ALASKA LEGISLATURE COMMITTEE FILES 1981-1982 8672

1210 ARRC FISHERIES ISSUES

1210

Fishing Days Icy Straits

886

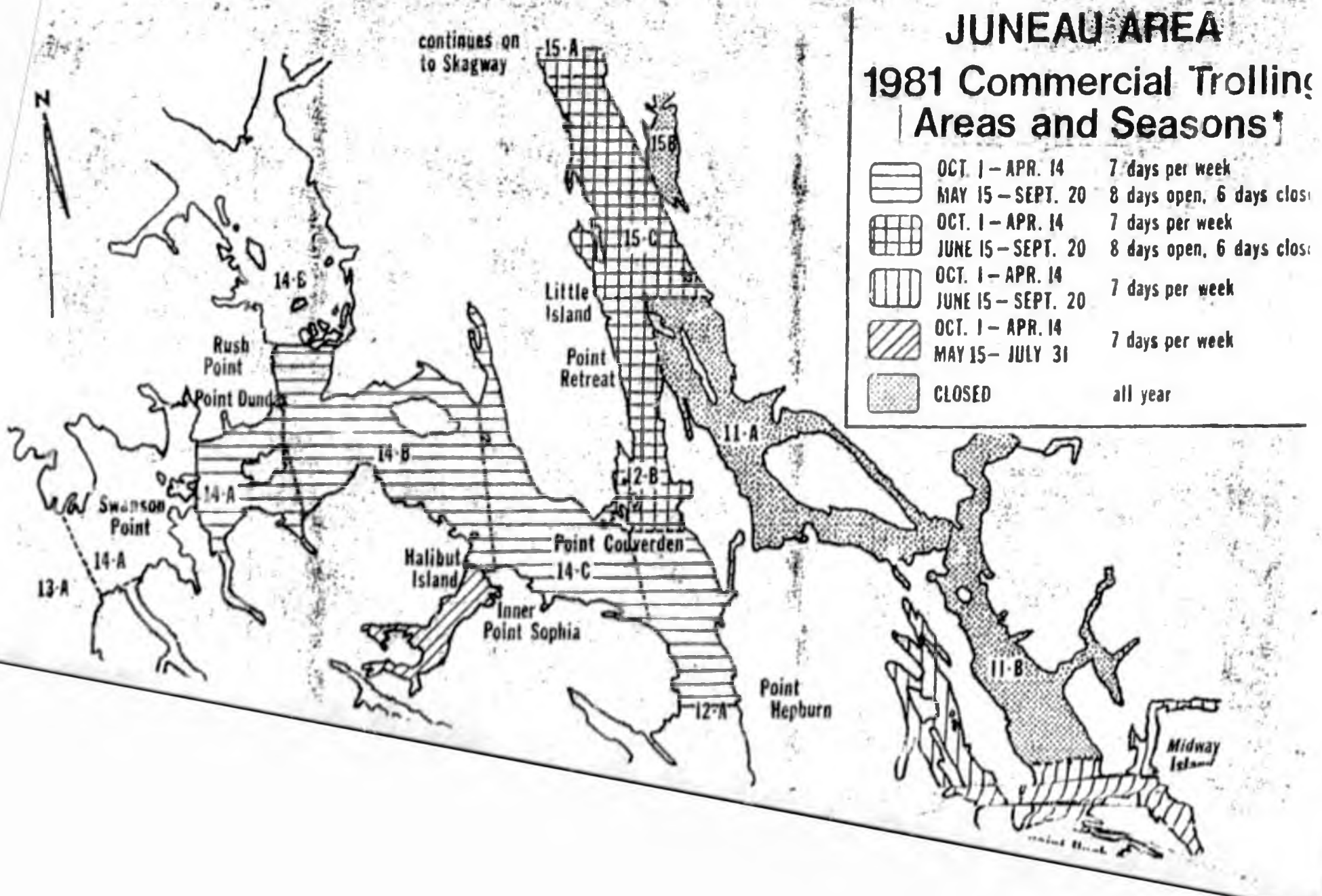
April 15	16	17	18	19	20	21	22	23	24	25	26	27	28
May 29	30	1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	June 1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	18	19	20	21	22	23
24	25	26	27	28	29	30	July 1	2	3	4	5	6	7
8	9	10	11	12	13	14	15	16	17	19	20	21	
22	23	24	25	26	27	28	29	30	31	Aug 1	2	3	4
5	6	7	8	9	10	11	12	13	14	15	16	17	18
19	20	21	22	23	24	25	26	27	28	29	30	Sept 1	2
(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	11	12	13	14	15	16
17	18	19	20										

	no. of Handtroll Permits used	no. of Fishing days in Icy Straits
"78"	2622	158
"79"	2206	129
"80"	1666	96
"81"	1135	62

JUNEAU AREA

1981 Commercial Trolling Areas and Seasons

	OCT. 1 – APR. 14	7 days per week
	MAY 15 – SEPT. 20	8 days open, 6 days clos
	OCT. 1 – APR. 14	7 days per week
	JUNE 15 – SEPT. 20	8 days open, 6 days clos
	OCT. 1 – APR. 14 JUNE 15 – SEPT. 20	7 days per week
	OCT. 1 – APR. 14 MAY 15 – JULY 31	7 days per week
	CLOSED	all year



Klukwan ,Alaska

February , I5. I982 FEB 1 8 1982

Representative , Dick Randolf

And Members of A.R.R.C. Committee.

Alaska State Legislature
Pouch V. State Capitol
Juneau , Alaska 998II

Chairman, Dick Randolf,

It was my Intent to testify via teleconference February I0th I982, However, due to the difficulties within the system at that time, all communities were disconnected . Therefore , the following is parts of my concerns, although not new, but supportive of the numerous complaints received by ..R.R.C.

(I) I believe the adequacy on statstics claimed by the department of fish and game on resource management methods are unjust to our fishery , as it affects commercial fishermen.

(2) I suppoef the Introduction of a Bill that would allocate funds to a private resarch agency to Investigate fish and game methods of collecting and evaluating stastliss regardeng fisheries stocks.

(3) In reference to time and area closures , I will enclose letters directed to area biologist Ray Staska, with c.c. to other s.

(4) Other related letters.

(5) News Artacle, relating to fish weir. (Haines News)

My opposition to Chilkat fish weir, It is detrimental to commercial fishermen because our commercial fishing time is regulated to the excapement into to the lakevia the fish weir , more so during the sockeye season . It is located about twenty five miles away from salt water and our weekly fishing period is adjusted accordingly, therefore it is detrimental to our commercial fishing. furthermore, my descussion with Dave Cantillion , Jim Duncan, Mike Miller and a representative from the govenors office , Indicated by Cantillion that there was a tremendous Increase in Taku after the fish weir was removed. Also most recently, Ray Staska reported that he found forty streams and tributaries below the Chilkat Weir. I would appreciate it if needed to testify before your committee. Thank you kindly,

Sincerly,

Joe Hotch

Joe Hotch

enclosure letters
cc file

Klukwan, Alaska

Mr. Ray Staska
Area Biologist

Haines, Alaska

Dear Mr. Staska:

It is very difficult for me to accept your theory for closing the fall season of Lynn Canal gillnet commercial fishing.

With the large amount of fishermen that met with you at your office before your announcement, that expressed their view on why it should have been kept open even as a test fish 12 hours or more per week was a demanding and a justifiable unanimous position.

1. I highly disagree with your position that should you keep this area open, you would discriminate against non-residents, which in this case would be out of state fishermen, as you pointed out. If they desire to leave this state or remain has no sound bearing in you making your decision upon our request for test fishing.

2. I believe your concentration on the river escapement does not fully protect either sockeye, chum or coho salmon. Salt water salmon protection is also necessary, fishermen should not be permitted to leave port before day break, opening date and gillnet vessels anchored between Juneau and Haines prior to opening date should be checked for salmon.

3. I believe all fishermen that were at the meeting were disappointed that the Commissioner would not meet with us to discuss continuation of salmon fishing.

4. And as I had stated at the meeting, I have a strong position that before too long salmon will be spawning within Pyramid Island to Glacier Point area because it had been closed to commercial fishing for many years, and you have held that same position since you have been stationed here also.

Salmon does not go up river within it's proper time frame as it use to in the past to its proper spawning areas. I submit this theory over your title as area biologist for the State of Alaska.

Sincerely,

cc: Governor Jay Hammond
Commissioner, Fish & Game
Representative Jim Duncan
Representative Mike Miller
Ronald Williams, ANB

Dear Editor,

I would like to comment on the three percent tax on fishermen that seems to have passed by the recent voting held, I have been voting against it all along, I agree with Mr Mackie upon the voting procedure used the aquaculture associations , as I must have gotten six envelopes each with a ballot enclosed, some fishermen might have voted several times . I have opposed it for several reasons, One there is no guarantee that my children or any of my family members will be a part of the program should I be out of the fishery by one reason or another.
Two; there is no acknowledgement of my three percent already paid , being received by the aquaculture associations or state to date and the associations or the state has been taking the three percent for several years now. Other than the cannery tickets showing it being taking there is no word saying we have recieved your three percent from the cannery for respective season. If I am not acknowledged as a part , I have no reason to support such a program that will only ask for my financial support. It appears that remarks of those that are operating such hatcheries are hard to have a positive attitude towards an aquaculture program. All we need is someone that will listen to proper local knowledgeable people and receive knowledge and understanding of our natural salmon stock are span in areas. I firmly believe that the fish and game representatives in all areas should meet in each community and long term look at fishery should be the goal , right now only the immediate regulations are discussed and taking our choices hasty , too many times the ear only listens to the fisherman that delivers the most salmon, it is good to see someone deliver a large amount of salmon however, the knowledge of the area is not really within the amount of catch or of the many fishermen that come from other areas using modern equipment. Enforcement is needed by time and time on the grounds , state police are not involved in activities on the waters.
Mr. Fred Mowatt , never was once, since he was the agent, a fisherman was stopped right now if there was a violation, and the south boundary lines were moved recently, . two hundred fatoms distance was enforced, nets were tied to there nets when fishing you never let your end go , only to untie ends or deliver your salmon to the tender. Salmon was counted when it was bought by per salmon. when it was switched to weight wise it was not counted but is being averaged out , so the count is not even near accurate, on a thousand

pounds , there is a loss of up to twenty salmon.
and the point of delivery is almost immaterial because salmon caught on the Chilkat side is sometimes delivered on the Chilkoot or mud bay side and Chilkoot or mud bay can be salmon is delivered on Chilkat side.
Also the understanding of entry permit , at the beginning was, it would limit those that enter alaska for commercial fishing from other states which is non residents fishermen. if this was not the intent than we were mislead to believe it as such. should the hatchery produce as being told to us, our fish prices would go down because of over abundance of salmon, as it is we are hearing from the canneries , as not selling as in the past. warehouses are still selling a large amount of canned salmon , we've been told for several years now. cost of operating vessel, machinery and gear has increased considerably over the few years.
these are a few of my concerns.

1. [illegible] have [illegible]
[illegible] and strength
of [illegible]
Also Chilkat [illegible] king salmon , now
the [illegible].

2. Having [illegible] , seals, sealions,
sharks and whales [illegible] Lynn Canal and eat many
fish that the State Fish and Game consider having for excapement.

3. Several years ago [illegible] dominated the sockeye streams on the
Chilkat river and [illegible] closed Lynn Canal to commercial
fishing at that time.

4. Not enough attention [illegible] salmon areas rivers
and streams [illegible] debris has filled
Chilkat river over the years with out attention.
The fish wheel [illegible] does not answer the needs to
resolve excapement [illegible] of salmon.
over a period of [illegible] risen and droped
[illegible] reasons that salmon
[illegible] small streams.

5. [illegible] salmon
[illegible] , [illegible] very wide across
the [illegible] and deep place where
[illegible]

6. [illegible] in Lynn Canal
[illegible] , Lynn Canal
[illegible].
[illegible] season, [illegible]
[illegible]

[illegible]
[illegible]

[illegible] any other business person.
[illegible] dated by the state exc..
[illegible]
[illegible] would before we receive our
[illegible]
[illegible] to fishermen in Lynn Canal
district if [illegible] closures is established by the state
[illegible] with an average of the preceding
year and even [illegible] for those that may
[illegible]
[illegible] should be considered
for [illegible] emergency closurers in all
[illegible]

On July 17, [illegible] , I met with representative Jim Duncan and his assistant and discussed the eight points of concerns, and compensation for fishermen in [illegible] waite an opening and compensation to be applicable when ever an area is closed by the fish and game department.

And that an unemployment type of insurance be considered for fishermen that are effected by [illegible] disasters.

I was pleased with the meeting and it was latter decided that the next day that the governors representative and fish and game representative be present also representative Mike Miller, district representative .

On July 18, [illegible] , Bob Waters governors representative , Dave Cantillion fish and game representative, Mike Miller district representative and Jim Duncan district representative and I again discuss the eight points along with compensation and unemployment Insurance , with the unemployment receiving approval to have within the next legislature , a legislation be introduced.

With copies of the eight points in each individuals hand I asked if there were any questions or remarks on any one or all eight points? there were no questions or remarks , therefore I feel these points are justifiable concerning our Lynn Canal fishery and fishermen.

representatives Jim Duncan and Mike Miller requested Dave Cantillion to respond to me by letter upon his review again.

Employment for fishermen of Klukwan was also discussed , which involves the cleaning of the Klehini River of logs stumps and other debris .

All were receptive to my concerns and I am confident that a officials each will work along with our fishing concerns of this area.

[illegible] Proposal

[illegible] Chilkat River

[illegible] clear open river water for salmon [illegible] Chilkat River without hindrance to salmon, and to assist [illegible] during fall months when salmon had already [illegible].

[illegible] families [illegible] closures in Lynn Canal through out summer season.

Project to be in as soon as possible after the river has receded in the fall.

Work to be involved [illegible], to pile logs, stumps and other debris and burn on river away from main stream.

[illegible] at Chilkat [illegible] river towards Klukwan and then down towards [illegible], if [illegible] time will not permit completion of clearing [illegible] could be proposed for the following year [illegible] could work from 10 mile down with another crew.

The number of [illegible] involved from Klukwan would be as follows:

Men [illegible] -- [illegible] per hour- 640.00 per day

[illegible] ---------------------------------- $3,200.00 per [illegible]

$3,200.00 [illegible] ---------------------------------- $12,800.00 per [illegible]

[illegible] ---------------------------------- $35,600.00 [illegible]

KLUKWAN A.N.S.

Camp No. 8

P.O. Box 220 ★ Haines, Alaska 99827

(907) 766-2805

[illegible] 14 [illegible]

Jim Duncan

Representative District [illegible]

Juneau , Alaska [illegible]

Dear Mr. Duncan,

As the President of Klukwan [illegible] would like to meet with you as the representative of district [illegible] about the emergency closurer that may [illegible] be a complete closurer [illegible] salmon season in district 15 to Lynn Canal fishermen.

It affects [illegible] fishermen and twenty one family members directly in Klukwan [illegible] in Haines that are [illegible].

I would like to discuss [illegible] for your immediate consideration, [illegible] have been awaiting an [illegible].

[illegible] of Alaska [illegible] Representative , [illegible] my justifications for [illegible] would be [illegible].

[illegible] is not desirable .

[illegible] of this letter will be [illegible] in Haines also.

TESTIMONY OF CHRISTOPHER J. PACE TO THE ADMINISTRATIVE REGULATION REVIEW COMMITTEE VIA TELECONFRENCE ON FEB. 17, 1982

FEB 22 1982

" I'm Chris Pace, a troller from Petersburg.

1) On the question of allocation of funds to a private research agency to investigate Fish & Game methods of collecting and evaluating statistics regarding fish stocks; I think that this money would not benefit anyone other than the private biologists and analysts conducting the study. Their conclusion, I suspect, would be that ADF&G's methods and assumptions are basically sound, but that often their surveys lack sufficient intensity to prevent the possibility of erroneous estimates of stock size or composition. Point estimates of certain smaller crab stocks in Western Alaska occassionally have 75% confidence intervals as great as plus or minus 110%! These errors are caused primarily by very low levels of pre-commercial sampling in relation to the estimated value or abundance of a resource. Most often this low sampling intensity is not the intention of Fish and Game personnel, but rather the result of budgetary constraints which force the staffs to adopt a posture of "managment by crisis".

In the case of Southeast salmon fisheries, we, as fishermen, suffer from Fish & Game budget cuts which reduce helicoptor and aircraft stream survey time, temporary help for port sampling and foot surveys of streams, cuts which prevent tagging and enumeration of our Alaskan salmon stocks, and research into the migration of these stocks to determine, for instance, how and why our coho are returning from the ocean with net marks.

Rather than fund a duplicate research effort by a private group, this money could be better spent to fund basic research on Alaska's most important renewable resource, its fisheries.

2) As for sport fishing being prohibited from a Troll vessel - this is obviously discriminatory. I know crabbers and seiners who can use their boats for sport and subsistance fishing, and there should be no differences for any Alaskan commercial fishing vessels.

3) The matter which I feel most warrents the attention of this committee in the way of regulation review is the power of the State Board of Fisheries to adopt regulations without the necessity of public input. We give the legislature similiar power, but you are elected officials and are subject to the ballot box. Members of the Board of Fisheries are political appointees. As a means of instilling the democratic process into the actions of the Boards, formal calls for proposed regulation changes are made to the public and the staffs of concerned State Agencies. These proposals are then compiled into a package for comment, review, and recommendation by staff, public, and local advisory committes. The Boa d should then weigh these opinions to decide on the best cource of action with regard to the condition of the resource and the public interest.

I can think of two recent examples where the Board has adopted regulatory changes which never appeared in the proposal packet:

A) The 1981 decision to limit handtrollers to one line, and

B) The recent decision to reduce the 1982 King Salmon O.Y. to 243,000 fish.

The Board claims that by publishing legal notice of their intent to "ammend, adopt, and review" regulations in a certain fishery, that this gives them carte blanc authority to create any regulations which they feel necessary. These meetings are expensive, lengthy, and difficult to attend for the average resident of the state, and this is why we send representitives of our local advisory committes, or have the opportunity and the advance notice to send written comments and testimony.

I, so far, have been unable to identify how the public interest is served through such an administrative short-cutting of a citizen's ability to provide comment and input into the decision making processes, and feel that it is detrimental to the image of the Board as a democratic institution.

I ask the legislature to review this aspect of the Board's regulatory authority to see if it is consistant with our rights as outlined in the State Constitution, and

suggest that their regulatory authority be limited to acceptance, rejection, or discussion of only those regulation changes, amendments, or deletions contained in the current proposal package.

Thank you

FEB 25 [illegible]

February 17, 1982

Mr. Richard L. Randolph
State Capitol
Pouch V
Juneau, Alaska 99811

Dear Mr. Randolph:

I am enclosing a copy of a letter which I wrote to Govenor Hammond concerning the troll fishery in Southeast Alaska. I would appreciate it deeply if you would take time to read this letter so that you may become more aware of the unfortunate situation in which we find our fishery today.

Thank you, in advance, for your time and consideration.

Sincerely,

David R. Carlson
F/V Quest
PO Box 1232
Petersburg, AK 99833
772-3765

February 16, 1982

The Honorable Jay S. Hammond, Govenor
State of Alaska
Pouch A
Juneau, Alaska 99811

Dear Mr. Hammond:

I am a commercial Salmon Power Troller in Southeast Alaska. I am writing this letter to you to apprise you of the dire situation in which we now find our fishery. I will try to make this letter as short and brief as possible but there are certain facts and events which have recently taken place of which I believe you should be aware.

Presently, and since 1973, our fishery has been under Limited Entry which has limited the number of participants in the fishery. Although the concept of Limited Entry has been ruled unconstitutional by Judge Carlson, I trust that the Alaska Supreme Court will uphold the Limited Entry Law. In 1980, the Alaska Board of Fisheries in conjunction with the North Pacific Management Council (NPFMC) imposed a "Quota" or "Optimum Yield" on the King Salmon harvest for the first time. This allowed us a harvest of 320,000 King Salmon which was supposed to be the last ten year average of King Salmon harvests in Southeast Alaska. However, this did result in a substancial reduction from the 1979 harvest level. We were led to believe that this harvest level would remain in effect for the forseeable future thus stabilizing our harvest levels. This quota or optimum yield was imposed, for the most part, because both boards believed, although scientific data was grossly inadequate, that we were harvesting a large number of the Columbia River Bright stock of King Salmon which was not reaching the desired excapment goal as outlined by the Washington Department of Fish and Wildlife. In 1981, the Alaska Board of Fisheries and the NPFMC again recommended a further reduction of the King Salmon harvest level. There was, however, a difference of opinion as to whether the reduction whould be ten or fifteen percent. No agreement was reached so we fished last season under a quota or optimum yield range of 272,000 to 288,000 King Salmon. The net result of these quotas or optimum yields and subsequent reductions resulted in a loss of approximately 40% of fishing time as compared to 1979.

In January of this year, the Alaska Board of Fisheries and the NPFMC again met to discuss the Southeast Troll Fishery and regulations for the 1982 season. The NPFMC again recommended another reduction which would lower our King Salmon Harvest to 243,000. The Alaska Board of Fisheries declined to vote in favor of this further reduction at this time. Thus, we now have a range in the quota or optimum yield

of 243,000 to 238,000 King Salmon. Both boards will meet again in March to decide on which figure, or somewhere inbetween, will be the King Salmon harvest for 1932. The Alaska Board of Fisheries did not agree with the NPFMC recommendations for the following reasons: In 1981, we harvested 52,000 fewer King Salmon than in 1980. Although our quota for 1981 was 272,000 to 288,000 King Salmon, we actually harvested only 268,000 King Salmon. (This figure includes harvest by all gear types in Southeast Alaska). This was because Alaska Fish & Game made a "double-entry" error with their computer calculations which resulted in an additional closure late in the season. Bear in mind, now, that the primary purpose for these reductions in our King Salmon harvests was to allow more escapment of the Columbia River Bright stock of King Salmon. As a result of this reduction of 52,000 fewer King Salmon harvested in 1981, the number of King Salmon reaching the Bonneville Dam near the mouth of the Columbia River increased by a paltry 2000 fish. This indicates a cost-benefit ratio of 25 to one. In other words, for every 25 King Salmon we allow to pass through Southeast Alaskan waters, one makes it to the mouth of the Columbia River. The worst of the situation is yet to come. By the time these fish made it to the McNary Dam and, thus, to their spawning grounds (I believe four dams and about one hundred miles upriver) there were actually fewer fish than there were in 1980. It is obvious that the reductions in King Salmon harvests in Southeast Alaska have had absolutely no effect on this stock of King Salmon. The escapement goal as proposed by the Washington Department of Fish and Wildlife for the Bright stock of King Salmon is 40,000 fish. 63,900 made it to the Bonneville Dam but only 25,500 made it to the McNary Dam. That means an interdam loss of SIXTY PERCENT. What happened to these fish? Well, the dams certainly don't help the fish on their way to the spawning grounds but poaching and other illegal harvesting of these fish is certainly to be considered. The Washington Department of Fish and Wildlife has refused, or at least been very reluctant, to solve the problem. It has been much easier to point their finger at Alaskans than at the problem in their own "backyard". It has already been determined that if we were not to harvest any King Salmon at all in Southeast Alaska, the escapement goal would still not be met for these stocks of fish. In fact, the Washington Department of Fish and Wildlife has now built in a 60% interdam loss in escapment goals. They are obviously not willing to determine the reasons or attempt to alleviate this loss of King Salmon between the dams. An obvious solution, although perhaps an unorthodox, one, would be to truck these King Salmon the hundred or so miles to the upriver side of the McNary Dam and thus to their spawning grounds. So Washington and Oregon again approached the NPFMC and the Alaska Board of Fisheries to further reduce our harvest quota or optimum yield which history has shown will provide no benefit to these stocks of King Salmon. It must

also be pointed out that the Canadians harvested more than three times the number of King Salmon that we harvested in 1981. I'm sure you are aware of the fact that geographically they are much closer to the Columbia River than we are in Southeast Alaska.

This brings me to the purpose of writing this letter to you. I urge you to support and encourage the Alaska Board of Fisheries to adhere to their 288,000 harvest range of King Salmon for 1982. Further reductions will NOT reduce or alleviate the problem of the Columbia River Bright King Salmon stocks. We simply DO NOT catch that many to make any significant consequence. Our King Salmon harvest has already been reduced by approximately one-third since 1979. Further reductions would deal an almost fatal blow to our troll fishery.

I purchased a permit in 1979 and the value of that permit has been reduced by a third since then. The vessel I own is essentually unsellable for a "fair" price because no one is willing to enter the fishery with all the "chaos" we have been going through for the past two years. Although our seasons and harvest levels have been significantly reduced over the past two years, the level of participants allowed in the fishery has remained the same. It doesn't take a mathimatical genius to figure out that reduced harvest levels and fishing seasons means less money for the fisherman. I am unable to make a living at trolling, however, I cannot sell out because the present market values would not cover the existing loans I have on the boat and permit. Since 1979, we have had absolutely no stabilization in our fishery. Every year we have been confronted with even further cuts and reductions in our harvest levels and seasons. This year, again, we will not know how many King Salmon we can harvest or what our fishing seasons will be until the end of March. Somehow, someone has got to make some coherent sense out of this situation if there is to be any hope at all of maintaining this fishery for those other than school teachers, vacationers, etc.

I offer the following recommendations or suggestions to save the fishery from virtually becomming extinct:

1. Support the Alaska Board of Fisheries with their 288,000 King Salmon harvest level and urge them to resist any further reductions until it can be shown, for biological and NOT political or allocation reasons, that further reductions will benefit the fishery.

2. Take a hard look and make revisions in the Limited Entry system so that reductions in our harvest levels will result in a reduction of participants allowed to enter the fishery so that those remaining in the fishery have a reasonable opportunity to make a living which was the whole purpose of instituting Limited Entry in the first place. I purchased my permit expecting to have this opportunity. With all the reductions imposed on us over the past two years, I can no longer do this..

3. Urge our two Senators and one Representative in the United States Legislature to offer an amendment to revise the Federal Marine Fisheries Act to allow more representation by Alaskans on the NPFMC. At the present time, Alaskans do not even have a voting majority on this body; the very body that regulates our traditional fisheries. In addition, all persons appointed to the NPFMC should fully support Alaskans and their fisheries. Clem Tillion, a present member of the board, has repeatedly been quoted as saying that if he has a choice between voting for the fisherman or the fish, he will vote for the fish every time. He has voted for the fish but the fish he has voted for in our situation have wound up in the hands of Canadian or Washington fisherman or in some cases, poachers on the Columbia River. It would also be exceedingly helpful if there was a troller on the NPFMC. As long as this body is going to continue to concentrate on the troll fishery, we need an Alaskan troller to represent and convey our interests and concerns.

4. Mandate that all regulations be reviewed by the local advisory boards. At present, most regulations that are passed by the Alaska Board of Fisheries are not those which have been reviewed and considered by the advisory boards. This has led to a total lack of confidence by fishermen in these boards. This does not help in promoting trust in government.

5. Lastly, I, and many other trollers, would like to know what the future of our fishery is going to be. If it is the desire of the State of Alaska and the Federal Government to put trollers out of business, I'd like to know it now so I can do something else. We can't take being "nickled, dimed, and quartered" to death. We HAVE to have some stabilization and confidence in this fishery if it is to survive.

I know this letter is lengthly and I apologize but I am very concerned and dissappointed over what has happened to our fishery and my investments and livelihood. I rely on fishing to support my family and make a living. I can no longer do this. I would appreciate your assistance in this matter.

Thank you for taking the time to read this letter.

Sincerely,

David R. Carlson
F/V Quest
Po Box 1232
Petersburg, Ak 99833
772-3765

LEGISLATIVE AFFAIRS AGENCY

SITKA LEGISLATIVE INFORMATION OFFICE
210 LAKE STREET, (BOX 737)
SITKA, AK. 99835 PHONE: 907-747-6276

MEMORANDUM

February 11, 1982

TO: SIGRID FRY, ARR Committee Staff

FROM: ELAINE SUNDE, Sitka Legislative Information Office

FEB 17 1982

Enclosed is original hand-written testimony from a Sitka resident. He requested that the Legislative Office transmit his testimony, via computer, last night to assure that his comments were before the Committee, along with other testimony.

You may wish to have his original document in lieu of the computer message.

Just use Julie's telecom copy not original letter Sigrid.

Testimony of Joseph Malley a troller, member of ATA, Troll-pac.

J. Malley Box 865 Sitka, Ak 99835

Eric McDowel in an earlier testimony mentioned six sources of error that in aggregate accounted for a one million dollar 'mistake'. This 'mistake hurt all trollers & right of the bat I'd like to mentio that I find it morally reprehensible that no one responsible for this 'mistake' has come forth with an admission of error & a formal apology.

Perhaps then a one million dollar mistake may be too insignificant to justify an apology. So hereafter I'll address myself to one error whose effect upon the future of all our salmon fisheries shall far exceed one paltry million dollars.

The error that I am referring to is simply that the statistical methodology employed by management in our fisheries is not even formally (that is mathematically) proper. The only adequate statistical tool to employ in a modeling problem as complex as that posed by the regulation of the salmon fishery is called a multiple regression program. Now in two minutes I'm not going to be able to explain what a multiple regression is, but I'll just mention that multiple regression is standard practice throughout industry of virtually every description. [redacted]

My question is this: What efforts are being made by the ADF&G statistical branch to generate a multiple regression analisys of the salmon harvest, and where do they get off subjecting user groups to the hardships imposed by the lack of one.

In closing I'd just like to mention that there is virtually no chance for a mistake in a proper regression analisys.
(of the typical historical magnitude)
Can the State of Alaska afford to be without one?

COPY

MSG 82-00007514 PRTY 1 IN= 0018
FROM: SITKA LIO TO: JUN/INFO..
ACCT: KINNEY SUBJ: FISHERIES REG. TESTIMONY TYPE: PAGE 1

TO: REPRESENTATIVES RANDOLPH, ABOOD, MOSS
SENATORS ZIEGLER SR., COLLETTA, HOHMAN JR.
FM: JOSEPH MALLEY
MEMBER OF ATA, TROLL PAC
P.O.B. 865
SITKA, AK 99835
RE: FISHERIES REGULATIONS
SIRS: ERIC MCDOWEL IN AN EARLIER TESTIMONY MENTIONED SIX SOURCES OF ERROR THAT IN AGGREGATE ACCOUNTED FOR A ONE MILLION DOLLAR 'MISTAKE'. THIS 'MISTAKE' HURT ALL TROLLERS AND RIGHT OFF THE BAT I'D LIKE TO MENTION THAT I FIND IT MORALLY REPREHENSIBLE THAT NO ONE RESPONSIBLE FOR THIS 'MISTAKE' HAS COME FORTH WITH AN ADMISSION OF ERROR AND A FORMAL APOLOGY.
PERHAPS THEN A ONE MILLION DOLLAR MISTAKE MAY BE TOO INSIGNIFICANT TO

FROM: SITKA LIO TO: JUN/INFO.
ACCT: KINNEY SUBJ: FISHERIES REG. TESTIMONY TYPE: PAGE 2

JUSTIFY AN APOLOGY. SO HEREAFTER I'LL ADDRESS MYSELF TO ONE ERROR WHOSE EFFECT UPON THE FUTURE OF ALL OUR SALMON FISHERIES SHALL FAR EXCEED ONE PALTRY MILLION DOLLARS.

THE ERROR THAT I AM REFERRING TO IS SIMPLY THAT THE STATISTICAL METHODOLOGY EMPLOYED BY MANAGEMENT IN OUR FISHERIES IS NOT EVEN FORMALLY (THAT IS MATHEMATICALLY) PROPER. THE ONLY ADEQUATE STATISTICAL TOOL TO EMLOY IN A MODELING PROBLEM AS COMPLEX AS THAT POSED BY THE REGULATION OF THE SALMON FISHERY IS CALLED A [redacted] NOW IN TWO MINUTES I'M NOT GOING TO BE ABLE TO EXPLAIN WHAT A MULTIPLE REGRESSION IS, BUT I'SS JUST MENTION THAT MULTIPLE REGRESSION IS STANDARD PRACTICE THROUGHTOUT INDUSTRY OF VIRTUALLY EVERY DESCRIPTION.

MY QUESTION IS THIS: WHAT EFFECTS ARE VEING MADE BY THE ADF&G STATISTICAL BRANCH TO GENERATE A MULTIPLE REGRESSION ANALYSIS OF THE SALMON HARVEST, AND WHERE DO THEY GET OFF SUBJECTING USER GROUPS TO THE HARDSHIPS IMPOSED BY THE LACK OF ONE.

MORE _
MSG 82-00007514 PRTY 1 IN= 0010
FROM: SITKA LIO TO: JUN/INFO.
ACCT: KINNEY SUBJ: FISHERIES REG. TESTIMONY TYPE: PAGE 3

IN CLOSING I'D JUST LIKE TO MENTION THAT THERE IS VIRTUALLY NO CHANCE FOR A MISTAKE OF THE TYPICAL HISTORICAL MAGNITUDE IN A PROPER REGRESSION ANALYSIS. CAN THE STATE OF ALASKA AFFORD TO BE WITHOUT ONE?

MORE _

REOPENING THE WATER WEST OF CAPE SUCKLING TO TROLLING
The Only Solution to a Critical Situation

Submitted by

Richard W. Lundahl
2/17/82

I. SITUATION AS OF 2/1/82.

A. Chinook Stocks.

1. Chinook stocks South and East of Cape Suckling are generally depressed.

2. Chinook stocks North and West of Cape Suckling are generally in good shape. These stocks have just this year had a reduction in harvest level by foreign trawlers of approximately 600,000 Kings.

B. Harvest Level -- O. Y.

1. Both the N.P.F.M.C. and the A.B. of.F. have drastically cut the O.Y. recently for conservation reasons and for political reasons.

2. Both the N.P.F.M.C. and the A.B. of F. are now intending to further cut the O.Y. by an additional 10 percent.

C. Judge Craig.

1. Judge Craig has stated his intention to see that the U.S.A. will uphold its treaty obligations to the Wash. Treaty Indian Tribes.

2. Judge Craig via the N.P.F.M.C. is seriously looking at the Alaskan Troll Fisheries as a real threat to these obligations.

D. The Alaska Troll Fisheries are overcapitalized because of Government Mismanagement.

1. The issuance of permanent permits to the troll fisheries clearly implies (practically guarantees) the viable, permanent, and professional status of these fisheries. We have bought and sold permits and taken out loans with this understanding.

2. The area designation of "Statewide" strongly implies that the Troll fisheries will again be allowed to fish West of Cape Suckling when the biological condition of these stocks allows. We have bought and sold permits and indebted ourselves with this understanding. This was board intent in 1973 when trolling was restricted to Southeast.

3. The enactment of the 200 mile limit (The F.C.M.A.) strongly implied to the public that the Federal Government intented to protect the American Fisherman from foreign harvests in our waters.

4. Despite depressed stock conditions South and East of Cape Suckling and down into Washington and Oregon, and serious habitat degradation problems to the South, and the threat to Alaskan Trollers of the Judge Boldt Decision; managers allowed high harvests until 1979.

5. Low interest Government loans during periods of high inflation rates, Government contruction fund incentives, and Tax incentives have all encouraged the fisherman to invest in his boat and equipment, especially in leiu of # 1, 2, 3, and 4 above.

6. The number of Power Troll permits was based upon fishing efforts from 1968 thru 1972 when we were allowed to fish Statewide. In essence managers have restricted a "Statewide" fishery to one region and then blame the trollers for over-fishing that Area.

7. Legislative over-sight and A. B. of F. inaction allowed the Hand Troll Fleet to grow out of all proportion. This "Statewide" Fishery is also restricted to Southeast.

E. Approximately ¼ of the Power Troll Fleet is facing Bankruptcy. The current policies are going to hurt us all.

1. At least ¼ of the P. T. Fleet is unable to meet their financial obligations at current harvest levels.

2. Because of the economic situation in the lower '48 these fishermen can not sell their boats. Who wants to go into debt to fish in a severely restricted fishery.

3. The bankers don't want to repossess these boats because they can't get rid of them. Who would buy them. Besides, if you repossess it; you have to maintain it.

4. These fisherman are thus encouraged to try another year or to try alternate fisheries. Another year's interest is piled onto the priciple and/or the fisherman buys new gear.

II. OPTIONS --- A REALISTIC LOOK.

A. Hatcheries and Enhancement.

1. Too long term. The troll fleets need a solution now.

2. Not even a long term solution. The Kings that spawn in Southeast Alaska live and feed in waters West of Cape Suckling.

3. Possibly Hatcheries in the lower '48 (placed there in our behalf) would be a solution; but again, it's too long term.

B. Buy Back.

1. Not acceptable to vast majority of trollers as of Spring of 1981.

2. Unfair. Why should we bear the brunt of government's mismanagement? Besides, Who can afford the 7% tax on our gross. We're paying a voluntary 3% tax on our gross already for hatcheries.

3. Too long term. It would be several years to set the system up and get it working. We need a solution now.

C. Alternative Fisheries.

1. A possible solution; but not very probable. Subsistence considerations.

2. The established lucrative fisheries are already fully exploited and many are protected by Limited Entry. Who can afford to change fisheries now?

3. New fisheries are very uncertain. New markets would have to be found and developed for many. Who can afford to experiment now? Possibly too long term to be an effective solution.

4. New fisheries can create biological problems. Many species have very low fecundity. Lack of biological data on these fish could seriously deplete these resources thru overharvesting and mismanagement.

5. Many of the species currently not being used in large commercial fisheries are used in rural communities by subsistence users.

D. Status Quo and/or raising the O.Y.

1. The Chinook stocks South and East of Cape Suckling are generally in a depressed condition.

2. The A. B. of F. initiated a 15 to 20 year program of allowing increased escapement in order to rebuild these runs (started during 1981 season).

3. In reasing the O. Y. on Southeast stocks could destroy the rebuilding program besides endangering the resource.

4. The troll fleet is in serious even critical trouble now -- with the present O.Y. Status Quo, while being a biological solution, is not an economic solution. It is just too long term.

E. Reopen Westward to Statewide Trolling.

1. The Chinook stocks West of Cape Suckling generally are in good shape.

2. These Stocks have within the last year received a major shot in the arm --- the extreme curtailment of (prohibited) foreign fleet harvests. This amounts to 350,000 to possiblly over 1,000,000 extra Kings for escapement and Alaskan fishermen.

3. There is no biological reason for restricting Statewide Trollers to Southeast any longer.

4. There is a tremendous need for biological data about Chinook Salmon. Managers need to know migration patterns and concentrations, feeding patterns, habits, and concentrations, rearing areas, etc. Replacing foreign trawl fleets with Alaskan trawl fleets on the high seas, in the F.C.Z. and in State waters does not reduce the danger of harvesting mixed stocks with high catch rate fisheries.

5. The Troll fisheries are slow attrition fisheries with low catch rates. The Troll fisheries are the only safe way to harvest mixed stocks on the high seas, F.C.Z. and State waters, besides being the cheapest and fastest way to gather the necessary biological data. This data is going to be needed if the managers are going to protect the mixed salmon stocks and the Alaskan subsistence user from incidental and accidental over-harvest of salmon by Trawl fleets.

6. The Troll caught salmon has the best quality and highest market price of any salmon on the comercial market.

7. Statewide Troll is biologially acceptable and needed. It enhances the managers need for data to ensure the subsistence priority, Statewide Troll maximizes the benefits to the public and ensures the health of the Southeast fishing economy.

III. Conclusion.

Reopening Statewide waters to the Troll fleet is the only solution to a critical situation in this fishery. This solution ensures the conservation of the resource, satisfies the subsistence priority, and maximizes the benefits to the public.

Ed Bergeron

Preliminary Report

NORTH PACIFIC FISHERY MANAGEMENT COUNCIL

PILOT OBSERVER PROGRAM FOR THE TROLL SALMON FISHERY OFF ALASKA

Contract No. 78-9

September 22, 1978

Craig Juleen
Troll Fishery Biologist
Alaska Department of Fish and Game

OCEAN TROLL FISHERY OBSERVER PROGRAM

To meet the objectives of the observer program data was collected by on-board observers to help identify salmon species by catch, age, length, weight, sex, mature and sub-legal (shaker), catch by gear type, and influencing environmental factors for various statistical areas and times. Troll logbook information was also obtained in conjuction with comments recorded on daily record sheets.

See Table 1 for a list of the observer trips by statistical area and location.

The total catch (all species) for the observer program was:

Chinook	Coho	Pink	Chum	Chinook Shakers	Sockeye	Salable Halibut
715	1,778	873	38	300: 233 Good 27 Fair 40 Poor	7	15

Unsalable Halibut	Ling Cod	True Cod	Turbot	Rockfish
45	17	10	1	509

Total Landed Chinook and Coho Weight Per Trip:

Vessel	Chinook(lbs.)	Coho(lbs.)
North Star	238.40	
F/V Rambler	1,375.00	
Gota		6.50
Germaine	124.74	13.20
C-Rae	1,132.11	593.25
Carolyn L	1,491.36	46.98
F/V Sea Kin	1,394.00	3,390.20
Myrth	558.54	98.46
F/V Duke	559.77	360.36

Vessel	Chinook(lbs.0	Coho(lbs.)
Defense	758.43	5,879.97
Coronation	214.40	2,148.80
Chief Seattle(for 3 areas fished)	155.25	550.20
	455.40	1,721.98
	12.54	162.80
Defiance (2 areas fished)	2,828.00	851.00
	207.00	959.00
Combined Total Weight for All Trips -	11,504.94	21,782.10
Combined Catch Average for All Trips-	16.00	7.00

Overall Shaker to Legal Chinook Incidence
(Total shaker divided by total chinook) = 0.42

Scale and gonad samples were taken from every fifth chinook and coho salmon. Laboratory analysis will begin September 20th to determine age composition, maturity and stock origin. Recorded lengths and weights for each landed chinook and coho salmon were on the daily record sheets for the separate areas and times (Specific and detailed information can be obtained from the individual trip data sheets).

Trips by statistical areas were separated and statistics for total and average chinook and coho weights were computed. Shaker to legal chinook incidence was recorded for all given areas. The results are displayed in Table 2.

The observers were asked to look at gear type and possible influential effects on catch composition. It was noted that the various boats observed used a varied assortment of gear. The following is collected data pertaining to each individual vessel:

Gear Type: (Flashers were used at all times in conjuction with baited hooks, and in the majority of cases with hootchies.)

1. North Star - 8 lines, 49 hooks - 28 spoons, 10 hootchies, 11 bait
2. Rambler - 4 lines, 32 hooks - 2 plugs, 4 spoons, 13 hootchies, 13 bait. 40-45 fathoms of wire out.
3. Germaine - 3 lines, 15 hooks - 15 hootchies. 20 fathoms of wire out.
4. Gota - 4 lines, 20 hooks - 6 spoons, 14 hootchies. (hook baited with herring used once) 28 fathoms of wire out.

5. C-Rae - 4 lines, 30 hooks - 22 spoons, 4 hootchies, 3 bait, 1 plug. 50 fathoms of outside wire. 25 fathoms inside wire.

6. Carolyn L - 4 lines, 29 hooks - 7 spoons, 13 hootchies, 9 bait. 6 lines, 36 hooks - 8 spoons, 17 hootchies, 11 bait

7. Sea Kin - 6 lines, 48 hooks - 24 spoons, 24 hootchies. 40 fathoms of wire out. Coho gear.

8. Myrth - 4 lines, 22 hooks - 2 plugs, 8 spoons, 6 hootchies, 6 bait. 28-30 fathoms of outside wire out. 26 fathoms of inside wire out.

9. Duke - 4 lines, 41 hooks -26 spoons, 15 hootchies.

10. Defense - 4 lines, 26 hooks - 22 spoons, 4 hootchies. (Coho gear) 15-18 fathoms of wire out.

11. Coronation - 4 lines, 46 hooks - 26 spoons, 20 hootchies. (Coho gear) 20-30 fathoms of wire out (varied for the different areas fished)

12. Chief Seattle - Coho gear - 4 lines, 54 hooks - 44 spoons, 10 hootchies.

The gear was periodically changed due to good or poor fishing conditions or a shift to a new location. The choice of gear noticeablely affected the catch composition. Those fishermen using coho gear* (Chief Seattle, Coronation, Defense and Sea Kin) caught a much larger percentage of coho in relation to chinook salmon, while the C-Rae and Myrth using hooks baited with herring and copper chinook spoons caught a higher percentage of chinooks compared to the coho catch.

Feed varied with time and area. The following data pertains to stomach contents in order of abundance.

Rambler - Chinook and coho feeding on: 1) needlefish, 2) Krill

Germaine - Chinook and coho feeding on: 1) needlefish, 2) juvenile needlefish

Gota - Coho examined contained needlefish.

C-Rae - Chinook feeding on: 1) herring, 2)needlefish, 3) juvenile pollock. Coho feeding on: 1) juvenile pollock.

Carolyn L - Salmon contained shrimp, herring, needlefisn and capelin

* Small spoons and hotchies utilizing bright colors.

Sea Kin - Chinook feeding on: 1) shrimp, 2) herring, 3) juvenile pollock, 4) prowfish. Coho feeding on: 1) shrimp, 2) herring.

Myrth - Chinook and coho feeding on: 1) needlefish, 2) juvenile needlefish

Duke - Chinook and coho feeding on herring.

Defense - Chinook and coho feeding on: 1) herring, 2) juvenile herring.

Chief Seattle - Chinook and coho feeding on herring

It was discovered on some fishing trips chat most salmon were landed between 0645-1000 and 1845-2045 hours. When fathometers were used, most feed showed up on the graph in the early morning and evening hours.

Observers also took note of environmental influences on the salmon harvest. When seas became larger, it was hard to see the poles rattle. Also, when the weather became nasty, fishermen spent more time in their wheel houses.. Both of these environmentally-related factors led to higher mortality rates of sub-legal fish due to the dragging of hooked fish. During this past (1978) fishing season there was a large intermittent amount of pelagic seasquirts, a gelatinous, free-swimming, Urochoradate (genus Salpa). By continually fouling both hooks and line, they became a perpetual headache to the fishermen.

The observers for this first on-board program encountered a few problems. Perhaps the major difficulty was finding skippers willing to have observers aboard. Reasons for not wanting observers onboard were: 1) No room - not enough back space, 2) distrust of Fish and Game management programs and 3) violation of personal space. When onboard, there were a few drawbacks in collecting data. Noting catch by bait type, sampling, cleaning, weighing, observing, keeping balance, etc., did become a dilemma when large pallets of fish were encountered at one time. Pandemonium ran high with fish flapping everywhere. (Boats with small working decks should be avoided.) Shaker conditions when released can also be questioned due to the continual forward progress of the boats and not wanting to get in the way of fishing operations. Those shakers marked good on the daily record sheets may have actually been impared. Normal trip practices of shaker release may have been changed by having a Fish and Game observer on board. Other proplems were: 1) ocean fatique, 2) wind, rain and large seas making data collection extremely rough and 3) personality conflicts.

A comparison of observer logbook data with the fishermen's log shows that there were varying observed and recorded variances pertaining to information regarding shaker numbers, abundance of bottom fish and marine mammals. Memories of such data are not clear after a hard day or trip of fishing.

From all of the data, observations and observer comments, it was found that an onboard program does work. The skippers who took the observers were congenial and cooperative. The biological samples, daily statistical record sheets, observer log, and individual trip summarations will definitely be useful tools in helping form a comprehensive management plan.

Table 1. OBSERVER TRIPS BY STATISTICAL AREA AND LOCATION

Location	Statistical Area	Vessel	Observer	Dates	Average Fishing Time	Sea Conditions	No. of Fish Caught and Average Wt.	Shaker to Legal Chinook Incidence	Other
St. Lazaris Island	113	Gota	Craig Juleen	7/20-7/22	1½ hrs. 1-harbor day 2-fishing	3-4 ft.	1 coho- 6.5 lbs. 2 shakers- 1 good 1 fair	---	Engin troub
Gornoi, Gulf & Biorka Is.	113	Germa	Robert Hernacki	7/26-7/27	6-3/4 hrs.	slight	9-chinook-13.86 lbs. 2-coho-6.6 lbs. 2-shakers- 1 good 1 fair	0.22	
St. Lazaris Is. to Cape Edgecumbe	113	C-Rae	Craig Juleen	7/26-7/30	14 hrs.	5-7 ft.	63-chinook-17.97 lbs. 113-coho - 5.25 lbs. 6- shakers-4 good 2 fair	0.10	
Sandy and Snipe Bay	113	Myrth	Craig Juleen	8/5-8/10	9½ hrs.	3-4 ft.	29-chinook-19.26 lbs. 18-coho- 5.47 lbs. 20-shakers- 17 good 1 fair 2 poor	0.69	
Off Cape Edgecumbe	113	F/V Duke	Robert Hernacki	8/26-8/29	10½ hrs.	slight to 5 ft.	29-chinook-20.68 lbs. 44-coho- 8.19 lbs. 5-shakers- 4 fair 1 poor	0.17	
Surge Bay-Hoktaheen Area	113	F/V Coronation	Linnea Neuman	8/1-8/9	9½ hrs.	2-8 ft.	13-chinook-16.8 lbs. 316-coho- 6.8 lbs. 13-shakers-11 good 2 poor	1.00	

Location	Statistical Area	Vessel	Observer	Dates	Average Fishing Time	Sea Conditions	No. of Fish Caught and Average Wt.	Shaker to Legal Chinook Incidence	Othe
Surge Bay	113	Chief Seattle	Linnea Neuman	8/18-8/20	6¼ hrs.	3-6 ft.	9-chinook-17.25 lbs. 60-coho-9.17 lbs. 2-shakers- 1 good 1 poor	0.22	
From Redfish Cape to Biorka Island	154	F/V Sea Kin	Robert Hernacki	7/28-8/5	16½ hrs.	2-6 ft.	68-chinook-20.50 lbs. 460-coho- 7.37 lbs. 10-shakers-7 good 1 fair	0.15	
Between Cape Addington & Cape Cherikof	104	F/V Rambler	Gary Gunstrom	5/19-5/30	14 hrs.	15-20 ft. 8-fishing 2-harbor days	101-chinook-13.75 lbs. 32-shakers-26 good 2 fair 4 poor	0.32	
).Inner Bank-Outside of Stat. Area-116-25		North Star	Randy Timothy	5/24-6/1	7¼ hrs.	5-7 ft. 3-fishing 3-harbor days	16-chinook-.4.90 lbs. 8-shakers-5 good 3 fair	0.50	
1.Nine miles off Cape Fairweather	181-05	Carolyn L	Linneau Neuman	6/16-6/22	14 hrs.	3-8 ft.	104-chinook-14.34 lbs. 9-coho- 5.22 lbs. 16-shakers-11 good 4 poor	0.14	
2.Ocean Cape, Dangerous River	181-05	Chief Seattle	Linnea Neuman	8/21-8/22	5¼ hrs.	3-8 ft.	1-chinook-12.54 lbs. 20-coho- 8.14 lbs. 2-shakers-1 good 1 fair	2.00	
3. Ten-12 mi. off inner bank	181-25	Defiance	Linnea Neuman	7/17-7/22	14¼ hrs.	2 ft.	163-chinook-17.35 lbs. 112-coho- 7.60 lbs. 20-shakers-12 good 8 poor	0.12	

Location	Statistical Area	Vessel	Observer	Dates	Average Fishing Time	Sea Conditions	No. of Fish Caught and Average Wt.	Shaker to Legal Chinook Incidence	Oth
14. Between Lituya Bay & Icy Point	116-05	Defense	Craig Juleen	8/23-8/29	14½ hrs.	slight to 2 ft.	53-chinook-14.31 lbs. 827-coho- 7.11 lbs. 84-shakers-64 good 12 fair 8 poor	1.58	
15. La Perousse Glacier Area	116-05	Chief Seattle	Linnea Neuman	8/14-8/17	10 hrs.	4-6 ft.	30-chinook-15.18 lbs. 179-coho- 9.62 lbs. 60-shakers-54 good 4 poor	2.00	
16. North Pass, Cape Cross Area	116-05	Defiance	Linnea Neuman	7/14-7/23	7½ hrs.	2 ft.	14-chinook-14.80 lbs. 133-coho- 7.21 lbs. 20-shakers-15 good 1 fair 4 poor	1.43	

Table 2. COMBINED TOTALS FOR VARIOUS STATISTICAL AREAS

COMBINED TOTALS FOR STATISTICAL AREA 116-05 (3 trips)

Total chinook weighted for 97 landed fish	-	1,420.83 lbs.
Average Weight	-	14.65 lbs.
Total coho weight for 139 landed fish	-	8,560.95 lbs.
Average weight	-	7.52 lbs.
Shaker to legal chinook incidence (164 shakers)		1.69

* Note: Area 116.05 had triple or greater the number of shakers when compared to the data collected in the other areas.

COMBINED TOTALS FOR STATISTICAL AREA 113 (7 trips)

Total chinook weight for 152 landed fish	-	2,744.76 lbs.
Average weight	-	18.06 lbs.
Total coho weighted for 544 landed fish	-	3,770.77 lbs.
Average weight	-	6.81 lbs.
Shaker to legal chinook incidence (50 shakers)		0.33

COMBINED TOTALS FOR STATISTICAL AREA 154 (1 trip)

Total chinook weight for 68 landed fish	-	1,394.00 lbs.
Average weight	-	20.54 lbs.
Shaker to legal chinook incidence (10 shakers)		0.15
Total coho weight for 460 landed fish	-	3,390.20 lbs.
Average weight	-	7.37 lbs.

COMBINED TOTALS FOR STATISTICAL AREA 104 (1 trip)

Weight for 101 landed fish	-	1,375.75 lbs.
Average weight	-	13.75 lbs.
Shaker to legal chinook incidence (32 shakers)		0.32

COMBINED TOTALS FOR STATISTICAL AREA 116-25 (1 trip)

Total chinook weight for 16 landed fish	-	238.40 lbs.
Average weight	-	14.90 lbs.
Shaker to legal chinook incidence (8 shakers)		0.50

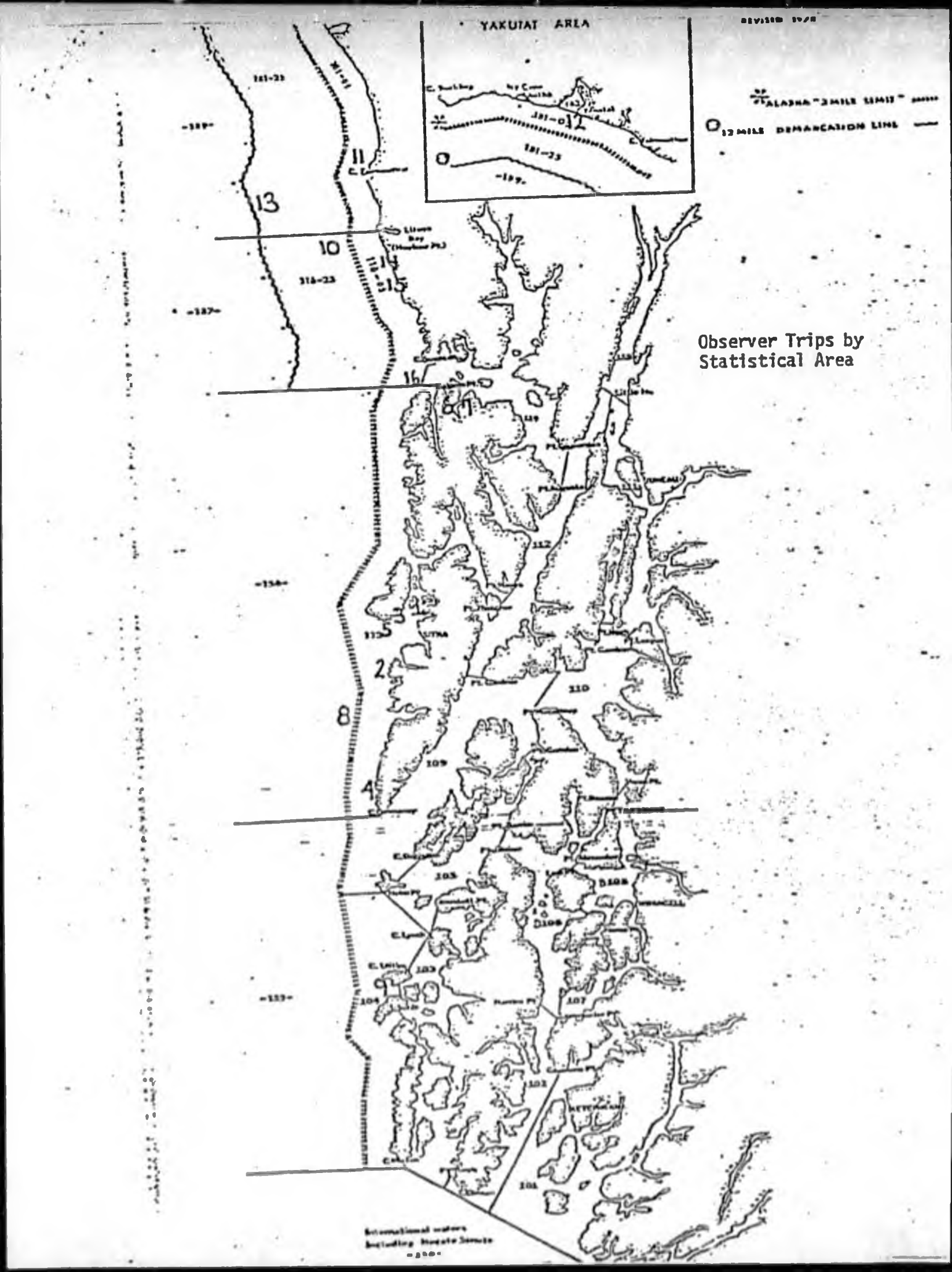
COMBINED TOTALS FOR STATISTICAL AREA 181-25 (1 trip)

Total coho weight for 117 landed fish	-	851.00 lbs.
Average weight	-	7.60 lbs.
Total chinook weight for 163 landed fish	-	2,828.00 lbs.
Average weight	-	17.60 lbs.
Shaker to legal chinook incidence (10 shakers)		0.12

COMBINED TOTALS FOR STATISTICAL AREA 181-05 (2 trips)

Total chinook weight for 105 landed fish	-	1,503.90 lbs.
Average weight	-	14.32 lbs.
Total coho weight for 29 landed fish	-	209.79 lbs.
Average weight	-	7.23 lbs.
Shaker to legal chinook incidence (17 shakers)		0.16

Predators


YAKUTAT AREA
ALASKA "3 MILE LIMIT"
12 MILE DEMARCATION LINE
Observer Trips by
Statistical Area
13
10
11
16
8
2
4
International waters
beginning three miles

REPORT TO THE BOARD OF FISHERIES

RESEARCH TROLL FISHERY

SPRING, 1981

By:
Mike Bethers

ABSTRACT

A troll research fishery was conducted in northern S.E. Alaskan waters from April 16 to May 11, 1981. During the study, 764 chinook salmon were tagged, elevin stocks of chinook salmon in the study area were identified, and a study of the efficiency and hook-induced mortality of single and treble fish hooks was conducted.

As of September 30, 1981, 45 disc tags with complete information had been recovered. Chinook salmon tagged in outside areas were recovered at nearly three times the rate of fish tagged in Inner Icy Strait; 12.8% as compared to 4.7%, respectively. The percentages of Alaskan and non-Alaskan recoveries of fish tagged in outer areas were 28.6% and 71.4%, respectively as compared to 80.6% and 19.4% respectively for fish tagged in inner Icy Strait. Overall, 29 (64.4%) tag recoveries were made in Alaskan waters and 16 (35.6%) were made in non-Alaskan waters.

Of the nine coded wire tagged chinook salmon caught, 6 had been released from hatcheries in S.E. Alaska, 1 from British Columbia and 2 from Oregon. No coded wire tagged wild Alaskan chinook salmon were caught.

Hook performance data suggests that the hooking rate for treble hooks is significantly higher than single hooks, and that treble hooks could be expected to produce an 18% higher catch. It is indicated that a lower hook injury rate occurs with treble hooks than for single hooks, however additional data would be required to determine whether the difference is statistically significant.

RESEARCH TROLL FISHERY

SPRING 1981

Historically, the chinook salmon troll fishery in S.E. Alaskan coastal waters has been open to fishing from April 15 to October 31. In an attempt to conserve the depressed stocks of mature chinook salmon returning to S.E. Alaskan streams, the Alaska Board of Fisheries, in January, 1981, delayed the opening of the troll season until May 15th by closing all State waters to commercial trolling from April 15th to May 14, 1981. This action stimulated concern regarding potential loss of "in-fishery" recoveries from approximately 150,000 coded wire tagged Taku and Stikine River chinook currently at large in the ocean.

This research troll fishery stemmed from the Board's decision to close the April 15th to May 14th segment of the season and was conducted to:

1) Determine stock identification, run timing, migration routes, and transfer to other fisheries of chinook salmon passing through the Icy Strait-Cross Sound corridor areas.

2) Determine important juvenile chinook feeding areas and contribution of chinook stocks to the troll fishery by recovering coded wire tagged fish.

3) Evaluate the catch efficiency and hook-induced mortality of single and treble hooks on commercial chinook salmon troll gear.

Four power trollers fished under short term vessel charter for the Department during the study. Two boats fished at any one time; one in inner Icy Strait and one in the Cross Sound - outer coastal areas.

Vessels fished in their normal fashion, except that both single and treble hooks were used. Only one type of hook was used on a troll line at one time, so that individual hook type data could be collected. Hook types were switched among the vessels main lines, to prevent bias. A biologist from the Alaska Department of Fish and Game or the Alaska Troller's Association was aboard each vessel during the course of this study.

Hooked fish were retrieved to the side of the boat and were lead into an electrified landing basket, instead of being gaffed. Larger fish remained in the electrified basket in a state of electronarcosis during sampling and tagging. Chinook salmon under approximately 24 inches were lifted aboard, by the leader, and restrained by hand in a smooth plastic lined tagging trough for sampling and tagging.

The public was informed of the tagging program through articles in local newspapers, Fish and Game news releases and radio spots. The recovery of disc tags was accomplished primarily through voluntary angler returns. Each tag returned with catch date and location data was worth a $2.00 reward to the angler. As an added incentive, one angler received a $500.00 bonus via a lottery drawing of the tags turned in.

RESULTS

Between April 16th and May 11, 1981, a total of 846 salmon were caught by the four trollers. A total of 764 chinook and one coho were tagged and released. Seventy nine chinook were retained, as they were either adipose fin clipped or mortally wounded. Fish were tagged in the Icy Strait-Cross Sound area and on the outer coast from Cape Cross to Icy Point (Fig. 1 & 2)).

As of September 30th, 1981, 45 disc tags with complete information had been returned to the Department. An additional eight disc tagged chinooks were known to have been observed, but usable data was not available. Of the 45 recoveries, 4 were made in Alaskan chinook river systems, 25 in Alaskan fisheries, 13 in British Columbia fisheries, 2 in Washington fisheries and 1 in Oregon fisheries. A total of 14 recoveries (12.8%) of the fish tagged in the outer areas were recovered, as compared to 31 (4.7%) of the fish tagged in inner Icy Strait. It is apparent that fish tagged in inner Icy Strait tended to be recovered in inside waters and fish tagged in outside areas tended to be recovered in outer areas. Only 19.4% of the recoveries of fish tagged in inner Icy Strait were made in non-Alaskan waters, as compared to 71.4% of the chinook tagged in outside waters. A comparison of recovery locations of chinook tagged in inside and outside waters is presented in Table 1.

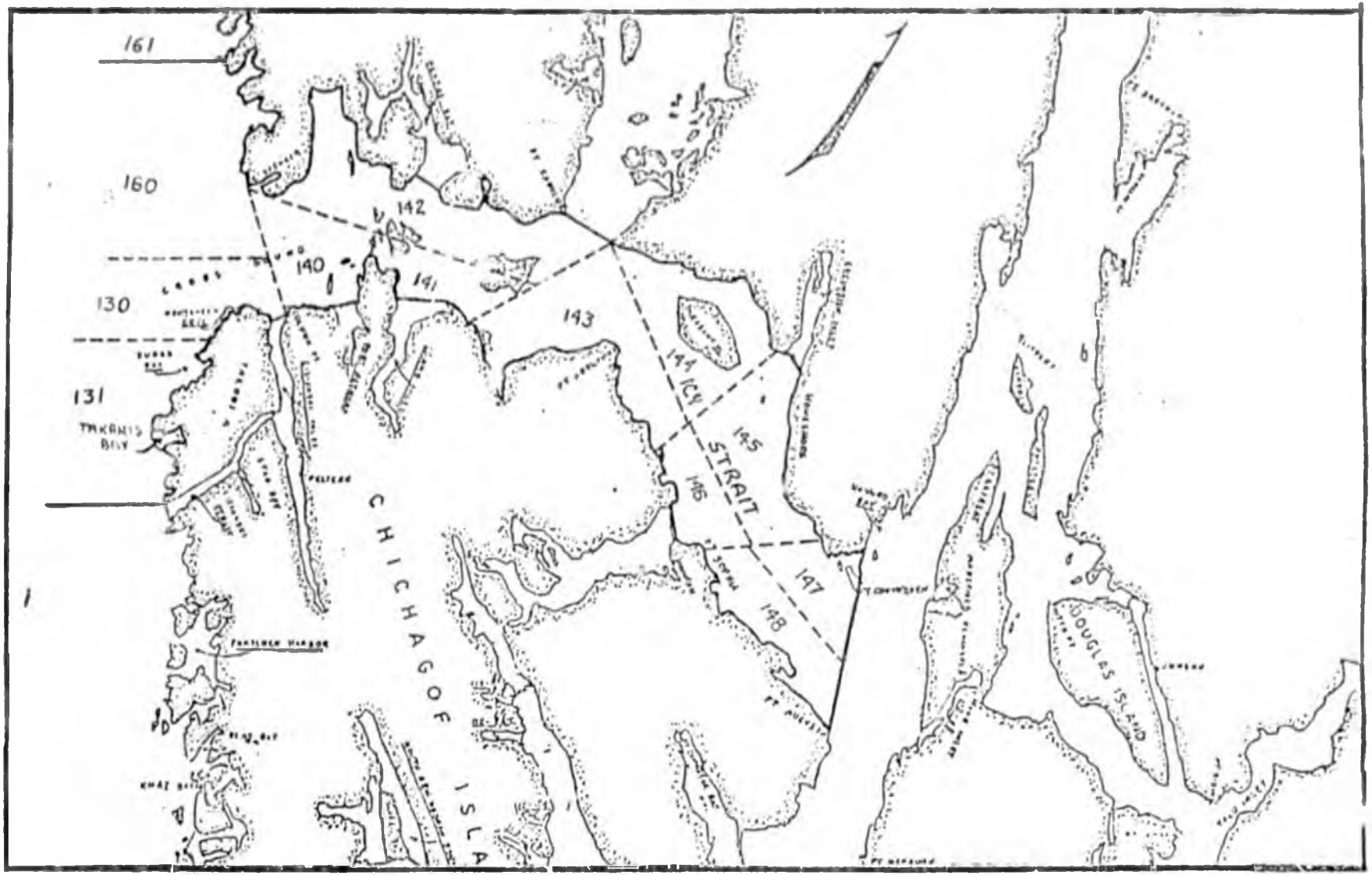
A total of 12 adipose fin clipped chinook were caught during the study. Of these, 9 had coded wire tags. Of the 9, 6 were from Alaska, 1 was from British Columbia and 2 were from Oregon. All tagged fish were from hatchery releases. Of the 12 adipose clipped chinook caught, only 2 were of legal troll length (28 inches).

Of the 6 coded wire tagged Alaskan chinook recovered, 5 were recovered in inner Icy Strait and only 1 was recovered in the outer area. Of the 3 non-Alaskan tagged fish recovered, 2 were recovered in outer areas and 1 was recovered in inner Icy Strait.

Hook type data was collected on 829 chinook during the study. Of these, 443 (53%) were 28 inches or greater in total length (legal troll length) and 340 (47%) were sublegal.

The results of this study indicate that the hooking rate for treble hooks is significantly higher than for single hooks. Single hooks could be expected to catch 67 fish per 100 bites compared to 79 fish per 100 bites for treble hooks, i.e., an 18% higher catch rate.

FIGURE 1. FISH TAGGING AREAS, CROSS SOUND - ICY STRAIT TEST TROLL FISHERY, 1981



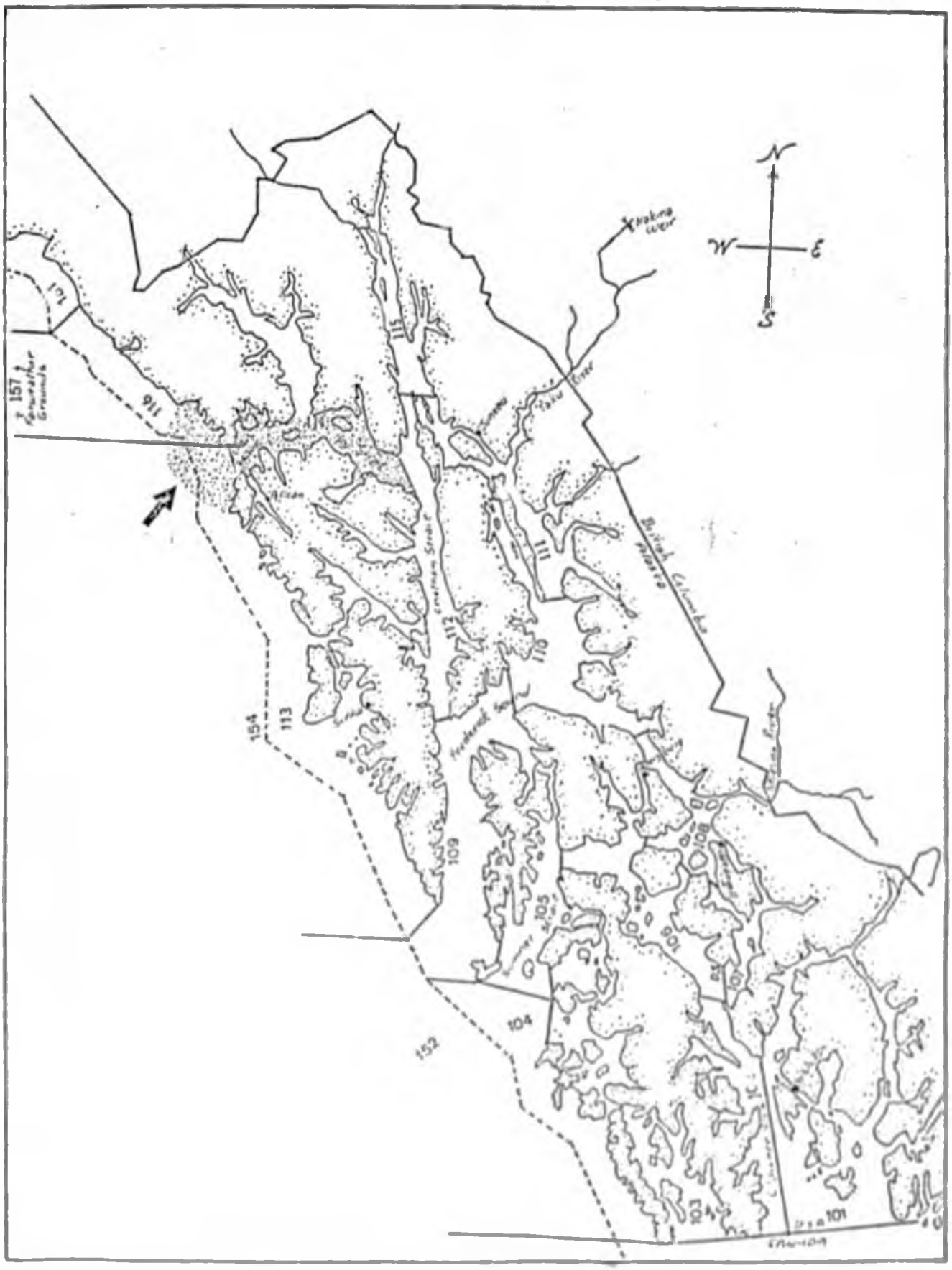


Figure 2. Study Area, 1961 Troll Research Fishery.

Table 1. A Comparison of Recovery Areas of Chinook Salmon Disc Tagged in Inner Icy Strait and Outside Coastal Areas.

Recovery Area	Tagging Locations: Outer Areas n (%)	Inner Icy Strait n (%)	Total
ALASKA:	4 28.6%)	25 (80.6%)	29 (64.4%)
Milling (within 5 mi. of tagging location)	0 (00.0%)	6 (19.4%)	6
Inside waters of Alaska	0 (00.0%)	15 (48.3%)	15
Outside waters of Alaska	4 (28.6%)	0 (00.0%)	4
Alaskan Chinook systems	0 (00.0%)	4 (12.9%)	4*
NON-ALASKAN:	10 (71.4%)	6 (19.4%)	16 (35.6%)
A) British Columbia	7 (50.0%)	6 (19.4%)	13
B) Washington	2 (14.3%)	0 (00.0%)	2
C) Oregon	1 (07.1%)	0 (00.0%)	1
TOTAL	14/109 (12.8%)	31/656 (4.7%)	45/765 (5.8%)

* 3 from Taku, 1 from Stikine River

An analysis of the data also indicates that a lower hooking injury rate occurs with treble hooks than with single hooks; however, additional data would be required to determine whether this difference is statistically significant.

It should be emphasized that great care was taken in removing hooks from the fish. Therefore, the results may not be representative of hook performance in the commercial troll fleet.

A comparison of recovery rates of disc tagged chinook caught on single and treble hooks is presented below.

F.L. (mm)	Single Hooks	Treble Hooks	Total
673mm+ (legal)	17	15	32
673mm- (sublegal)	4	9	13
No. recovered by hook type	21 (46.6%)	24 (53.3%)	45 (100%)
No. released by hook type	369 (48.5%)	391 (51.3%)	760 (100%)

Scale samples and length data collected during the study could not be analyzed in time for this report. When analyzed, this data may shed some light on the origins and ages of fish tagged in the study. From this, important juvenile feeding areas may be identified.

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Eleven stocks of chinook salmon were identified by the use of coded wire tags and "in river" recoveries and observations of chinook salmon tagged in this study.

Following is a list of chinook salmon stocks identified by the recovery or observation of disc tagged fish in spawning systems.

	Recovery Data		Tagging Data	
Stock		Date	Location	Date
(AK) Stikine		6 03/81	Excursion Inlet	4/28/81
(AK) Nakina (Taku)	1)	6/03/81	Homeshore	5/09/81
	2)	8/07/81	Homeshore	5/04/81
	3)	8/10/81	Homeshore	4/17/81
(AK) Chilkat		7/06/81	?	4/16-5/11/81
(AK) Nahlin (Taku)	1)	7/22/81	?	4/16-5/11/81
	2)	7/22/81	?	4/16-5/11/81
	3)	7/22/81	?	4/16-5/11/81
(WA) Quinault		9/22/81	P.D. Grounds	5/02/81
(OR) Nehalem		9/24/81	Soapstone	4/25/81

Stocks of chinook salmon identified by the recovery of coded wire tagged fish during the study are listed below.

	Tagging Data			Recovery Data	
Stock	Rel. Site		Date	Location	Date
(AK) Unuk	L. P. Walter	1)	5/79	Excursion Inlet	4/27/81
		2)	5/80	Homeshore	5/09/81
		3)	4/79	Homeshore	5/11/81
		4)	4/79	Port Althorp	4/26/81
(AK) Andrews Creek	C. L. Hatchery	1)	6/77	Homeshore	5/04/79
		2)	5/78	Homeshore	5/05/81
(B.C.) Robertson Creek	R. Cr. Hatchery		5/77	Icy Point	5/02/81
(OR) Willamette	Below Falls		11/77	Homeshore	5/11/81
(OR) Nestucca	Nestucca River		11/79	Port Althorp	5/05/81

The number of tagged chinook recovered by area and gear type is presented below.

Recovery Area	Recovery Type	Tagging Area: Outer Areas	Tagging Area: Inner Icy Strait	Total Per Gear
AK	Stream Survey	0	3	3
	Stream Sport	0	1	1
	Troll	5	8	13
	Gillnet	1	3	4
	Marine Sport	0	10	10
B.C.	Troll	3	2	5
	Gillnet	2	3	5
WA	Gillnet	2	0	2
OR	Stream Sport	1	0	1
	TOTALS	14	30	44

DISCUSSION

Of the 842 salmon caught during the study, 596 were taken at either Homeshore or Excursion Inlet in inner Icy Strait. This was due to both boats fishing inside at the beginning of the study because of bad weather on the outside coast. Also, the Homeshore - Excursion Inlet drag was fished continuously by one boat throughout the study as it is normally a reliable producer of chinook salmon during the early season. The large catch in inner Icy Strait provided substantial hook type catch data, however, it would have been more desirable to have used additional boats to spread the catch over more tagging locations.

Fish handling procedures used in this study worked well and the use of electricity to stun large salmon for handling is recommended for further study and use. Small chinook (under approximately 24 inches) were not suitably stunned by the electric landing basket. It is not known whether this was due to a possible difference in the voltage required to stun smaller fish, or to the design of the basket.

Even though this study was much smaller in scope than that conducted by Parker and Kirkness in the early 1950's, it is indicated that this project will show similar results.

Results of both tagging studies showed that:

1) Fish tagged in inner waters of S.E. Alaska tended to be recovered in inside Alaskan waters and fish tagged in outside areas were recovered in outside waters. Generally, there was little exchange of fish from outside to inside waters or vise versa.

2) Fish tagged on the outside coast tended to be recovered in southern non-Alaskan waters to a much greater degree than fish tagged in inside Alaskan waters.

In the Parker-Kirkness study, 5.2% of fish tagged from Cape Spencer to Cape Fairweather were recovered during the same year as tagging. In our study 12.8% of the fish tagged in outside areas were recovered during the year of tagging. This difference may be indicative of increased fishing pressure.

Of the 842 chinook caught, 12 (1.4%) were adipose fin-clipped. Nine of the fish retained coded wire tags. Seven of the 9 tagged fish were of sublegal length. The high number of adipose fin-clipped sublegal chinook caught, coupled with the usual 30% sample of the commercial catch may indicate that the Department is recovering only a small percentage of the potentially recoverable tagged chinook available. Even though the actual numbers of tagged sublegal chinook taken in the commercial fishery may be less than that observed in this test fishery, a regulatory proposal was submitted to the board of fisheries that would allow retention of sublegal chinook in the troll fishery. This proposal will allow recovery of young age classes of chinook in the troll fishery, which to date have not been legally available for recovery.

Treble hooks did catch a higher percentage of the fish hooked, as was predicted by many fishermen. It was also indicated that treble hooks did less damage, as they tended to hook the fish shallower than single hooks. It appeared as though chinook would get hooked on treble hooks usually on the first time the bait was mouthed and consequently would be hooked close to the lips. On single hooks it appeared as though the fish would mouth the bait longer and consequently would not actually get hooked until the hook was farther into the mouth.

Analysis of hook type data collected in this study indicates that there is no justification to continue the ban on treble hooks in the S. E. Alaskan troll fishery.

Appendix I. Discription of condition codes and comparison of hooking and injury rate of single and treble hooks on commercial gear.

Fish caught were "graded" according to the amount of damage caused by hooking. The condition codes used in this study were:

"A" = Negligible injury, very slight.

"B" = Definite injury, however, complete recovery expected

"C" = Severe injury, recovery doubtful.

"M" = Terminal injury, fish killed by hook.

Appendix I (Continued)

I. Comparison of Hooking Rates

Hook Type		Catches	Losses	Total Bites
Single -	#	408	200	608
	%	67.1%	32.8%	
Treble -	#	421	109	530
	%	79.4%	20.6%	
TOTAL		829	309	1,138

II. Comparison of Hooking Injury Rate

A. Sublegal Fish (less than 673 mm fork length)

Hook Type		Fish Condition (Condition Codes) Good (A,B)	Poor (C,M)	Total fish
Single -	#	148	28	176
	%	84.1%	15.9%	
Treble -	#	192	18	210
	%	91.4%	8.6%	
TOTAL		340	46	386

III. Comparison of Hooking Injury Rates

B. Legal Fish (673 mm fork length and larger)

Hook Type		Fish Condition (Condition Codes) Good (A,B)	Poor (C,M)	Total Fish
Single -	#	165	67	232
	%	71.1%	28.9%	
Treble -	#	175	36	211
	%	82.9%	17.1%	
TOTAL		340	103	443

Appendix II

FISH TAGGING AREAS DESCRIBED,
NUMBERS OF FISH TAGGED, MORTALITIES,
ADIPOSE CLIPPED SALMON CAUGHT BY AREA,
TROLL RESEARCH FISHERY, 1981

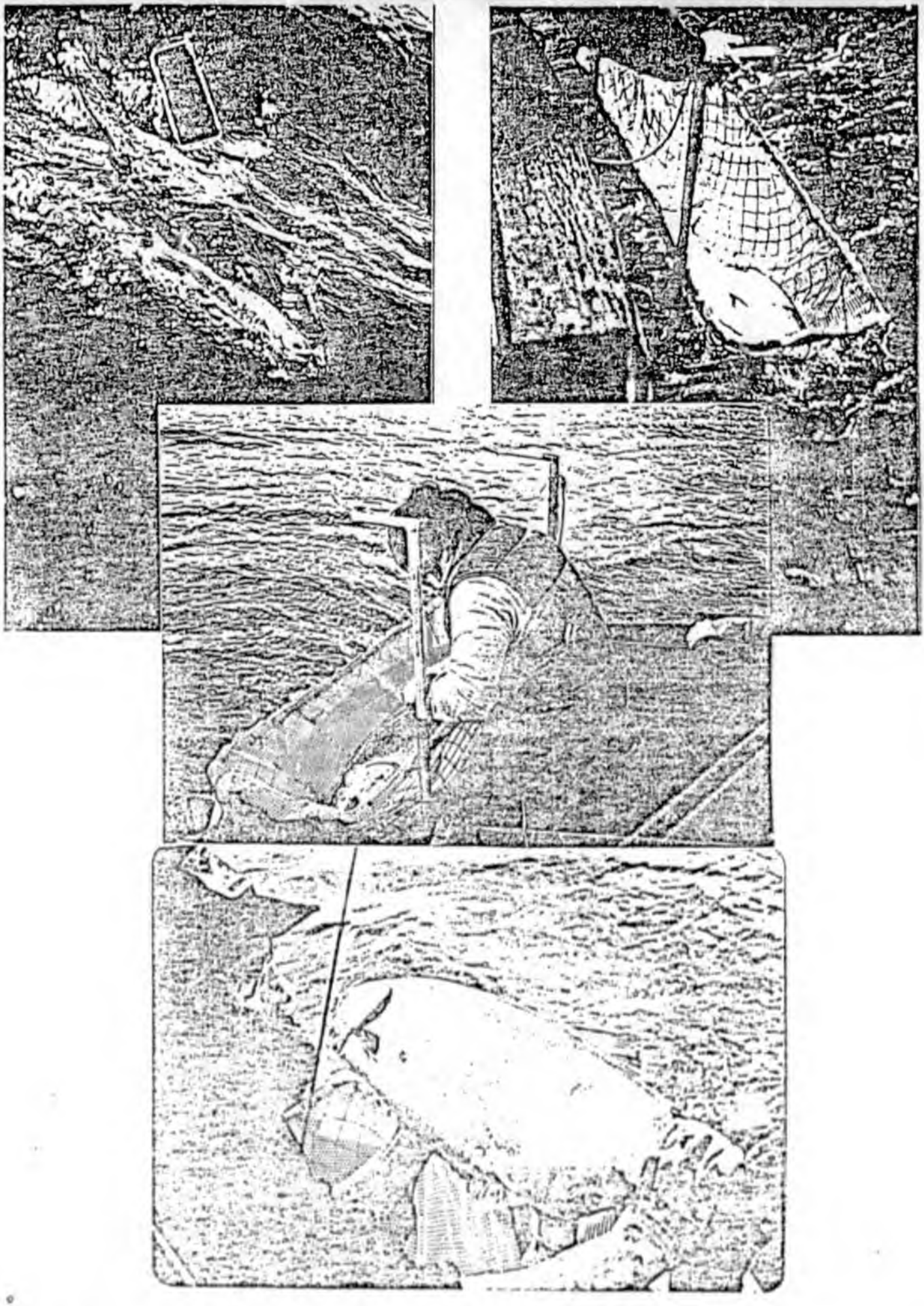
FISHING AREAS

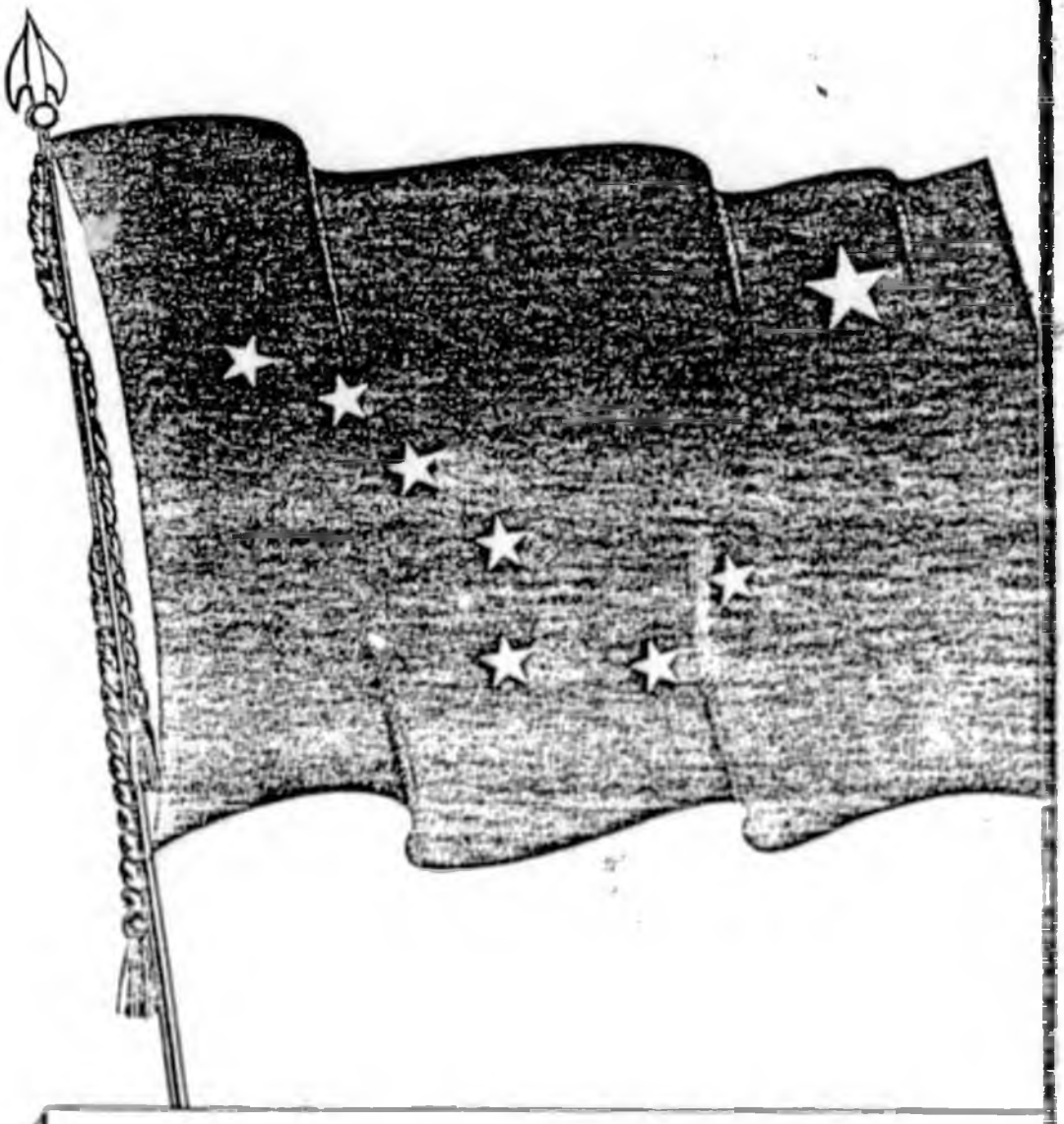
Number	Descriptive Area	Number tagged	Number Mortalites	Number Ad. Clips
130	Soapstone Pt. (SS)	49	3	-
	Hoktaheen (HK)	4	-	-
131	Cape Cross (CC)	1	1	-
140	Port Althorp (AL)	47	1	2
	Three Hill Is. (3H)	[illegible]	-	-
	Cross Sound (CS)	12	-	-
141	Idaho Inlet (II)	1	-	-
142	Dundas Bay (DB)	1	-	-
143	Point Adolphus (PA)	-	2	-
	Pinta Cove (PC)	3	-	-
	Eagle Point (EP)	-	-	-
144	Pleasant Island (PI)	-	-	-
145	Homeshore (HS)	477	45	6
	Excursion Inlet (XI)	120	11	2
146	Point Sophia (PS)	-	-	-
147	Point Couverden (PC)	3	-	-
148	Spasski-Whitestone (SW)	-	-	-
160	Cape Spencer (CS)	2	-	-
	Graves Harbor (GH)	20	3	-
	Dixon Can (DC)	4	-	-
	Torch Bay (TB)	4	-	-
	Libby Island (LI)	1	-	-
	Polka Rock (PR)	-	1	-
161	Dixon Harbor (DH)	2	-	-
	Sugarloaf Island (SI)	1	-	-
	P. D. Grounds (PD)	1	-	-
	Astrolabe Point (AS)	6	1	-
	Bousole Bay (BB)	5	1	-
	Palma Bay (PB)	2	-	-
	Icy Point (IP)	7	-	2
	TOTALS	765	69	12

Appendix III. A Summary of Adipose Fin Clipped Chinook Caught in the Research Troll Fishery, 1981.

Recovery Data				Tag and Release Data		
Location		Date	F.L.	Location	Date	Tag Code
Excursion Inlet	(145)	4/27	470mm.	Little Port Walter, AK	5/79	3-16-36
Homeshore	(145)	5/04	820	Crystal Lake Hatchery, AK	6/77	4-16-16
Homeshore	(145)	5/05	610	Crystal Lake Hatchery, AK	5/78	4-18-36
Homeshore	(145)	5/09	415	Little Port Walter, AK	5/80	3-17-4
Homeshore	(145)	5/11	530	Little Port Walter, AK	4/79	3-16-33
Homeshore	(145)	5/11	580	Willamette River, OR	11/77	9-16-31
Port Althorp	(140)	4/26	620	Little Port Walter, AK	4/79	3-16-31
Port Althorp	(140)	5/05	490	Nestucca River, OR	11/79	7-18-51
Icy Point	(161)	5/02	680	Robertson Cr., B.C., CANADA	5/77	2-16-35
Homeshore	(145)	4/21	620	Adipose Only - No C.W.T.		
Excursion Inlet	(145)	4/22	468	Adipose Only - No C.W.T.		
Icy Point	(161)	5/02	630	Adipose Only - No C.W.T.		

Appendix IV. Landing and Tagging of Chinook in Electric Basket.





KING SALMON AND THE OCEAN TROLL FISHERY OF SOUTHEASTERN ALASKA

RESEARCH REPORT NO. 1
Alaska Department of Fisheries
Juneau, Alaska

KING SALMON AND THE OCEAN TROLL FISHERY OF SOUTHEASTERN ALASKA

By

Robert R. Parker and Walter Kirkness

Research Report No. 1

ALASKA DEPARTMENT OF FISHERIES

Juneau, Alaska

September, 1956

TABLE OF CONTENTS

FOREWORD

The following research report is the first of an intended series, published with the belief that a well informed citizenry is the key to proper utilization of a renewable resource. Subsequent reports will be published by the Alaska Department of Fisheries when scientific studies are sufficiently complete to provide reliable evidence for presentation.

Research reports are free and may be obtained upon request from the Department Librarian.

C.L. ANDERSON, Director
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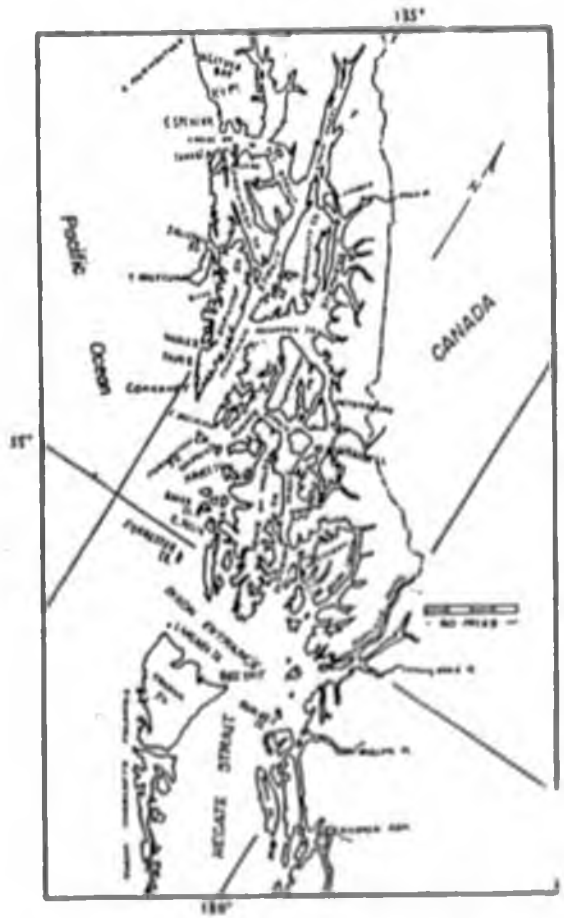

Figure 1. A map of the Pacific Coast of North America from Cape Fairweather, Alaska, to Cape St. James, Queen Charlotte Islands.

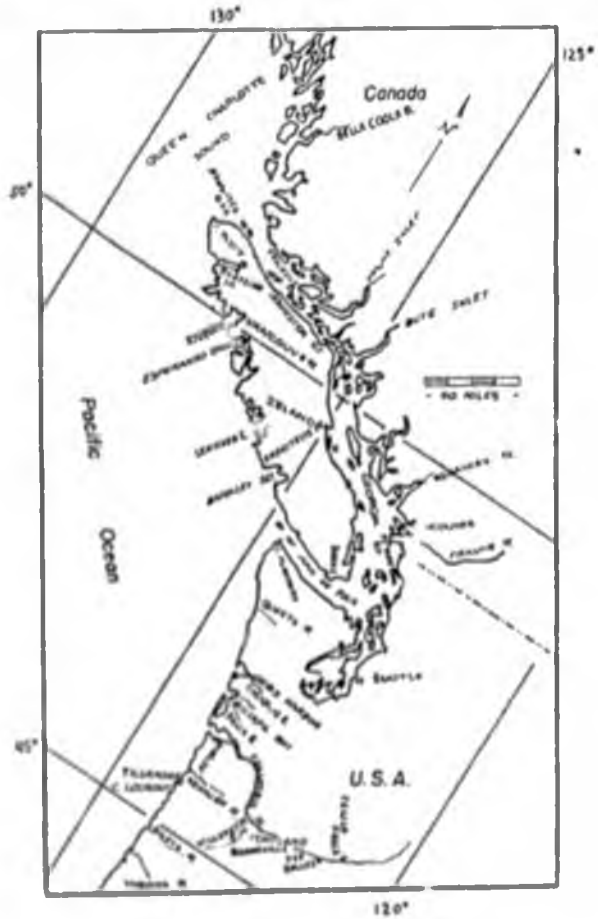

Figure 2. A map of the Pacific Coast of North America from Cape St. James to the Yaquina River, Oregon. Figure 2 is contingent with Figure 1.

KING SALMON AND THE OCEAN TROLL FISHERY OF SOUTHEASTERN ALASKA

Robert R. Parker and Walter Kirkness

STATISTICAL HISTORY King salmon (*Oncorhynchus tschawytscha*) and the troll fishery have been a permanent part of Alaska's economy since early 1900's. Cobb[1] stated:

> "For some years the Indians here (Southeastern Alaska) had been catching king salmon for their own use during the spring months, and about the middle of January, 1905, king salmon were noticed in large numbers in the vicinity of Ketchikan. Observing the Indians catching these, several white fishermen decided to engage in the pursuit, shipping the product fresh to Puget Sound ports. They met with such success that 271,644 pounds, valued at $15,400 were shipped. The next year several of the wildcat dealers established plants in this region, -- and as a result the fishery has grown until in 1915, 2,170,400 pounds of king salmon . . . . . were caught and marketed."

By 1918 production of this species by trolling had increased to 8,177,818[2] pounds. Record production of nearly 17 millions of pounds was reached in 1937; since that date annual production has fluctuated in the magnitude of nine-million pounds annually.

The value of the troll production of king salmon in 1950 was an estimated 2,951,000 dollars, computed at first wholesale value.[3] When this value is considered as a return from

(1) Cobb, 1921, p. 81.

(2) Cobb, 1921, p. 147. See footnote b of Table 1.

(3) First wholesale value is here defined as the monies received by the fishermen for their catches. In 1950 approximately 1,041,000 pounds of troll king salmon were caught and marketed. This catch was graded into large and fred mustad, approximately 11 pounds or larger, dressed, head off, small red and white. Approximately 84 percent (estimate) consisted of the catch were graded large red and sold for a seasonal average of approximately 43 cents per pound. The small red and white were sold for a seasonal average of approximately 29 cents per pound.

capital invested, the actual cash value of the resource becomes very large. In terms of local and governmental economy, the fact that the majority of the fishermen reside in Southeastern Alaska and are a stable part of the communities is a valuable asset and the troll fishery as an industry and the king salmon as a resource must be maintained. What has been said for the value of the industry that uses this resource applies equally to values accrued by sports fishermen. This phase of development is in its infancy in Southeastern Alaska, is rapidly growing and has a very large potential.

To facilitate an understanding of the history of the troll fishery for king salmon, Table 1 has been prepared. Here estimates of the annual production in pounds dressed, head on, are presented for the years 1906 to 1953. These data will not be understood unless defined by the factors that have, in part, caused them and limited them. The authors, then, have attempted a definitive history of the fishery to accompany the statistical presentation. Table 1 shows, in general, a period of rapid expansion from inception to about 1919. A second of exploration and increasing annual production ended about 193[illegible], when a third stage of slowly declining production began and continues at present. Within these general trends are severe fluctuations.

DEFINITIVE HISTORY

Trolling began as a hand line operation – a single line trolled in a row boat. Power boats entered the fishery early in the 1910's and increased the amount of gear fished per boat. Power gurdies came into general use in the 1920's allowing the use of steel lines, heavier weights, and an increase in the number of lures fished. Boats have increased in size and efficiency until the modern day troller which averages over 40 feet in length. Aids to navigation such as radio-telephone, direction finders and echo-sounders have turned the fleet as a whole into a highly efficient and mobile unit, capable of a swift change in grounds as new schools or concentrations of salmon are located. From a

Table 1. Estimated troll catch of king salmon, Southeastern Alaska, 1906-1953(a)

YEAR	CATCH	YEAR	CATCH
1953	9,235	1929	8,493
52	8,936	28	6,947
51	9,824	27	12,498
1950	7,061	26	6,606
49	9,443	25	10,493
48	9,182	24	9,676
47	9,499	23	8,524
46	10,529	22	10,137
45	7,686	21	10,928
44	6,587	1920	7,510
43	7,769	19	11,292
42	10,742	18	7,434(b)
41	11,911	17	6,414
1940	8,550	16	7,581
39	12,798	15	4,537(b)
38	14,117	14	5,155
37	16,923	13	6,514
36	12,933	12	5,959
35	11,910	11	5,489
34	9,944	1910	4,096
33	7,950	9	2,402
32	11,915	8	1,235
31	8,465	7	6[illegible]
1930	11,519	1906	1,165

(a) Catch given in 1,000's of pounds. Data taken from Heath and Cobb (1908-11), Chamberlain and Cobb (1913-13) Bower and Parsons (1914) Bower and Allen (1915-18) Bower (1919-48) and Thompson (1913-54). 1953 data furnished by Rhodolo (footnote 6).

Fishermen give catch by boxes to numbers of fish. These have been converted to pounds dressed using the factor of 20.

(b) Data given in this table are at variance with those of other authors. Cobb (1921) gives the catch of troll caught kings in 1915 as 2,170,400 lbs., 1918 – 8,177,818 lbs. Undoubtedly, a conversion of 20 lbs. per dressed fish is not proper for these early years. Many buyers were refusing fish at their buying stations that were less than 18 lbs. and a higher conversion would be in order. However, the authors are at a loss to arrive at a more reasonable figure and to what point to effect the change. Present methods of obtaining catch statistics give the raw data in lbs. of fish, which are converted to numbers of fish by dividing by 20. The authors, wishing to present the catch data in pounds have simply reconverted. The more serious error lies in extrapolating the conversion backward to the historical catch records. This has been done, in lieu of a better method, in order to present as complete a catch record as is possible.

cluster of row boats fishing in the vicinity of a buyer, the trolling fleet has emerged as a group of vessels capable of fishing for two weeks per trip and of transporting their iced catches safely to a distant buyer. Even the weather ceases to be an dominant a factor, for the use of stabilizers(6) now allows the fishermen to work in weather that would have been deemed impossible a decade ago. In the face of all these technological developments(7) the annual catches have been decreasing rather than expanding. Why?

Commensurate with technological development, the fishing grounds have been changing. Chamberlain and Cobb (1913) described Forrester Island as being the most important trolling ground in 1912. In 1913 Forrester Island and Cape Ommaney were listed as the most important (Bower and Fassett, 1914). Expansion of the fishing grounds is shown to be in progress as in 1914 (Bower and Aller, 1915) Forrester Island, Cape Ommaney, Point Lemesurier, Point Casmano, Kashakes Point, Craig, Wrangell and Sunny Bay are all listed as important trolling areas. In 1916 (Bower and Aller, 1917) the most important waters were near Port Conclusion (Cape Ommaney), Noyes Island and Forrester Island.

The present trolling grounds of the Alaska fleet extend from Northern Hecate Strait on the south to Cape Fairweather on the north. Occasional landings originate west of Cape Fairweather but are not of sufficient magnitude to enter into the present discussion.

The history of Forrester Island may be further followed in historical records (Rich and Ball, 1933). The catch of kings in the vicinity of Forrester Island was in 1912, 22,380 fish; in 1913, 20,689; 1914, 82,122; 1915, 13,356; 1916, 595; 1917, 17,154; 1918, 11,463; 1919, 2,500; 1925, 1,160; 1926, 920. Production is seen to drop rapidly after a high in 1914, and during a time of expanding markets and demand. Today

(6) Scofield, 1950, gives a description of stabilizers as used by trollers.

(7) Fry and Hughes, 1951, give an adequate description of modern trolling methods and gear. Alaska I also has trollers by law on the use of 4 lines per boat.

the Forrester Island ground is rarely visited by the troller.

Rich and Ball (ibid.) lists the junction of Frederick Sound with Chatham Strait, and Cape Ommaney as important trolling grounds, saying:

> "Hundreds of trollers resorted to these regions and made phenomenal catches of salmon."

The catches of king salmon by lines in Southern Chatham Strait (includes above important areas) show a peak production of 373,427 fish in 1924 and a "normal production level" of 144,124 fish in 1927. No data are available for this specific area until 1951 when 11,526 kings and 1952 when 16,951 kings were landed.(8)

It is only possible to pinpoint the period of decline by the records(9) of mild cure salmon produced at Port Alexander, near Cape Ommaney. In 1930, 385 tierces(10) of kings were mild cured. In 1933 the pack was 1,020 tierces; 1937, 1,182 tierces and in 1938, 342 tierces. Production remained substantially at this level until 1942 (256 tierces). In 1943, only 43 tierces and in 1944 only 59 tierces were packed. Since that time mild curing has not been resumed at Port Alexander.

A comparison of catch from several trolling areas, past and present, are presented in Table 2. Area designation follows as closely as possible that of Rich and Ball (ibid.). It will be seen that South Chatham Strait and the West Coast of Prince of Wales Island production has fallen to comparatively low levels. We are able to see, then, the virtual disappearance of important king salmon trolling grounds during a period of exploration, expansion, and technological development. It is not remarkable that such events should occur in almost perfect correlation with the destruction of the Columbia River spawning grounds.

(8) Data by courtesy of E. C. Standish, Supervisory Statistician U. S. Fish and Wildlife Service.

(9) Pacific Fishermen yearbook series. These records are incomplete but do show consistency for mild cure production at Port Alexander for the period 1927 on down.

(10) A tierce of mild cure equals approximately 825 lbs. of which 500 lbs. of dressed troll king salmon are required to fill one tierce.

Table 2. Comparison of catches in selected trolling areas of Southeastern Alaska of years prior to 1928 with 1952. Catches in numbers of fish.

AREA	PEAK YEAR(a)	PEAK CATCH	1927 CATCH	1952 CATCH(b)
Icy Strait	1927	43,086	43,086	32,032
North Chatham Strait	1919	18,947	3,498	4,459
South Chatham Strait	1924	373,427	144,124	16,951
West Coast Baranof and Chichagof Islands	1923	298,071	113,239	159,399
West Coast of Prince of Wales Island	1913	146,615	14,646	43,521

(a) Peak year refers to peak catch up to and including 1927. 1928-1951 catches are not available.

(b) 1952 data courtesy of E. C. Hinedale, Supervisory Statistician, U. S. Fish and Wildlife Service.

A STRONG WARNING

A warning note to the industry was sounded by Dr. Rich when in 1932 he wrote(9):

"This constant increase in the catch of this species (king) has been due undoubtedly to a corresponding increase in the amount of trolling, in which type of fishing kings and cohos (*O. kisutch*) are taken almost exclusively. It has been mentioned . . . that tagging experiments have shown that many of the kings taken by troll off the coast of Southeastern Alaska and British Columbia are native to the Columbia River and to a lesser extent to the rivers farther south . . . . Under such conditions the conservation of this species in Southeastern Alaska is not at all a local matter, but is intimately involved with the troll fishery off the coasts of British Columbia, Washington, Oregon, and California, as well as the important fisheries in the Columbia River.

"The Columbia is undoubtedly the most productive stream in the world so far as king or chinook salmon are concerned and evidently dominates the catch throughout at least the northern part of the western coast. The Columbia River runs have been fished intensively for many decades and show unmistakable signs of depletion . . . .; the spawning areas have been greatly reduced by the erection of dams and the drain on the resource has been gradually increased by the development of the fishery in the river and more recently by the increase in trolling. The future seems doubtful and a continuation of the increase in the catch of kings in Southeastern Alaska seems most unlikely, although certainly there is no indication of reduced catches in the data herein considered. If this valuable fishery resource is to be preserved, however, a complete and detailed study of all the influences that bear upon the maintenance of the Columbia River kings should be undertaken without delay."

(9) Rich and Ball, 1933, page 662.

The Fishery agencies of the States of Oregon and Washington in cooperation with the U. S. Fish and Wildlife Service have stated(10):

"1. The Federal Government has constructed 40 dams on the Columbia River watershed during the period 1902 to 1942.

2. Thirty-five of these dams constitute total barriers to fish migration.

3. Any dam which necessitates a fish ladder causes a substantial loss through delay, injury, and death to both upstream and downstream migrants.

4. In the Columbia River watershed still available to salmon there are 14 large Federal water diversion projects, six of which are screened. Of the total migration, of young salmon through the average diversion canal, it is known that as much as 100 per cent have been lost through inadequate or defective screen units or through improper care.

5. Seventy per cent of the original total stream mileage of the Columbia River watershed has been lost to anadromous fish as a result of Federal dam construction.

6. The spring chinook salmon fishery of the Columbia River has been reduced to less than 10 per cent of its original magnitude, principally as a result of Federal dam construction."

SITUATION UNCHANGED

The situation today, concerning our king salmon and our troll fishery is no less critical than in 1947, despite the vast sums expended in both research and correction. In an address to the Eighty-third annual meeting of the American Fisheries Society, Mr. John L. Farley, Director of the Fish and Wildlife Service, stated(11):

(10) Anon. 1947 – p. 12

(11) Farley, 1953, p. 15

"The most serious threat to the maintenance of Pacific Coast salmon is the construction of major dams, particularly on the Columbia River watershed."

He further stated,

"The States of Washington and Oregon joined with the Fish and Wildlife Service and the Corps of Engineers in 1949 in a comprehensive program for the rehabilitation and development of all possible tributary streams *below* the site of McNary Dam." (12) (emphasis the authors')

This statement seems to exclude the possibility of maintenance of king salmon stocks, *status quo*, above the site of McNary Dam. It appears that civilization marches with a longer pace than science.

(12) McNary Dam was completed and dedicated in 1954.

RACIAL COMPOSITION

LITERATURE REVIEW

Proof of the influence wielded by the Columbia River on the troll fishery of Southeastern Alaska was given by the results of a tagging experiment conducted by the U. S. Bureau of Fisheries in 1927. Rich and Ball (ibid. p. 575) reported:

"It is also known that the king salmon of these coastal waters (Southeastern Alaska) are not all destined to the streams of Alaska, ... , but are members of several populations, probably representing runs to the rivers of the mainland from the Columbia River northward. This wide dispersion of king salmon from these localities was shown by an experiment in 1927 when 382 troll-caught kings were tagged and released off the west coast of Baranof Island. Of the 38 recaptured, 22 were taken at the Columbia River, ..."

Pritchard (1934) in summing up a series of Canadian experiments has shown: (1) kings tagged off the coast of Canada show a predominant southward movement to the natal streams. Counter movement is barely in evidence; (2) a regression of the percentage of Columbia River kings in the catches in areas from south to north, and (3) contributions of practically all major rivers from the California-Oregon boundary northward. Pritchard postulated a series of "northern limits of influence", i.e. as one fishes northward he would pass through a predominantly Columbia River stock and into a Fraser River zone, Skeena River zone, etc.

On the basis of all tagging experiments, Silliman (1948) further advanced the theory of a regression of Columbia River influences from south to north giving the equation R = 65.9 - .413L where R is the percentage of Columbia River recoveries of tags and L is the north latitude less 48 degrees, expressed in minutes and divided by five. Using this regression Silliman corrected the estimated catches of kings landed in Ketchikan, Sitka, and Pelican by the factors 0.30, 0.21 and 0.16, respectively, to obtain the Columbia River contributions.

We have, then, a hypothetical measure of the contributions of the Columbia River to the troll catches of king salmon in Southeastern Alaska.

A RE-APPRAISAL

Feeling that, on the basis of historical developments as related, the troll fishery for king salmon in Southeastern Alaska had a perilous future, the Alaska Department of Fisheries undertook in 1950 a re-appraisal of the present condition of the stocks as fished. The remainder of this report will be confined to a description of the stocks of king salmon as found in the ocean fishery, the stocks found in inside waters to be the subject of a future report. This research program was designed and conducted coincident with a similar program sponsored by the Pacific Marine Fisheries Commission[13], formed by the States of California, Oregon and Washington. Canada joined in the efforts with a similar program off the Canadian Coast.

The most direct approach to the question of racial composition of the present stocks of king salmon as fished by the Alaska troller is through tagging. Two main areas were selected for study, (1) the west coast of Prince of Wales Island (Area III), and (2) the west coast of Chichagof Island (Area II). These areas support the most productive fisheries of the present areas fished and are widely separated. Counter migration, if it existed, would be shown by such a selection. A third area bounded by Cape Spencer and Cape Fairweather (Area I) was studied, not as a principal production area but because of a possible future increase in trolling intensity.

TAGGING METHODS

King salmon for tagging were bought directly from the fisherman. Arrangements were made for the scientist to accompany the vessel for trips of 10 to 14 days, all fishing operations, such as area, gear, and methods used were left to the discretion of the fisherman. The duties of the scientist were limited to the tagging of the fish and recording of the data. Reimbursement for the fish was made on the basis of estimated dressed weights obtained through length-weight studies and the prevailing price for fish at the nearest cold storage port of landing. The fish tagged and sampled are considered as representative of the troll catch of kings landed in the areas sampled.

Only fish in reasonably unharmed condition were purchased for tagging and these were graded according to the extent of their injury and their apparent condition. The returns of tags have indicated that apparent condition at the time of tagging is a reliable measure of chance of survival. For the arbitrary grades "A" (best), "B" and "C" the 1950 percentages of recovery of 1950 tagging were 13.9, 10.5 and 0, respectively. These returns led to the elimination of "C" grade fish from the tagging data and such fish were not tagged in further experiments.

In 1950 and 1951 the standard "Petersen" type tags were used, consisting of two celluloid discs five-eighths of an inch in diameter with a centered hole and a pure nickel pin. One disc was colored red and the other white; both were printed with "Alaska Dept. of Fisheries, Juneau" and bore identical serial numbers. To attach the tag, one of the discs was placed next to the head of the pin and the fish was pierced in the region immediately below the insertion of the dorsal fin. The second disc was then threaded on the pin and a knot tied in the exposed end of the pin to prevent the tag from separating. In the 1952 tagging an adaptation of the Petersen tag was used in the nose. The pin bearing a disc three-eighths of an inch in diameter was inserted through the roof of the mouth just posterior to the oral flap. A five-eighths inch baffel was then affixed to the dorsal surface of the nose and a knot tied in the pin. This later "nose-tagging" method appears to have several advantages over the fin position, yielding a higher percentage of tags recovered and showing less evidence of skin abrasion.

(13) Results published under various authorship in Bulletin 2, Pacific Marine Fisheries Commission, 1951.

A canvas-lined box holding approximately 80 gallons of water was used as a live box. The fish were placed therein as caught and the fishing gear carefully removed from the mouth. Several methods were used for landing the fish including dip nets and gaff hooks but the most successful was to lift the fish directly aboard by the trolling g ar. On fish weighing in excess of 20 pounds this method is seldom feasible and careful gaffing in the lower jaw gave the best results with a minimum of injury. The live box was continuously supplied with fresh sea water by means of a mechanical pump and the fish were tagged, measured, and a scale sample obtained while supported in water. Figure 3 illustrates this method of tagging fish and a fin tag in place.

The several individual tagging experiments are grouped in Table 3 according to the main areas of tagging as previously set forth in this text. Table 4 presents the recoveries grouped according to area. Complete recovery data by tag number are presented in Appendixes I–III.

Table 4 indicates the contributions of the Columbia River to the Alaska troll fishery. A finer analysis of the data illustrates that 21 of 27 stream recoveries (78 percent) from Area I were of Columbia origin. For Area II and III the Columbia River recoveries were 18 of 44 (41 percent) and 6 of 13 (46 percent) respectively.

The Fraser River is also a large contributor to Alaska's troll fishery. Of stream recoveries from Area I, 3 of 27 or 11 percent were of Fraser origin. Stream recoveries from Area II were 44 of which 12 or 27 percent were from the Fraser. For Area III, 4 of 13 stream recoveries or 31 percent were recovered in the Fraser. This comparison shows a striking similarity of king salmon found in Areas II and III, and a dissimilarity between Area I and Areas II and III, Area I is characterized by a high percentage of Columbia River king salmon.

Direct use of these data for calculating the contributions of these rivers to the Southeastern Alaska troll catch should be made with discretion. Silliman (1948)[14], recognizing the

(14) Silliman (1948) pp. 1 and 2.

inherent errors in such an application, stated:

> ". . . it is well to recognize that their (tagging and recovery data) suitability for this purpose is entirely dependent upon the fishing intensity and recovery effort . . the various regions. For instance, we assume a stock of 1500 tagged salmon, composed of 1,000 British Columbia and 500 Columbia River fish. Disregarding other mortality, and assuming 100 percent recovery of tagged fish caught, a fishing intensity of 25 percent in British Columbia and 50 percent in the Columbia River would result in 250 recoveries of tags in each region, and evidence from recoveries alone would point to 50 percent Columbia River fish instead of the true 33 1/3 percent. When efficiency in recovering the caught fish, as well as fishing intensity itself, varies, the situation is further complicated. . . . the consideration of another source of error . . . the application of the tagging results to years other than those during which the experiments were performed. It is necessary here to realize that the percentage of Columbia River fish on the British Columbia trolling grounds depends upon the abundance of other fish as well as those from the Columbia. If other fish increase in numbers the percentage of Columbia River fish will decrease, even though their absolute number remains the same."

Recognizing these sources of error, and lacking the necessary data to correct for them leaves the authors little choice but to summarize the tagging data as follows, but with reservations on the relative importance of the Fraser and Columbia Rivers:

1. The largest single source of supply of king salmon for the Southeastern Alaska troller is probably the Columbia River.

2. The second largest single source of supply is probably the Fraser River.

3. All major streams from Southern Oregon northward to Southeastern Alaska contribute, but to a lesser degree.

Of the fish known to be of Columbia River origin, further analysis is possible. The data presented in Appendixes I–III give the date of recapture of all recoveries.

It is seen, that according to the month and recoveries made, there were two in April, three in May, three in July,

Figure 3. Illustrating the method used for handling fish for tagging aboard a troller at sea.

Table 3. Schedule of tagged fish released and recoveries by time and area of tagging.

AREA	DATES	NO. TAGGED	NO. RECOVERED	PERCENT RECOVERED
Area I				
Cape Spencer to Cape Fairweather	June, July, 1950	132	22	.166
	June, July, Aug., '51	75	9	.120
	May, June 1952	158	26	.164
	Total	365	57	
Area II				
Sitka to Cross Sound	May, June, July Aug., Sept. 1950	358	68	.190
	June 1951	22	6	.273
	Total	380	74	
Area III				
Warren Island to Cape Fells	May, June, July 1950	173	26	.150

Table 4. Percentage recovery of tagged king salmon by area.

AREA OF TAGGING	AREA OF TAGGING					
	Area I		Area II		Area III	
	No. rec.	% rec.	No. rec.	% rec.	No. rec.	% rec.
Oregon Coast Streams	0		6	8.1	0	
Columbia River	21	36.8	18	24.3	6	23.1
Washington Coast streams	1	1.8	4	5.4	1	3.8
Fraser River	3	5.3	12	16.2	4	15.4
British Columbia streams	0		4	5.4	2	7.7
Alaska streams	2	3.5	0		0	
Washington inside waters	0		3	4.1	1	3.8
British Columbia inside waters	1	1.8	5	6.8	3	11.6
Alaska inside waters	1	1.8	1	1.4	0	
Oregon ocean fishery	0		1	1.4	1	3.8
Washington ocean fishery	2	3.5	0		0	
British Columbia ocean fishery	13	22.8	8	10.8	5	19.3
Alaska ocean fishery	13	22.8	12	16.2	3	11.6
TOTAL	57		74		26	

fourteen in August, twenty-one in September, and two in October. Silliman (1950) states[15]:

> "In contradistinction to the legal fishing seasons noted, certain large and obvious fluctuations in the catch during the fishing season have been recognized by fishery biologists and have led them to speak of at least three separate Chinook salmon runs. These are more readily apparent for data from early seasons, before certain of the runs were reduced in abundance . . ."

Roughly these runs are (1) the spring run of May, (2) the summer run of June and July, and (3) the fall run of August, September and October. Without considering the effects of closed periods of fishing[16] the recoveries show a large majority of the Columbia River king salmon tagged were of the fall run, possibly in excess of 80 percent.

The recovery of tags by locality in the Columbia River strongly suggests that the stocks Alaska is concerned with are of upriver (above Bonneville Dam) origin. Of 37 recoveries in the fall run, 12 were recovered at The Dalles or at Celilo. The various component races of the fall run are hopelessly mixed in the lower Columbia River and nothing can be said of tag recoveries from that area except that the majority of them could have belonged to upriver races. Until the problem of salmon and dams is satisfactorily solved, it seems obvious that with the completion of each new dam on the Columbia River, a further depression of abundance of king salmon available to the Alaska troller will be certain.

(15) Silliman, 1950, p. 367.

(16) Since these deductions are based entirely upon tags returned and these are almost entirely due to commercial fishing, the periods of closed season will markedly affect the analysis. No ready means of correction have occurred to the authors, and the data are herewith presented as face value.

STOCK CHARACTERISTICS

For the remainder of the rest, it is the objective of the authors to present data and make analyses that may in general be used to describe the characteristics of the stocks of king salmon, as found in the coastal waters of Southeastern Alaska during the years 1950 to 1952, inclusive. The conclusions drawn may not accurately describe conditions during years other than those sampled, for the stocks are dynamic in regard to racial origin, as well as being subjected to everchanging environmental influences, both of natural and human origin. In addition to kings tagged and released, measurement data were taken from fish unfit for tagging and these two series of measurements are combined to describe the stock as a whole for each area.

SIZE FREQUENCY

The length frequency of the fish sampled is presented as an estimation of the length frequency of the stocks found in Areas I, II and III. Original measurements were obtained by holding the specimen against one side of the tagging box to which was affixed a ruler marked in inches. The measurement used was straight line distance from the tip of the snout to the end of the center rays of the caudal fin. This measurement is known as "fork length." Measurement was taken to the closest one-half inch. The manner of obtaining these measurements leaves much to be desired, but principal importance was placed upon returning tagged fish to the water with as little abuse as possible. The lengths presented then, are not strictly accurate, but do reflect the size composition of the stock. The original data have been grouped in two and one half inch size groups for presentation in Table 5.

A comparison of the stocks of kings as sampled in the three areas reveals an apparent regression in average size from south to north. Prominent modes are displayed at the 35.0 and 37.5 inch groups in Area III, at the 30.0 and 32.5

inch groups in Area II and at the 27.5 and 30.0 inch groups in Area I. Further evidence of these apparent differences may be determined from an examination of Table 6. Data are available for 1950 from only the Ketchikan and Sitka landings. No data are available to properly weight these averages into a seasons total except to note that the principal fishery for kings occurs during May, June and July. During this period the average weights for the Ketchikan landings are consistently greater than for the Sitka landings. The same relationship is apparent for landings originating from south of Cape Spencer compared with landings originating northwest of Cape Spencer in the years 1953 and 1954. Also apparent is the manner in which the average weight falls as the season progresses. In addition Table 6 illustrates the dynamic status of the populations from year to year. The 1954 season was characterized by an early run of large fish and this feature is reflected in the data.

We may summarize the size characteristics of the king salmon by stating (1) the average size of the king salmon found in the offshore waters of Southeastern Alaska increases from northern extremity to southern extremity, and (2) the average size may be expected to decrease as the season progresses in any given year. A full explanation will be offered later in the text.

AGE ANALYSIS

In order to understand the size composition of the stocks of king salmon it becomes necessary to transpose the discussion into terms of age classes or year groups. From each fish sampled a group of scales was taken for use in age analysis. Procedures used in assessing age to particular fish were standard, and interpretations follow those outlined by Fraser (1917) and Rich (1925). The symbols used to designate age are the year of life in which the fish is taken with a subnumber designating the year of life in which the fish entered the sea. Thus the notation 5_3 designates a fish captured in its fifth year that migrated from the natal stream to the sea during its second year. The ages receiving the subnumber

Table 5. Length frequency of king salmon as sampled in the outside waters, Southeastern Alaska, in two and one half inch size groups, 1950 - 52.

Call Boundary Inches	Call designate Inches	AREA I No.	AREA I Percent	AREA II No.	AREA II Percent	AREA III No.	AREA III Percent
11.25 - 13.75	12.5	1	0.2				
13.75 - 16.25	15.0	10	2.2	4	0.8		
16.25 - 18.75	17.5	9	2.0	2	0.4		
18.75 - 21.25	20.0	19	4.1	3	0.6		
21.25 - 23.75	22.5	35	7.6	11	2.1	3	1.5
23.75 - 26.25	25.0	56	12.1	40	7.6	3	1.5
26.25 - 28.75	27.5	147	31.9	83	15.8	13	6.6
28.75 - 31.25	30.0	114	24.7	117	22.4	26	13.3
31.25 - 33.75	32.5	42	9.1	117	22.4	31	15.8
33.75 - 36.25	35.0	21	4.6	91	17.3	46	23.5
36.25 - 38.75	37.5	6	1.3	43	8.2	47	24.0
38.75 - 41.25	40.0	1	0.2	10	1.9	23	11.7
41.25 - 43.75	42.5			1	0.2	3	1.5
43.75 - 46.25	45.0			1	0.2	1	0.5
46.25 - 48.75	47.5						
48.75 - 51.25	50.0			1	0.2		
Total		461	100.0	524	100.1	196	99.9

Table 6. Average weights of kings sampled in cold storage ports of landing – Ketchikan, Sitka, and Pelican.(a)

Period	Average weight in pounds					
	Ketchikan 1953	Sitka 1953	South of C. Spencer 1953	1954	[illegible] of Spencer 1953	1954
May 1-10			19.02	21.75		
11-20				21.96		18.55
21-30	14.67		18.37	21.78		16.10
31-June 9	16.80		17.93	19.47	16.35	15.86
10-19	17.39	16.38	17.96	18.20	14.89	16.96
20-29	18.93	17.14	18.13	17.99	18.47	16.04
30-July 9	18.13	16.69	18.10	17.79	18.12	18.69
10-19	17.68	16.88	17.61	16.62	15.78	15.28
20-29	18.26	17.28	17.60	18.31	16.66	12.79
30-Aug. 8	19.71	16.96		17.45		11.74
9-18	14.96	17.74		16.65		10.82
19-28	12.17			16.84		9.00

(a) Ketchikan landings include Hecate Strait and Dixon Entrance in addition to West Coast of Prince of Wales Island. 1953-4 data supplied by Pacific Marine Fisheries Commission. Sampling was done at Pelican Cold Storage.

designation 1 are the "ocean type" of Fraser (ibid.) and Rich (ibid.), those receiving the subnumber 2 are the "stream type."

In a study of this type, considerable room for doubt of correct interpretation exists, particularly in distinguishing a stream type from an ocean type nucleus. In their treatment of the material, the authors have made every effort for a "correct" interpretation but realize the possibility of error. The interpretations are consistent with each other, for repeated checks of the material have yielded materially the same interpretation.

From a total sample of 1181 specimens, 110 or 9.3 percent of the scales were unreadable for a variety of reasons. These fish were assigned age designations by length groups according to maximum likelihood as determined by the rest of the sample.

Table 7 presents the results of the age analysis. The size frequency data previously discussed (Table 5) are seen to reflect the age composition of the stocks encountered in Areas I, II, and III. A regression is apparent in age from Area III to Area I.

Table 7. Age composition of king salmon as sampled in the outside waters of Southeastern Alaska, 1950-2

Age	AREA I			AREA II			AREA III		
	No.	Total	Percent	No.	Total	Percent	No.	Total	Percent
3_1	17	18	3.9	7	7	1.5			
3_2	1			0					
4_1	94	115	24.9	36	40	7.6	9	10	9.1
4_2	21			4			1		
5_1	231	285	61.8	100	320	61.1	73	85	43.4
5_2	54			20			12		
6_1	28	41	8.9	117	146	27.9	73	91	66.4
6_2	13			29			18		
7_1	0	2	0.4	7	11	2.1	3	18	9.1
7_2	2			4			7		
Total	461	461	99.9	524	524	100.0	196	196	100.0

The phenomenon displayed in the average weight data of decreasing size as the season progresses is also reflected in the age frequency of Area I. Table 8 presents this material by 30 day periods. Area I is characterized by a large percentage of immature fish. The older, more mature, fish leave the area during the spring months and early summer resulting in an increasing percentage of immature fish as the season progresses. This same exchange is undoubtedly true for Area II and III, except that a smaller percentage of immature fish is present throughout the season.

Table 8. Percentage age composition by 30-day periods in Area I.

Period	AGE 2	3	4	5	6	Total
May 1-30	2	8	70	20		100
May 31-June 29	1	10	80	6	2	99
June 30-July 29	8	29	58	5		100
July 30-Aug. 28	1	51	42	6		100

AGE-SIZE RELATIONSHIP

The relationship between age and size is dynamic throughout the season. The samples were drawn from a population at the height of the growing season; age, on the other hand, is determined from year to year with no intermediate designations. Having insufficient samples to break into small units of time and describe several age-size relationships, the authors have measured a large sample of the available scales from Areas I and II and applied Fraser's technique[17] in calculating the size at the completion of each annulus. These values are presented in Table 9 for ocean and stream type individuals.

Inspection of the values given in Table 9 shows Lee's phenomenon apparent in these data.

An exception is the calculation for Area I, ocean type fish in their fifth year. The values obtained exceed those for fish in their third and fourth years. Fraser (ibid.) explained the phenomena of older fish having lower average increments throughout their life than younger fish in that the largest fish of each year class matured and spawned while the smaller individuals remained at sea and spawned a year or more later. This explanation does not clearly explain why the phenomena should manifest itself in calculations based upon a collection of scales from fish shown (by tagging) to be largely immature as is the case of the samples drawn in Area I. Whatever the correct interpretation may be, the relationship between age and size is better explained by restricting the data to the use of the calculated size at the completion of the last annulus. These statistics may be determined by reading the last of the columned figures diagonally in Table 9.

An apparent difference between the size of the fish of the same age found in Areas I and II is shown to exist by data in Table 9. In the ocean type fish this difference occurs in the second growth year as the increments for the other years of life are similar in both areas. This can best be shown by the use of annual increments as calculated from the values of Table 9 and presented in Table 10. For the stream type fish the early years are not comparable due to the absence of fish

(17) Fraser (ibid.) made detailed studies on the growth of the king salmon (chos pinnatis) in the waters of Georgia. He accepted the theory advanced by Lea, and others, which proposed a linear relationship between the growth of the scale and the growth of the fish. Lee's formula was objected to by many investigators, but principally on the basis of Lee's phenomenon which refers to an apparent discrepancy between the growth as calculated from the scales of older fish and growth as calculated from the scales of younger specimens. Fraser used the length of the fish at the time (con't.)

(17 — con't.) when the scales are formed (1.5 inches) to a corrected formula which with our notation is $L_1 = \frac{S_1(L-1.5)}{S} + 1.5$ where,

L_1 denotes the desired length of the fish at some previous date,
L denotes the length of the fish at capture,
S_1 denotes the length of the scale as measured along a radius from the edge of the original platelet to the length at the desired date, and
S denotes the length of the scale as measured along the same radius from the edge of the original platelet to the margin.

For a detailed account of scale-body relationships the reader is referred to Van Oosten (1929).

Table 9. A comparison of average fork lengths in inches at the completion of each annulus as calculated from king salmon of each age group by means of Fraser's formula.

Type of Scale	Area	Completed annulus number	Number of completed annuli				
			1	2	3	4	5
Ocean type	Area I	1	11.0	9.1	8.3	9.5	
		2		18.9	18.3	19.1	
		3			24.9	26.0	
		4				32.0	
		Size of sample	13	40	89	24	
	Area II	1	11.3	10.2	9.1	8.7	7.8
		2		21.9	19.7	18.2	17.0
		3			27.8	25.7	23.4
		4				32.8	29.7
		5					36.1
		Size of sample	4	22	195	75	7
Stream type	Area I	1	4.3	5.2	5.1	4.8	6.4
		2		16.7	16.0	15.0	15.2
		3			23.8	22.2	21.8
		4				29.3	28.2
		5					32.6
		Size of sample	1	17	76	8	2
	Area II	1		5.2	5.1	5.2	4.9
		2		18.8	17.2	17.0	15.0
		3			25.9	24.8	22.8
		4				32.7	30.8
		5					39.7
		Size of sample		1	10	19	4

in their second and third years in Area II. Where comparison can be made the rate of growth is quite comparable, however, the number of samples do not lend any degree of confidence to the results.

Table 10. Annual increment of king salmon as calculated from the growth year prior to the last annulus.

Growth year	Average annual increments in inches			
	Ocean type		Stream type	
	Area I	Area II	Area I	Area II
1	11.0	11.3	4.3(b)	
2	9.8	11.7	11.5	13.3(b)
3	6.6	8.1	7.8	8.7
4	6.0	7.1	7.1	7.9
5		6.4(c)	4.4(c)	8.9

(a) Based on 3 specimens.
(b) Based on 1 specimen.
(c) Based on 2 specimens.

ANNUAL INCREMENT

Compared with Fraser's growth tables[11] these specimens show faster early growth but a lesser annual increment in later years. For sizes or ages of kings normally encountered by the commercial troller as immatures (not in the final year) annual increment is estimated as the calculated growth between the end of the penultimate and the end of the ultimate annuli. These averages are: for Area I, ocean type, 6.5 inches, stream type 7.6 inches; for Area II, ocean type 7.8 inches, stream type 8.2 inches. As an estimate for both types, weighted by the occurrence in the samples, the average expected annual increment is for Area I 6.7 inches and for Area II 7.9 inches. These estimates are based on calculated growths for the 1949 and 1950 growth years; certainly growth different years will not be precisely the same.

SIZE-WEIGHT RELATIONSHIP The relationship between size and weight is a useful statistic for estimating the weight of a measured sample. Market measurements were obtained throughout the season at Ketchikan, Sitka and Juneau. The data were first inspected for evidence of significant differences between the areas or during different periods of time. While small differences do exist, the most useful statistic will be one which describes the whole of the fishery and this may be done without serious error. The original measurements were obtained in units of one half inches and one half pounds. Samples from the empirical data were selected to suppress the emphasis placed in a study of this type by the modes of the sample and to equalize the influence of the extremes of the size range. The total sample was held to 1,000 individual sets of measurements. The relationship between length and weight is best expressed by the parabolic equation $W = \frac{L^{3.151}}{3542}$ ..... (1)

where W denotes estimated dressed weight in pounds and L denotes the fork length in inches.

Table 11 presents the calculated values at two and one half inch intervals and compares them with the average weights and their standard deviations derived from the empirical data at the same length intervals. The calculated values are an extrapolation of equation (1) below 25.0 inches and above 42.5 inches of fork length for only 38 measurements were obtained below and 6 above the aforementioned levels in the 1,000 total sample selected.

OCEAN MORTALITY If the following major assumptions be granted:

1. Fishing mortality on the stocks of kings herein considered is uniform over the size range and between the years contained within the tagging experiment.

2. Tag loss is not progressive, i.e., tag loss is complete in the initial year of tagging. We have refer to the tag loss

Table 11. Computed values of the length weight relationship of king salmon compared with empirical data and their standard deviations.

Fork length inches	Computed weight pounds	Empirical average weight, lbs.	Standard deviation	No. in sample
12.5	0.8			
15.0	1.4			
17.5	2.3			
20.0	3.6			
22.5	5.1			
25.0	7.2	7.2	.78	22
27.5	9.7	9.3	.94	19
30.0	12.7	11.8	1.41	19
32.5	16.4	16.1	1.92	36
35.0	20.7	21.3	3.07	35
37.5	25.7	26.6	2.04	21
40.0	31.6	30.9	2.68	15
42.5	38.2	38.6	2.88	5
45.0	45.7			
47.5	54.1			
50.0	63.7			