AGENDA E-1
July 1981

# M E M O R A N D U M

TO: Council, SSC, and AP Members

FROM: Jim H. Branson
Executive Director

DATE: July 14, 1981

SUBJECT: Southeast Alaska Salmon

*ACTION REQUIRED*

*E-1(a)* *Review status of fishery and Amendment #2. Information only.*
*E-1(b)* *Call for proposals for 1982 season*
*E-1(c)* *Review limited entry objectives and alternatives. Further direction required.*
*E-1(d)* *Appoint additional members to limited entry workgroup.*

AGENDA E-1(a)
July 1981

# M E M O R A N D U M

TO: Council, SSC, and AP Members

FROM: Jim H. Branson
Executive Director

DATE: July 14, 1981

SUBJECT: Report on 1981 troll fishery to date, and status of Amendment #2

*ACTION REQUIRED*

*Information only.*

BACKGROUND

The Southeast Alaska troll season opened one month later (May 15) than previous years. By early June the catch had exceded the 1980 catch to the same date. Troll harvest as of July 10 was estimated by ADF&G at 145,000 including 10,000 caught during the winter fishery before April 15. This is 53% of OY. Due to the high catch rate a 9-day closure was implemented from June 26 - July 5 to slow the harvest.

The bulk of the harvest (77%) so far has come from outside/FCZ waters, with 36% coming from off Baranof and Chichagof Islands (areas 113 and 154). Nineteen percent was from the northern outside districts.

A 10-day closure is anticipated for late-July to early-August to move coho inside. If chinook catch rates continue at the same rate as early season, the (federal) OY will be reached by the end of August even with this closure.

Amendment #2

Proposed regulations for the 1981 fishery were approved on June 23 and became effective immediately. Final regulations may be promulgated as early as August 25 if the 30-day cool-off period is waived.

AGENDA E-1(b)
July 1981

# M E M O R A N D U M

TO: Council, SSC, and AP Members

FROM: Jim H. Branson
Executive Director

DATE: July 14, 1981

SUBJECT: Salmon Regulations

*ACTION REQUIRED*

*Formal call for proposed regulations for 1982 troll salmon season.*

BACKGROUND

It is time to start planning for the 1982 season, and the Council should ask for proposals from the public and agencies at this time. Proposals will be accepted until the September meeting in Anchorage. In order to have regulations in place by season opening, the Council should plan on stating preferred alternatives at the November meeting in Sitka and final decision at the December/January meeting with the Board.

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AGENDA E-1(c)
July 1981

# M E M O R A N D U M

TO: Counci, SSC, and AP Members

FROM: Jim H. Branson
Executive Director

DATE: July 15, 1981

SUBJECT: Limited Entry Options and Considerations

*ACTION REQUIRED*

*Review and provide further direction for workgroup.*

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# LIMITED ENTRY OPTIONS

The Council has been discussing limited entry for the salmon fishery in the FCZ for several years. These discussions have continued for two primary reasons: (1) chinook salmon stocks originating in Southeast Alaska and other areas continue to fall short of historic production levels; and (2) offshore (FCZ) catches of both chinook and coho have increased dramatically in recent years. More and more restrictions on the troll fleet have been imposed each year without improving stock conditions. Many people feel that limited entry is the only way to re-establish the inside/outside harvest balance, reduce interceptions of mixed stocks, and more equitably distribute the catch among user groups.

At the May meeting the Council discussed principles of FCZ limited entry for the troll fishery. Many questions about goals and guidelines were raised, and a workgroup was established to weed-out some of the extraneous concepts and help focus future discussions. The initial workgroup, consisting of Jim Glock, Pat Travers, George Utermohle and Lewis Schnaper, was directed to draw-up a list of potential goals of FCZ limited entry, analyse each goal, and describe methods of reaching them. The Council provided the following suggestions and topics to be considered:

1. Stabilize and/or reduce the total FCZ salmon catch to 1977 or other historic level.
2. Keep the system simple to understand and administer.
3. Utilize both transferable and non-transferable permits.
4. Tie the FCZ permit to the state permit.
5. Address hand and power trollers equitably.
6. The fishing season should be year-round. (We considered this impractical and would suggest the traditional season length.)
7. The system should improve the livelihoods of those involved.
8. An "economically optimum" fleet size must reduce harvest pressure to biologically acceptable levels to be satisfactory.
9. Determine whether to use pounds, landings or some other criteria for eligibility.

10. Determine what base period should be used.
11. Don't address legal and administrative questions in depth at this time.

The workgroup added another guideline to the consideration:

12. Is limited entry necessary, desirable or applicable to achieve the objectives of the FMP? How would it mesh with those objectives?

The workgroup felt that the goals of the FMP would be an appropriate starting point in the discussion, and that other considerations should follow.

OBJECTIVES OF THE FMP

The troll salmon FMP objectives approved by the Council in March 1981 are as follows:

1. Manage the troll fishery in conjunction with other Southeast Alaska fisheries to obtain the number and distribution of spawning fish capable of producing the optimum total harvest on a sustained basis from wild stocks harvested in Southeast Alaska.
2. Allocate the optimum yield to the various Southeast Alaska user groups as directed by the Alaska Board of Fisheries and the North Pacific Fishery Management Council.
3. Decrease directed and incidental harvest of smaller, immature fish and reduce sublegal chinook hook/release mortalities where possible, consistent with allocation decisions and with the objective of maximizing benefits to user groups.
4. Control and reverse recent trends of expanding effort and catch in outer coastal and offshore Southeast Alaskan waters to accomplish conservation goals.
5. Develop fishery management techniques which will allow full utilization of salmon returning to supplemental production systems while providing necessary protection for intermingling natural runs which must be harvested at lower rates.

6. Work towards the development of an integrated coastwide management plan for chinook salmon.

Of these six goals, only number 2 and 4 could be achieved directly by limited entry. Objective 1 would be helped but could be accomplished only with other measures. Up to now, objective 2 has been interpreted to mean allocation between user groups rather than within a user group. The primary directive of the FMP towards limited entry seems to be in Objective 4, to "control and reverse expanding effort and catch in outer coastal and offshore Southeast Alaskan waters to accomplish conservation goals." This goal has been interpreted by the Board to address coho stocks rather than chinook stocks. The Board has a goal to return the inside/outside coho catch ratio to pre-1978 levels by 1984, but has no similar goal for chinooks.

When the Council discussed limited entry during the development of the current salmon FMP, they made four major findings (from pages 45-46 of the FMP):

"1. That limited entry or limited access into the Alaska power troll fishery in the FCZ is necessary to maintain present levels of effort and catch.

2. That the use of other management techniques in conjunction with a limited access system will help promote sound conservation and management practices and provide flexibility to deal with fluctuating biological and ecological factors, since other management techniques will operate more efficiently and with better results when used in conjunction with this limited access system.

3. That an ocean salmon management plan without a limited access system will in all probability result in increased effort by power troll fishermen who have so far fished exclusively in State waters, by fishermen excluded from fisheries by the limited entry program of the State of Alaska, and by fishermen from the State of Washington and elsewhere who are adversely affected by Federal Court decisions on resource allocation in their present fisheries.

4. That limited entry for the FCZ is necessary because alternative management measures, i.e., a ban on all trolling in the FCZ or a separate FCZ quota, are either too disruptive of present social and economic structure or too costly to administer and enforce.

"Limited access into the power troll fishery in the FCZ is important as one of the management tools needed to carry out the NPFMC's intention to stabilize at present levels the rate of interception of mixed stocks of salmon by stabilizing effort in that fishery.

"The NPFMC recognizes that the implementation of limited entry as a management tool cannot by itself stabilize the rate of interception. It will help to achieve that goal most effectively in conjunction with other techniques such as some form of quota, and/or restrictions on time, area, gear, size, etc. In this context, stabilizing the harvest may include the amount of harvest, the average size and weight of fish, species composition and other considerations. This may mean that future phases of the limited access system being initiated would be tied to effort."

GOALS OF FCZ LIMITED ENTRY

Three management goals that limited access can address are:

1. stabilize the interception of mixed stocks of salmon at the 1977-78 level;
2. return the inside/outside balance of the coho harvest to pre-1978 levels; and
3. address all trollers in an equitable way.

Based on these goals, the Council has three major options for use of limited access: (1) limited access as the primary conservation tool; (2) limited access as one of several management tools; and (3) not use additional limited access for the FCZ fishery.

Questions from the Workgroup

1. Is the Council asking if limited entry is the best way to accomplish the conservation goals of the FMP (i.e., stabilize and reduce offshore catch, limit interception)?

   Any FCZ limited entry scheme will require harvest restrictions and possibly a separate quota. Unless major fleet reduction is accomplished most existing restrictions on time, area, gear and size would still be needed.

2. Does the Council merely want to control the latent potential harvest capacity in the FCZ?

   This could be accomplished by allowing everyone who has fished in the FCZ to continue, but disallowing new participation. This would not stabilize or reduce offshore effort.

3. Does the cost of adequately enforcing the state/FCZ boundary make it too expensive to establish an FCZ limited access system?

   This is a problem worthy of consideration by the Council.

4. Is the Council's primary goal to protect the stocks, ease the management burden or improve the economic utilization of the resource?

   Limited access in some form can accomplish these. A statewide system would be more effective then a separate FCZ limited access system.

5. Does the Council want highliners to be more eligible for permits than average or less-active fishermen?

   Eventually all or most permits will be held by very active and efficient fishermen. The Council should decide if they want to start at that position.

6. How long after implementation is the Council willing to wait to achieve the benefits of limited access?

The Council has requested that non-transferable permits be included in the system. This means a phase-out period will be required. The half-life of the current transferable permit fleet is about 5-10 years. CFEC reports that about 60% of the permits have turned over since inception of the state system. Thus, 1,000 non-transferable permits may be reduced to 500 in 5-10 years, for example.

## OPTION 1. LIMITED ACCESS AS THE PRIMARY CONSERVATION TOOL

A limited access system can be devised to act as the primary conservation tool for managing the troll fishery in the FCZ. In simplistic terms, it could be developed as follows:

1. Establish the harvest level desired.
   Examples: the 1977 catch level; 15% of OY; etc.
   Questions: Coho only? Total salmon?

2. Determine the number of fishing units required to harvest this amount, based on historic fishing patterns and CPUE's for hand and power trollers in the FCZ.
   Problem: All future permit holders would be highliners with higher CPUE's, therefore requiring further limitation or restrictions.

3. Set eligibility criteria at a level to achieve the desired number of fishermen.

4. Use closures to adjust harvest to run size variations.

Based on data from the ADF&G Port Sampling Program and calculations by George Utermohle, the FCZ portion of the current chinook OY could be harvested by about 15 to 30 power troll vessels targeting on chinooks during an 18-28 week season. The number of boats required to harvest the FCZ portion of the coho

harvest is not immediately available, but would be added to the chinook total. During the 1971-77 base period the average FCZ coho catch was about 28,000 fish, or 3% of the average annual coho harvest. The 1975-79 average was 95,000 fish, or 14.5% of the total troll catch. Based on a season of approximately 60 days and an average of 10 fish per boat-day, the 1971-77 base period catch could be harvested by 47 vessels. (60 days and 10 fish/day are arbitrary, liberal figures.) Combining this with the figure for chinooks and giving a 30-50% buffer, 100 boats would be allowed to fish in the FCZ. Using a 30-day peak season fishery with an average of 50 fish per boat-day gives an estimate of about 20 boats to harvest the 1971-77 coho average.

Major Problems of Limited Access to the FCZ

Several problems with a separate FCZ limited entry system are immediately apparent. Some of these can probably be solved but management may become more difficult, at least in the short-run.

1. Enforcement of the state/FCZ boundary.
2. Identification of permitted vessels.
3. FCZ catch might need to be limited, requiring a separate FCZ quota.
4. An FCZ quota would lead to mis-reporting catch.
5. Limited entry is costly in time and dollars.
6. It will disrupt traditional fishing patterns and reduce freedom of many fishermen.
7. If non-transferable permits are used to phase out effort, any benefits of limited access will be postponed.
8. Unless the fleet is drastically reduced, major harvest restrictions will be needed.
9. Local unemployment will increase.
10. It will be difficult to determine who should receive permits.

Benefits of Limited Access

1. If fleet is reduced adequately, management will be simplified.
2. May reduce the need for regulations.
3. May reduce enforcement needs.

4. May improve economic efficiency.
5. Will control allocation and distribution of costs and benefits of the use of the resource.
6. May reduce economic incentive to violate regulations.
7. May lengthen harvest season.
8. Will reduce the risk of serious overharvest.
9. May promote more economically rational use of the salmon resources.
10. May help reduce offshore harvest and interception of mixed stocks.

How to Distribute Permits

The easiest way to distribute permits would be to establish the number of permits available and hold a lottery of eligible trollers. Eligibility could be based on liberal criteria (such as one landing in the 1975-77 base period and a current permit), or based on a point system using economic dependence, past participation, etc. State and federal attorneys could help develop criteria which would best meet the legal requirements, hasten processing time and minimize challenge. The most active or dependent fishermen would be eligible for the lottery. A single poundage requirement for all trollers would be acceptable.

Hand troll permit holders as of the date of Council approval would be eligible for FCZ hand troll permits. Power troll permit holders would be eligible for FCZ power troll permits.

Option 2 includes some criteria which could be used to determine eligibility.

OPTION 2. LIMITED ACCESS AS A SECONDARY FCZ MANAGEMENT TOOL

The Alaska limited entry program has effectively limited the number of power troll vessels which could have entered the FCZ fishery. This limited entry program is a secondary management tool because overfishing would still occur if harvest restrictions were relaxed. The Council could implemement a similar system for the FCZ based primarily on:

1. historic participation;
2. dependence on the FCZ fishery;
3. optimum economic utilization of the resources; or
4. optimum (or maximum) social benefit.

Option 2a. Limited Access Based on Historic Participation.

We have data from CFEC on participation in the outercoastal/FCZ fishery for 1975-1980. The Council could choose liberal or conservative requirements for participation. A series of alternatives are listed. All refer to the 1975-77 base period and require a current permit.

| | Number Eligible | |
|---|---|---|
| | Hand Troll | Power Troll |
| 1. At least one FCZ/outercoastal landing in at least one base year. | 564 | 465 |
| 2. At least one FCZ/outercoastal landing in at least two base years. | 156 | 351 |
| 3. At least one FCZ/outercoastal landing in all three base years. | 46 | 234 |
| 4. At least two FCZ landings (based on average pounds/landing) in at least one base year. | 403 | 400± |
| 5. At least two FCZ landings in at least two base years. | 108 | 300± |
| 6. At least two FCZ landings in all three base years. | 26 | 200± |

Option 2b. Limited Access Based on Dependence

Dependence on the FCZ fishery is difficult to measure and involves economic, social, geographical and other considerations. Through CFEC we can obtain a measure of economic dependence through landings. If the Council sets minimum poundage requirements for hand and power trollers, or a single poundage requirement for all trollers, we can generate the number of eligible participants fairly easily. Some examples and very rough estimates are listed.

(1) 500 pounds/yr for hand trollers any 2 years, 1975-77: 75±
2,500 pounds/yr for power trollers any 2 years, 1975-77: 300±

(2) 1,000 pounds/yr for hand trollers any 2 years, 1975-77: 50±
5,000 pounds/yr for power trollers any 2 years, 1975-77: 250±

(3) *5,000 pounds/yr for hand trollers any 2 years, 1975-77: 30±
15,000 pounds/yr for power trollers any 2 years, 1975-77: 90±

(4) 9,000 pounds/yr for hand trollers any 2 years, 1975-77: 4±
20,000 pounds/yr for power trollers any 2 years, 1975-77: 40±

*Maximum FCZ hand troll catch in any year was less than 15,000 lbs.

Option 2c. Limited Access Based on Economics

Optimum economic utilization is probably not a reasonable (or at least achievable) goal, although improvements could be made. Considerable data, both economic and biological, would be necessary to develop a system based primarily on economics. A review by Jim Richardson, staff economist, follows this report. We have no estimates of numbers.

Option 2d. Limited Access Based on Social Benefits

Maximum social benefit is also difficult to determine due to a number of variables and unknown impacts. A large fleet would distribute the fishing income to more people, but obviously each would get less. Timing and duration of the harvest directly affects processing and marketing as well. Detailed studies of the socioeconomic environment would be required to achieve this goal. We offer no estimates of numbers.

OPTION 3. ALTERNATIVES TO FURTHER LIMITED ACCESS

The Council could choose to no longer consider further limiting access to the FCZ troll fishery and continue managing the existing fleet through gear restrictions and closures. It is possible to reduce offshore effort using these traditional measures, although they will become stricter as more boats move outside.

Option 3a. Exclusive Registration Areas

An alternative approach could be to establish offshore (FCZ) districts as exclusive registration areas. If no ceiling were placed on the number of permits the Council could avoid most of the problems associated with limited entry. The Council could stipulate that any fisherman registering for an FCZ area would forfeit rights to all other areas (state and federal) for that fishing year. This would obviously disrupt traditional fishing patterns and would lead to the same boundary enforcement problems involved in FCZ limted entry. We have no estimate of the number of fishermen who would be interested in fishing in the FCZ exclusively, but it would probably be small if fishermen realized they could fish only in outer waters for coho as well as chinooks. A great deal of feedback from the industry is necessary before taking this approach.

Option 3b. A Separate FCZ Quota

A simple system for management would be to set a quota for the FCZ and close the fishery when the quota is reached. The quota could be set as a percentage of OY as an amendment to the FMP. This would foster misreporting of areas, however, and could be ineffective unless closely monitored. An FCZ quota could also lead to quotas for other areas and would imply a separate management system for state and federal waters. It does not seem to promote management of the stocks throughout their range.

Option 3c. Close the FCZ to Trolling

The Council could close the FCZ to all trollers until an optimum management system is determined. This is contrary to certain goals of the FMP and would disrupt established social and economic patterns.

## OPTION 4. AN IDEAL LIMITED ACCESS SYSTEM

An ideal limited entry system would provide benefits to fishermen, and managers alike. It would reduce the agencies' need to closely monitor the stocks, nearly eliminate enforcement requirements, and allow managers to concentrate on improving stock conditions rather than only protecting them from overharvest. There would be little risk of serious depletion of the resource because harvest capacity would closely match average biological production. Fishermen would be free to fish where and when they wanted with the most efficient gear they could fit on their boats. Fishermen could set their own individual economic and lifestyle goals and have no impediments to reaching them except themselves and the elements. These fishermen would be dedicated to protect the resources because doing so would have a direct effect on their incomes and lifestyles. The gains from whatever sacrifices they might make would accrue to their benefit and not be dissipated through general participation in the fishery. They could afford to wait until fish grew larger. There would be little economic need or incentive to overfish or fish in nursery grounds or other sensitive areas. The shore-based infrastructure would operate more smoothly because sudden gluts would be avoided and processing and market availability would occur over a longer period.

The fleet could fish throughout Southeast Alaska and might consist of a few hundred highly efficient power trollers, a few hundred less efficient subsistence fishermen, and a recreational fleet. A system to achieve or even approach this ideal is not possible for the FCZ alone, but could be set up by the State.

Option 4a.

A single, state-administered limited entry system would be established for the entire Southeast Alaska salmon troll fishery. This system would address both state and federal waters, hand trollers and power trollers, and be based on an optimum fleet size. All vessels could fish at any time in any area which was not closed for stock-specific management.

The optimum number of vessels is the fleet size which approximates the harvest capacity necessary to harvest OY in an average year, within the traditional 28 week season, April 15 - October 30.

In-season adjustments will still be needed, and would take the form of closures rather than efficiency restrictions. If the troll harvest capacity is insufficient to harvest OY in a particular season, the excess will be allocated to other gear groups until troll harvest capacity is increased.

Eligibility would be based on a point system (applicable to the entire troll fleet) based on criteria established by state law within the guidelines of the National Standards and Magnuson Act (Section 303(b)(6)).

There would probably be fewer than 500 boats trolling in Southeast Alaska.

Option 4b.

A state-administered limited entry system would be extended into FCZ waters. State permits would be divided between outside and inside districts, and an optimum number of permits would be allowed to fish in outside (FCZ and outercoastal) districts not closed for stock-specific management.

The optimum number of permits for outside the surfline is the number necessary to harvest the outside portion of OY in an average year within the traditional 28 week season.

Option 4c.

A state-administered limited entry system would be extended into FCZ waters. An optimum number of state permits would be allowed to fish in FCZ districts which were not closed for stock-specific management, in a manner similar to exclusive area registration.

The optimum number of permits for the FCZ is the number necessary to harvest the FCZ portion of OY in an average year within the traditional 28 week season.

SUMMARY

Gear restrictions, closures, and quotas decrease economic efficiency of fishermen. Limited entry can improve economic efficiency at the expense of fishermen excluded from the fishery. A buyback system and alternative employment opportunities would reduce the economic expense to excluded fishermen. A slow phase-out postpones economic, regulatory, biological and management benefits.

In summary, an optimum limited entry system, in terms of maximum biological benefits with minimal regulations, would apply in both federal and state waters. If the harvest capacity of the fleet roughly matched the optimum production of the resource, fishermen and management would both benefit substantially. However, it would be difficult to determine how many boats would be required and this number would change as boats and gear were upgraded. Variations in run size would prevent a static optimum harvest capacity from ever being achieved, but excess fish could be allocated to other gear groups if necessary.

If non-transferable permits are used to phase out effort, biological, economic and regulatory beneftis will be postponed. If the "optimum" fleet size were established more immediately, unemployment and other social impacts would be locally severe even if boats and permits were bought by the government.

More realistically, limited entry would not help ease the pressure on salmon stocks, would make minimal economic improvement for the industry, and would create another layer of bureaucracy. This would be especially true if an FCZ only limited entry system were established because only a portion of any fisherman's income is generated by FCZ fishing and the effort will merely shift to other areas.

## An Economically Optimum Fleet Size

Some clarification is necessary as a preface to discussing the methodology of determining the economically optimum salmon fleet configuration.

First, it is necessary to recognize that it is not possible presently to reach an absolute economic optimum method of harvesting salmon due to regulated inefficiencies in the harvesting sector. The most efficient (least cost) manner of harvesting would probably be to trap salmon on migration routes as they approach terminal streams and rivers. Fish traps are not politically viable however, due to the unpopular distribution of fishing wealth that system fostered when it was used in Alaska. The present troll fleet is restricted by gear limitations, time/area closures, etc., all designed to reduce the efficiency of the fishing fleet. Regulating inefficiencies into the harvesting sector has been a tool by which management agencies have ensured conservation despite increased participation in the fishery. The following discussion assumes that the present regulatory status quo will be maintained in the future. The best economic solution that can be achieved therefore, is to maximize the economic yield from the fishery, given the existing system.

Maximum economic yield from a fishery does not mean simply maximizing the total returns from the fishery. The costs of harvesting need to be taken into consideration. The difference between total revenue and total cost is at a maximum where the last unit of effort[1/] yields a revenue (catch) just equal to the cost of harvesting that catch. If the fishery is operating at a level utilizing less than that amount of fishing effort, additional effort would increase the economic yield from the fishery. If the fishery operates at a higher level of effort than that, a decrease in economic yield from the fishery would result.

1/ Fishing effort can be classified into two categories, nominal and effective effort. Effective fishing effort refers to the biomass extracted by the fishery. Nominal effort refers to the amount of production inputs used in the fishery and is the context used here.

To begin to identify a methodology by which fishing rights should[2/] be allocated between the hand troll and power troll fleet, the following observations are made:

1. Both gear types fish the same population of salmon.
2. There are two distinct and separable gear types.
3. The cost of production is different for the two gear types.
4. The two gear types have different "fishing power."
5. The product (salmon) is the same from both fleets; there is not a price or quality difference.

The methodology which will be described is how the allocation determination should be made. There are approximations which could be made however, which would allow the determination to be calculated with a smaller data collection effort needed.

All of the data, biological or economic, needed to actually calculate the optimum allocation of effort are not presently available. One of the biological data requirements not available is the relationship between fishing effort and yield from the fishery. A hypothetical representation of the relationship between escapement and total salmon return is shown in Figure 1a, shown on the next page. From this figure, the relationship between the number of spawners and harvestable surplus is derived and shown in Figure 1b. The figures are from the Council Document #15.[3/] From some determined relationship between the salmon population (numbers of spawners), fishing effort and yield, Figure 1b could be transformed into a yield/effort curve at different population levels. At this point the economic analysis would begin.

The method used to determine optimal allocation between the fleets on an economic basis is represented by Figure 2 which is divided into three parts. Part (a) represents the marginal cost curve of the hand troll salmon fleet.

[2/] From the viewpoint of economic efficiency only, obviously there are political and social considerations in allocative decisions.

[3/] "A Study of the Offshore Chinook and Coho Salmon Fishery Off Alaska" contracted to Natural Resource Consultants.

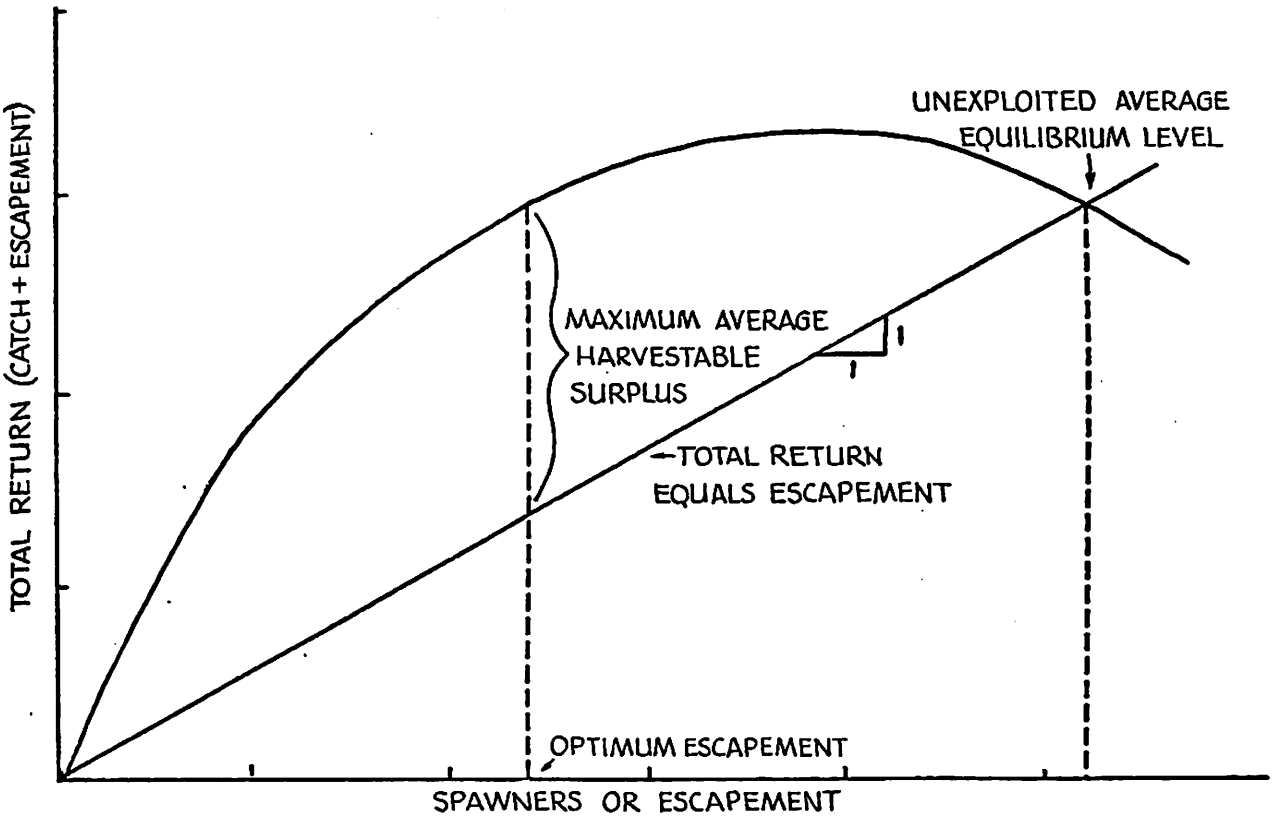


Figure 1a. Spawner-return relationship.

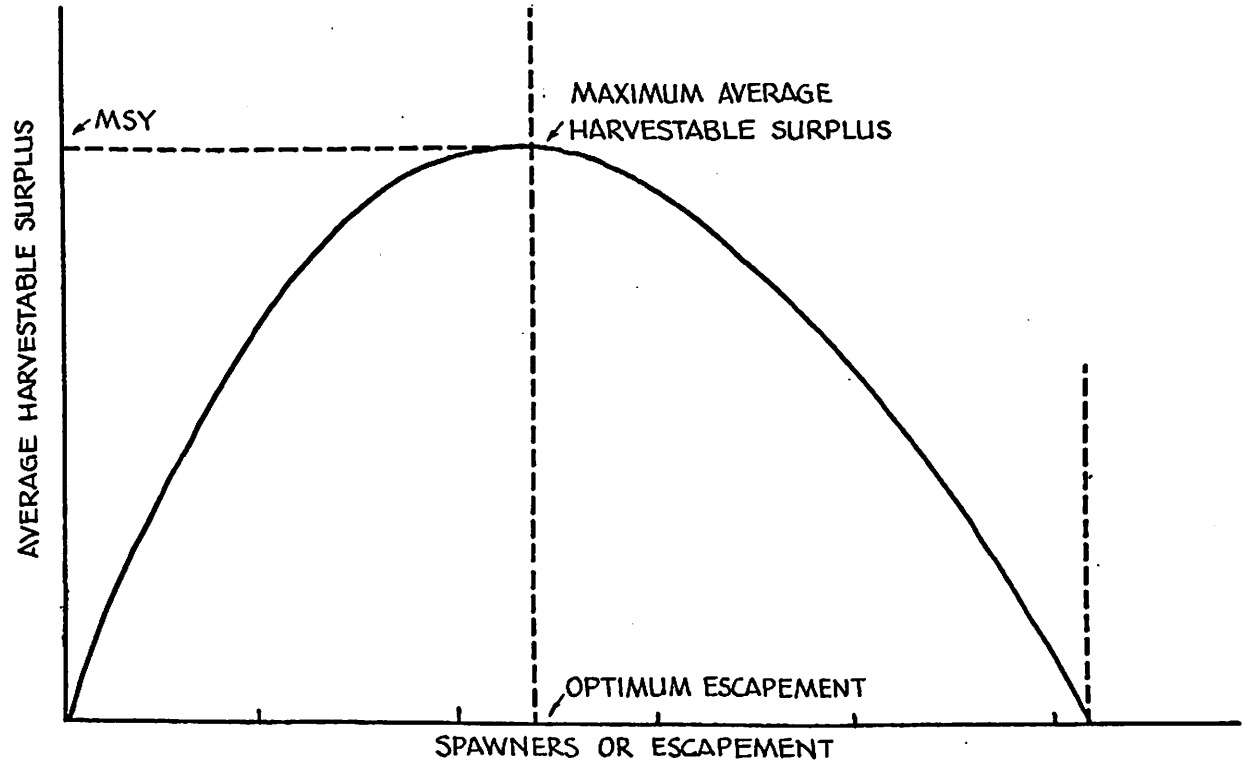


Figure 1b. Spawner-average harvestable, surplus relationship.

Figure 1. Salmon production curves.

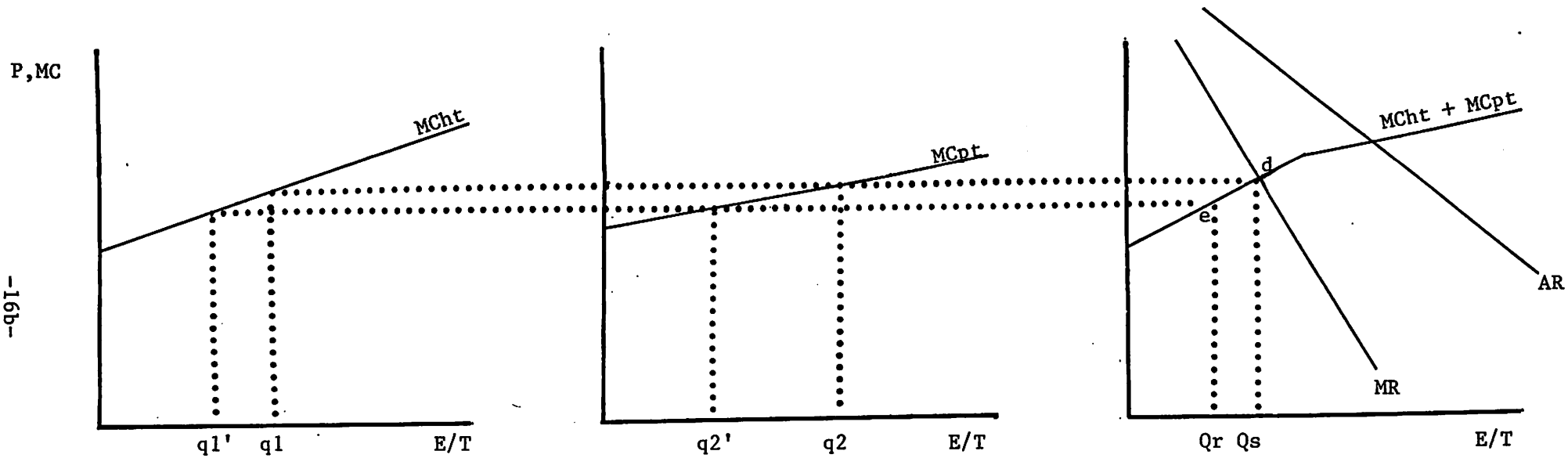


FIGURE 2

Hypothetical Solution to Optimum Economic Production in the Salmon Troll Fishery

For each increment of production (salmon) the additional (or marginal) cost to produce that increment is represented by the marginal cost curve ($MC_{ht}$). Similarly, part (b) of Figure 2 represents the marginal cost curve for the power troll fleet ($MC_{pt}$). Part (c) shows the horizontal summation of $MC_{ht}$ and $MC_{pt}$, the average revenue (AR), and the marginal revenue (MR) curves for the salmon fishery. The aggregate marginal cost curve shown in part (c) represents the cost of production for the combined hand troll and power troll fleet, regardless of the actual present level of effort in the salmon fishery. The marginal revenue is the additional increment to total revenue from one more unit of production and would be the same for both the hand and power troll fleet (see observation 5 above). Average revenue is the total revenue divided by the output (catch). Both of these curves, MR and AR, are derived from the yield/effort relationship represented in Figure 1b, but they could be approximated over a range by the ex-vessel price for salmon if the prices did not vary significantly over the fishing season.

Economic theory tells us that the most efficient point to operate is where the marginal cost of producing a unit of output is equal to the marginal revenue received from that production. This point is represented by point (d) in Figure 2(c).

From this point, we can identify the optimum amount of fishing effort Qs. This effort is allocated between the hand and power trollers as shown in Figure 2(a) and (b). The price line from point (d) intersects the marginal cost curves and yields a solution of $q_1$ and $q_2$ for hand troll and power troll fishing effort respectively, as the optimum allocation.

In the salmon fishery in Alaska, it is likely that the above solution for optimum fishing effort would require a larger catch than is available under the management quota, which takes into account other criteria besides economic efficiency. If so, then the optimum solution is that amount of catch which would closest approach the optimum level of effort. For example, if the quota were set at Qr, the respective effort allocations for the hand troll and power fleet would be represented by q1' and q2' respectively, where the price line from point (e) intersects the marginal cost curves.

Since the biological relationship between salmon yield and population is not known anyway, substituting the amount of effort necessary to catch the quota of salmon would make the analysis easier. The remaining data which are not available and which would be required for this determination of optimum allocation are the costs of production for both the hand troll and power troll fleets. Once these data were available, a calculation could be made which would estimate the most economically efficient way to distribute effort in the salmon troll fishery.

AGENDA E-1(d)
July 1981

M E M O R A N D U M

TO: Council, SSC, and AP Members

FROM: Jim H. Branson
Executive Director

DATE: July 14, 1981

SUBJECT: Salmon Limited Entry Workgroup Membership

*ACTION REQUIRED*

*Appointment of additional members to limited entry workgroup.*

BACKGROUND

The Executive Director was asked by the Council to suggest additional members for the limited entry workgroup. The Council should consider at least the following individuals.

Bob Mace, NPFMC
Clem Tillion, NPFMC
Bob McVey, NMFS
John Williams, CFEC
Jim Ferguson, Processor, Pelican Cold Storage

JULY/K

# PACIFIC FISHERY MANAGEMENT COUNCIL

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| | Exec. Dir. | |
| | Deputy EXECUTIVE | DIRECTOR |
| | Admin. O Lorry M. | Nakatsu |
| | Exec. Sec. | |
| | Staff Asst. 1 | |
| | Staff Asst. 2 | |
| | Staff Asst. 3 | |
| | Economist | |
| | Sec./Skkr. | |
| | Sec./Typist | |
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| | JUL 17 1981 | |
| | | |

July 13, 1981

Mr. Jim H. Branson
Executive Director
North Pacific Fishery Management Council
P. O. Box 3136DT
Anchorage, AK 99510

Dear Jim:

Thank you for your letter of June 17, 1981, proposing a jointly sponsored North Pacific/Pacific Council workshop on the Washington Department of Fisheries' salmon management model. The Council considered your proposal at its July 8-9, 1981 meeting and voted to approve it and go forward with arrangements to co-sponsor the workshop. We agree with the North Pacific Council that the proposed workshop could contribute greatly to the public's and the two Councils' understanding of the bases of the model and its use in salmon management.

As to the time frame of the workshop, we would suggest sometime in early or mid-September, after the peak of the salmon fishing seasons and before the end of the fiscal year. My primary staff member involved in making the workshop arrangements will be Larry Six; I hope that he and your staff can work together closely to ensure that this meeting will be beneficial to both Councils.

Sincerely,

Lorry M. Nakatsu
Executive Director

cb

# PACIFIC FISHERY MANAGEMENT COUNCIL

CHAIRMAN
E. C. Fullerton

526 S.W. Mill Street
Portland, Oregon 97201
Phone: Commercial (503) 221-6352
FTS 8-423-6352

| ACTION | ROUTE TO | INITIAL |
|---|---|---|
| | Exec. Dir. | |
| | Deputy EXECUTIVE | DIRECTOR |
| | Admin. O Lorry M. | Nakatsu |
| | Exec. Sec. | |
| | Staff Asst. 1 | |
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