fourths of the three year olds to escape, which in turn are the least valuable segments of the spawning escapement. This relationship is also presented in Table 5.

Table 5. Escapement of Taku River king salmon by age groups, 1951-1953, with the three year average percentage of the total run escaping.

	Age Groups					
Year	II	III	IV	V	VI	Total
1951	1,380	1,950	1,910	2,590	30	7,860
1952	880	5,820	2,580	4,110	100	13,490
1953	950	2,540	5,680	3,020	120	12,310
Three year average percent of escapement						
	98	77	33	25	16	38

Such a differential escapement, resultant of the selectiveness of commercial gear for the larger, hence older fish, causes a profound change in the sex composition of the run. No data are available for discussion of the sex ratio of the 1951 run, except that the two year old age group, which was very abundant, suffered practically no fishery, and was observed to cause a high relative abundance of males in the spawning escapement. In 1952 the original run was estimated to be 39.9 percent females, and 60.1 percent males. After withdrawals by the fisheries, the spawning escapement was composed of 25.8 percent females and 74.2 percent males, or about three males to one female. In 1953 the original run was estimated to be 50.6 percent females and 49.4 percent males. After subsequent commercial exploitation, the spawning escapement was composed of 46.5 percent females and 53.5 percent males. Thus, in terms of total escapement the 1952 run (13,490 fish) was better than the 1953 run (12,310), but in terms of female escapement the 1953 run (5,720 females) was better than the 1952 run (3,480 females). The female escapement is a priori a better measure of the reproductive capability of the run than is the total escapement.

Optimum size of escapement is still an unsolved and puzzling problem. The observed escapements for 1951-1953 cannot, therefore, be termed either as good or poor within the concepts of a maximum sustained yield of the resource. Observations of the spawning habits of the king salmon show (1) that the female assumes almost the entire duty of the preparation of the redd (nest), (2) more than one female may occupy the same redd, (3) males have been observed to move from one redd to another, and back again, and (4) the sole function of the male in the entire project of nest building and subsequent coverage of the fertilized eggs seems to be limited to the spawning act. It is a safe assumption, then, that certainly only one male is needed for each female, and probably adequate fertilization would be assured with one male to two females. On this basis, more efficient use could be made of the resource if it were possible to reduce the selective action of the commercial gear employed.

NET SELECTIVITY

Preliminary studies on the selectivity of gill net mesh sizes were conducted in 1953. A graphic comparison of the length frequencies of king salmon taken with the nine inch mesh king salmon nets, the six inch mesh red salmon nets and of the population available to the gill net fishery is presented in Figure 3. First, consider the length frequency curve of the available population. This would be the expected curve of a non-selective unit of gear. Three modes or "bumps" are discernible, one at about 15 inches caused by the two year old group, another at about 26 inches caused by the three year old group, and the largest at about 34 inches caused by the combined four, five, and six year old groups. The nine inch mesh is seen to allow complete escapement of the twos and a large portion of the threes. It fishes primarily on the fours, fives and sixes. The six inch mesh is seen to select a higher proportion of the threes than the combined fours, fives and sixes, yet allows substantially a complete escapement of the twos.

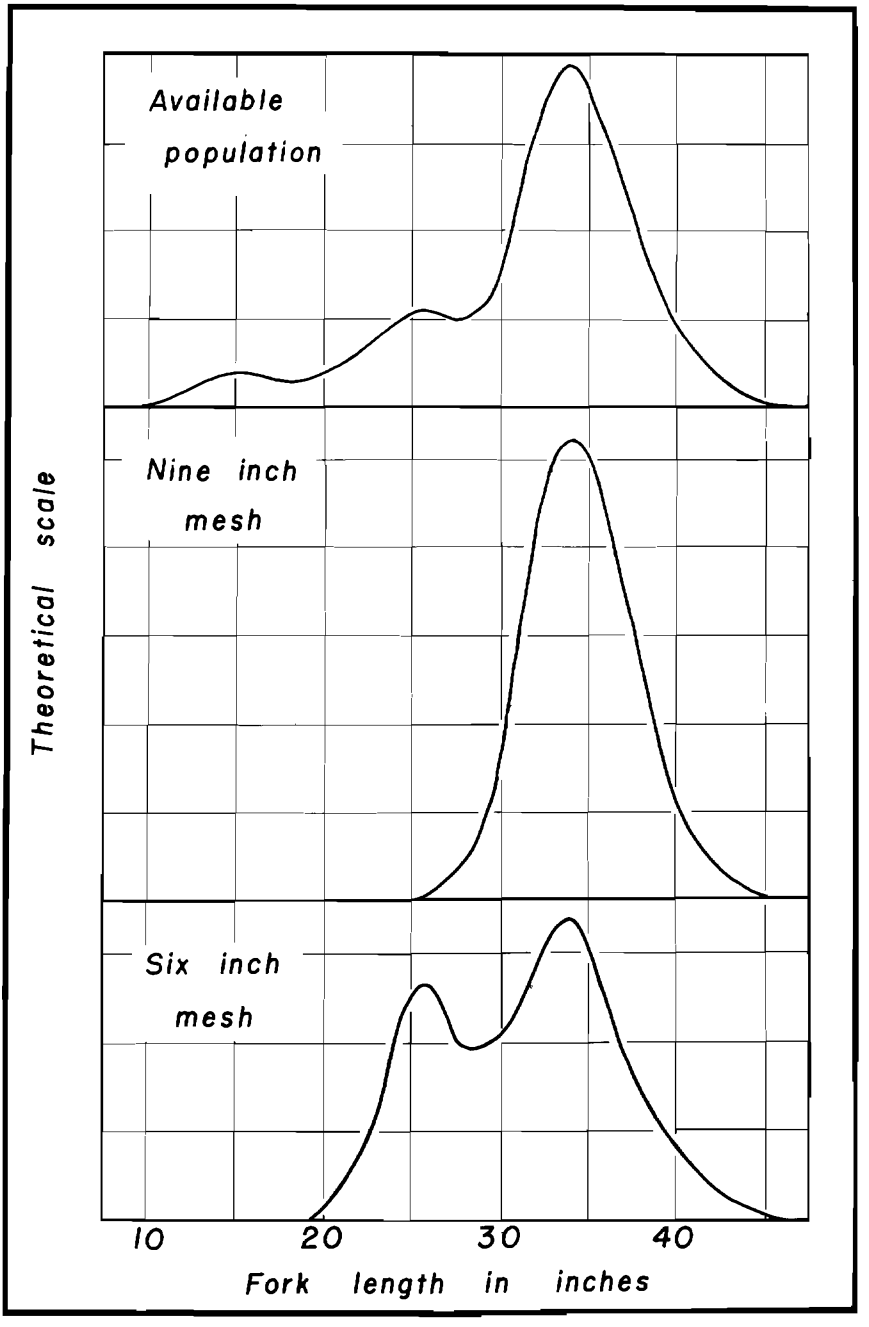


Figure 3. COMPARISON OF LENGTH FREQUENCY CURVES OF KING SALMON TAKEN WITH SIX AND NINE INCH MESH GILL NETS WITH CALCULATED LENGTH FREQUENCY OF THE AVAILABLE POPULATION. TAKU RIVER, 1953.

Such comparisons are, however, not the complete solution of the problem. The problem, simply stated, is: how can the younger age groups be exploited without lowering the efficiency of the fishermen on the larger fish? In other words, add a catch of small fish to the present catch of large rather than reduce the catch of large in favor of the small. This line of research will undoubtedly lead to experiments with types of gill net gear not presently legalized in Alaska.

To achieve a balanced ratio of catch to escapement it is necessary to measure the two factors simultaneously. The physical characteristics of the Taku River rule out any possibility of counting escapement directly with devices such as weirs before the clear water streams are reached and the delay would make impractical any additional closure deemed necessary, for it would not necessarily apply to the particular segment of the run that had been over fished. The escapement has, therefore, been sampled with fishing devices at the Canyon Island Research Station, situated approximately 17 miles upriver from Taku Point. (Plate 1)

ESCAPEMENT INDICATORS

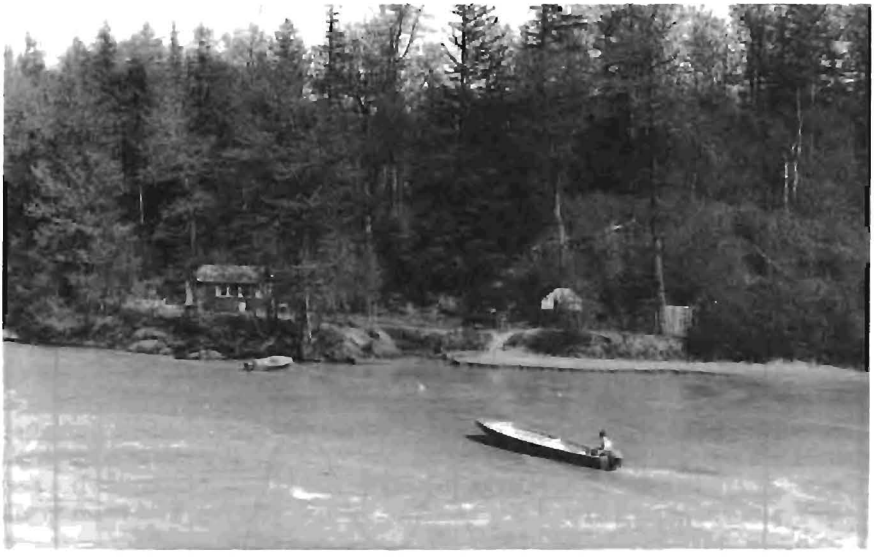


Plate 1. THE CANYON ISLAND RESEARCH STATION OF THE ALASKA DEPARTMENT OF FISHERIES, SITUATED 17 MILES UPSTREAM FROM THE MOUTH OF TAKU RIVER.

Two different fishery devices have been used in sampling the runs of salmon escaping the fishery, set nets and a fish wheel. (Plates 2, 3, 4, and 5) For sampling kings the set nets have proved the most effective. Accumulated catches for 1952 and 1953 are compared graphically in Figure 4. Daily catches have been converted to a catch per unit of effort index, using a 50 foot set net of nine inch mesh, fished for 12 hours a day as a standard unit of effort. In this manner, escapement, totaled to any day during the fishing season, may be compared with the escapement pattern of the past season. If, at any time during the season, the escapement is failing while commercial catches remain high, immediate remedial action may be taken.

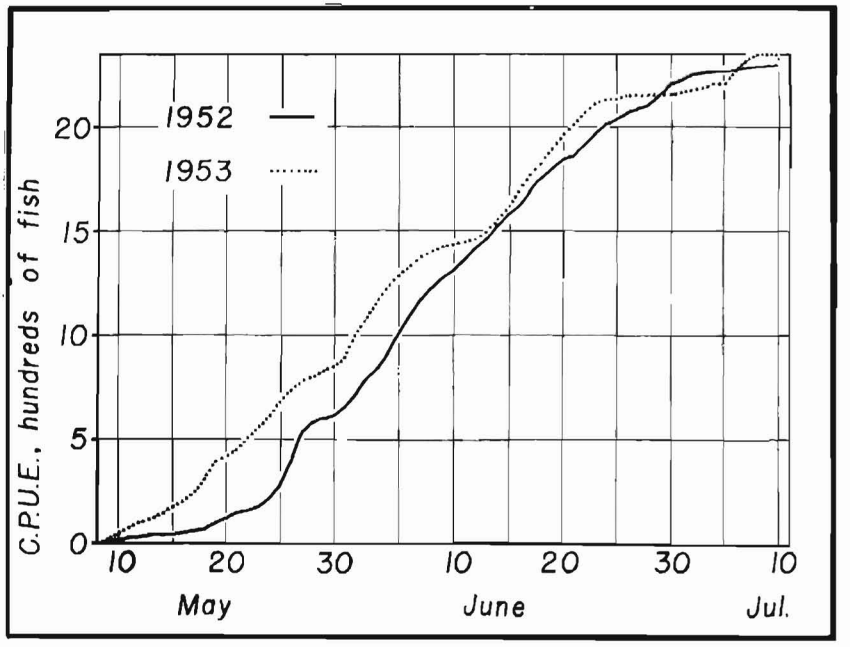


Figure 4. COMPARISON OF ACCUMULATED CATCH CURVES OF KING SALMON, 1952 AND 1953, CANYON ISLAND SET NETS. CATCHES ARE ADJUSTED TO A STANDARD 50 FOOT NET FISHED 12 HOURS EACH DAY.

Plate 2. OPERATING THE SET NET. KINGS ARE POCKETED AND PLACED IN THE LIVE-BOX, THEN RELEASED FROM THE NET, MEASURED, TAGGED, AND RETURNED TO THE RIVER.

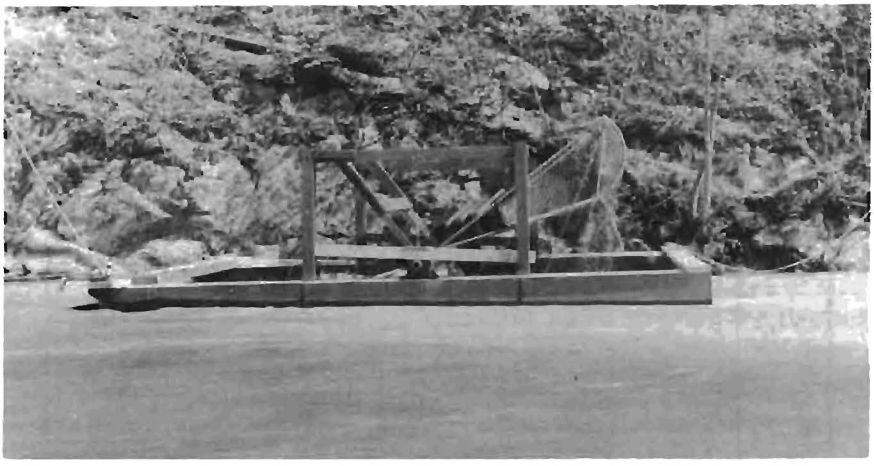


Plate 3. A SIDE VIEW OF THE FISH WHEEL. THIS DEVICE OPERATES ENTIRELY BY THE CURRENT OF THE RIVER.

The set nets are selective to approximately the same sizes of fish as the commercial gill nets and are, therefore, sampling "effective" escapement. The fish wheel has proved to be very selective to the smaller sizes of kings and is inefficient on the four, five and six year age groups. The other salmon species, pinks, reds, silvers and chums are efficiently sampled by the fish wheel and comparative statistics are presented in Table 6.

Table 6. 1952 and 1953 fish wheel catches of pink, red, silver and chum salmon. Data adjusted to a standard unit of effort equal to 24 hours fishing per day.

Week	Reds		Pinks		Silvers		Chums	
	1952	1953	1952	1953	1952	1953	1952	1953
June 5 - 11	5	3						
12 - 18	77	53						
19 - 25	261	61	1	8				
26 - 2	208	(1)	113	(1)				
July 3 - 9	151	55	815	102				
10 - 16	125	24	286	56	22			
17 - 23	277	151	6,290	1,411	75	23	7	2
-24 - 30	318	260	2,583	459	77	57	4	0
31 - 6	255	180	2,964	40	117	52	4	19
Aug. 7 - 13	47	142	149	7	67	46	10	17
14 - 20	36	85	33	2	118	47	23	5
21 - 27	10	39	7	3	169	122	46	47
28 - 3	4	20	4	5	268	226	80	75
Sept. 4 - 10	2	2	0	2	83	62	139	56
11 - 17	0		0		32	60(2)	38	155(2)
18 - 24	1		8		401	45	571	500
25 - 1					514	30	1,165	805
Oct. 2 - 8					(1)	20	(1)	155
9 - 15						7		30
16 - 22						2		8
Total	1,777	1,075	13,253	2,095	1,943	799	2,087	1,874

(1) Wheel inoperative
(2) Approximations after Sept. 11.

OTHER SPECIES OF SALMON

Salmon species, other than kings have received little attention in escapement estimates and spawning ground surveys, and the relationship between escapement and fish wheel catch indices is not known. The presence of the several species and races in Taku Inlet and at Canyon Island at the same time is apparent and suggests that the pattern of escapement should be a constant weekly proportion of all salmon rather than a total escapement of some races and a poor escapement of others. The superimposition of species is graphically presented in Figure 5, together with the pattern of closed periods (black bars) for the years 1951, 1952 and 1953.

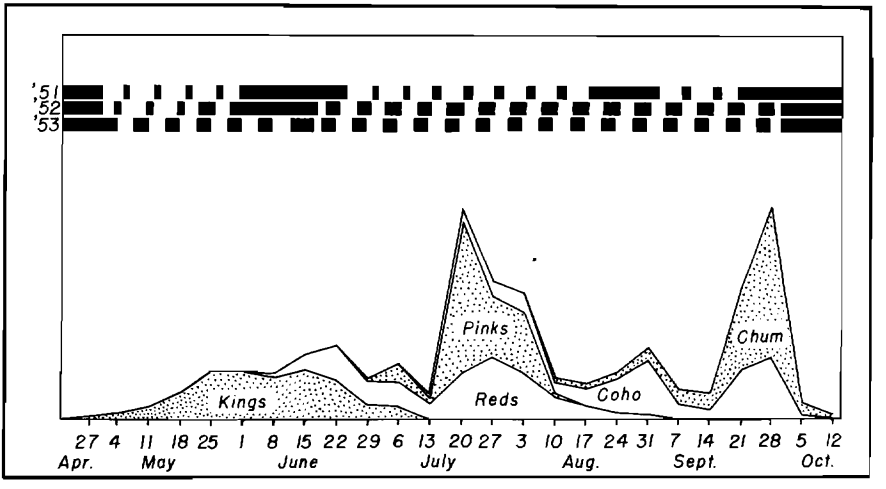


Figure 5. GRAPHIC PRESENTATION OF THE TIME OF APPEARANCE AND PERIOD OF ABUNDANCE OF THE FIVE SPECIES OF SALMON OF THE TAKU RIVER AT CANYON ISLAND. 1952 AND 1953 COMBINED. BLACK BARS INDICATE CLOSED PERIODS IN 1951, 1952 AND 1953.

Catch statistics of the Taku River gill net fishery are presented in Tables 7-11. A comparison of the catches in the gill net fishery and at Canyon Island for the red salmon (Tables 6 and 8) shows a relatively poorer catch to escapement relationship in 1953, than in 1952. Closer inspection of the weekly catches indicates a much more intensive fishery on the early red run than on the late run. The Tulsequah River flooded during the week June 19-25 (flood crested on the 26th) with turbidity readings rising from a norm of 100-200 p.p.m. to over 1000 p.p.m. The coincidence of the two observations (abnormal fishing intensity and flood stage of water) indicates a general holdup of red salmon during abnormal river conditions to the immediate benefit of the fishery but ultimate loss of spawning escapement.

TABLE 7. Catches of king salmon by seven day periods, Taku River gill net fishery, 1945 - 1953.*

		1945	1946	1947	1948	1949	1950	1951	1952	1953
May	1 - 7	0	782	361	324	580	754	183	403	681
	8 - 14	581	1,527	570	1,607	1,080	1,364	1,422	2,523	1,642
	15 - 21	1,257	2,576	1,203	909	2,092	2,319	1,402	3,488	1,818
	22 - 28	1,788	1,572	1,194	2,110	1,497	1,955	4,737	3,210	4,002
	29 - 4	483	247	244	367	472	950	1,315	537	5,111
June	5 - 11	0	0	0	0	0	0	0	0	1,938
	12 - 18	0	0	0	0	0	0	0	205	492
	19 - 25	18	5	13	90	36	0	60	144	558
	26 - 2	52	82	132	359	360	535	287	672	92
July	3 - 9	69	75	75	188	225	320	135	296	292
	10 - 16	6	45	83	64	79	118	131	71	46
	17 - 23	2	19	19	15	38	81	100	68	65
	24 - 30	7	3	36	2	10	28	13	11	14
	31 - 6	0	0	2	0	2	12	6	11	3
Aug.	7 - 13	0	2	0	0	1	7	0	0	1
	14 - 20	0	0	0	0	1	0	1	0	2
	21 - 27	0	0	0	0	0	0	0	0	0
	28 - 3	0	0	0	0	0	0	0	0	1
Sept.	4 - 10	0	0	0	0	0	0	0	0	1
	11 - 17	0	0	0	0	0	0	0	0	6
	18 - 24	0	0	0	0	0	0	0	0	1
	25 - 1	0	0	0	0	0	0	0	0	0
Totals		4,263	6,935	3,932	6,035	6,473	8,443	9,792	12,941	16,766

* Data by courtesy of U. S. Fish and Wildlife Service, Juneau office.

TABLE 8. Catches of red salmon by seven day periods, Taku River gill net fishery, 1945 - 1953.*

		1945	1946	1947	1948	1949	1950	1951	1952	1953
May	1 - 7	0	0	0	0	0	0	0	0	0
	18 - 14	0	0	0	0	0	0	0	0	0
	15 - 21	0	0	0	0	0	0	0	0	0
	22 - 28	0	0	0	0	0	0	0	0	0
	29 - 4	0	0	0	0	0	0	0	0	0
June	5 - 11	0	0	0	0	0	0	0	0	36
	12 - 18	0	0	0	0	0	0	0	996	3,733
	19 - 25	190	442	403	469	313	0	1,518	9,724	13,442
	26 - 2	2,549	3,276	2,994	2,252	5,826	5,396	12,394	4,007	3,380
July	3 - 9	2,750	1,938	2,825	2,921	3,682	4,862	8,848	5,913	3,460
	10 - 16	823	1,572	3,105	2,916	4,064	4,257	9,680	6,290	3,056
	17 - 23	130	1,720	1,791	1,375	4,821	2,050	6,198	8,908	9,331
	24 - 30	2,115	1,106	2,201	1,358	5,212	3,733	12,482	5,178	6,707
	31 - 6	3,726	1,486	2,358	7,685	4,210	9,797	9,901	3,109	6,055
Aug.	7 - 13	661	386	5,572	3,489	2,719	6,460	2,383	593	1,949
	14 - 20	213	233	2,187	495	2,682	1,961	261	387	255
	21 - 27	0	0	0	0	0	0	0	74	48
	28 - 3	15	8	413	4	0	16	3	35	66
Sept.	4 - 10	65	44	873	5	0	11	7	11	26
	11 - 17	51	22	116	0	0	20	7	5	14
	18 - 24	12	0	28	0	0	2	5	2	12
	25 - 1	0	0	0	0	0	0	0	1	0
Totals		13,300	12,233	24,875	22,969	33,565	38,565	63,687	45,233	51,570

* Data by courtesy of U. S. Fish and Wildlife Service, Juneau office.

Plate 4. A VIEW OF THE FISH WHEEL FROM THE DOWNSTREAM END. THE SILVER SALMON HAS JUST FALLEN FROM THE WEBBED BASKET INTO THE SLIDE AND WILL SLIDE INTO THE LIVE-BOX CONTAINED IN THE PONTOON.

TABLE 9. Catches of pink salmon by seven day periods, Taku River gill net fishery, 1945 - 1953.*

		1945	1946	1947	1948	1949	1950	1951	1952	1953
May	1 - 7	0	0	0	0	0	0	0	0	0
	8 - 14	0	0	0	0	0	0	0	0	0
	15 - 21	0	0	0	0	0	0	0	0	0
	22 - 28	0	0	0	0	0	0	0	0	0
	29 - 4	0	0	0	0	0	0	0	0	0
June	5 - 11	0	0	0	0	0	0	0	0	0
	12 - 18	0	0	0	0	0	0	0	0	8
	19 - 25	16	2	217	2	105	0	264	83	271
	26 - 2	930	32	2,206	218	5,719	150	4,913	415	143
July	3 - 9	1,670	176	3,304	2,832	3,962	692	20,391	1,490	1,589
	10 - 16	638	375	2,250	6,170	2,839	1,409	29,885	8,348	932
	17 - 23	14	648	1,252	1,421	1,938	921	11,431	15,339	1,969
	24 - 30	256	179	370	451	1,064	1,526	4,810	7,730	1,241
	31 - 6	119	46	870	762	764	1,470	2,728	5,519	561
Aug.	7 - 13	46	17	2,137	409	725	214	472	45	154
	14 - 20	10	4	1,035	53	329	102	30	228	24
	21 - 27	0	0	0	0	0	0	0	7	10
	28 - 3	0	12	623	6	45	3	91	6	5
Sept.	4 - 10	0	8	281	3	96	0	4	83	3
	11 - 17	0	32	57	0	33	0	4	0	2
	18 - 24	0	7	7	0	3	0	4	0	2
	25 - 1	0	0	0	0	0	0	0	0	0
Totals		3,699	1,538	14,609	12,327	17,622	6,487	75,027	39,293	6,914

* Data by courtesy of U. S. Fish and Wildlife Service, Juneau office.

TABLE 10. Catches of silver salmon by seven day periods, Taku River gill net fishery, 1945 - 1953.*

		1945	1946	1947	1948	1949	1950	1951	1952	1953
May	1 - 7	0	0	0	0	0	0	0	0	0
	8 - 14	0	0	0	0	0	0	0	0	0
	15 - 21	0	0	0	0	0	0	0	0	0
	22 - 28	0	0	0	0	0	0	0	0	0
	29 - 4	0	0	0	0	0	0	0	0	0
June	5 - 11	0	0	0	0	0	0	0	0	0
	12 - 18	0	0	0	0	0	0	0	0	0
	19 - 25	0	0	3	1	0	0	0	0	0
	26 - 2	0	0	8	3	0	0	47	4	0
July	3 - 9	0	0	0	26	0	0	21	40	3
	10 - 16	6	0	7	161	302	0	60	77	6
	17 - 23	8	0	5	73	673	152	243	359	267
	24 - 30	85	0	96	223	865	366	1,089	440	363
	31 - 6	381	15	324	1,074	814	900	1,214	488	357
Aug.	7 - 13	112	177	274	1,555	672	1,069	1,283	626	206
	14 - 20	72	201	399	620	986	1,343	383	761	86
	21 - 27	0	0	0	0	0	0	0	2,361	705
	28 - 3	290	953	2,917	6,629	1,067	4,246	756	3,483	1,414
Sept.	4 - 10	8,071	5,316	12,116	11,556	8,746	4,388	6,218	5,131	3,947
	11 - 17	14,196	8,338	2,787	6,253	6,383	22,511	9,857	4,687	3,352
	18 - 24	2,489	2,395	457	7,210	506	3,326	6,369	6,732	8,494
	25 - 1	0	0	0	0	0	0	0	4,676	1,302
Totals		25,710	17,395	19,393	35,384**	21,014	38,301	27,540	29,865	20,502

* Data by courtesy of the U. S. Fish and Wildlife Service, Juneau office.
** Incomplete data.

TABLE 11. Catches of chum salmon by seven day periods, Taku River gill net fishery, 1945 - 1953.*

		1945	1946	1947	1948	1949	1950	1951	1952	1953
May	1 - 7	0	0	0	0	0	0	0	0	0
	8 - 14	0	0	0	0	0	0	0	0	0
	15 - 21	0	0	0	0	0	0	0	0	0
	22 - 28	0	0	0	0	0	0	0	0	0
	29 - 4	0	0	0	0	0	0	0	0	0
June	5 - 11	0	0	0	0	0	0	0	0	0
	12 - 18	0	0	0	0	0	0	0	0	1
	19 - 25	0	0	0	0	0	0	0	9	28
	26 - 2	2	0	0	0	5	0	9	15	52
July	3 - 9	8	7	25	0	5	9	15	50	39
	10 - 16	5	24	37	0	12	35	31	74	179
	17 - 23	2	48	55	28	37	40	32	181	159
	24 - 30	46	37	15	37	91	22	106	106	383
	31 - 6	45	25	187	55	100	64	90	224	143
Aug.	7 - 13	16	12	61	91	86	91	75	26	60
	14 - 20	7	7	121	53	67	107	12	57	28
	21 - 27	0	0	0	0	0	0	0	101	189
	28 - 3	61	221	1,194	732	402	637	84	442	1,193
Sept.	4 - 10	2,469	1,718	3,172	2,572	4,976	1,771	887	1,669	2,440
	11 - 17	7,272	5,586	788	3,287	3,869	13,931	3,120	6,542	4,329
	18 - 24	1,987	5,796	125	724	621	4,024	3,131	6,489	7,601
	25 - 1	0	0	0	0	0	0	0	7,960	1,680
Totals		11,920	13,481	5,780	7,579	10,271	20,731	7,582	23,945	18,504

* Data by courtesy of the U. S. Fish and Wildlife Service, Juneau office.

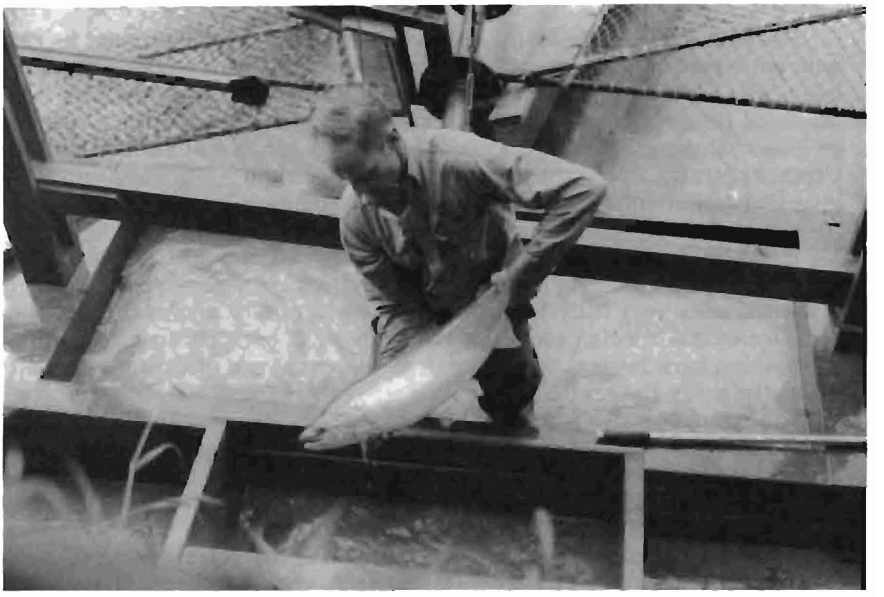


Plate 5. BIOLOGIST REMOVING A SILVER SALMON FROM THE PONTOON LIVE-BOX AND PLACING IT IN AN OUTBOARD LIVE-BOX FOR MEASUREMENT.

TROLL FISHERY INVESTIGATIONS

Aside from winter scratch fishing, the earliest show of kings of any magnitude occurs in Clarence Stråit during February, March and April. During 1953 an Alaska Department of Fisheries biologist tagged 264 salmon during this time, to determine the relative maturity and the area of origin of the stocks contributing to the troll fishery. Twenty-seven recovered tags have been received during 1953, with only two indicating a spawning migration, one to Rivers Inlet, B. C., and the other to Bute Inlet, B. C. The remaining 25 recoveries show random movement through the channels and waters of Southeast Alaska. Extreme migrations were to Hecate Strait, a straightline distance of 150 miles; to Icy Strait, 225 miles; and to Imperial Pass, west coast of Chichagof Island, 257 miles. The average minimum distance traveled was 61.7 miles. The shortest time any fish was free was 8 days, the longest, (1953 returns only) 207 days and the average time free was 109 days. One individual fish was recovered, after 63 days, in Ernest Sound, released and again recovered in Snow Passage after being free a total of 195 days.

The stocks of kings found in the early Clarence Strait run have characteristics similar to other stocks found in the inside waters of Southeast Alaska (Annual Report, 1952, 1953). They are considered to be largely immature and definite information on their areas of origin will depend upon 1954 and 1955 tag recoveries.

BLACKCOD RESEARCH

Research on blackcod (Anaplopoma fimbria) was continued in 1953 with emphasis on the analysis of data collected in past years. The program was initiated in 1950 with the collection of all available data from blackcod fishermen and other fisheries agencies. In 1951 the first tagging and sampling program was conducted on a limited scale in Northern Chatham Strait. The over-all program was intensified in 1952 with tagging and sampling being conducted from Middleton Island in the Gulf of Alaska to Southern Chatham Strait. (Figure 6)

It has been advantageous to work in cooperation with Canada and the Pacific Marine Fisheries Commission to carry on a coast-wide study of blackcod, since very little was known of the migratory and racial characteristics of this species. Many of the early problems confronting the investigation have been clarified through the exchange of data and results of preliminary programs.

The first objective was the evaluation of the present condition of the stocks of blackcod in Alaskan waters. This analysis involved the first four phases of the over-all program: (1) A study of the fishing gear employed by the blackcod fishery was undertaken to determine the effect of fishing on the stocks of blackcod. (2) A tagging program was carried on to determine if separate stocks existed and the delimitation of these stocks if they were found to exist. (3) Data to show the length frequency, sex ratio and maturity of blackcod on the various grounds was obtained by sampling the commercial catch. (4) The relative abundance of blackcod as indicated by the catch per unit of effort was determined for the major fishing areas. These data have been taken from the fishermen's log books and corrected to a standard unit of gear.

FISHING METHODS

All blackcod landed in Alaska are caught by long-lines. Each unit of gear is termed a "skate" which is approximately 240 fathoms in length. Each skate consists essentially of a ground line to which hooks are attached at intervals by leaders or gangions. An anchor is fastened to each end of the ground line to keep the gear as stationery as possible. A buoy line is attached to each anchor and connects to a buoy on the surface of the water which is marked for identity with the fishing vessel. In 1948 a change in blackcod gear was introduced in Alaskan waters. Instead of using the large halibut hooks at intervals of 13 or 18 feet, smaller, eyed hooks were used and attached to the ground line by a nylon gangion at intervals of 9 or 13 feet. The use of these small hooks prevented a large number of fish from spinning themselves free from the gear as frequently occurred with large hook gear. At the present time a majority of fishermen employ this new type of gear.

Small hook gear was used very successfully during tagging operations in Chatham Strait. To test the effectiveness of the gear, one skate of large hooks was placed midway between four skates of small hooks in each five skate string. Each skate of large hooks produced an average catch of 12 fish, while the small hook gear averaged 40 fish per skate. There were twice the number of hooks on the small hook gear as on the large, but corrections applied by doubling the large hook catch showed the effectiveness of the small hooks was still significantly greater.

During the tagging operations, each fish that was landed aboard the fishing vessel was carefully examined for any injury which might have occurred from the gear. The fish were held up by the tail making possible

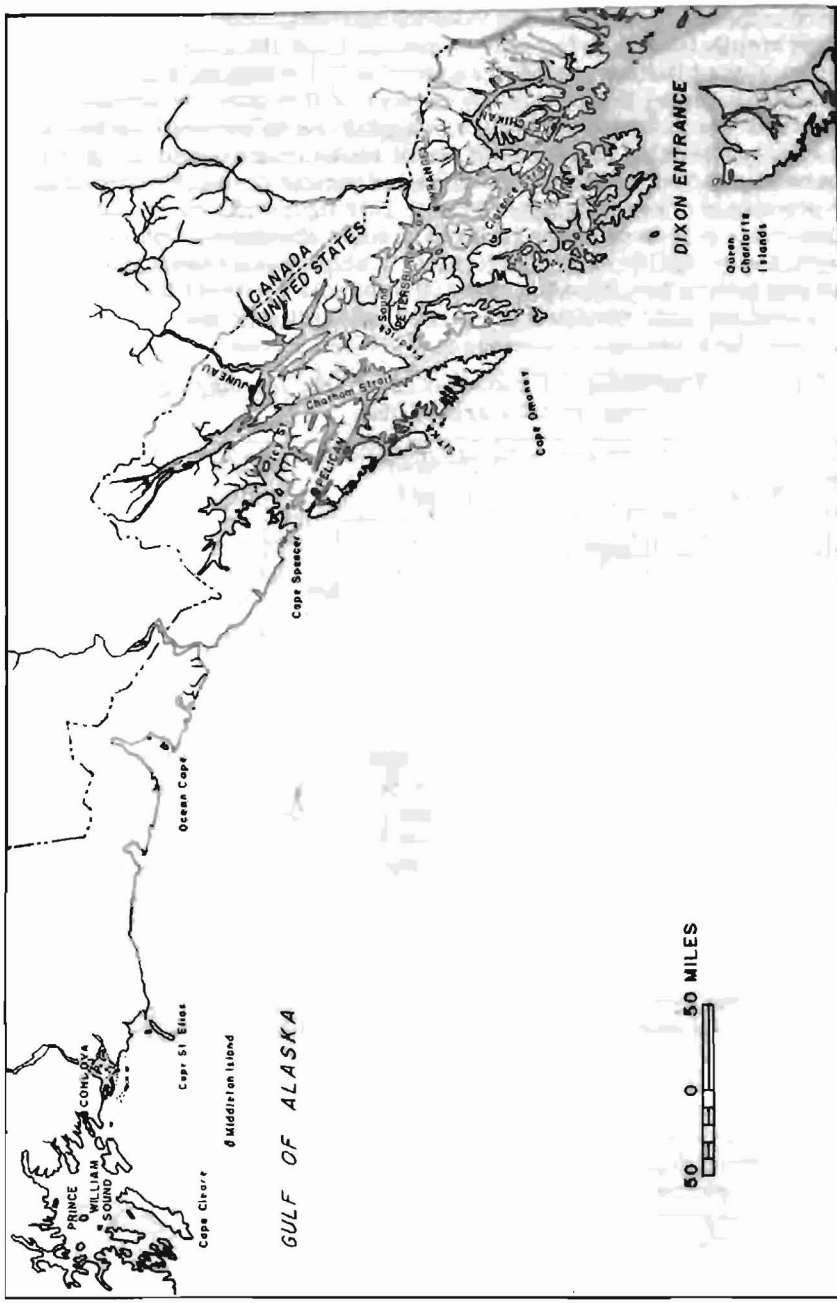


Figure 6. MAP OF THE CENTRAL AND SOUTHEASTERN ALASKA COASTLINE SHOWING THE MAJOR BLACKCOD FISHING AREAS AND PORTS OF LANDING.

an examination of the esophagus for hook injuries. Quite often fish were hooked in the esophagus and later freed themselves but were hooked again in the mouth before being able to escape from the gear. Sixty-three percent of the blackcod landed were unsuitable for tagging due to severe injuries caused by the gear. The number of fish taken by commercial operations which were unsuitable for tagging due to severe injuries and the effect of hooking by large and small hooks is presented in Table 12. The smaller hooks hooked more fish in and around the lip which reduced the percentage of severely injured fish. This figure can be considered a minimum as there were many gangions brought aboard the fishing vessel which were tightly coiled indicating a blackcod had been hooked but managed to spin free from the gear. It was quite apparent that blackcod were able to spin free from the larger halibut hooks easier than from the small hook gear.

Table 12. Percentage of blackcod unsuitable for tagging from long-line gear by area, 1952.

Area	Number Caught	Number Unsuitable	Percentage Unsuitable
Middleton Island (Large hooks)	2,722	1,753	64.4
Cape Spencer (Large hooks)	5,209	3,754	72.1
Chatham Strait (Large hooks)	1,593	965	60.6
Chatham Strait (Small hooks)	4,778	2,517	52.7
TOTAL	14,302	8,989	62.8

The size of blackcod taken by long-line gear varies from approximately 18 inches to 40 inches. After the small hook gear had been in use a short time, there were reports that this gear was selecting a smaller size group of fish than was the large hook gear. Both types of gear were employed in tagging operations in Chatham Strait and a very large sample from each was obtained. Figure 7 compares the length frequency of blackcod taken by large and small hooks. This comparison shows the length frequency distributions to be nearly identical. The mean length of the distributions is also nearly equal, being 27.23 inches for the catch by large hooks and 27.54 inches for the small hook catch.

TAGGING METHODS

All tagging and sampling was conducted aboard a commercial long-line vessel. As each fish was landed, it was carefully examined for any injuries which might have occurred from the gear, as previously described. Only those fish considered to be in excellent condition were selected for tagging.

Metal strap tags were first tried but were found to be unsuitable because the opercular bones were too thin to properly hold this type of tag and, furthermore, they were difficult to detect upon recovery. Two plastic discs were then tried, being affixed to the fish by a pure nickel pin. In preliminary studies, the disc type of tag was tried immediately below the first or second dorsal fin, the anal fin, through the nose or through the opercle. It was concluded that a yellow or white tag of this kind affixed to the opercle would produce the most satisfactory results. The opercles of juvenile blackcod are too tender to support a tag so these small fish were tagged immediately below the second dorsal fin.

1951 TAGGING

Tagging operations were first conducted in 1951 in Northern Chatham Strait. A total of 989 blackcod were tagged during the experiment and 9 recoveries have been made. These recovered fish were free an average of 405 days and migrated an average of 10 miles from the point of tagging.

THE 1952 TAGGING PROGRAM

Tagging and sampling were intensified in 1952 with a program extending from Middleton Island in the Gulf of Alaska to Southern Chatham Strait in Southeastern Alaska. A total of 5,333 blackcod were tagged in the Middleton Island, Cape Spencer and Chatham Strait areas. The number of tags liberated in each area is shown in Table 13. Also presented in Table 13 is the number of recoveries, average number of days free and average migration. The total recoveries from the tagging program is 14 which is a 0.3% return.

Table 13. Summary of blackcod tagging by area, 1952.

Area	Number Tagged	Number Recovered	Average Days Free	Average Miles Traveled
Middleton Island	969	2	637	1,610
Cape Spencer	1,455	4	168	11
Chatham Strait	2,909	8	254	8

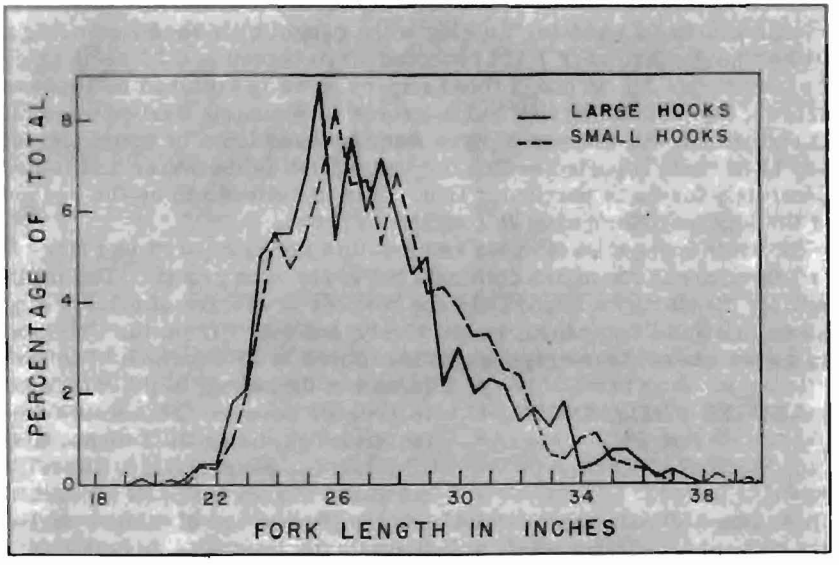


Figure 7. COMPARISON OF THE LENGTH FREQUENCIES OF BLACKCOD CAUGHT BY LARGE AND SMALL HOOK LONG-LINE GEAR IN CHATHAM STRAIT.

During 1952 and 1953 the heaviest concentration of fishing, although relatively low, occurred in Chatham Strait. The Cape Spencer area supported a less intense fishery during these years, while only a very few boats fished in the Middleton Island area and their operations were mostly limited to one trip each. The pattern of fishing effort coincides with the tag returns which number eight from Chatham Strait, four from Cape Spencer and two from Middleton Island. The two recoveries from the Middleton Island tagging are worthy of special mention since their average migration is 1,610 miles as compared to 11 miles for the Cape Spencer area and 8 miles for the Chatham Strait area. As previously mentioned, very little fishing occurred in the Middleton Island area after the completion of tagging operations. If the fishing intensity on those grounds had been equal to that in the other areas, some tag returns would probably have been made locally. This same pattern of a non-migratory body of blackcod, with occasional straying, has been observed in the tagging programs of other fisheries agencies along the Pacific Coast. It is still possible, however, that the stocks of blackcod in the Middleton Island area are more migratory than other Pacific Coast stocks.

TAGGING OF IMMATURE BLACKCOD

Each year, during the months from May to September, concentrations of juvenile blackcod are found in the shallow water areas of bays and inlets. In an attempt to determine when and where these fish ultimately enter the commercial catch, tagging was conducted in Tongass Narrows at Ketchikan in June 1953. These immature fish school in large numbers, actively feeding along the waterfront area of that city. It is of interest to note that immature blackcod of this numerical magnitude are not encountered by the commercial fishery, or observed in large numbers other than during the summer months. The juvenile blackcod used for tagging were caught by a hand line using a barbless hook. A total of 1,114 blackcod were tagged and 24 recoveries have been made. All but one of these returns were recaptured in Tongass Narrows; this remaining fish had migrated to Wrangell Harbor where it was recaptured. All recoveries were made by hand lines or sport tackle. Many fishermen reported seeing the tagged fish in the water and fished deliberately for these particular fish. This is believed to be the reason for the high recovery rate in Tongass Narrows.

LENGTH FREQUENCY and SEX RATIO

The length frequencies of males and females are compared in Figure 8. In all three areas the males dominate the lower size groups. The mean length for the Middleton Island and Cape Spencer areas are similar, being 25.9 inches and 25.6 inches, respectively, but differ from the Chatham Strait area where the average length for males is 25.1 inches. The difference of the average length of females is greater between the outside and inside areas, being 29.3 inches and 28.5 inches, respectively. Table 14 compares the sex ratio, as expressed in percentage of males and females, and the percentage of mature males and females for the two outside areas and Chatham Strait. In both cases the Middleton Island and Cape Spencer areas are very similar but differ from the Chatham Strait area. All of these comparisons, together with the results of the tagging, indicate that separate stocks exist, especially a separation of inside and outside stocks of blackcod.

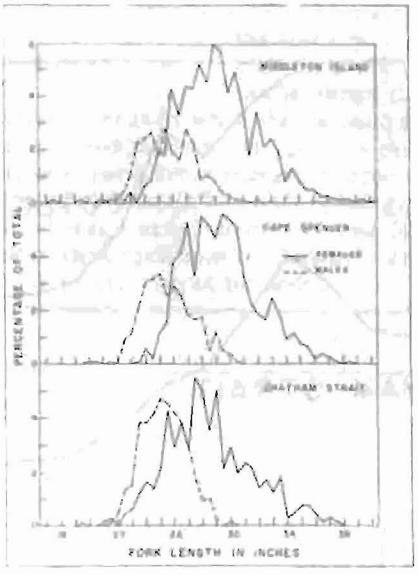


Figure 8. LENGTH FREQUENCY DISTRIBUTIONS OF THE MIDDLETON ISLAND, CAPE SPENCER AND CHATHAM STRAIT AREAS SHOWING THE SEX COMPOSITION OF THE COMMERCIAL CATCH OF BLACKCOD.

Table 14. Sex ratio and maturity of blackcod, taken in 1952, by area.

Area	Percentage of Males and Females		Percentage Mature	
	Males	Females	Males	Females
Middleton Island	26.2	73.8	94.9	98.0
Cape Spencer	30.0	70.0	93.1	97.9
Chatham Strait	38.1	61.9	87.9	86.2

RELATIVE ABUNDANCE

Long-line fishermen have kept accurate logs listing the daily catches and units of gear fished. From these data the catch per unit of effort has been calculated for the various fishing areas to determine the relative abundance of blackcod. Figure 9 depicts the catch per skate for the outside areas and Chatham Strait. The catch was calculated in both numbers and pounds of fish per skate, but since the former group of data are more complete at this time it is presented in Figure 9. The trend of catch per skate in numbers of fish will differ from the catch per skate in pounds due to the changing average size of the fish as accumulated stocks are withdrawn. The change-over of gear from large to small hooks in 1948 necessitated correction of the catch by small hooks to equal the standard unit of gear which used large hooks.

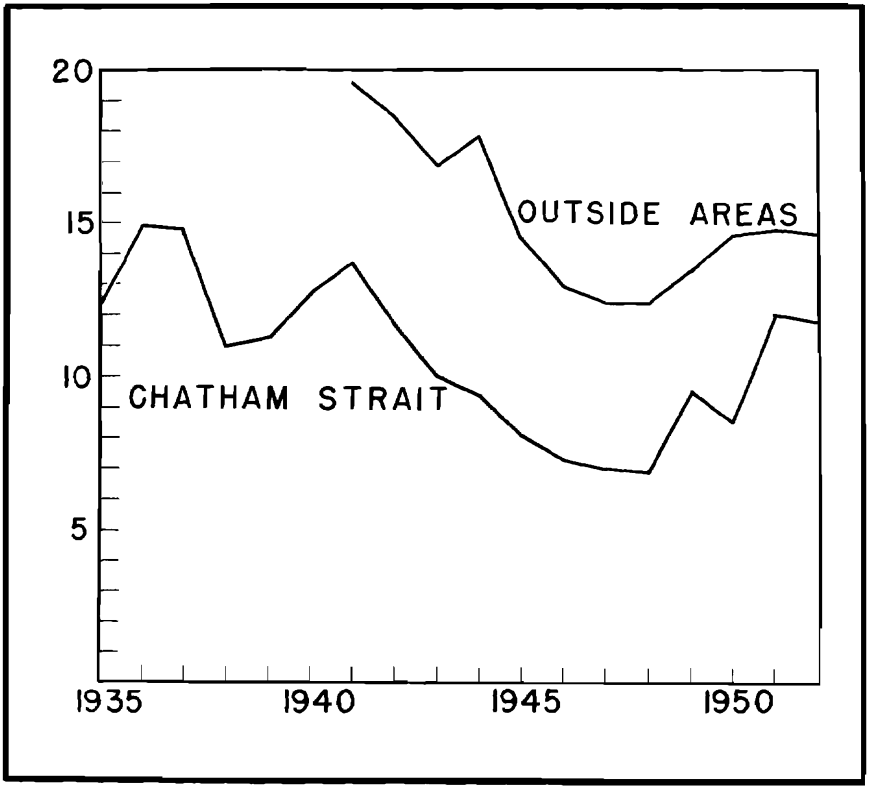


Figure 9. CATCH PER UNIT OF GEAR IN NUMBERS OF FISH FROM THE OUTSIDE AREAS AND CHATHAM STRAIT.

This correction was accomplished by the results of the comparative gear studies in Chatham Strait and data from the logs of fishermen fishing simultaneously with each type of gear in the same area.

The trend of the catch per skate is one of general decline from the early years of the fishery to 1947, when the intensity of the fishery lessened, causing the declining trend of abundance to cease. This trend still continued in Chatham Strait during 1948 but rose sharply the following year. In both areas, the greatest period of decline was during the years of World War II when increased market demands created an intensive fishery on all blackcod grounds. The market demand decreased in 1947 due to previous overproduction and the erratic condition of the liver market in face of the expected importation and the synthesizing of Vitamin A. Due to this decreased demand, the fishing intensity fell sharply causing the trend of the catch per skate index to level and later rise. Since that time the catch per skate has shown a steady increase indicating the stocks of blackcod have been accumulating since the period of high fishing intensity. If the stocks of blackcod are again subjected to a sustained period of high fishing intensity, the past history of the fishing indicates that the stocks will decline until a point of depletion occurs.

Figure 10 depicts the Alaska blackcod landings from 1915 to 1953.

These landings cannot be used as an index of abundance of blackcod since there has been such great fluctuations in fishing intensity. A history of the fishery is now being compiled and will serve to explain the trend of the landings prior to 1940. From 1940 to 1946 the catch increased when the demand for blackcod and the value of the liver continued to rise. In 1947, as previously mentioned, over-production and an erratic liver market caused the landings to drop sharply. Since that year, the catch has undergone great fluctuations and varied with the cold storage carry-over. The amount of carry-over of frozen blackcod is dependent upon market demands and this demand ultimately determines the production of blackcod.

ANNUAL LANDINGS

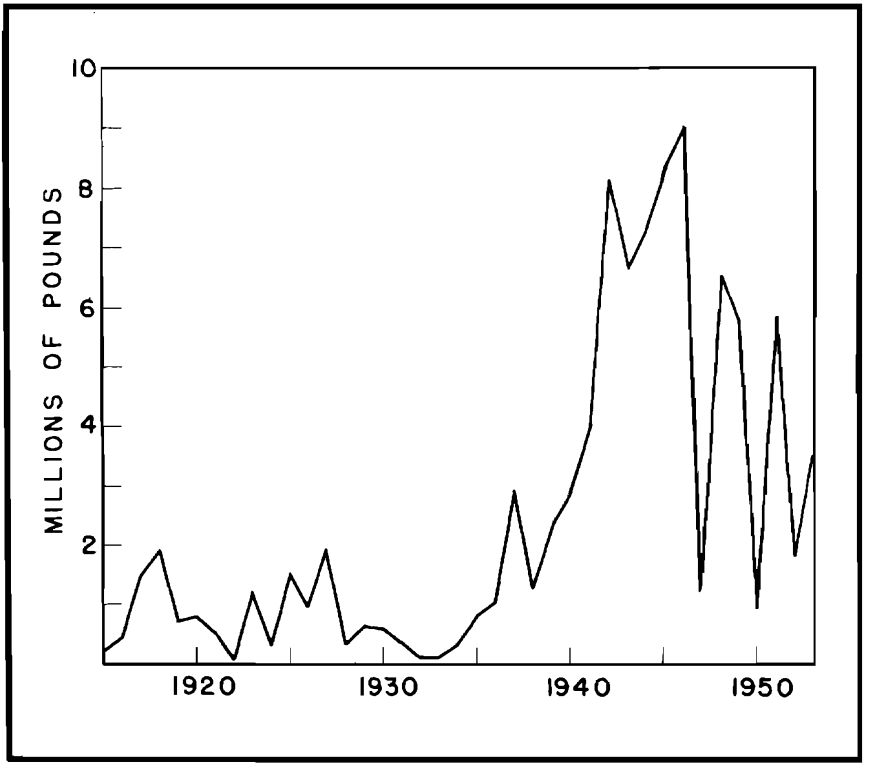


Figure 10. COMMERCIAL LANDINGS OF BLACKCOD IN ALASKA FROM 1915 TO 1953.

The present fishing season for blackcod seems to offer protection for the fish while spawning. This legal closure of territorial waters is effective from November 30 to May 1 of the following year. The closure appears to accomplish its purpose and is favored by the majority of the fishermen.

The small hook long-line gear, introduced in Alaskan waters in 1948, has been very successfully used by the blackcod fishery. This gear takes blackcod of the same size as the conventional halibut gear but is far more effective. The tagging and sampling of the commercial catch of blackcod has shown the stocks to be largely

SUMMARY

separated. There appears to be a distinct separation of the stocks in the inside and outside waters of Southeastern Alaska and these stocks further appear to be separated from those in the northwestern Gulf of Alaska. The long-line fishery operates on a largely mature stock of blackcod ranging from 18 inches to 40 inches in length. The males dominate the lower size groups while the sizes above 27 inches are composed predominantly of females. Large schools of immature blackcod are abundant during the summer months in the shallow water areas. These juveniles are not found in any large numbers during the winter and appear largely separated from the adult population. The catch per skate, as an index of relative abundance, shows the stocks of blackcod to have been steadily reduced from 1941 to 1947 when the market demands prompted a high fishing intensity. The trend of the catch per skate has risen since 1947 due to a reduced fishing intensity caused by erratic market conditions. This condition is probably responsible for an accumulation on the grounds since 1947. Annual Alaska blackcod landings have ranged from 64,000 pounds to 9,019,000 pounds during the past 39 years. These landings are not indicative of the abundance of blackcod since they vary directly with the fishing intensity, which in turn is a function of the cold storage holdover.

INSPECTION

In continuance of its cooperative program with the Fish and Wildlife Service, the department furnished the Federal agency with 12 men during the 1953 fishing season to assist in the enforcement of Federal fishery regulations. These inspectors were distributed as follows:

7 in the Southeastern Alaska area
2 in the Kodiak area
1 in the Copper River-Prince William Sound area
1 in the upper Copper River district
1 on the Kenai Peninsula

In addition, one full time district inspector was stationed at Ketchikan checking the streams on a year round basis and correlating the work of the Inspection and Watershed Management Divisions in that district.

The man on the Kenai Peninsula and the one in the upper Copper River district operated from panel trucks furnished by the department. Accessibility of the spawning streams by road makes this type of inspection feasible in these two districts. The prevention of poaching of salmon, while on their spawning migration, was the main concern of these two inspectors. In addition they proved of valuable assistance to the Sport Fish Division by checking anglers for the territorial license and by assisting in lake surveys, stocking of trout and general help around the hatcheries.

The two Kodiak inspectors assisted in the egg-taking, hatchery, and egg-planting operations of the Watershed Management Division, when not on active patrol work. One of the Southeastern Alaska inspectors worked with the Biological staff on the Taku River investigation.

KODIAK KING CRAB OTTER TRAWL BOAT.

RED SALMON COMING ABOARD GILL NETTER, TAKU INLET.

Plate 1. KING SALMON MUTILATED IN GILL NET BY HAIR SEAL.

PREDATOR CONTROL

The hair seal control program was continued during 1953 on about the same scale as in the previous year with operations in the Stikine, Taku, and Copper River districts.

In the 1951 and 1952 seasons two expert hunters were employed in the Stikine River district, during which time 1,714 hair seals were shot. As a result of these operations the seal population showed a considerable decline and reports from the fishermen were to the effect that seal depredations had been greatly reduced. Accordingly, it was decided that one hunter would be sufficient to hold these predators under control during 1953. This man was employed for a period of 5 months, from April 15 to September 15. During this time he disposed of 552 hair seals and 11 sea lions, which were shot incidental to the seal operations.

STIKINE RIVER

For the Taku River district, the same fishery inspector employed in 1952 was again hired for the 1953 season. Doubling as a seal hunter he accounted for 355 animals during the period from April 16 to September 30. Although this is a relatively small area, hair seals are unusually destructive, especially in the early part of the fishing season when the king salmon are running. Many of these large salmon are so badly mutilated in the fishermen's gill nets that they are worthless for market purposes. (Plate 1) Others less seriously damaged sell for half price.

TAKU RIVER

The dynamite "depth bomb" method of seal hunting was used again during 1953 and accounted for 6,754 of the 6,799 hair seals destroyed in the Copper River area. The other 45 animals were killed by shotgun fire in places where "bombing" was not practical or where there might be salmon fry or fingerlings present. Plate 2 shows the results of one bombing run.

COPPER RIVER

The "bombs" were made up into 25, 15, and 12-1/2 pound charges, dependent upon the depth of the water in which the seals were to be bombed. Heavy charges in shallow water caused "blow outs" which did not appear to be effective, but were very powerful when used in depths of 20 feet or over. The 15 pound bombs were best in depths of 12-18 feet and also in shallower water with a soft bottom. The explosive used was DuPont 50% ditching powder primed with No. 6 cap and waterproof safety fuse ignited by expendable slip-on fuse lighters of the pull-wire type.

Exceptionally fine cooperation financially and otherwise was again obtained from the New England Fish Company, Parks Canneries, Inc., Halferty Canneries, Inc., Copper River Co-op Company, Cordova Fish & Cold Storage Company, Copper River & Prince William Sound Cannery Workers' Union and the Cordova District Fisheries Union.

ACKNOWLEDGMENT

Plate 2. HAIR SEALS KILLED DURING ONE "BOMBING" RUN.

Plate 1. INTERIOR OF FAIRBANKS TROUT HATCHERY.

SPORT FISH

This report presents the progress of the Sport Fish Division of the department and represents the combined efforts of the following staff:

E. S. Marvich, Senior Biologist
A. H. McRea, Senior Biologist
R. J. Simon, Junior Biologist
W. J. Cahill, Biological Aide

The Sport Fish Division, since its inception in 1951, has concentrated its efforts on the waters readily available by road from the larger population centers of the Territory. The reasons for this were discussed in detail in the reports of 1951 and 1952. The vast majority of anglers, having limited amounts of time and money, were confined to the waters adjacent to their homes and available by automobile. Since these waters had supported an intensive fishery for a period of years, they were badly depleted of sport fish stocks. Rehabilitation measures were taken to insure the maximum sustained yield of game fish per surface acre in certain readily available lakes in the Fairbanks and Anchorage areas.

Fairbanks Hatchery Expansion

Again in 1953, it became the responsibility of the Fairbanks hatchery to supply small rainbow trout for stocking the waters in the Fairbanks, Anchorage, and, in addition, the Cordova areas. Due to the increase in demand for rainbow trout for stocking purposes, the Fairbanks hatchery had to be expanded from a four trough station in 1952 to a fourteen trough station in 1953. (Plate 1)

The expansion of the hatchery to over three times its original capacity was a comparatively simple matter. In the original design and construction, consideration had been given to an anticipated increase in the hatchery's size. The water intake pipe was large enough to carry an adequate supply of water for the increase to fourteen troughs. One end of the hatchery building was removed and 12 feet of building was added to accommodate the additional units. This increased the size of the hatchery building from 12 feet by 16 feet to 12 feet by 28 feet.

Hatchery Supply Control Dam

The outlet of Birch Lake was used for the hatchery water supply. Considerable anxiety was experienced during the 1953 season because of the fluctuations in water flow. In 1951, for the first time in 27 years, this outlet went dry on July 17. The water flow during 1952 and 1953 was subject to considerable fluctuation, depending on the rainfall for sustaining the water level of Birch Lake sufficiently so that an adequate rate of flow would be maintained in the outlet for hatchery operation.

A more consistent water supply for the hatchery was desirable. The outlet of Birch Lake was surveyed and a dam was constructed in the outlet about 100 feet from the lake. Spruce logs, 12 inches in diameter, were used for the dam foundation. An earth dam faced with moss and grass turf was used to impound the water in the lake. A plank spillway was con-

Plate 2. BIRCH LAKE WATER LEVEL CONTROL DAM.

structed through the dam; vertical slots were fitted in the spillway so that dam boards could be installed to regulate the rate of flow in the outlet. (Plate 2)

The dam permitted the impoundment of a considerable quantity of water in 850-acre Birch Lake. About 20 inches of water could be built up. The dam was completed by October 15, 1953. The reservoir of water to be impounded behind the dam structure will tend to insure a continuous dependable supply of water to the hatchery. Prior to the dam construction, no control could be exercised over the hatchery water supply. The dam with its spillway control should provide good insurance against water supply failure.

Fairbanks Hatchery Operation

Again in 1953, rainbow trout eyed eggs were imported from the states and were incubated and hatched at the Fairbanks hatchery. The rainbow trout introductions made in 1952 justified the continuation of this species and stock for planting the lakes in the Fairbanks and Anchorage areas. The techniques used in egg procurement, shipment, incubation, hatching and feeding were discussed in detail in the 1952 Annual Report. Essentially the same methods were used during 1953.

A total of 342,986 eyed rainbow trout eggs were purchased from sources of supply in Idaho and Montana. The eggs were received at the Fairbanks hatchery on the following dates: 150,780 eggs on May 17, 111,606 eggs on May 29 and 80,600 on June 12. Out of the total number of eyed eggs received, there were 51,968 damaged eggs that died prior to hatching.

The damaged dead eggs were individually removed or picked out of the baskets of live eggs. Recognition of the damaged eggs was a simple matter. They turned white or opaque, having lost the transparent qualities of the live eggs. The dead eggs were removed from the basket since they would have become infected with fungus. The fungus would spread quickly to the adjacent live eggs and soon kill them. The dead eggs were picked out of the basket by means of a rubber suction bulb fitted with a short length of glass tubing. The inside diameter of the tubing was slightly larger than the diameter of the eggs. The eggs were sucked through the tube and into the bulb for discard. (Plate 3)

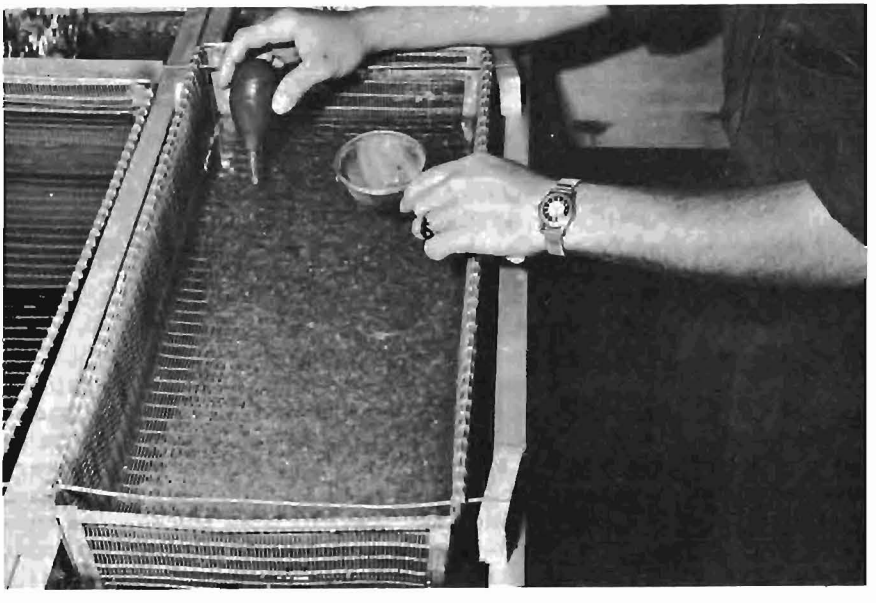


Plate 3. PICKING DEAD (WHITE) RAINBOW TROUT EGGS.

The three lots of eyed rainbow trout eggs were all hatched by June 17. After the yolk material had been absorbed and the ventral abdominal slit had closed, the fish were fed a diet of finely ground liver and salmon meal. The fish were fed a minimum of five days and a maximum of eighty-four days prior to stocking. Feeding and holding the fish in the hatchery insured the biologists a source of rainbow trout for stocking purposes from the middle of June until the first week in September.

Fish Hauling

The portable fish tank used during the 1952 season proved to be efficient and economical for the hauling of rainbow trout fry. With the greatly increased capacity of the Fairbanks hatchery, more tanks were needed to expedite fish planting in the Interior and for shipments of rainbow trout to Anchorage. Two additional units were constructed and used during 1953.

Rainbow trout fry shipped from the Fairbanks hatchery to Anchorage for stocking by the biologist located in that area were transported in the fish tanks approximately four to six hours. The four 5-gallon cans in each unit were loaded with water and trout at the Fairbanks hatchery and transported the 55 miles to the Fairbanks airport where they were loaded on the aircraft for delivery in Anchorage. The loaded unit weighed 206 pounds and was sent by air-freight for $14.42; up to 10,000 rainbows were loaded in each unit.

An accurate check on the condition of the fish was necessary in order to evaluate the hauling success of the Anchorage shipments. Fish live-boxes, constructed of a fine screen over a wooden frame, were placed in various locations in the Anchorage area. The rainbow trout fry received from Fairbanks were held in the live-boxes for several days prior to stocking. The fish were fed during this holding period and permitted to recover from their airborne ride. The live-box holding tests showed that the hauling losses from the Fairbanks hatchery to Anchorage were negligible, and that the fish were in excellent condition on arrival.

A total of 172,409 healthy rainbow trout fry were planted in the lakes from the Fairbanks hatchery. A complete list of the 1953 rainbow trout plantings from this station can be found at the end of this report. Mortalities suffered during fry shipment and stocking have not been included in the above total.

1952 Rainbow Trout Planting Results

As discussed in the Annual Report for 1952, many of the rainbow trout plantings made during that year were on an experimental basis. Trout plantings were made in marginal bodies of water to determine whether these would support game fish. In other instances, trout were introduced to determine whether these fish would compete against existing rough fish populations. Since little or no previous trout stocking had been done in the areas involved, the biologists were obliged to plant fish under varied ecological conditions in order to evaluate the game fish production potential of the various bodies of water. These experimental plantings did establish certain facts that enabled the biologists to more accurately evaluate the lakes in the Fairbanks and Anchorage areas.

Lost Lake, rehabilitated in 1951 by the use of rotenone, was stocked in 1952 with 21,212 rainbow trout that averaged 2,651 per pound. Fourteen months later these trout were 12 inches in total length. (Plate 4) Quantitative sampling for fish in the lake, as well as observations of trout activity, indicated that the survival of the introduced trout was poor. The rate of growth of the trout was considered excellent.

Two out of the eight gravel pits stocked in 1952 contained rainbow trout populations in 1953. As discussed in the Annual Report for 1952, the gravel pits along the Richardson Highway in interior Alaska were stocked as an experiment. In spite of their shallow depth, approximately 10 feet, sufficient water was exchanged between the successful gravel pits and the Tanana River to keep the dissolved oxygen content of the water at a sufficiently high level to sustain the trout during the long winter months. The rainbow trout, one year after stocking, were 8 to 10 inches in length. Six of the gravel pits failed to winter the trout because of inadequate dissolved oxygen storage beneath the ice layer and the lack of water exchange between the pits and the Tanana River.

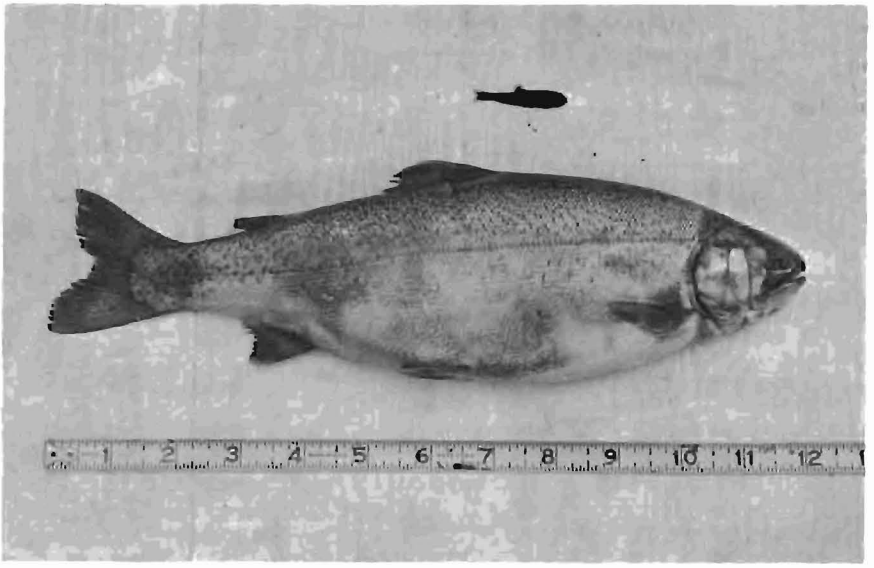


Plate 4. RAINBOW TROUT GROWTH IN LOST LAKE. UPPER RAINBOW REPRESENTS THE SIZE AT THE TIME OF STOCKING, LOWER RAINBOW SHOWS THE SIZE OF THE FISH 14 MONTHS LATER.

The gravel pits are utilized, to a large extent, by family groups from Fairbanks for swimming and picnicking. The pits are of small size, being from one to five acres in extent. Their production potential for trout, therefore, is limited. As a result, the Tanana Valley Sportsmen's Association of Fairbanks recommended that the gravel pits containing trout be open only to children under 16 years of age. The Alaska Fisheries Board wholly concurred with the recommendation of the sportsmen. Presumably, this will be the case in 1954, when the pits are opened to fishing.

Hidden Lake, a landlocked body of water near Anchorage, produced excellent results from the rainbow trout plantings made in 1952 and 1953. The rainbow trout fry planted in 1952 were 1,700 per pound at the time of stocking. Eighteen months later, they ranged from 9-1/2 to 13-1/2 inches in forked length (measured from the nose of the fully extended fish to the center of the indented tail) and averaged two-thirds of a pound apiece, with the largest weighing slightly over one and one-half pounds. (Plate 5) Rainbow trout fry weighing 2,086 per pound were stocked in 1953; five months later, they ranged from 5-1/2 to 7-1/2 inches in forked length. (Plate 5) An abundance of food and warm water temperatures provided ideal conditions for a rapid rate of growth of the introduced rainbow fry in Hidden Lake. Fry survival appeared to be good.

Falk Lake, located near Butte in the Matanuska Valley, was planted with rainbow trout fry in 1952. These fish were 1,752 per pound at the time of stocking. In 1953, fourteen and one-half months after planting, the rainbow were 8-1/2 to 11 inches in forked length. Rainbow trout stocked in 1953 at 1,500 per pound grew to a length of 6-1/2 inches in five months. The growth rate of the introduced rainbow trout fry was considered very good in this land-locked spring-fed lake.

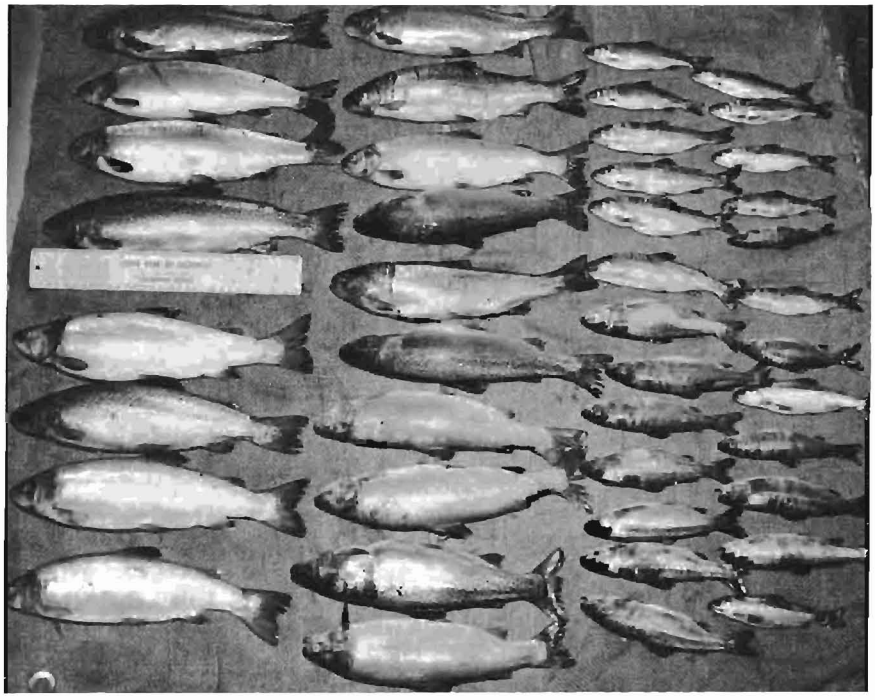


Plate 5. HIDDEN LAKE RAINBOW TROUT. TWO COLUMNS OF FISH ON THE LEFT ARE 18 MONTHS OF AGE; THE TWO COLUMNS ON THE RIGHT ARE 5 MONTHS OLD.

Insufficient data were available to accurately evaluate the results from the remainder of the rainbow trout plants made in 1952. In some instances, the trout survival was small or entirely lacking. Further investigations should disclose whether this was due to migrations, low winter dissolved oxygen concentrations, competition for food, predation, or a combination of these and other unknown factors.

Lake Rehabilitation Program

The lake rehabilitation program of the department has been discussed in detail in the past reports of the department. Basically, the program entails the process of eradicating an undesirable fish population from a lake and putting the lake into the exclusive production of game fish. It means making full utilization of the potential game fish production of a lake by the elimination of scrap fish that compete for food with game fish and the elimination of predaceous fish that preclude the successful establishment of a game fish population.

Rotenone is used as a fish toxicant to eradicate the undesirable fish from a lake. The term "poison" is often used when speaking about rotenone and the lake rehabilitation program. Actually, rotenone is not a poison. It causes a paralysis of the breathing functions of fish and they suffocate; however, rotenone is not toxic to mammals. The water in which it is used remains potable. Fish killed by rotenone are edible. Rotenone

remains one of the most powerful tools at the disposal of the management and research biologists; it enables these men to completely eradicate an undesirable fish population from a lake.

The elimination of a trash fish population in a lake by the use of rotenone is a complex operation. The lake is carefully surveyed with engineering instruments, enabling the biologists to calculate the poundage of water in the lake. Since rotenone is applied at one pound of rotenone to forty million pounds of water, the biologists must know the poundage of water in the lake. With this knowledge, the biologists can calculate the correct quantity of rotenone required to eradicate the fish.

Rotenone is applied to the open water areas of a lake by towing the material in a burlap bag behind an outboard motor driven boat. (Plate 6) The powdered derris or cube root, containing the rotenone, leeches out of the porous gunny sack and into the water. Distribution is accomplished by zigzagging the boat over the open water areas. The shorelines and swamps are completely blanketed with the toxicant by spraying; a concentrated rotenone solution is sprayed over these areas using a 10-horsepower gasoline driven pump. (Plate 7) The inlets, outlets, marshes and marginal potholes are treated with hand pumps and hand carried burlap bags of toxicant. Every precaution is taken to insure a complete kill in the lake and all connected drainages.

Plate 6. ROTENONE APPLICATION. TOWING A BAG OF THE CUBE ROOT CONTAINING THE ROTENONE BEHIND AN OUTBOARD MOTOR DRIVEN BOAT.

Plate 7. SHORELINE AND WEED AREA SPRAYING WITH A POWER PUMP DURING LAKE REHABILITATION.

The following lakes were rehabilitated during the year using rotenone as a fish toxicant:

Lake	Surface Acres	General Location
Sand	67	Anchorage
Jewel	30	Anchorage
Rocky	57	Matanuska Valley
Echo	23	Matanuska Valley
Tex Smith	15	Glenn Highway, Mile 169
	Total 192	

The kill per surface acre, on a poundage basis, was heaviest in Tex Smith Lake. Suckers and cottoids were killed in this lake. In numbers of fish killed per surface acre, Rocky Lake headed the group of lakes rehabilitated. Stickleback, in large numbers, were killed in Rocky Lake. The cottoids, suckers and stickleback are not particularly dangerous as predators; however, they take up the food and living space that should go to game fish production. If a lake is saturated with these species of rough or trash fish, it is difficult to economically establish a game fish population. The small rainbow trout fry would be literally starved to death.

Toxicity tests, to determine the duration of rotenone toxicity, were conducted in the five rehabilitated lakes. It was desirable to stock the lakes with rainbow trout as soon as possible, in order to take advantage of the remainder of the 1953 growing season. Rainbow trout fry were

placed in screened boxes in each of the lakes at different time intervals to check when the rotenone toxicity dissipated from the water. All the lakes were free of toxicity in one month and were stocked with rainbow trout fry during the late summer and fall. Refer to the rainbow trout plantings on the last page of the sport fish report for a list of these plantings.

Dissolved Oxygen Determinations

Dissolved oxygen is provided in lake water from three primary sources: aeration, photosynthesis and inlets (streams and springs). During the summer months, for the most part, adequate supplies of oxygen are furnished to maintain the dissolved oxygen concentration of the lakes at a sufficiently high level to support game fish. The lakes are open to the atmosphere, thus oxygen is absorbed at the surface by aeration. Plants liberate free oxygen during photosynthesis; this oxygen is absorbed by the water. Springs and inlets flowing into a lake are normally saturated with dissolved oxygen, thus they add to the dissolved oxygen content of the lake water.

The dissolved oxygen concentrations in Alaskan lakes frequently drop below the minimum required to sustain fish life during the long winter months. Aeration is eliminated when the first film of ice covers the lake, and plant photosynthesis is likewise eliminated by the ice and snow layer on the lake which prevents light penetration. The inlets and springs are frequently frozen solid so that this source of oxygen replenishment is also cut off. Enough dissolved oxygen must be stored beneath the ice layer to provide for fish respiration, as well as for the respiration of other animals and plants. Oxygen supplies are further diminished by the decomposition of organic materials at the lake bottom.

The dissolved oxygen concentration in the lakes was of immediate concern because of its importance in determining the environmental suitability for game fish. During the winter of 1953, dissolved oxygen concentrations and other chemical values were ascertained at 5-foot intervals in 30 lakes. The amount of oxygen available under the ice layer was found to range from zero to better than nine parts per million. Three parts per million of dissolved oxygen is generally accepted as the minimal requirement for trout; however, trout wintered over in Alaskan lakes with as little as two parts per million oxygen. The dissolved oxygen concentration studies will be continued. An attempt will be made to establish criteria by which marginal bodies of water can be evaluated to determine whether they contain sufficient dissolved oxygen to support fish.

Jewel Lake, in the Anchorage area, may sustain a winter kill of trout. This shallow lake was rehabilitated and stocked with rainbow trout from the Fairbanks hatchery, along with salmon fry salvaged from nearby waters. The rainbow trout were reared from eggs obtained from the states. Jewel Lake, with both outside and indigenous stocks of salmonoids, may enable the biologists to evaluate the relative tolerances to low dissolved oxygen concentrations of these two sources of fish. If native stocks of fish have lower oxygen requirements, these stocks will be used in lakes with marginal oxygen concentrations.

Anchorage Fish Hatchery

It became increasingly necessary that a trout hatchery be constructed in the Anchorage area. The long distance necessary to transport trout fry from the Fairbanks hatchery to Anchorage made this program time consuming and relatively expensive. Trout stocking requirements for the Anchorage area taxed the Fairbanks station to its limit. If, by some ununforeseen accident, the Fairbanks hatchery production failed, both Fairbanks and Anchorage would lose their source of fish supply. A hatchery in the Anchorage area could provide sport fish for stocking local waters and would insure a source of fish supply to Fairbanks in the case of failure at that station, thereby giving more flexibility to the hatchery program.

With these thoughts in mind, investigations were conducted during 1952 and 1953 on possible locations for hatchery construction. It was necessary to select a suitable location for the hatchery by March 1953 so that plans could be made to construct the hatchery the same year.

The outlet creek of Upper Fire Lake, located 16 miles out of Anchorage on the Glenn Highway, was selected as the most suitable site for a trout hatchery to service the Cook Inlet and adjacent areas. This source of water supply had been checked for over a year. Sufficient data were available regarding the water temperature, turbidity and rate of flow, during all four seasons of the year, to justify the use of the outlet of Fire Lake for the hatchery water supply. The site selected for the construction of the hatchery included access by an open year-around road, electricity readily available, a well drained level area for the hatchery building and sufficient drop from the creek to the proposed hatchery location to provide for the gravity flow of water to the station.

The outlet's minimum rate of flow, found during April and May, was adequate to supply an eighty trough hatchery with clear water. During periods of heavy run-off, the outlet was free of silt. Twenty-seven acre Fire Lake acted as a settling basin for any debris carried into the lake. Silt-free water in the outlet is of considerable importance in hatchery operations. Fine trough screens will not plug and the incubating eggs will remain clean if the water is clear. Silt deposits on incubating eggs will prevent the percolation of fresh water through the eggs, thus causing them to suffocate.

The outlet of Upper Fire Lake had water temperatures that were within the desired limits for trout egg incubation and rearing. Water temperatures were in the 50° Fahrenheit range by the middle of May and remained above 50° Fahrenheit until the middle of September. These water temperatures fitted in very nicely with the fish cultural and proposed management practices in the area. Trout eggs received in late April or early May would be hatched and the fish would be ready for stocking by the middle of June. Continued high temperatures during the summer months would insure a rapid rate of growth on the fish held in the hatchery.

The Engineering Division of the department designed the hatchery installation. The hatchery was built during the late summer and fall of 1953. The hatchery building is 38 feet by 44 feet. The structure was built on a reinforced concrete floater-type slab. Sheet metal was used for the walls and roof. The hatchery is discussed in detail in the engineering section of this report.

The Anchorage hatchery was built and donated to the department by the Anchorage Sportsmen's Association, with seven thousand dollars they raised during their "Fish Unlimited" campaign. These men and women, realizing the necessity for a game fish hatchery in the Cook Inlet area, promoted the fund raising campaign that provided money for the hatchery building. The intake dam, intake pipe, troughs, head trough and other necessary structures and equipment were or will be provided for with departmental funds. The hatchery will be in operation by the 1954 season.

The Anchorage hatchery installation was made possible by the Anchorage Sportsmen's Association along with the splendid cooperation of other agencies and the public in general. Approximately six thousand dollars worth of services was donated to the Anchorage Sportsmen's Association and this department by interested governmental agencies and the public. A list of the participants in the Anchorage hatchery construction is as follows:

Anchorage Sportsmen's Association, along with several other clubs in the Cook Inlet area
U. S. Bureau of Land Management
Alaska Road Commission
U. S. Army, Forty-Second Engineers Battalion
U. S. Air Force, Wing Disposal Unit
C. R. Foss, Inc., General Contractor
Steel Fabricators, Inc.
Anchorage Sand and Gravel, Inc.
Fire Lake Lodge

The Anchorage hatchery will be provided with twelve troughs for the 1954 season. The building will accommodate forty troughs; these will be provided, when necessary, and as finances permit.

Conclusion

The number of projects completed during 1953 would have been much smaller without the cooperation and assistance rendered by the various organizations and individuals in the Territory. The sportsmen's clubs in Fairbanks, Anchorage, Cordova and the remainder of the Territory have cooperated and assisted the biologists in the prosecution of their appointed tasks. Individuals have donated time in fish planting, hatchery construction, lake surveying and lake rehabilitation. Governmental agencies have loaned equipment, rendered advice and given assistance whenever asked. With the modest appropriations available to the Sport Fish Division, all the aforementioned contributions have aided materially in the furtherance of sport fisheries management in the Territory.

FAIRBANKS HATCHERY
1953 RAINBOW TROUT PLANTS

DATE	LAKE	NO. PLANTED	No. of FISH PER POUND	AREA
June 15	Gravel Pit, Mile 31	1,340	2,700	Fairbanks
June 15	Gravel Pit, Mile 20	2,685	2,700	Fairbanks
June 18-Sept. 17	Lost	47,678	2,300 to 91	Fairbanks
June 23	Pothole	4,150	2,100	Summit Lake
June 25	Hidden	2,172	2,086	Anchorage
June 25 & 30	Upper Fire	5,472	2,086	Anchorage
June 30	Bear	1,100	2,086	Anchorage
July 4	Gravel Pit, Mile 80	1,115	1,122	Fairbanks
July 8	Gravel Pit, Airport	8,000	1,122	Fairbanks
July 11	Gravel Pit, Mile 79	1,200	822	Fairbanks
July 13	Green	5,206	1,402	Anchorage
July 13 & 15	Falk	8,010	1,500	Anchorage
July 14 & August 26	Echo	8,858	1,150	Anchorage
July 16	Gravel Pit, Mile 31	900	900	Fairbanks
July 30, 31-August 28	Sand	13,307	1,406 & 750	Anchorage
July 31	Jewel	5,046	1,550 & 758	Anchorage
August 1	Tex Smith	2,174	758	Glennallen
August 1	Willow	758	758	Glennallen
August 1	Frank & Jerrys	6,064	758	Glennallen
August 5	Meier	6,200	750	Fairbanks
Aug. 6, 26, 28	Rocky	12,225	1,550 & 750	Anchorage
August 14	Scout	1,915	1,280	Cordova
August 15	Courser	1,920	1,280	Cordova
August 15	Beaver	2,870	1,280	Cordova
August 15	Summit	3,500	1,280	Cordova
August 21	Bonnie	4,000	1,000	Anchorage
August 25	Boleo	10,099	500 & 360	Big Delta
August 26	Butte	375	750	Anchorage
August 26	Crossroads	50	750	Anchorage
Sept. 2	Monterey	4,020	360	Fairbanks
	TOTAL	172,409		

WATERSHED MANAGEMENT

The fishways at Paul's Basin on Afognak Island functioned for their second year in allowing silver salmon to pass through to the formerly blocked waters of Laura Lake. In order to gain an idea of the results of the 1951 and 1952 red salmon egg stocking program in Paul's Basin the fry and fingerlings produced in Laura Lake were sampled. The red salmon egg plants at Paul's Basin and Frazer Lake on Kodiak Island were continued on an increased scale.

A stream diversion project on Falls Creek, one of the tributary streams in the Karluk Lake system on Kodiak Island, was constructed to increase the spawning area in this depleted system.

In the Ketchikan district stream surveys and stream improvement explorations were continued. Red salmon eggs were again planted in the Old Frank's Creek system on Prince of Wales Island above natural barriers to salmon migration.

The following report covers the mutual efforts of:

Clinton Stockley, Junior Biologist
Leo M. Thompsen, Junior Engineer
Stanley D. Swanson, District Inspector
Paul Garceau, Fishery Inspector

BIOGRAPHICAL SKETCH

LEO M. THOMPSEN was born June 1, 1924, in Brooklyn, New York where he completed his elementary and technical high school education. In 1942, he enlisted in the Army. During his 39-month tour of duty, he received a year's basic engineering training under a college-level program and later served with the combat engineers and paratroopers overseas.

Following his discharge, he worked as a plant-layout draftsman during the day and attended Brooklyn Polytechnic Institute at night, minoring in Mechanical Engineering. In 1949 he entered Virginia Polytechnic Institute as a full-time student, and completed the requirements for a B.S. degree in Civil Engineering in July, 1951. Prior to graduation, the Chi Epsilon (National Civil Engineering Honor) Fraternity elected him to membership.

Mr. Thompsen served with the Oregon State Highway Commission as a Jr. Bridge Inspector, and with the City of Springfield, Oregon, as Assistant City Engineer before joining the Alaska Department of Fisheries in January, 1953, as assistant to the engineer. In March he took over all duties of the engineer's office when the former engineer resigned.

In April, 1953, he was accepted as a junior member of the American Society of Civil Engineers.

KODIAK AREA

PAUL'S BASIN FISHWAYS

A major part of the effort in the Kodiak area was devoted to the Paul's Basin watershed on northeast Afognak Island. Figure 1 illustrates the location. The effort here is directed towards starting and maintaining a run of red salmon of commercial importance into the two formerly blocked lakes now opened by the fishways. The ladder was completed in August of 1952 and the system above the block had been planted with red salmon eggs in 1951 and 1952. These phases have been reported upon in the 1951 and 1952 Annual Reports of the Alaska Department of Fisheries.

It had been felt that the silver salmon using the available spawning area below the block would naturally extend their range into the newly opened system as they had been observed attempting to jump the 12-foot falls between Paul's and Laura Lakes. However, the red salmon using Paul's Lake were all lake spawners and showed no inclination to ascend the system further. For this reason plants of red salmon eyed and green eggs had been made in 1951, 1952, and again in 1953 in order to establish a run to the newly opened area.

SALMON ASCENDING THE FISHWAYS IN 1953

This assumption has proven correct as silver salmon were observed using the ladder and spawning in Laura Lake in 1952 and again this past year. On September 9, 1953, a school of 100 silvers were seen at the outlet of Laura Lake above the fishways, while other adult silvers were jumping in the lake. It is estimated that about 400 silver salmon ascended the fishways in 1953 while only one red salmon was observed.

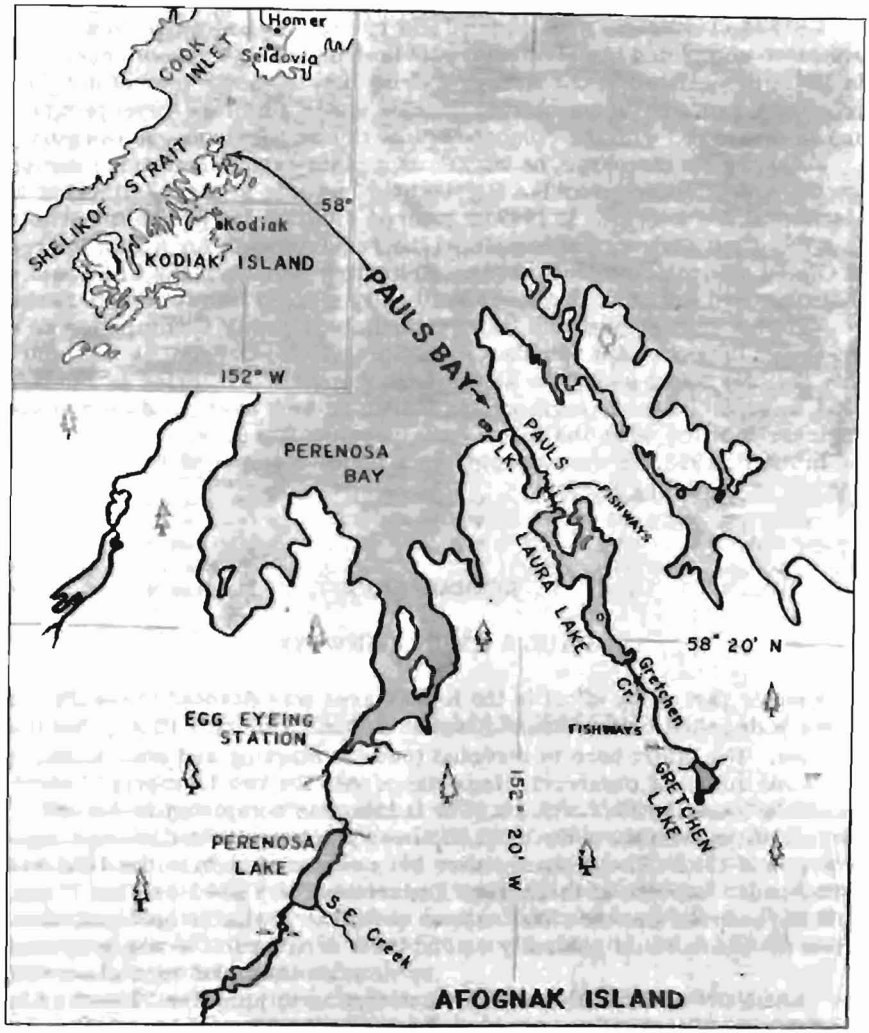


Figure 1. PAUL'S BASIN WATERSHED.

Red salmon have been planted as fertilized green and eyed eggs in Gretchen Creek, the interlake stream between Gretchen and Laura Lakes, to establish the species in the watershed above the fishways. In an effort to gain information of the relative success of these plants during their residence in the gravel as eggs and yolk sac fry and in successive stages as fry and fingerlings in the lake, sampling of the fish at these various stages was undertaken.

SAMPLING OF PREVIOUS PLANTS TO INDICATE RELATIVE SUCCESS

Excavation of representative artificial nests in 1952 and 1953 indicated, by the small number of "blank" or dead eggs, a good survival of the 1951 and 1952 egg plants to the stage of emergence from the gravel.

In 1953 a beach seine was operated in the vicinity of the mouth of Gretchen Creek on Laura Lake in search of further evidence of the survival from the 352,000 eyed eggs planted in August, 1952. The beach seine hauls yielded red salmon fry in equal and often dominant numbers to the other species normally inhabiting the shallows (stickleback, sculpins, trout, etc.). The red salmon fry appeared in excellent condition. A typical fry recovered in the seine catches is illustrated in Plate 1.

A downstream migrant trap, illustrated in Plate 2, was installed at the outlet of Laura Lake on May 10, 1953, and fished through July 13. A total of 1,238 yearlings, probably a substantial portion of the total downstream migrants, were counted as they passed through enroute to the sea. The fingerlings were beginning their second summer's growth and were derived from the August, 1951, plant of eyed and green eggs. They were from 4.5 to 6.0 inches in fork length, an exceptional size for yearling red salmon. One of the migrant yearlings is illustrated in Plate 1.

The incubator station at Perenosa Bay was moved to a more temperate stream near the mouth of the bay in order to gain a higher survival rate to the eyed egg stage. The stream formerly used had developed excessively high temperatures conducive to higher mortalities. The stock of red salmon spawning in Southeast Creek of Perenosa were again used for a source of eggs. A total of 512,000 red salmon eggs were eyed out in the two trough station. The mortality of eggs from spawn taking to planting was 7.7 percent. When the eggs reached the eyed stage they were transported in six lots by skiff and back packing to Gretchen Creek, where they were planted in nests previously prepared by blasting with dynamite.

1953 PLANT IN PAUL'S BASIN

The program of developing a red and silver salmon run in Laura and Gretchen Lakes is proceeding satisfactorily. The silver salmon are extending their own range and the new rearing area open to them should provide an increase in their numbers. Sampling of the fresh water phase of the young red salmon planted in Gretchen Creek indicates a good growth rate. However, pending the results of the 1952 plant to the migratory stage, it would appear that larger numbers of eggs may be needed to establish a self sustaining stock of red salmon in Laura Lake. There is a definite possibility that larger numbers of red fingerlings will leave the lake after two years residence than those with one year, thus at least another year's results must be analyzed before any conclusions may be drawn.

CONCLUSION

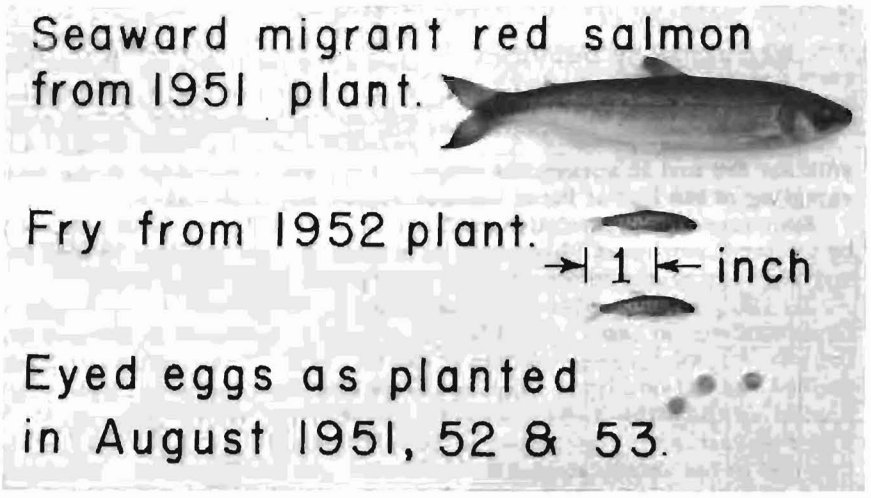


Plate 1.

RED SALMON EGGS, FRY, AND SEAWARD MIGRANT FROM LAURA LAKE.

Plate 2.

DOWNSTREAM MIGRANT TRAP AT OUTLET OF LAURA LAKE.

Falls Creek is located on the southeastern side of the Karluk Lake Basin on Kodiak Island. Figure 2 illustrates the geographical location of Falls Creek. This stream formerly entered O'Malley River from the east, just below the river outlet from O'Malley Lake. During the mid-1940's, the stream cut through its banks in the upper reaches, 4,630 feet from its original mouth, and made a new short, precipitous channel to O'Malley Lake, entering along the east shore about 3/8 mile southeast of its former mouth. Notes suggesting the Falls Creek channel alteration appeared in the 1951 and 1952 annuals.

FALLS CREEK STREAM DIVERSION

On July 22, 1953, a dike, 35 feet in length, of log crib construction, wired and spiked together and rock filled, was completed at the diversion site. The original channel was reopened by blasting a cut 1.5 feet deep and 16 feet wide. Plate 3 illustrates the log dike and channel cut. Diversion of the stream to its original channel increased the stream length from 2,200 feet to 4,630 feet. The original channel has an ideal gradient providing excellent spawning conditions throughout its length. Diverting the cold run-off stream to its former channel, issuing directly into O'Malley River, effectively cooled the warm river waters flowing from the surface of the lake. This reduction of river water temperature provided water cool enough in O'Malley River for the red salmon to spawn in mid-summer, which they had not done since the natural diversion in Falls Creek occurred. On the 4th of August 300 reds were observed spawning in Falls Creek .

Frazer Lake, of 5,000 surface acres on Kodiak Island, was planted for the third successive year with red salmon eggs. These egg plants have been made with a twofold purpose: (1) to establish if Frazer Lake will or will not raise red salmon satisfactorily, and (2) if red salmon do return in sufficient numbers a brood stock will have been established by the time sufficient funds become available to ladder the 31-foot falls which now prevents the ascent of salmon into the lake system. A total of 1,000,000 green eggs were introduced in 1953 to various tributary streams of Frazer Lake. Further explorations and surveys were made for a fishway to by-pass the falls.

FRAZER LAKE PLANTING

On December 13, 1953, the fourth shipment of fall run king salmon eggs from Washington State were planted in artificial nests in the gravel of Montana and Spring Creeks near Juneau. The purpose of this experiment is an attempt to determine whether our coastal streams are suitable and will support the fall run king salmon. Returning king salmon from the first plants of 1951 should appear in Montana Creek in the fall of 1954.

FALL RUN KING SALMON PLANTING

KETCHIKAN DISTRICT

In continuation of work begun in 1952, lake systems blocked to anadromous fish were surveyed and catalogued for development as salmon rearing areas. Some of these systems may be brought into production by establishing runs from egg or fry plants and permitting access to the spawning beds

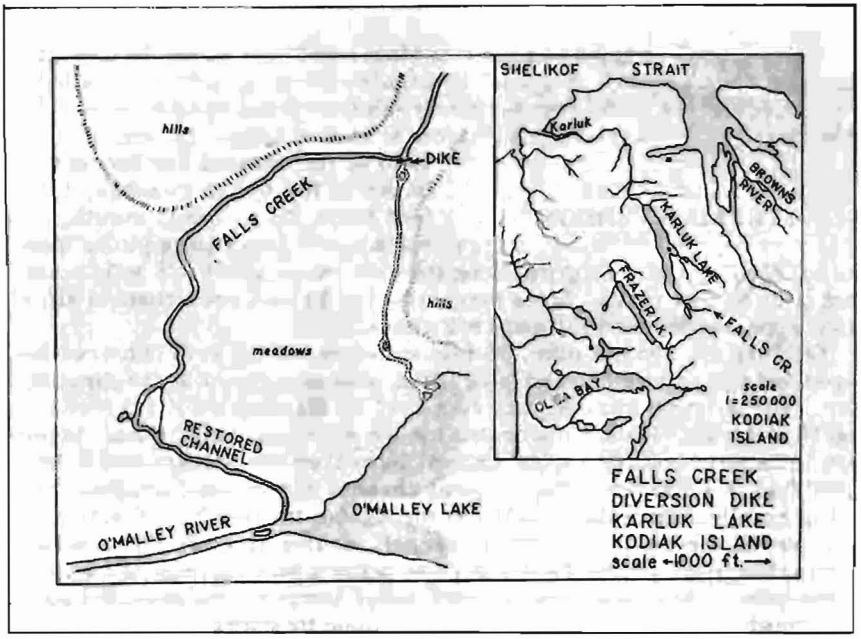


Figure 2. MAP SHOWING THE LOCATION OF FALLS CREEK.

Plate 3. FALLS CREEK DIKE.

BARREN AREA PRODUCTION

for the returning adults by construction of fishways at the barrier falls. Where falls are too high or numerous to permit laddering, annual plants of eggs or fry would permit maintenance of runs. In this case the lake would serve as a large rearing area for the hatchery incubated fry, providing far more rearing space than would be available if conventional hatchery rearing ponds were used.

Suitability for salmon production in five of the most promising lakes was explored by gathering data on temperatures, depths, water properties, species and condition of existing fish within the system.

Lakes surveyed during the 1953 season are as follows: Smugglers Cove, Shelokum, Long, Hassler Island, Orchard, Granite, Nooya, Princess Bay, Wolf and Bakewell Lakes. Bakewell system offers definite possibilities for opening a large lake area for rearing salmon on a natural spawning basis. One fishway constructed at the 20 foot falls in the outlet stream would open to spawning migrants a lake area of 740 acres with three large inlet streams; the largest, which has the best spawning facilities, is 35 feet in width and enters at the head of the lake. The barrier falls lies 200 yards below the lake in the 1/2 mile long outlet stream. Sockeye salmon were observed leaping at the barrier falls on July 27, 1953. See Plate 4.

Plate 4. FALLS AT BAKEWELL LAKE OUTLET WITH RED SALMON ATTEMPTING TO ASCEND IT.

Old Frank's system on Prince of Wales Island, described in the 1952 Annual Report, was planted with red salmon eggs for the second year to test its capability of rearing salmon; 77,000 green eggs were introduced here in 1953.

This system also offers good possibilities for laddering. Numerous small bays and inlets in the four lakes provide a large area suited to the rearing of young salmon.

A number of lake systems with coho spawning in their tributaries were surveyed as sources of future brood stock for planting the blocked areas. These included Fish Creek, Mahoney Creek, Walker Creek, Heckman Lake Inlet, Checats Lake Inlet and Reflection Lake Inlet. Reflection Lake Inlet proved to be the best source of coho for eggtaking. An estimated 3,000 spawners were using this tributary. As better areas may exist, surveys for coho spawners will be continued in the future.

The rod and reel fishery on king salmon in the Ketchikan area has gained great impetus in the past 5 years. New industry has resulted in a marked growth of the population of the city with a corresponding increase in the number of people who seek recreation in king salmon fishing.

KING SALMON TAGGING

To gather information on the stocks of king salmon that are contributing to this increasingly intensive fishery, a tagging program was begun to encompass the areas most heavily fished with sport gear. The fish tagged were taken on sport tackle with the major proportion being contributed by sport fishermen, thus reducing the over-all cost of the operation. Accumulation of considerable information has resulted to date from the program. A total of 66 fish were tagged in the general sport fishing area north of Ketchikan. Table 1 lists the tagged fish recovered to December 31, giving the area tagged, area caught, days out, and nautical miles from tagging point to recovery point. No migration pattern is apparent from this data.

Table 1. Tag recovery results to December 31, 1953.

Area Tagged	Area Recovered	Days Out	Distance Traveled*
Clover Pass	Grant Island	32	5
Clover Pass	Vallenar Bay	123	5
Mountain Point	Blank Island	30	4
Mountain Point	Vallenar Point	146	14
Bell Island	Bell Island	39	0
Skin Island	Mountain Point	117	25
Skin Island	Vallenar Point	117	11
Skin Island	Duke I. - West Rock	70	35
Skin Island	Cape Chacon	15	40
Island Point	Skin Island	13	5
Island Point	Twenty-fm. bank	95	3

* Distance between tagging and recovery points in nautical miles.

Beaver dams were found to be preventing salmon from reaching spawning areas in several locations. This situation prevailed at Leask Cove Creek in George Inlet. On July 6, five beaver dams, which were totally blocking the lake inlet stream, were blasted out. On July 11, three dams

STREAM CLEARANCE

in the main stream were blasted out and four others were modified by creating a depression in the surface of the dam. The areas of dam removal and modification were creosoted in each case to deter repair by the beavers.

At the time of dam removal in the main stream, the water level was very low and the sockeye salmon present in the stream were confined to

Plate 5. BEAVER DAM AT HELM BAY PRIOR TO BLASTING.

Plate 6. BEAVER DAM AT HELM BAY AFTER BLASTING.

the deep areas and were unable to ascend the shallows. When the dams were removed, the impounded water was released and the stream level rose considerably, permitting the sockeye to easily ascend to the lake.

On August 30, the inlet stream to Leask Lake was surveyed and 80 spawning sockeye were counted in the area above the point where the first dam encountered was removed. None of the dams had been rebuilt in the system as of August 30.

A large beaver dam directly at the outlet of Helm Bay Lake was blown open and creosoted on August 1. (Plate 5 and 6) The dam was visited several times in August and each time it was necessary to remove a patched area built back by the beavers. On each occasion the dam was resprinkled with creosote. Loggers working in the area reported that the sockeye salmon were able to ascend to the lake during the intervals that the dam was open.

A fishery inspector employed by the department, W. H. Jackson, constructed a flume through a beaver dam at Dolomi Creek, east Prince of Wales Island, which proved successful in allowing passage of sockeye salmon upstream. Upon completion of the flume, 2,000 sockeye were observed to pass through and continue upstream. Seven remained milling in the pool below the dam. This device is illustrated in Plate 7. No effort was made by the beavers to plug the flume. This flume holds considerable promise for installation at many other locations where the beaver are particularly tenacious in their efforts to keep the impounded water at its present level by repairing their dams after every blasting.

Advantages of the flume installation over blasting of the dams are that the pools are not entirely drained and lost as rearing areas for young salmon. In addition, the beavers remain undisturbed as their houses are not exposed by draining of the pools resulting from blasting holes in the dams.

ENGINEERING

The engineering activities directly connected with the Watershed Management division have been incorporated in the current and past reports of this division. In addition to these duties the department engineer has been called upon, from time to time, by some of the other divisions for work on a number of their projects in which engineering surveys and designs were required.

The designing of the Anchorage hatchery for the Sport Fish division was the major engineering project for 1953. While the immediate requirements of the trout stocking program in the Anchorage area called for only 12-20 hatching troughs, it was decided to plan a hatchery with an ultimate capacity of 40 troughs in order to take care of foreseeable future needs of the district. Accordingly, plans were drawn for a building 38 feet by 44 feet, so as to provide ample work space and bachelor quarters in addition to housing the 40 troughs. The original design was for a building with a concrete floater-type slab floor with built-in drain gutters, concrete block walls and a sheet metal roof. (Figure 3) In order to reduce costs, a last minute change was made by substituting sheet metal for concrete blocks in the walls.

Plate 7. OUTLET OF FLUME THROUGH BEAVER DAM AT DOLOMI CREEK.

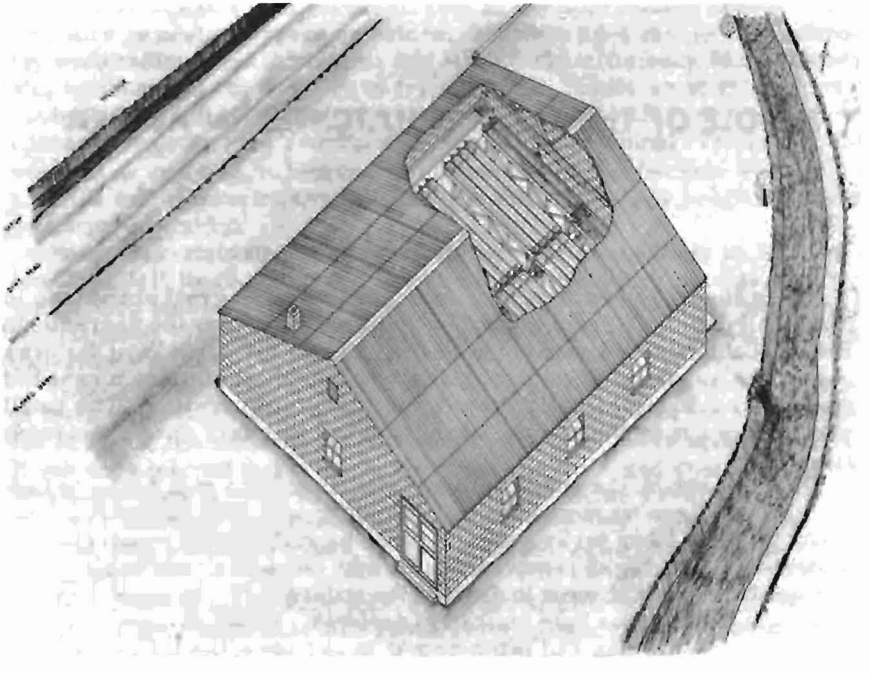


Figure 3. FIRE LAKE HATCHERY LOCATED NEAR ANCHORAGE.

The plans call for a concrete head trough, 4 feet deep and 16 inches wide. The hatching troughs will be arranged in banks of four, separated by 21-inch aisles. Double use of the water will be made possible by having two troughs laid end to end. This will, at the same time, necessitate only 20 outlets in the head trough.

Water for the hatchery will be from the outlet stream of upper Fire Lake, with a small intake dam located about 450 feet upstream from the hatchery site. A 4-inch pipeline from the dam will be adequate to supply 20 troughs with 12 gallons per minute, as well as provide water for domestic and utility purposes. The building, water supply and head trough were completed in 1953. By installing hatching troughs and other equipment early in the coming year the hatchery will be ready for operation during the 1954 season.

PLANTING RECORD

Afognak Island:	August 28 to September 6, 1953 -- Gretchen Creek eyed red salmon eggs	512,000
Kodiak Island:	July 18 to 21, 1953 -- Frazer Lake, east creek, west creek and north river "green" red salmon eggs	1,000,000
Ketchikan District:	September 3 -- Old Frank's Lake -- main tributary "green" red salmon eggs	38,000
	October 3 -- Old Frank's Lake -- main tributary "green" red salmon eggs	39,000
	October 26 -- Wolf Creek system, Moser Bay "green" silver salmon eggs	23,000
Juneau District:	December 13, 1953 -- Montana and Spring Creeks eyed king salmon eggs	50,000

ROLE OF THE SALMON HATCHERY IN ALASKA

By
C. L. Anderson

Less than 100 years ago salmon were found in great abundance in practically every stream along the Pacific Coast from the Sacramento River in California northward to the Yukon. Except for occasional failures, due to the vagaries of nature herself, these crops of salmon renewed themselves automatically from generation to generation. The small quantities caught by the original inhabitants had no effect on the returning runs.

With the establishment of salteries and canneries man began to take his toll from these bounteous stocks. But along with this commercial exploitation came other serious consequences as civilization penetrated the wilderness. Man began removing the forests on such a vast scale that it resulted in profound changes in many of the watersheds. In some streams water was diverted for huge irrigation projects. Young salmon were unable to reach the sea and often as not wound up on the farmer's field. Large dams for generating electrical energy were built on other rivers, entirely blocking the upstream migration of the mature salmon on their

way to the spawning grounds. Pollution from industrial plants contributed its deadly poisons. Harmful effects were also produced by a number of lesser factors such as gravel washing and mining operations, channelization of streams, improper construction of road culverts and others. All of these factors reduced the amount and quality of suitable spawning grounds for the salmon upon return to their parent stream. Of even more importance, less and less rearing area became available to the young salmon fry upon their emergence from the gravel. Natural reproduction was being seriously curtailed.

It was quite likely, at least at first, that neither the fishery administrators nor those responsible for the above factors realized the full significance of the damages being wrought. The gradual dwindling of the runs was invariably attributed to overfishing. In an effort to stem this tide, restrictive measures were placed on the commercial fishermen and artificial propagation was started.

Even a superficial study showed that millions of eggs were deposited by the runs of spawning salmon, but only a few individuals returned to complete their life cycle. Nature is most prodigal. It was clearly evident that the major percentage of the seed was being wasted. If man could successfully eliminate this tremendous waste, fewer fish would be needed to perpetuate the runs. It was believed that this loss was largely due to lack of fertilization at the spawning time and heavy mortality during the hatching period.

Artificial propagation appeared to be the answer. Salmon hatcheries were established up and down the coast, even in Alaska where the advances of civilization had not as yet penetrated to any appreciable degree. Man was sure he could improve on nature. Millions upon millions of salmon fry were released in the streams and lakes. The efficiency of a hatchery was measured by the numbers of fry produced. Little or no attempt was made to feed and rear these fry before releasing. After many years of concentrated effort the results were most disheartening. Things did not work out as expected, in fact in some cases conditions became worse. As a result some agencies abandoned their entire hatchery program. This was true in Alaska.

However, certain fishery officials on the coast, especially in Washington State, felt there still was a definite place in fishery management for the salmon hatcheries. They set out to learn why the early hatcheries were failures. Trained fishery biologists were called in to investigate and experiment.

Numerous experiments were conducted on rearing the young salmon in fresh water ponds before releasing. This was based on the theory that the larger the fish the better its chances of protecting itself upon liberation. It was soon learned that two species of salmon, pink and chum, would not lend themselves to fresh water rearing. Also, hatchery rearing of red or sockeye salmon was beset with some difficulties. But the other two species, king and silver (coho), gave very encouraging results, especially the latter.

Downstream traps were placed on selected streams. Young salmon of various ages were liberated above the traps and the outgoing seaward migrants counted as they passed through the traps. Many experiments were run. One typical of the results with silver salmon follows:

Age at Time of Plant	% Survival to Seaward Migratory Age
3 months	10%
6 months	22%
9 months	45%
yearlings	75%

As further studies by the biologists proceeded, it became apparent that this increase in survival was not due entirely to greater size of the older fish. Investigations of the early life history soon disclosed a great difference between the several species. It was learned that the pink and chum salmon remained in fresh water for a very limited time before proceeding to the sea. This explained the lack of success with fresh water rearing of these two species. On the other hand, it developed that the red or sockeye lived in their fresh water environment for a year or more before heading for the ocean. For the most part they lived in the lakes, usually at considerable depths, rather than in the streams. This fact explained why some difficulties were encountered in raising this species in the narrow confines of shallow ponds.

In the case of the king and silver salmon it was found that the streams, and to some extent the shallows of lakes, were the habitat of these species during their infancy. In the case of the fall races of king salmon fresh water life was approximately 90 days, but with the spring races this varied considerably and might be as much as one year. The silver salmon showed the most consistency with the great percentage of them remaining in fresh water for approximately one year from the time of emergence from the gravel.

Continued biological studies disclosed that the production of downstream migrants by a particular stream was limited by the amount of fish food present in its waters. Annual fluctuations in climatic conditions might vary the number of downstream migrants somewhat from year to year, but in general it remained fairly constant. A stream, or a lake, is like a pasture. It can graze only so many fish. The planting of large numbers of fry can only result in over-population and over-grazing with no resultant increase in numbers of downstream migrants. However, in streams and lakes that are badly depleted, or barren, fry plantings can be beneficial by building the populations up to the normal capacities of the waters.

In order to supplement natural production and to compensate for the losses of spawning and rearing areas, the goal of modern hatchery operations is to rear the young salmon in fresh water until they are of the size and condition of true seaward migrants. By releasing them at this stage they go to the sea almost immediately, without further drain on the streams for food. This procedure is showing positive results in Washington State and other places where it is being followed.

The question arises as to whether hatchery fish have as great a survival rate as wild fish. While experiments have shown both positive and negative results the preponderance of evidence would seem to be against the hatchery stocks. In actual practice this deficiency is made up by liberating extra numbers of hatchery fish to compensate for their lower survival rate.

Under normal conditions the success of natural spawning and hatching of pink and chum salmon will approach that of artificial propagation. The heavy mortality in nature seems to occur between the time of emergence from the gravel and time of adjustment to salt water existence. So far hatchery methods have not been able to improve on natural conditions, although some success is now being had with salt water rearing of these species in Washington State.

Experiences in the states have demonstrated that, wherever possible, natural reproduction is the best and cheapest method of maintaining the salmon runs. This is being accomplished by proper regulation of the fisheries based on sound biological investigations; by construction of fishways past stream barriers; by intelligent stream improvement; by reforestation; and by other means that will improve the fresh water habitat.

Nevertheless, it is becoming increasingly apparent that salmon hatcheries do have a useful and important place in the over-all salmon management program. Some watersheds become so badly depleted from time to time, because of man-made or natural causes, that restoration by nature would be a slow process. In such cases a "transfusion" or "shot in the arm" of hatchery fish will restore the runs in much less time. When barren areas are opened by means of fishways and stream clearance, the same method of hatchery stocking proves invaluable. In these instances it is possible to use salmon in the fry stage, hence a minimum of rearing is required and costs are nominal.

As more and more spawning and rearing areas become unavailable to the salmon, more and more dependence must be placed upon the hatcheries. Natural reproduction in the remaining waters must be supplemented by artificial propagation in order to maintain the runs of salmon. Rearing of young salmon to migratory size, although costly, seems to provide the only answer.

Before commenting on the role of the salmon hatchery in Alaska, it might be well to remark that natural reproduction is also the cheapest and best for the Territory. Fortunately, up to the present time there have been only minor losses of spawning and rearing areas due to the advances of civilization. It is believed that some of the damages sustained in the states can be eliminated here. All parties, both private and governmental, involved in the utilization and management of our natural resources have pledged close cooperation.

If Alaska is to develop it must have new industries. They are needed and welcome. However, we must face the fact that we cannot have new industries without some damage to our salmon fisheries, but they must be kept to the minimum. In spite of all precautions some fresh water habitat will be lost entirely and some will become less productive.

Much of this loss can be compensated for by the opening up of new watersheds that are now blocked to the migration of salmon by barriers in the streams. These new areas are of two types. First, those spawning and rearing waters that can be economically opened on a permanent basis by the construction of fishways around the barriers. Second, those in which the building of fishways is financially impracticable, but which still can be made to produce.

In either case the salmon hatchery is a necessity. In the first situation stocking of young salmon must be carried out for a full cycle. If this initial series of plants is successful, natural reproduction can then take over. It is obvious that in the second instance annual stocking must continue indefinitely. These plants can be of "eyed eggs" or fry, as circumstances dictate, either of which can be produced in the hatchery at nominal costs. The returns of mature salmon at the end of the cycle should repay several times over the annual expense of stocking. Silver and red salmon are most adaptable for this type of work. Opportunities for the utilization of unproductive waters are found in all sections of Alaska.

Another important application for the salmon hatchery is in the treatment of depleted streams by the "shot in the arm" technique. While this is used largely for silvers and kings, it may become possible to utilize this method for all five species as our knowledge of artificial propagation is expanded.

Much has been said for and against the introduction of new species or races of salmon. Some experiments have been successful, others not. The introduction of fall run king salmon into the streams of Southeast Alaska is admittedly of an experimental nature. If successful it will pay off in big dividends for both the commercial and sport fisherman. With a hatchery it becomes possible to rear these to migratory age - about 90 days - before liberation. Chances of survival should then be much greater.

At the start, it is not expected that rearing of the young salmon to migratory stage will be the major part of hatchery operations in Alaska. However, one definite use has just been mentioned. Another possibility will be in developing a returning broodstock to a particular hatchery location. Silver salmon lend themselves readily to such a process.

In the inauguration of a salmon hatchery program for Alaska emphasis will be placed on king, silver (coho) and red (sockeye) salmon. Progress in the techniques of artificial propagation of the other two species, pinks and chums, will be watched closely. Should any of these advancements seem applicable to Alaskan conditions they will be given a thorough trial.

STATISTICS

The tables presented in this section are a continuation of those published in past reports. The latest available data are given for the ten year period 1944 to 1953, with the exception of Table 3. Table 3 is presented as two tables, Table 3A and Table 3B, giving the number of salmon taken by fishing gear, species and district for the years 1952 and 1953, respectively, bringing all tables up to date.

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 commercial fisheries branch of the United States Fish and Wildlife Service. The 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
1944	$ 12.05 2,258,738	$ 7.37 7,525,672	$ 8.00 16,749,448	$ 15.75 583,009	$ 15.23 24,079,273	$ 51,196,140
1945	12.12 2,457,242	7.68 5,312,270	8.04 18,007,700	16.70 720,196	15.51 18,260,272	44,757,680
1946	17.30 3,250,249	10.53 6,421,647	10.67 21,895,235	21.25 805,199	19.55 20,784,864	53,157,194
1947	18.24 2,689,888	17.95 8,229,464	18.72 32,210,755	21.08 1,112,539	24.19 35,739,285	79,981,931
1948	25.96 5,732,253	21.10 15,082,926	24.24 31,445,485	26.70 1,435,578	27.51 44,964,049	98,660,291
1949	22.00 3,781,482	15.00 7,498,382	16.00 44,147,496	24.00 1,402,934	26.05 25,581,995	82,412,289
1950	22.00 5,556,430	21.10 15,539,056	24.00 26,753,868	23.00 1,590,996	29.00 34,811,975	84,252,325
1951	25.28 8,726,587	15.18 10,925,359	20.84 32,505,086	28.41 2,489,046	31.85 24,603,107	79,249,185
1952	21.34 4,206,757	15.66 15,140,209	18.52 21,705,200	26.76 1,526,532	28.60 33,783,606	76,362,304
1953	19.67 2,511,209	13.43 10,622,248	17.59 16,613,896	27.64 1,553,585	28.50 26,877,507	58,178,445
	TOTAL VALUE ALL SPECIES 1905-1953					$1,871,807,648

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.
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
1953	977,682	37	1,350,589	43	533,996	20	2,862,267	100

TABLE 3A. NUMBER OF SALMON TAKEN IN 1952, COMPILED BY FISHING GEAR, SPECIES & DISTRICTS.

Gear and Species	Southeast Alaska	Central Alaska	Western Alaska	All Districts
SEINES:				
Number of Units	549	642	22	1,213
% of Total Catch	44	51	5	
Silver	130,459	60,484	594	191,537
Chum	2,710,257	2,575,822	267,701	5,553,780
Pink	4,361,540	5,820,712	33,179	10,215,431
King	1,625	10,094	656	12,375
Red	277,685	924,104	320,992	1,522,781
Total	7,481,566	9,391,216	623,122	17,495,904
GILLNETS:				
Number of Units	941	4,525	2,064	7,530
% of Total Catch	6	22	95	
Silver	286,999	378,050	69,474	734,523
Chum	135,021	345,248	254,334	734,603
Pink	106,225	824,488	14,130	944,843
King	79,323	91,588	91,707	262,618
Red	343,904	2,498,500	11,342,744	14,185,148
Total	951,472	4,137,874	11,772,389	16,861,735
TRAPS:				
Number of Units	205	129	-	334
% of Total Catch	42	27	-	-
Silver	344,941	178,412	-	523,353
Chum	1,329,138	541,501	-	1,870,639
Pink	5,316,827	3,366,367	-	8,683,194
King	583	12,904	-	13,487
Red	297,304	918,627	-	1,215,931
Total	7,288,793	5,017,811	-	12,306,604
LINES:				
% of Total Catch	8		-	
Silver	983,628	70	-	983,698
Chum	4,133	1	-	4,134
Pink	34,168	1	-	34,169
King	446,816	3	-	446,819
Red	443	201	-	644
Total	1,469,188	276	-	1,469,464
TOTAL:				
Silver	1,746,027	617,016	70,068	2,433,111
Chum	4,178,549	3,462,572	522,035	8,163,156
Pink	9,818,760	10,011,568	47,309	19,877,637
King	528,347	114,589	92,363	735,299
Red	919,336	4,341,432	11,663,736	16,924,504
Grand Total	17,191,019	18,547,177	12,395,511	48,133,707

TABLE 3B. NUMBER OF SALMON TAKEN IN 1953, COMPILED BY FISHING GEAR, SPECIES & DISTRICTS.

Gear and Species	Southeast Alaska	Central Alaska	Western Alaska	All Districts
SEINES:				
Number of Units	475	545	59	1,064*
% of Total Catch	45	54	10	42
Silver	148,333	39,222	670	188,225
Chum	2,411,104	1,898,651	196,441	4,506,196
Pink	2,293,238	6,783,280	87,488	9,164,006
King	4,921	2,812	475	8,208
Red	401,001	988,392	439,855	1,829,248
Total	5,258,597	9,712,357	724,929	15,695,883
GILLNETS:				
Number of Units	1,336	5,239	1,829	8,402*
% of Total Catch	8	18	90	29
Silver	259,143	201,302	30,667	491,112
Chum	216,577	540,579	422,138	1,179,294
Pink	44,132	384,368	12	428,512
King	28,812	89,328	101,748	219,888
Red	408,777	1,961,501	6,213,797	8,584,075
Total	957,441	3,177,078	6,768,362	10,902,881
TRAPS:				
Number of Units	256	119	-	375
% of Total Catch	38	28	-	26
Silver	268,321	146,737	-	415,058
Chum	907,072	692,774	-	1,599,846
Pink	2,620,046	3,434,435	-	6,054,481
King	1,960	20,333	-	22,293
Red	563,666	813,125	-	1,376,791
Total	4,361,065	5,107,404	-	9,468,469
LINES:				
% of Total Catch	9	-	-	3
Silver	487,784	-	-	487,784
Chum	7,148	-	-	7,148
Pink	22,293	-	-	22,293
King	462,652	-	-	462,652
Red	3,006	-	-	3,006
Total	982,883	-	-	982,883
TOTAL:				
Silver	1,163,581	387,261	31,337	1,582,179
Chum	3,541,901	3,132,004	618,579	7,292,484
Pink	4,979,709	10,602,083	87,500	15,669,292
King	498,345	112,473	102,223	713,041
Red	1,376,450	3,763,018	6,653,652	11,793,120
Grand Total	11,559,986	17,996,839	7,493,291	37,050,116

* Exclusive of duplication.

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

SPECIES	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953
Salmon	393,318,474 $14,527,257	402,635,233 $15,564,474	391,689,076 $17,088,935	381,807,676 $19,570,408	338,369,670 $23,143,760	388,345,160 $32,662,497	264,918,844 $22,637,117	276,588,312 $32,368,160	282,966,799 $31,020,258	220,276,191 $21,497,532
Herring	113,278,500 $1,141,663	139,769,328 $1,355,738	196,231,250 $1,982,312	187,889,562 $2,077,314	174,449,254 $1,852,972	33,061,172 $414,072	165,366,843 $2,067,085	81,624,700 $1,003,292	45,802,151 $444,461	34,812,369 $452,811
Halibut	36,663,562 $3,517,067	33,398,004 $4,020,358	35,010,441 $4,082,000	34,016,781 $5,676,630	34,960,888 $5,095,063	35,196,343 $5,157,902	38,636,402 $5,776,224	32,045,000 $4,117,608	33,390,807 $4,533,808	26,749,543 $2,959,704
Sablefish	7,384,883 $803,539	8,351,129 $914,542	9,019,257 $739,600	1,228,431 $110,559	6,512,346 $707,734	5,753,724 $427,374	954,901 $35,791	5,815,405 $529,368	1,804,417 $141,364	3,547,271 $250,792
Cod	1,645,161 $31,112	1,722,479 $34,013	2,531,630 $126,820	2,347,514 $81,405	2,337,770 $73,960	2,185,547 $54,639	858,318 $22,676	-- --	-- --	-- --
Sharks and Skates	3,654,217 $128,919	2,744,224 $71,176	6,445,025 $60,180	1,975,664 $23,264	2,250,474 $36,358	1,507,325 $24,333	18,883 $105	11,008 $110	3,550 $53	2,450 $131
Miscellaneous Bottom Fish[1]	1,237,902 $ 71,811	1,774,992 $105,317	1,500,545 $136,849	82,900 $12,462	408,989 $17,387	192,157 $12,281	20,604 $528	25,264 $1,620	377,414 $22,325	14,146 $586
Clams:										
Butter	476,444 $9,647	713,035 $14,925	412,458 $36,965	11,176 $838	15,644 $939	5,652 $339	-- --	80 $8	23,116 $1,828	80,394 $6,432
Razor	1,646,353 $111,129	1,705,947 $115,151	1,804,679 $162,421	606,540 $57,621	1,222,649 $128,378	1,699,695 $203,693	2,201,717 $264,206	2,355,681 $347,574	1,272,454 $165,419	1,486,222 $193,209
Crabs:										
Dungeness	1,272,700 $53,072	1,857,720 $59,692	2,438,600 $131,436	1,392,611 $69,630	1,222,326 $63,217	1,428,401 $80,716	4,119,425 $277,382	5,482,416 $478,387	3,749,412 $331,433	3,471,806 $312,463
King	15,208 $1,238	-- --	22,600 $960	752,668 $31,988	2,133,354 $96,001	1,206,945 $72,417	1,519,249 $91,155	1,993,912 $227,622	2,772,833 $388,197	4,613,209 $547,431
Shrimp	540,846 $8,112	1,263,291 $23,757	2,248,900 $56,222	1,657,299 $215,449	2,834,803 $226,784	2,267,934 $181,434	2,158,260 $172,661	1,707,816 $179,301	1,952,777 $181,609	1,733,882 $225,405
Miscellaneous Shellfish[2]	13,197 $1,714	37,918 $2,100	27,426 $2,447	23,917 $2,078	7,329 $733	19,630 $1,348	73,200 $4,392	44,193 $3,596	23,021 $2,081	91,956 $8,076
Miscellaneous Fish[3]	51,450 $3,087	78,360 $5,793	64,128 $9,932	16,855 $1,953	174,487 $38,116	19,596 $1,564	1,445,976 $22,304	32,909 $3,594	45,424 $5,548	87,023 $12,265
Miscellaneous Livers, Oil & Viscera	$4,158	$1,112	$5,377	$50,589	$13,503	$4,396	--	--	--	--
TOTALS	561,198,897 $20,413,525	596,051,660 $22,288,148	651,446,014 $24,622,456	613,809,594 $27,982,188	566,899,963 $31,494,805	472,889,281 $39,299,005	482,292,622 $31,371,626	407,726,696 $39,260,240	374,184,175 $37,238,384	296,966,482 $26,466,835

[1] Includes Rockfishes, Flounders, Lingcod.
[2] Includes Cockles, Oysters, Tanner Crabs.
[3] Includes Trout, Smelt, Albacore, Sheefish.

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

SPECIES	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953
Salmon	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	156,657,320
	$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	$62,067,161
Herring	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	14,365,884
	$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	$805,260
Halibut	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	20,534,801
	$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	$3,261,482
Sablefish	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	2,455,115
	$888,799	$1,239,929	$1,153,025	$143,250	$968,100	$529,935	$51,579	$548,426	$161,812	$271,366
Cod	510,000	543,680	921,114	819,822	786,931	660,664	519,035	--	--	--
	$56,000	$80,255	$152,660	$163,498	$85,389	$74,680	$65,347	--	--	--
Sharks and Skates	492,494	251,688	277,038	164,276	177,847	153,777	2,104	1,321	426	294
	$116,850	$80,397	$153,241	$59,572	$82,016	$42,019	$125	$155	$170	$131
Miscellaneous Bottom Fish[1]	880,126	1,253,417	1,097,973	68,261	240,463	140,167	14,804	20,298	372,809	6,938
	$79,660	$110,733	$91,342	$19,404	$24,115	$14,938	$689	$2,170	$22,591	$832
Clams:										
Butter	372,608	382,964	261,681	2,700	13,452	5,916	3,192	80	404,479[2]	509,329[2]
	$145,949	$135,744	$171,947	$1,985	$3,584	$1,219	$3,073	$40	$505,542	$622,369
Razor	570,312	538,096	680,555	259,690	428,551	613,140	754,684	670,398	--	--
	$426,974	$403,688	$752,783	$247,801	$498,469	$680,171	$857,871	$812,791	--	--
Crabs:										
Dungeness	312,614	480,749	585,280	345,583	302,972	375,908	1,130,828	1,715,967	1,657,670[3]	2,002,081[3]
	$248,306	$352,222	$640,908	$326,958	$293,550	$349,693	$972,812	$1,125,419	$1,562,498	$2,098,883
King	3,802	--	5,421	195,433	572,107	499,121	626,871	812,690	--	--
	$3,900	--	$8,172	$168,507	$684,260	$272,905	$630,876	$754,208	--	--
Shrimp	140,620	214,806	346,811	350,375	493,271	521,703	500,566	427,096	507,857	503,168
	$118,439	$177,400	$323,372	$326,467	$523,750	$473,790	$443,410	$434,201	$485,153	$276,469
Miscellaneous Shellfish[4]	8,538	9,619	6,780	4,899	1,026	4,356	47,400	2,174	--	--
	$5,572	$6,113	$5,800	$2,949	$684	$3,504	$8,875	$1,609	--	--
Miscellaneous Fish[5]	38,588	63,233	41,504	12,587	181,390	14,249	55,441	20,658	30,963	71,888
	$5,919	$9,547	$8,558	$2,435	$50,827	$3,481	$16,508	$4,391	$9,941	$16,311
Miscellaneous Livers, Oil & Viscera	164,487	9,633	74,275	199,967	417,704	23,337	529,963	--	--	--
	$141,833	$1,112	$433,575	$66,701	$149,906	$4,396	$39,149	--	--	--
TOTALS	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	197,106,818
	$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	$69,620,264

[1] Includes Rockfishes, Flounders, Lingcod.
[2] Includes both Butter and Razor Clams.
[3] Includes both Dungeness and King Crabs.
[4] Includes Cockles, Oysters, Tanner Crabs.
[5] Includes Trout, Smelt, Albacore, Sheefish.

FINANCIAL STATEMENT,

April 1, 1953 - March 31, 1954

ALASKA DEPARTMENT OF FISHERIES

FUNDS APPROPRIATED FOR THE BIENNIUM APRIL 1, 1953 - MARCH 31, 1955:

FISHERIES BOARD	$ 7,500.00
ADMINISTRATION	60,800.00
BIOLOGICAL RESEARCH	145,700.00
INSPECTION	110,430.00
PREDATOR CONTROL (Hair Seal etc.)	50,000.00
SPORT FISH	90,000.00
WATERSHED MANAGEMENT	45,000.00
FOR FEDERAL OLD AGE TAX	972.00
	$510,402.00

EXPENDITURES FOR FISCAL YEAR, APRIL 1, 1953 - MARCH 31, 1954:

FISHERIES BOARD	Expenditures	Balance
Transportation	$ 1,714.10	
Subsistence & Lodging	2,363.00	
Telephone & Telegraph	14.00	
Postage, Freight & Express	14.70	
	$ 4,105.80	$ 3,394.20

ADMINISTRATION		
Salaries & Wages	$ 17,000.00	
Transportation	709.47	
Subsistence & Lodging	912.00	
Office Expense	418.72	
Telephone & Telegraph	173.62	
Postage, Freight & Express	93.10	
Printing	1,521.50	
Industrial Insurance	38.87	
Other General Expense	420.19	
Operating Expense	1,282.41	
Office Equipment	419.25	
	$ 22,989.13	$ 37,810.87

BIOLOGICAL RESEARCH		
Salaries & Wages	$ 36,073.33	
Transportation	1,831.28	
Subsistence & Lodging	7,017.00	
Office Expense	303.98	
Telephone & Telegraph	144.53	
Postage, Freight & Express	534.35	
Printing	144.75	
Industrial Insurance	335.00	
Other General Expense	544.55	
Operating Expense	12,499.07	
Office Equipment	290.65	
Floating Equipment	152.23	
Utility Equipment	89.56	
	$ 59,960.28	$ 85,739.72

FUNDS APPROPRIATED FOR THE BIENNIUM APRIL 1, 1953 - MARCH 31,1955 (cont)

		Balance
INSPECTION		
Salaries & Wages	$ 33,180.80	
Transportation	1,349.56	
Subsistence & Lodging	1,428.00	
Office Expense	158.34	
Telephone & Telegraph	116.93	
Postage, Freight & Express	104.92	
Printing	13.00	
Industrial Insurance	320.00	
Other General Expense	38.82	
Operating Expense	6,594.40	
Office Equipment	16.29	
Floating Equipment	1,187.83	
	$ 44,508.89	$ 65,921.11
PREDATOR CONTROL (Destruction of hair seals, etc.)		
Salaries & Wages	$ 6,737.50	
Transportation	72.92	
Postage, Freight & Express	62.59	
Industrial Insurance	515.00	
Other General Expense	$ 15.00	
Operating Expense	8,598.13	
	$ 16,001.14	$ 33,998.86
SPORT FISH PROPAGATION		
Salaries & Wages	$ 22,678.50	
Transportation	828.45	
Subsistence & Lodging	4,767.00	
Office Expense	95.78	
Telephone & Telegraph	210.02	
Postage, Freight & Express	696.36	
Rent	184.19	
Industrial Insurance	115.00	
Other General Expense	319.29	
Operating Expense	7,803.63	
Structures	1,018.78	
	$ 38,717.00	$ 51,283.00
WATERSHED MANAGEMENT		
Salaries & Wages	$ 11,600.00	
Transportation	844.10	
Subsistence & Lodging	3,502.50	
Office Expense	201.63	
Telephone & Telegraph	59.61	
Postage, Freight & Express	170.37	
Printing	13.30	
Industrial Insurance	170.00	
Other General Expense	122.67	
Operating Expense	2,760.93	
Utility Equipment	1,153.78	
	$ 20,598.89	$ 24,401.11
FEDERAL OLD AGE TAX		None
	TOTAL BALANCE	$302,548.87

KODIAK ISLAND KING CRAB.

KING CRAB DRAG COMING ABOARD KODIAK ISLAND.

LOOKING FORWARD

In general the operations of the several divisions for the coming year will continue along the lines outlined in this report for the present year. It is planned, however, to start some new projects and to expand certain others that were inaugurated in 1954.

BIOLOGICAL RESEARCH

KING CRAB STUDIES

The king crab fishery is relatively new in Alaskan waters and very little is known of the productive capability of this resource. It is wise, then, to discover the productive limits of the stock and to allow the orderly development of a fishery within the concepts of a maximum sustained yield. To assist in this study, the industry is making monetary contributions for basic research. Preliminary studies were initiated late in 1953.

The problems of managing the king crab fishery may be broadly classified into two categories. (1) Determination of fishing gear that is either selective to the desirable crabs, or inflicts negligible damage upon the unmarketable components of the catch. Proper fishing seasons and areas must be established to protect females, undersized males, and soft shelled crabs. (2) Determination of the productive capability of the various stocks and fishing grounds to prevent over exploitation of the resource.

Research will first be conducted on a "test run" basis and later expanded to include most or all of the crab stocks found in territorial waters. Without the basic knowledge, supplied only by research, the fishery may well eliminate itself in a few years by over exploitation and with improper gear.

KITOI BAY RESEARCH STATION

The fresh water lakes and streams of coastal Alaska are, at present, being poorly utilized by anadromous salmon. A large portion of these waters lie above natural water falls or lack suitable facilities for spawning. Much of these non-producing waters are actually rich in suitable food organisms and are considered a desirable environment for the fresh water stages of young silver or sockeye salmon.

Watersheds suitable for use in rearing areas, but at present unproductive of migratory salmon, may be classified according to the severity of their obstacles. (1) Waters where access to salmon is denied by a simple barrier that a modest expenditure will correct. In cases of this type salmon need to be artificially introduced that are "fitted" or adaptable to the particular environmental conditions of the watershed and are capable of becoming ancestors of a self-perpetuating run. This type of research is presently being conducted in the vicinity of Kodiak Island, and in the Ketchikan District. (2) Waters with a severe barrier or other conditions that, from a cost standpoint, are unfeasible to correct. There are hundreds of thousands of acres of potentially productive water of this classification. The main problem involved is to ascertain, in monetary values, the feasibility of planting these waters on an annual basis to show a substantial profit in providing returning adult salmon to the fishery.

A research station with facilities designed for efficiency studies on all phases of this problem is under construction at Kitoi Bay on Afognak Island. Here the cost of production will be compared with the value of the return and the feasibility of modern fish culture applied to red salmon production in Alaska will be determined.

INSPECTION

It is expected that operations of this division will continue on approximately the same scale as during 1953. Some 12 or 14 seasonal inspectors will be hired to cooperate with the enforcement program of the U. S. Fish and Wildlife Service. In addition to their enforcement duties, they will be called upon to assist in various phases of the work being conducted by the Biological Research, Sport Fish, and Watershed Management Divisions.

PREDATOR CONTROL

The depredations of the hair seals will again be kept under control by the hiring of hunters for the Stikine and Taku River districts and by the continuation of the dynamite "depth bomb" method on the Copper River delta.

It had been hoped to start a study of the predator activities of the beluga whale in Bristol Bay during 1953. However, due to unforeseen circumstances this had to be postponed, but every effort will be made to inaugurate this investigation during the coming year. It would be desirable to capture 25 to 50 of these animals during the time of salmon migrations for examination of their stomach contents. Reports from the residents of this region would indicate that belugas prey on the young downstream migrants as well as the returning adult salmon.

SPORT FISH DIVISION

Twelve hatching troughs and other accessory equipment will be installed in the recently completed Anchorage hatchery building as early in the spring as weather permits. It should be ready for operation by the first part of May. Trout fry from this hatchery will be used for stocking lakes in the Anchorage-Palmer area and other parts of the Third Division. Several lakes that were surveyed in 1953 will be rehabilitated during 1954. Undesirable fish that are predators or competitors of trout will be destroyed by the use of rotenone previous to stocking.

ANCHORAGE HATCHERY

The Fairbanks hatchery will continue to supply trout fry for planting in the lakes and ponds accessible to this location but the need for also supplying the Anchorage-Palmer area will be eliminated by the opening of the new hatchery near Anchorage. This will allow a much broader coverage in the interior section. The 1954 plans call for the rehabilitation of Rainbow (Deadman) Lake. This 341 acre body of water is located adjacent to the Alaska Highway near North-

FAIRBANKS AREA

way. At the present time it contains nothing but northern pike of small size, which contribute little to the sport fishery of this area. These predator fish will be eliminated by treatment with the usual toxicant, rotenone. After a rest period to allow for dissipation of the toxicant, the lake will be stocked with rainbow trout fry.

WATERSHED MANAGEMENT

KODIAK AREA

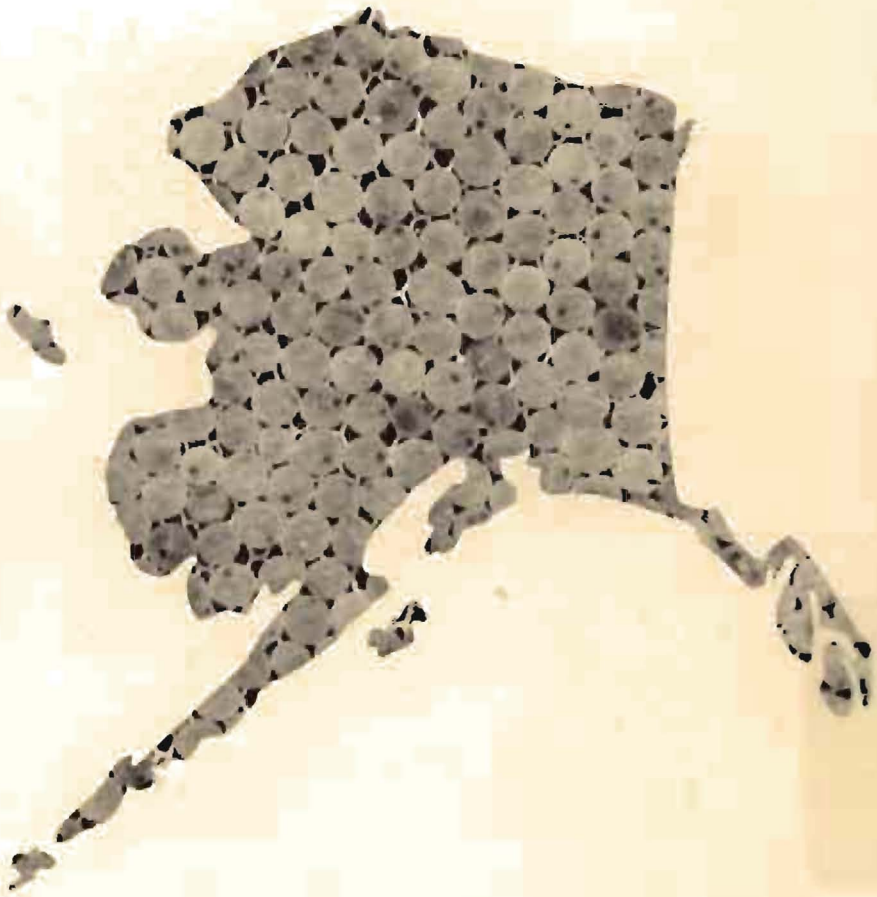
The experiments to start runs of red salmon in barren waters in the Kodiak area will be continued during 1954. Using the techniques developed in past years, green eggs will be planted in the tributary streams of Frazer Lake, while eyed eggs from the small Perenosa Bay hatchery will be stocked in the gravel of Gretchen Creek, a tributary of Laura Lake. These egg planting programs will of necessity have to be continued for at least one full cycle of five years.

KETCHIKAN DISTRICT

Similarly, the work started in the Ketchikan district will be continued. Limited plants of green and eyed salmon eggs will be made in selected locations for experimental purposes. Some preliminary discussions with certain civic minded groups in Ketchikan would seem to indicate that a salmon hatchery in or near this city is a possibility for the coming year.

BIOLOGISTS SAMPLING EGG SURVIVAL.

Back Cover: EYED RAINBOW TROUT EGGS. NOTE THE EYE SPOTS ON THE DEVELOPING EMBRYO. ABOUT ONE AND ONE-HALF TIMES NATURAL SIZE.



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