SB

40

Alaska State Legislature

Senate

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CSSB 40(RES)
Sponsor Statement

"An Act relating to the assessment of discrete salmon stocks"

Although fishery management in Alaska has been very successful in providing abundance of harvestable salmon on a statewide basis, record catches alone do not ensure that we are fulfilling our constitutional mandate for sustained yield. It is incumbent upon us all to pass along a healthy and diverse resource to future generations of Alaskans. I introduced SB 40 to help do just that.

CSSB 40(RES) is a great deal different than the original bill. Gone are the mandates to the Board of Fisheries to adopt and implement discrete stock management in prescribed areas along specified timelines. Instead, the bill mandates discrete salmon stock assessment, leaving to the Board of Fisheries the determination of stocks for which it is appropriate, applying criteria such as the biological health of the stock and the magnitude of user conflicts.

Far too much of our fishery management is being driven by allocation battles in our most contentious fisheries, instead of by sound science and pertinent information. In reviewing proposals for particular fisheries, the Board is often asked to address allocation disputes among various user groups or to react to a sudden and unexpected conservation concern. With a great deal of impassioned testimony on all sides of the issue and no better than anecdotal information on which to base their decisions, it is nearly impossible to resolve these issues. Lack of specific scientific information brings the same issues back before the board year after year. CSSB 40(RES) will address those circumstances by providing a mechanism to gain the stock composition data and escapement information needed to equitably decide critical issues.

This bill mandates discrete salmon stock assessment that will allow the board to target research on stocks and fisheries for which they most need the information. Passage of CSSB 40(RES) will improve the management of our diverse fishery resource by assisting the board in reaching decisions in the most contentious fisheries. Decisions supported by sound science are much more likely to be accepted by the user groups. I urge your support for this measure.

0-LS0296\Q
Utermohle
2/23/98

CS FOR SENATE BILL NO. 40(Res)

IN THE LEGISLATURE OF THE STATE OF ALASKA

TWENTIETH LEGISLATURE - SECOND SESSION

BY

Offered:
Referred:

Sponsor(s): SENATORS HALFORD AND GREEN, Donley

A BILL

FOR AN ACT ENTITLED

"An Act relating to assessment of discrete salmon stocks and to discrete salmon stock assessment surcharges."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

*** Section 1.** PURPOSE AND INTENT. (a) This Act requires the Department of Fish and Game and the Board of Fisheries to prepare and prioritize a list of discrete salmon stock assessment projects that are consistent with the sustained yield of wild salmon stocks. This Act also provides a means to offset the costs incurred by the state in conducting discrete salmon stock assessment projects by increasing the fees for commercial fishing licenses. The additional revenue generated and appropriated for discrete salmon stock assessment projects is supplemental to, and not intended to replace, funds appropriated for the operation of the division of commercial fisheries management and development or the division of sport fish.

(b) It is the intent of the legislature that the cost of conducting discrete salmon stock assessment projects be funded in part from revenue derived from the sale of sport fishing licenses in an amount that annually approximates $1 for each license sold.

* **Sec. 2.** AS 16.05 is amended by adding a new section to article 5 to read:

Sec. 16.05.740. Discrete salmon stock assessment. (a) The Board of Fisheries shall, in consultation with the department, identify those stocks of salmon for which discrete salmon stock assessments are needed. The board shall rank the discrete salmon stock assessment needs in accordance with the importance of the stock to fisheries in the state, the magnitude of conflicts among users of the stock, the biological health of the stock, and the need for information to ensure the sustained yield of the stock. The department shall assist the board in the identification of needed information and the ranking of the discrete salmon stock assessment needs.

(b) The department shall

(1) annually develop, with the assistance of the board, a list of, and priority ranking for, proposed research projects to collect information necessary for the assessment of discrete salmon stocks identified by the board under (a) of this section; the projects must include research on the stock composition of salmon taken in fisheries, development of escapement objectives for discrete salmon stocks, projection of escapements for discrete salmon stocks, and other projects intended to obtain information that the board determines necessary under this section;

(2) in conjunction with the board, solicit public comment on the list of proposed projects developed under (1) of this subsection and, as appropriate, revise the projects and the priority ranking assigned to the projects based on the information and comments received during the public comment period;

(3) submit the revised list of proposed projects together with a proposed budget for each project to the governor for inclusion in the proposed budget for the department for the following fiscal year.

(c) The governor shall include a request for an appropriation to the department to fund the discrete salmon stock assessment projects identified on the revised list prepared by the department under (b) of this section as part of the budget and annual appropriation bill submitted to the legislature. The individual projects contained on the list shall be included as allocations under the appropriation for discrete salmon stock assessment projects.

* **Sec. 3.** AS 16.05.480 is amended by adding a new subsection to read:

(e) In addition to the license fee set under (a) of this section for a crewmember fishing license, a stock assessment surcharge of $10 shall be collected at the time of issuance of a crewmember fishing license. The amount of the surcharge collected under this subsection shall be deposited into the general fund. The legislature may appropriate money collected under this subsection to the Department of Fish and Game for the discrete salmon stock assessment program under AS 16.05.740.

* **Sec. 4.** AS 16.43.160 is amended by adding a new subsection to read:

(e) In addition to the amounts collected under (a) - (d) of this section, the commission shall collect, at the time of renewal of an entry permit or interim-use permit for a salmon fishery, a stock assessment surcharge that shall reasonably reflect the different rates of economic return for different fisheries. The amount of the surcharge imposed on the renewal of a permit by a person who is eligible for a reduced permit fee under (c) of this section shall be reduced in the same proportion that a renewal fee for a permit under (c) of this section bears to the renewal fee for the permit under (a) of this section. The commission shall impose an additional surcharge on the renewal of an entry permit or interim-use permit held by a nonresident to the extent permitted by law. The total amount of revenue generated by the stock assessment surcharge must approximate $500,000 annually. The amount of the surcharge collected under this subsection shall be deposited into the general fund. The legislature may appropriate money collected under this subsection to the Department of Fish and Game for the discrete salmon stock assessment program under AS 16.05.740.

* **Sec. 5.** APPLICABILITY. (a) The Department of Fish and Game, with the assistance of the Board of Fisheries, shall develop the first annual list and priority ranking of proposed projects under AS 16.05.740(b), added by sec. 2 of this Act, for submission to the governor for inclusion in the proposed budget for the department for fiscal year 2000.

(b) AS 16.05.480(e), added by sec. 3 of this Act, and AS 16.43.160(e), added by sec. 4 of this Act, are applicable to crewmember licenses, entry permits, and interim-use permits issued or renewed for 1999 or a subsequent year.

0-LS0296\L
Utermohle
4/8/97

CS FOR SENATE BILL NO. 40(RES)

IN THE LEGISLATURE OF THE STATE OF ALASKA

TWENTIETH LEGISLATURE - FIRST SESSION

BY THE SENATE RESOURCES COMMITTEE

Offered:
Referred:

Sponsor(s): SENATORS HALFORD AND GREEN, Donley

A BILL

FOR AN ACT ENTITLED

"An Act relating to assessment of discrete salmon stocks and to discrete salmon stock assessment surcharges."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

* **Section 1.** PURPOSE AND INTENT. (a) This Act requires the Department of Fish and Game and the Board of Fisheries to prepare and prioritize a list of discrete salmon stock assessment projects that are consistent with the sustained yield of wild salmon stocks. This Act also provides a means to offset the costs incurred by the state in conducting discrete salmon stock assessment projects by increasing the fees for sport and commercial fishing licenses. The additional revenue generated and appropriated for discrete salmon stock assessment projects is supplemental to, and not intended to replace, funds appropriated for the operation of the division of commercial fisheries management and development or the division of sport fish.

(b) It is the intent of the legislature that the cost of conducting discrete salmon stock assessment projects be funded in part from revenue derived from the sale of sport fishing

licenses in an amount that annually approximates $1 for each license sold. The additional revenue necessary to fund the assessment projects should be generated from a $1 surcharge on sport fishing licenses or an increase in sport fishing license fees.

* **Sec. 2.** AS 16.05 is amended by adding a new section to article 5 to read:

Sec. 16.05.735. Discrete salmon stock assessment. (a) The Board of Fisheries shall, in consultation with the department, identify those stocks of salmon for which discrete salmon stock assessments are needed. The board shall rank the discrete salmon stock assessment needs in accordance with the importance of the stock to fisheries in the state, the magnitude of conflicts among users of the stock, the biological health of the stock, and the need for information to ensure the sustained yield of the stock. The department shall assist the board in the identification of needed information and the ranking of the discrete salmon stock assessment needs.

(b) The department shall

(1) annually develop, with the assistance of the board, a list of, and priority ranking for, proposed research projects to collect information necessary for the assessment of discrete salmon stocks identified by the board under (a) of this section; the projects must include research on the stock composition of salmon taken in fisheries, development of escapement objectives for discrete salmon stocks, projection of escapements for discrete salmon stocks, and other projects intended to obtain information that the board determines necessary under this section;

(2) in conjunction with the board, solicit public comment on the list of proposed projects developed under (1) of this subsection and, as appropriate, revise the projects and the priority ranking assigned to the projects based on the information and comments received during the public comment period;

(3) submit the revised list of proposed projects together with a proposed budget for each project to the governor for inclusion in the proposed budget for the department for the following fiscal year.

(c) The governor shall include a request for an appropriation to the department to fund the discrete salmon stock assessment projects identified on the revised list prepared by the department under (b) of this section as part of the budget and annual appropriation bill submitted to the legislature. The individual projects contained on

the list shall be included as allocations under the appropriation for discrete salmon stock assessment projects.

* **Sec. 3.** AS 16.05.340 is amended by adding a new subsection to read:

(g) In addition to the license fees set under (a) of this section, a stock assessment surcharge of $1 shall be collected on each sport fishing license sold under this section. The amount of the surcharge collected under this subsection shall be deposited into the fish and game fund. The legislature may appropriate money collected under this subsection to the Department of Fish and Game for the discrete salmon stock assessment program under AS 16.05.735.

* **Sec. 4.** AS 16.05.480 is amended by adding a new subsection to read:

(d) In addition to the license fee set under (a) of this section for a crewmember fishing license, a stock assessment surcharge of $10 shall be collected at the time of issuance of a crewmember fishing license. The amount of the surcharge collected under this subsection shall be deposited into the general fund. The legislature may appropriate money collected under this subsection to the Department of Fish and Game for the discrete salmon stock assessment program under AS 16.05.735.

* **Sec. 5.** AS 16.43.160 is amended by adding a new subsection to read:

(e) In addition to the amounts collected under (a) - (d) of this section, the commission shall collect, at the time of renewal of an entry permit or interim-use permit for a salmon fishery, a stock assessment surcharge that shall reasonably reflect the different rates of economic return for different fisheries. The commission shall impose an additional surcharge on the renewal of an entry permit or interim-use permit held by a nonresident to the extent permitted by law. The total amount of revenue generated by the stock assessment surcharge must equal $500,000. The amount of the surcharge collected under this subsection shall be deposited into the general fund. The legislature may appropriate money collected under this subsection to the Department of Fish and Game for the discrete salmon stock assessment program under AS 16.05.735.

* **Sec. 6.** APPLICABILITY. (a) The Department of Fish and Game, with the assistance of the Board of Fisheries, shall develop the first annual list and priority ranking of proposed projects under AS 16.05.735(b), added by sec. 2 of this Act, for submission to the governor

for inclusion in the proposed budget for the department for fiscal year 1999.

(b) AS 16.05.340(g), added by sec. 3 of this Act, AS 16.05.480(d), added by sec. 4 of this Act, and AS 16.43.160(e), added by sec. 5 of this Act, are applicable to sport fishing licenses, crewmember licenses, entry permits, and interim-use permits issued for 1998 or a subsequent year.

* **Sec. 7.** AS 16.05.340(g), added by sec. 3 of this Act, is repealed January 1, 1998, if a version of SB 7 increasing certain sport fishing license fees is passed by the First Regular Session of the Twentieth Alaska State Legislature and enacted into law.

FISCAL NOTE

STATE OF ALASKA **BILL NO.** CSSB 40

1998 LEGISLATIVE SESSION

Revision Date: 3/31/98 Dept. Affected: Fish and Game

Title: An Act relating to assessment of discrete salmon stocks and to discrete slamon stock assessment surcharges

BRU: Commercial Fisheries (Limited) Entry Commission

Component: Limited Entry Program Administration

Sponsor: Sen. Halford

Requester: Senate Resources

COMPONENT SERIAL NO. 0471

Expenditures/Revenues (Thousands of Dollars)

OPERATING EXPENDITURES	FY 99	FY 00	FY 01	FY 02	FY 03	FY 04
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	0.0	0.0	0.0	0.0	0.0	0.0
CAPITAL EXPENDITURES						
CHANGE IN REVENUES ( )						

FUND SOURCE (Thousands of Dollars)

1002 Federal Receipts						
1003 GF Match						
1004 GF						
1005 GF/Program Receipts	0.0	0.0	0.0	0.0	0.0	0.0
1006 GF/MHTIA						
Other						
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0

Estimate of any current year (FY98) cost: $ 0.0

POSITIONS

FULL-TIME						
PART-TIME						
TEMPORARY						

ANALYSIS: (Attach a separate page if necessary.)

No fiscal impact expected

Prepared By: Roger Kolden Phone: 789-6160

Agency: Commercial Fisheries (Limited) Entry Commission Date: 3/31/98

Approved by Commissioner: Bruce Twomley

Agency: Commercial Fisheries (Limited) Entry Commission Date: 3/31/98

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FISCAL NOTE

STATE OF ALASKA
1997 LEGISLATIVE SESSION

BILL NO. CSSB 40(RES)

Revision Date:
Title: Discrete Salmon Stock Assessment
Dept. Affected: Fish and Game
BRU: Sport Fish CFMD
Component: Sport Fish and Fisheries Management
Sponsor: Senators Halford and Green
Requester: Senate Resouces Committee
COMPONENT SERIAL NO. 464 and 1941

Expenditures/Revenues (Thousands of Dollars)

OPERATING EXPENDITURES	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03
PERSONAL SERVICES	338.0	1,150.0	1,150.0	1,150.0	1,150.0	1,150.0
TRAVEL	17.0	50.0	50.0	50.0	50.0	50.0
CONTRACTUAL	65.0	80.0	80.0	80.0	80.0	80.0
SUPPLIES	50.0	80.0	80.0	80.0	80.0	80.0
EQUIPMENT	50.0	40.0	40.0	40.0	40.0	40.0
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	520.0	1,400.0	1,400.0	1,400.0	1,400.0	1,400.0
CAPITAL EXPENDITURES	0	0	0	0	0	0
CHANGE IN REVENUES (1024)	520.0	1,400.0	1,400.0	1,400.0	1,400.0	1,400.0

FUND SOURCE (Thousands of Dollars)

1002 Federal Receipts		300.0	300.0	300.0	300.0	300.0
1003 GF Match						
1004 GF	520.0					
1005 GF/Program Receipts		900.0	900.0	900.0	900.0	900.0
1037 GF/Mental Health						
Other (Fish and Game Fund - 1024)		200.0	200.0	200.0	200.0	200.0
TOTAL	520.0	1,400.0	1,400.0	1,400.0	1,400.0	1,400.0

Estimate of any current year (FY97) cost: $ 0

POSITIONS

FULL-TIME	9	15	15	15	15	15
PART-TIME						
TEMPORARY		5	5	5	5	5

ANALYSIS: (Attach a separate page if necessary)

See Attachment

Note: Position requirements may change after FY99 depending upon projects selected selected for funding under the provisions of this bill.

Prepared by: Kevin Delaney and Bob Clasby
Division: Sport Fish
Phone: 465-4180 or 267-2224
Date: 4/9/97

Approved by Commissioner: Frank Rue
Agency: Fish and Game
Date: 4/9/97

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Projects funded during FY98 are:

Upper Susitna Abundance through Mark/Recapture:

Inriver abundance of migrating adult sockeye, chinook ,and coho salmon will be estimated by tagging a sample of migrating adults low in the river (most likely near Sunshine crossing) and resampling these and untagged fish upstream. Past studies, notably those associated with the Susitna Hydroelectric Assessment, have shown this to be a promising technology. Sockeye, chinook, and coho salmon will be tagged for a postseason estimate of escapement. This program is recommended for twelve years to provide assessment over two sockeye salmon life cycles.

Project cost 1st year:	$270,000
Project cost 2nd year and thereafter:	$220,000

Upper Cook Inlet Genetic Stock Identification:

Exxon Valdez Trustee Council funded development of allozyme (extensive) and DNA (limited) data sets for identification of Cook Inlet sockeye salmon in Central District fisheries. Central District and in-river fisheries were monitored during 1993-1996. This program is able to provide estimates of sockeye salmon stock composition of commercial catch within 48 hours after samples have been collected. Samples can be collected throughout the fishery with most being worked-up after the season. The project is currently in its final year and no funds are available for monitoring in 1997 or beyond. This program is recommended annually to provide data necessary to evaluate timing of stocks through the commercial fishery and to provide data inseason to fishery managers.

Annual project cost: $200,000

Genetic Stock Identification of Indicator Stocks:

Exxon Valdez Trustee Council funded development of allozyme (extensive) and DNA (limited) data sets for identification of Cook Inlet sockeye salmon in Central District fisheries. One result of that project was the discovery of several stocks that were quite unique and discernible. This project would fund monitoring a unique stock to the Kenai Peninsula (Russian River) and Northern District (most likely Susitna River population) and track their presence through their marine and riverine migration. This project in addition to the one above adds necessary additional baseline and inriver sampling. This program is recommended over one life cycle of sockeye salmon to better understand sub-population timing.

Annual project cost: $50,000

Additional projects funded in future will depend upon decisions made by the department and the Alaska Board of Fisheries based on the criteria described in this bill.

Prepared in Response to SB 40
by the Alaska Department of Fish and Game

Existing Escapement and Catch Composition Program

Project	Request	Description
Kenai River Sonar	66.8	Count and sample sockeye salmon in the Kenai R.
Kasilof River Sonar	36.7	Count and sample sockeye salmon in the Kasilof R.
Yentna River Sonar	44.5	Count and sample sockeye salmon in the Yentna R.
Crescent River Sonar	25.1	Count and sample sockeye salmon in the Crescent R.
Fish Creek Weir	13.7	Count and sample sockeye salmon in Fish Creek
Russian River Weir	78.0	Count and sample sockeye salmon in the Russian R.
UCI catch sampling	62.0	Collect age, size, and sex composition of the commercial catch
Offshore test fishing	93.8	Assess magnitude of sockeye salmon run entering UCI
Total	420.6	

Proposed Programs to be Funded with CIP Request:

Escapement Assessment

Upper Susitna Abundance through Mark/Recapture:

Inriver abundance of migrating adult sockeye salmon will be estimated by tagging a sample of migrating adults low in the river (most likely near Sunshine crossing) and resampling these and untagged fish upstream. Past studies, notably those associated with the Susitna Hydroelectric Assessment, have shown this to be a promising technology. Sockeye, chinook, and coho salmon will be tagged for a postseason estimate of escapement. This program is recommended for twelve years to provide assessment over two sockeye salmon life cycles.

Project cost 1st year: $200,000
Project cost 2nd year and thereafter: $150,000

Susitna Drainage Sub-population Abundance:

Weirs will be operated to count adult sockeye and coho salmon into selected tributaries of the Susitna River. Important sub-populations will be chosen on the Yentna River and Susitna mainstem tributaries. This program is recommended for twelve years to provide assessment over two sockeye salmon life cycles.

Project cost 1st year: $250,000
Project cost 2nd year and thereafter: $175,000

Westside Cook Inlet Abundance:

Little is known of the magnitude of sockeye salmon spawning stocks in rivers draining into the westside of Cook Inlet south of the Susitna (examples: McCarthur, Chillagan, Big River). We propose to use an appropriate combination of fixed wing, helicopter, foot surveys, and weirs to assess these populations. This program is recommended for six years to provide assessment over one sockeye salmon life cycle.

Project cost 1st year: $25,000
Project cost 2nd year and thereafter: $75,000

Knik Arm Assessment:

Weirs scheduled in 1997 to count coho salmon in Wasilla and Cottonwood Creeks will begin operation early enough to count sockeye salmon. One additional sockeye sub-population will also be chosen for assessment as will additional effort be funded to more fully document sockeye salmon presence in Knik arm. This program is recommended for twelve years to provide assessment over two sockeye salmon life cycles.

Project cost 1st year: $70,000
Project cost 2nd year and thereafter: $75,000

Escapement Goal Analysis

Kenai Peninsula Juvenile Studies:

Monitor the rearing success of juvenile sockeye salmon in the lake systems of the Kenai and Kasilof Rivers. Lake hydroacoustic surveys, limnology sampling, and smolt counts where possible will be conducted. This project was funded from 1990-1996 with Exxon Valdez oil spill settlement moneys. This program is recommended annually to provide data necessary to evaluate escapement goals, monitor productivity and forecast future returns.

Annual project cost: $150,000

Susitna River Juvenile Studies:

Monitor the rearing success of juvenile sockeye salmon in selected lake systems of the Susitna River. Lake hydroacoustic surveys, limnology sampling, and smolt weirs will be conducted. This project was funded from 1993-1995 with Exxon Valdez oil spill moneys from the state criminal settlement (CIP) This program is recommended annually to provide data necessary to evaluate escapement goals, monitor productivity, and forecast future returns.

Annual project cost: $100,000

Westside CI Juvenile Studies:

Monitor the rearing success of juvenile sockeye salmon in the Crescent River lake system. Lake hydroacoustic surveys and limnology sampling will be conducted. This project was funded in 1996 with general fund research. This program is recommended annually to provide data necessary to evaluate escapement goals, monitor productivity, and forecast future returns.

Annual project cost: $50,000

Spawning Habitat Assessment:

A better understanding of fresh water production of juvenile salmon is needed to set spawning goals which result in high sustained yields and to better identify surplus production available for harvest. In order to do this we must identify and maintain critical habitat. This project would include habitat baseline studies that would provide Federal, State and local governments with information needed to formulate and enforce effective watershed development plans. This program is recommended annually to provide data necessary to evaluate escapement goals, forecast harvestable surpluses, and monitor productivity.

Annual project cost: $125,000

Stock Composition and Run Reconstruction

Upper Cook Inlet Genetic Stock Identification:

Exxon Valdez Trustee Council funded development of allozyme (extensive) and DNA (limited) data sets for identification of Cook Inlet sockeye salmon in Central District fisheries. Central District and in-river fisheries were monitored during 1993-1996. This program is able to provide estimates of sockeye salmon stock composition of commercial catch within 48 hours after samples have been collected. Samples can be collected throughout the fishery with most being worked-up after the season. The project is currently in its final year and no funds are available for monitoring in 1997 or beyond. This program is recommended annually to provide data necessary to evaluate timing of stocks through the commercial fishery and to provide data inseason to fishery managers.

Annual project cost: $200,000

Genetic Stock Identification of Indicator Stocks:

Exxon Valdez Trustee Council funded development of allozyme (extensive) and DNA (limited) data sets for identification of Cook Inlet sockeye salmon in Central

District fisheries. One result of that project was the discovery of several stocks that were quite unique and discernible. This project would fund monitoring a unique stock to the Kenai Peninsula (Russian River) and Northern District (most likely Susitna River population) and track their presence through their marine and riverine migration. This project in addition to the one above adds necessary additional baseline and inriver sampling. This program is recommended over one life cycle of sockeye salmon to better understand sub-population timing.

Annual project cost: $50,000

UCI Marine Hydroacoustic Assessment:

The Upper Cook Inlet marine sonar survey was developed under the Exxon Valdez oil spill restoration program as a tool to estimate salmon abundance within Upper Cook Inlet marine waters. It was developed to provide information in years when sockeye salmon runs were expected to be small, which would necessitate closure of a standard regulatory Monday or Friday commercial opening. The sonar survey requires use of a chartered vessel capable of towing the sonar array, and takes 36 to 48 hours to complete, with preliminary results available at the time of completion. This program is recommended annually to provide data necessary to evaluate timing of stocks through the commercial fishery and to provide data inseason to fishery managers.

Annual project cost: $25,000

Chinook Salmon

During the late 1980's and throughout the 1990's, returns of chinook salmon to many rivers around Upper Cook Inlet have been below expected levels given parent escapements, resulting in restriction, and in some cases closures, of inriver sport and near-shore commercial and personal-use fisheries. Disappointing returns to west Cook Inlet (notably to the Lewis and Theodore rivers), northern Cook Inlet (notably the Susitna River tributaries Deshka River, Alexander Creek, and Peters Creek), and the Kenai Peninsula (notably Deep Creek) have been of particular concern. Concurrent with these reduced returns has been the growth of harvests in the northern Cook Inlet and lower Kenai Peninsula in-river recreational fisheries and in the marine sport fisheries prosecuted near Deep Creek and Homer. The harvest of chinook in the lower Cook Inlet commercial net fisheries has remained constant at about 2,000 per year. The stock composition of harvests in these marine fisheries is unknown. Without knowledge of the composition of these harvests, the department can not assess the causes behind the observed declines in production by stocks of chinook salmon returning to rivers around Upper Cook Inlet. A summary of harvest and stock composition data for these marine fisheries was first compiled by Clark et al. (1994)[1] and many of the recommendations in that report have

[1] Clark, J.H., D.N. McBride, and L. S. Timmons. 1994. Recent history of chinook salmon harvests in marine waters of south-central Alaska; compilation of harvest, size, and coded wire tag data by fishery,

been implemented by the department. Specifically, tagging has been expanded in Cook Inlet and recovery programs have been initiated in Cook Inlet and Kodiak. The first significant returns of tagged hatchery-produced chinook salmon are expected in 1997; the marine sport fishery near Deep Creek will be sampled for the first time in 1997. The marine sport fishery in Homer has been sampled in previous years with most tagged chinook having originated at hatcheries in British Columbia.

Escapements of most major stocks of chinook salmon in rivers around Upper Cook Inlet are indexed via aerial surveys. While these surveys have been adequate to implement timely regulations to conserve stocks, the quality of information from these surveys is insufficient to evaluate productivity of escapements necessary to conduct discrete-stock management. The department is developing a technology based on sonar to estimate the inriver return of chinook salmon in situations when chinook salmon are numerically the most abundant species. Although some results from this project on the Kasilof River are promising, the technology is not yet ready for export to other systems.

Existing Escapement and Catch Composition Programs

Project	Request	Description
Escapement:		
Kenai River Creel	266.9	Estimate and sample harvest inriver
Kenai River Sonar	228.1	Estimate inriver return
Lower Cook Inlet Escapement	26.8	Index escapements
Northern Cook Inlet Escapement	94.7	Index escapements
Deshka River Weir	145.2	Count and sample escapement
Total Escapement:	761.7	
Tagging:		
Kenai River Wild	155.7	Tag juveniles in Kenai River
Lower Cook Inlet Hatchery	65.6	Tag hatchery juveniles for release in LCI
Deep Creek Wild	28.3	Tag juveniles in Deep Creek
Northern Cook Inlet Hatchery	56.6	Tag hatchery juveniles for release in NCI
Deshka River Wild	207.7	Tag juveniles in Deshka River
Willow Creek Wild	199.2	Tag juveniles in Willow Creek
Cook Inlet Marine Tag Recovery	137.7	Sample marine sport fisheries for tags and estimate harvest by stock
Total Tagging:	850.8	
Grand Total:	1,612.5	

Proposed Programs to be Funded with CIP Request:

Escapement Assessment:

Kasilof Late Run Abundance through Mark/Recapture:

1980-1993 and recommendations for future assessment. ADF&G, Division of Sport Fish Fishery Management Report No. 94-9.

Inriver abundance of migrating chinook salmon will be estimated by fitting a sample with radio transmitters, then following these fish upstream where they are resampled along with fish without transmitters. This technology has been successfully applied to stocks of chinook throughout southeast Alaska. This program should continue for two years.

Annual project cost: $165.0

Upper Susitna Abundance through Mark/Recapture:

Inriver abundance of migrating adult chinook salmon will be estimated by tagging a sample of migrating adults low in the river (most likely near Sunshine crossing) and resampling these and untagged fish upstream. Past studies, notably those associated with the Susitna Hydroelectric Assessment, have shown this to be a promising technology. Estimates will include stocks migrating to the Chulitna, Talkeetna, and upper Susitna rivers above Talkeetna. This program is also presented as an increment to the sockeye program discussed in that section. As such, this program should continue fo. the life of the sockeye project (10 years).

Annual project cost: $35,000

Sampling Indexed Escapements:

Age, sex, and size composition of chinook salmon spawning in several rivers will be estimated with this project. Spawning populations of chinook salmon are comprised of several age groups in any one year with older fish more likely female. Because egg production by an escapement of chinook salmon will vary according to the age and size composition of the spawning fish, quality of chinook salmon escapement is an important consideration when analyzing the productivity of stocks. This project provides funding for sampling of selected indexed spawning escapements which are not currently sampled for age, sex, and size composition. Project duration is recommended for 8 years to cover two life cycles.

Annual project cost: $25,000

Stock Composition of Harvests in Marine Fisheries:

Tagging Wild Juveniles in the Kasilof River:

A sample of juvenile chinook salmon in the Kasilof River will be tagged for later recovery as adults in marine fisheries. Most likely tagged smolts will be taken from the mainstem. Project should continue 3 years to cover year classes of chinook salmon.

Annual project cost: $55,000

Sampling Marine Fisheries in Lower Cook Inlet:

Tags will be recovered to estimate harvest of chinook salmon by stock in commercial and sport fisheries not currently sampled. This project provides funding for sampling both sport and commercial fisheries. Project should continue for 3 years.

Annual project cost (sport):	$15,000
Annual project cost (commercial):	$15,000

Completion of Genetic Baseline for Cook Inlet:

The department obtained a grant from the federal Saltonstall/Kennedy program (funds expired January 1, 1996) to begin development of a baseline data set for Southcentral and Western Alaskan chinook salmon stocks. This effort was to provide information for identification of trawl-caught chinook salmon from the Gulf of Alaska and Bering Sea. The data have been merged into a Pacific Rim interagency baseline for chinook salmon which includes extensive data from California through Western Alaska. Initial work suggests that with continued refinement of the baseline for Southcentral Alaska some broad regional identification of stocks can be precisely and accurately estimated. Potential applications include separation of Kenai Peninsula populations from Susitna River populations in Cook Inlet.

Annual project cost: $166,000

Coho Salmon

Harvests of coho salmon in and around Cook Inlet are second only to harvests of this species in Southeastern Alaska. Mixed stocks of coho salmon are harvested in the Central and Northern District commercial fisheries incidental to targeted fisheries for sockeye salmon. The state's largest sport harvests occur throughout many of the freshwaters of Upper Cook Inlet; most notably in the Kenai and Little Susitna rivers and in tributaries to the Susitna River. In recent years, hatchery-produced coho salmon have been used to develop sport fisheries in urban areas Of greatest concern is the lack of information on escapements which precludes assessment of productivity and timely response to downturns in production.

Beginning in 1992, the department implemented a comprehensive plan to estimate stock-specific harvests of hatchery-produced and some wild coho salmon[2] based on tagging juveniles and recovering tagged adults from harvests. All releases of smolts from hatcheries have carried tags and their harvest in marine fisheries estimated since 1993. Several successful recreational fisheries for coho salmon were established with these releases, even though commercial exploitation of hatchery-produced coho salmon has been substantial. A tagging program for wild juveniles in the Kenai River has shown that

[2] Meyer, S., Vincent-Lang, D., and D. McBride. 1991. Goal statement and study plan for the development of a stock assessment program for upper Cook Inlet salmon stocks. ADFG unpublished.

commercial harvests of this stock to be much smaller than anticipated, indicating that commercial harvests of coho salmon in Upper Cook Inlet are comprised mostly of stocks from northern Cook Inlet. Samples of juvenile coho salmon from the Deshka River and Willow Creek in the Susitna River watershed will be tagged next year.

Inriver returns of coho salmon are estimated with weirs across the Little Susitna and Deshka rivers; more weirs will be constructed next year across several streams around Knik Arm including Wasilla, Cottonwood, and Fish creeks. Unfortunately, no feasible technology has yet been developed to estimate inriver return of coho salmon to the Kenai River. Fortunately, annual estimates of juvenile abundance have been calculated through our tagging program on the Kenai River, estimates that can be used to develop management objectives for fisheries exploiting this stock. Even with our current program, sufficient information on escapements on the majority of stocks in Upper Cook Inlet is preventing assessment their productivity.

Existing Escapement and Catch Composition Programs

Project	Request	Description
Urban Area Fisheries	79.6	Sample sport harvests and estimate harvest by stock
Northern District Tag Recovery	31.9	Sample commercial harvests and estimate harvest by stock
Central District Tag Recovery	153.9	Sample commercial harvests for tags and estimate harvest by stock
Kenai River Tagging	126.5	Tag juveniles in Kenai River
Hatchery Tagging	42.0	Tag hatchery-produced juveniles
Little Susitna Escapement	88.1	Count and sample coho escapement
Knik Arm Escapement and Tagging	103.0	Count and sample coho escapements and tag juveniles
Susitna River Tagging	33.0	Tag juveniles in Deshka River and Willow Creek
Total:	658.0	

Proposed Programs to be Funded with CIP Request:

Escapement Assessment:

Upper Susitna Abundance through Mar

Inriver abundance of migrating adult coho salmon will be estimated by tagging a sample of migrating adults low in the river (most likely near Sunshine crossing) and resampling these and untagged fish upstream. Past studies, notably those associated with the Susitna Hydroelectric Assessment, have shown this to be a promising technology. Estimates will include stocks migrating to the Chulitna, Talkeetna, and upper Susitna rivers above Talkeetna. This program is also presented as an increment to the sockeye program

discussed in that section. As such, this program should continue for the life of the sockeye project (10 years).

Annual project cost: $35,000

Yentna River Hydroacoustic:

This project will evaluate whether hydroacoustic techniques can be used to estimate inriver abundance of migrating adult coho salmon in the Yentna River. The program should be considered developmental for three years and if successful run annually for an inseason estimate of coho salmon escapement. Equipment will be purchased only if successful techniques can be developed.

Project cost year 1-3:	$50,000
Purchase of equipment:	$75,000
Annual project cost:	$50,000

Minor Stocks:

Escapement of coho salmon into two streams on the Kenai Peninsula (Deep and Crooked creeks) will be estimated by extending the operation of weirs now used to estimate escapement of chinook salmon. Escapement of coho salmon to the Kahiltna River will be estimated with a tagging program. Work at each site is recommended to continue for four years to provide information over one life cycle (four years) with work on the Kenai Peninsula preceding work at the Kahiltna River.

Annual cost for weirs on the Kenai Peninsula:	$33,000
Annual cost for tagging on the Kahiltna River:	$50,000

Stock Composition of Harvests in Marine Fisheries:

Upper Susitna River Tagging:

Technology will be developed to estimate exploitation of rates of coho salmon in the marine fisheries of Upper Cook Inlet Juvenile coho salmon emigrating from Larson Lake will be tagged. Tagged adults will be recovered in current programs to sample marine harvests to estimate harvest by stock Inriver return will be estimated in another project under this CIP initiative. If juveniles in Larson Lake are representative of all juveniles in the watershed, exploitation rates estimated for adults tagged as juveniles leaving Larson Lake will be the same as rates on all adults returning to the watershed. Under these circumstances, a return of coho salmon to the entire Susitna River can be estimated. We recommend that this program continue for eight years to provide information for two life cycles.

Project cost 1st year:	$35,000
Project cost 2nd year:	$140,000

Project cost 3rd year and thereafter: $100,000

Development of Genetic Stock Identification Markers

Very few genetic markers, either protein or DNA, are currently available for identification of discrete populations of coho salmon. This program would identify and develop DNA markers to identify discrete stocks inhabiting Southcentral Alaska. After marker development, databases will be developed for use in stock identification studies.

Annual project cost: $97,000

Chum Salmon

Chum salmon stocks along the westside of Cook Inlet pose one of our most persisting conservation problems. Even with complete closure of terminal commercial fisheries, returns to McNeil River fail to rebuild. We need better escapement, migratory, timing, and interception information.

Proposed Programs to be Funded with CIP Request:

Escapement Assessment:

McNeil River Escapement Assessment

Currently, aerial surveys are used to estimate escapement into this system, but estimates of bear predation sometimes exceed the estimated number of chum salmon in the river. Since McNeil River flows through a wildlife sanctuary internationally famous for brown bear viewing, methods used to estimate chum salmon escapement must be unobtrusive. This project will attempt to provide more accurate escapement estimates through improvements in the aerial survey program (e.g. radio and ultrasonic tagging of adult chum salmon captured in McNeil Lagoon to determine stream life and distribution) as well as development of techniques for using unmanned video equipment.

Annual project cost: $50,000

Stock Composition of Harvests in Marine Fisheries:

Tagging Wild Juvenile Westside Cook Inlet Chum Salmon

The fate of chum salmon returning to spawn in westside Cook Inlet systems will be examined through a juvenile tagging program. Juvenile chum salmon migrating to sea from one or more westside systems (e.g. Big Kamishak, Little Kamishak, McNeil, Bruin, and Iniskin Rivers and Cottonwood Creek) will be marked with half-length coded-wire

tags and returning adults will be recovered from various commercial fisheries to obtain information on run timing and migratory paths. If possible, a weir will be installed on one of the streams where juvenile tagging was conducted to obtain estimates on returning adult marked-to-unmarked ratios. This will allow estimates to be made of exploitation rates within selected commercial fisheries.

Annual project cost: $150,000

Gulf of Alaska: Chinook Salmon

During the late 1980's and throughout the 1990's, returns of chinook salmon to many rivers around Upper Cook Inlet have been below expected levels given parent escapements, resulting in restriction, and in some cases closures, of inriver sport and near-shore commercial and personal-use fisheries. Disappointing returns to west Cook Inlet (notably to the Lewis and Theodore rivers), northern Cook Inlet (notably the Susitna River tributaries Deshka River, Alexander Creek, and Peters Creek), and the Kenai Peninsula (notably Deep Creek) have been of particular concern. Concurrent with these reduced returns has been the growth of directed and incidental harvests of chinook salmon in marine sport fisheries near Kodiak, and in commercial net fisheries in the Kodiak, Chignik, and Prince William Sound management areas. There are also concerns about the bycatch of chinook salmon in the off-shore groundfish trawl fisheries.

A summary of available information on harvests and tag recoveries in these marine fisheries was first compiled by Clark et al. (1994)[3]. Fisheries in the Gulf that have or will shortly have sampling programs to recover tagged adults are: Prince William Sound commercial; Kodiak sport and commercial; and southeast Alaska commercial (troll) fisheries. Marine fisheries in the Gulf that are yet to be sampled include Chignik commercial and federally managed trawl fisheries. Many stocks of chinook salmon from Cook Inlet are now tagged; many more will tagged be under this CIP initiative. No stocks of chinook salmon from Kodiak Island are tagged. Without knowledge of the composition of now unsampled harvests in the Gulf, the department can not assess the causes behind the observed declines in production by stocks of chinook salmon returning to rivers around Upper Cook Inlet.

Existing Escapement and Catch Composition Programs

Project	Request	Description
Kodiak Rivers Escapement	33.3	Count and sample escapement in Karluk, Ayakulik, and Chignik
Kodiak Marine Tag Recovery	70.4	Sample commercial and sport harvest s recover tags and estimate harvest by stock
Total:	103.7	

[3] Clark, J.H., D.N. McBride, and L. S. Timmons. 1994. Recent history of chinook salmon harvests in marine waters of south-central Alaska; compilation of harvest, size, and coded wire tag data by fishery, 1980-1993 and recommendations for future assessment. ADFG, Division of Sport Fish Fishery Management Report No. 94-5

Proposed Programs and Analyses to be funded with CIP Initiative:

Tagging Wild Juveniles in Kodiak Island:

Samples of juvenile chinook salmon from the Ayakulik and the Karluk rivers will be tagged for later recovery as adults in marine fisheries. Projects should continue 3 years to cover year classes of chinook salmon.

Annual project costs at Ayakulik River:	$55,000
Annual project costs at Karluk River:	$55,000

Chinook Salmon Bycatch in Gulf of Alaska Trawl Fisheries:

Estimates of the incidental harvest of chinook salmon in trawl fisheries will be verified following technologies as was done for salmon bycatch in the trawl fisheries of the Bering Sea. Patterns of bycatch and CWT recoveries will be summarized by year, month, target fishery, depth, gear type and reporting area. Spatial patterns will be analyzed using geographic information system (GIS).

It is anticipated that completion of Cook Inlet GSI baseline data will provide a comprehensive coastwide baseline for chinook salmon. Analysis of this baseline will demonstrate feasibility of using this technique to identify chinook salmon bycatch. Project to identify stocks should continue for 3 years.

Trawl bycatch analysis, one time	$30,000
Annual GSI stock identification of bycatch	$50,000

Kodiak/Alaska Peninsula/Chignik

Very limited information is available on stock composition of sockeye fisheries in the outside waters of Kodiak, Chignik, Shumagin Islands, Southeast mainland areas of the Alaska Peninsula, and North Alaska Peninsula areas. Issues of interceptions of Cook Inlet sockeye in Kodiak, interception of Chignik sockeye salmon in the Cape Igvak, Shumagin Islands, and Southeast Mainland districts, and Bristol Bay sockeye in the North Alaska Peninsula fisheries are routinely addressed by the Board of Fisheries. Stock identification methods are currently not available to address these issues. Genetic stock identification methods which have been demonstrated for identifying Cook Inlet stocks in Cook Inlet catches offers promise. We propose to collect baseline samples for principal sockeye stocks in Kodiak, Chignik, South Alaska Peninsula, North Alaska Peninsula and Bristol Bay, and analyze to demonstrate feasibility to identify stocks in mixed stocks fisheries in Kodiak, and North Alaska Peninsula areas.

Kodiak Area: Sockeye and Coho Salmon.

The Kodiak management area harvests local and migratory sockeye salmon. Regulatory management plans guide inseason management of the various districts. Information on the stock specific contribution of sockeye salmon to specific districts are not available. The stock specific origin and local contribution of coho salmon harvested in the Kodiak Management area is not well known. Full escapement enumeration of local coho stocks currently does not occur.

Existing Escapement and Catch Composition Program

Project	Request	Description
Major System Weirs	199.7	Count and sample sockeye in the Karluk, Ayakulik, Frazier,. Dog Salmon, Upper Station Rivers, Akalura, Saltery, Buskin, and Litnik Rivers
Minor System Weirs	29.1	Count and sample sockeye in the Paul's Bay, Malina, and Shuyak rivers
Kodiak Catch Sampling	43.7	Collect age, size, and sex composition of the commercial catch
Kodiak Test Fishery	29.2	Assess magnitude of sockeye salmon run
Total	301.7	

Proposed Programs to be Funded with CIP Request:

Escapement Assessment and Fishery Stock Identification.

Completion of Genetic Baseline for Westward Region Sockeye stocks.

Exxon Valdez Trustee Council funded development of allozyme (extensive) and DNA (limited) data sets for identification of Cook Inlet sockeye salmon in Central District fisheries. Central District and in-river fisheries were monitored during 1993-1996. Many

genetic markers, both protein and DNA, are currently available for identification of discrete stocks of sockeye salmon. Extensive data (protein and DNA) are available for sockeye populations from Cook Inlet. Data from other areas are limited or nonexistent. Expand data base beyond Cook Inlet to include stocks from Kodiak, Chignik, Alaska Peninsula, and Bristol Bay Areas.

Annual Project Costs $200,000

Kodiak Area Sockeye Salmon Fishery Stock Identification.

Stocks in Kodiak area sockeye salmon fisheries will be identified using GSI methods. Commercial fishery harvests will be sampled from June 9 until August 30. There are seven areas where sampling will occur on a weekly basis: Mainland, Igvak, Afognak, Northwest Kodiak, Southwest Kodiak, Alitak, and Eastside Districts.

Annual Project Costs $500,000

Kodiak Area Coho Salmon Escapement Enumeration.

Increase local escapement enumeration via coho weirs and aerial surveys. Establish 6 coho salmon counting weirs and extend existing aerial surveys.

Startup Costs	$120,000
Annual Operational Costs	$240,000

Escapement Goals for Kodiak Area Sockeye Lakes.

Monitor the rearing success of juvenile sockeye salmon in selected lake systems of the Kodiak Area. Lake hydroacoustic surveys and limnology sampling will be conducted. This program is recommended annually to provide data necessary to evaluate escapement goals, monitor productivity, and forecast future returns.

Annual Costs $82,000

Chignik Area. Sockeye and Coho Salmon.

The Chignik Lakes system is comprised of two sockeye runs that have overlapping run timing. The early run returns to Black Lake and peaks in late June and a late run peaks in late July to Chignik Lake. Scale pattern analysis is used to apportion the stocks inseason and postseason, and although this is standardized methodology, it has flaws in its application. Scale pattern analysis depends on differential growth between stocks and in some years the classification accuracy's are low for both major age classes, age 1.3 and 2.3 sockeye salmon. Another major problem is that inseason only age 2.3 sockeye salmon can be analyzed directly by scale pattern analysis, and other less reliable methods are used

to assess the age 1.3 component which reduces the accuracy of inseason escapement estimates.

Stock composition of the commercial sockeye and coho salmon harvest taken outside Chignik Lagoon is unknown. The harvest of coho salmon is bimodal with peaks in late July and late August - early September. Sockeye salmon are also harvested in the Eastern, Western, Perryville and Central Districts throughout the season, however the stock composition is unknown.

Existing Escapement and Catch Composition Program

Project	Request	Description
Chignik Weir	100.1	Count and sample sockeye in the Chignik River
Chignik Catch Sampling	59.7	Collect age, size, and sex composition of the commercial catch
Chignik Test Fishery	60.0	Assess magnitude of sockeye salmon run
Total	219.8	

Proposed Programs to be Funded with CIP Request:

Escapement Assessment and Fishery Stock Identification.

Black River Sonar Enumeration.

A sonar project on the Black River (to be located above Chiaktuak creek) will complement the existing management weir which is situated on the Chignik River, below Chignik and Black Lakes. The Chignik River weir is used for establishing fishing periods and achieving overall sockeye salmon escapement goals. The Black River sonar project will be used to enhance the accuracy and reliability of apportioning catch and escapement to the appropriate run component, and assure that the escapement goals for each system are met inseason. Actual counts could be compared to scale pattern analysis estimates to check the accuracy of previous apportionment's of the Chignik Lakes' stocks post 1978. Once relationships in travel time are established scale pattern analysis could be discontinued.

Startup Costs	$83,700
Annual Project Costs	$45,000

Chignik Area Coho Salmon Escapement Enumeration.

Increase local escapement enumeration by extending operation of Chignik weir and existing aerial surveys.

Annual Operational Costs	$137,000

Alaska Peninsula Area: Sockeye and Chum Salmon

The Alaska Peninsula June fishery primarily harvests migrating sockeye and chum salmon. Pre-season quotas for these fisheries are set based on a percentage of forecasted Bristol Bay inshore sockeye catch. There is a regulatory management plan to guide inseason management. The origin of the sockeye catches are almost entirely from Bristol Bay and North Alaska Peninsula River systems. Chum salmon originate primarily from the northwestern Alaska River systems, including Bristol Bay, Kuskokwim, Lower Yukon, and Norton Sound River systems. Information on the specific river system contribution of sockeye and chum salmon to the June fishery harvest is currently not available.

The Alaska Peninsula Post June fishery is believed to harvest mainly local stocks of pink and chum salmon. In 1991 the Board of Fisheries established the Post June Salmon Management Plan for the Southern Alaska Peninsula (5 AAC 09.360) which delayed the opening of non terminal areas until July 19. This plan has reduced the incidental catch of migrating coho and chum salmon. There is potential for late run Yukon and Kotzebue Sound chum salmon occur in this fishery. The magnitude of Western Alaska chum salmon in catches as well as the stock composition of the incidental harvest of coho and sockeye salmon is unknown.

The Southeastern District Mainland Fishery (SEDM) is regulated under a management plan approved by the Alaska Board of Fisheries. In the SEDM 80 percent of the sockeye harvest from the season opening (approximately June 10) through July 25 (except in the Northwest Stepovak section) are considered Chignik River origin and 20 percent of the harvest as local Orzinski stock. The stock composition referenced in the management plan is based on a limited tagging study conducted in 1961. The stock specific contribution of sockeye salmon to the SEDM fishery.

The North Alaska Peninsula occurs in near terminal areas and harvest sockeye salmon originating in the North Alaska Peninsula river systems. Bristol Bay fishermen claim significant interception of Bristol Bay sockeye salmon occurs in the North Alaska Peninsula. Limited stock identification studies using scale pattern analysis have demonstrated that at times, substantial numbers of Bristol Bay sockeye have occurred in catches from the northern areas of the North Alaska Peninsula districts. The interception of Bristol Bay sockeye is a very controversial allocation issue. The department does not have stock specific harvest information of the commercial harvest in the North Alaska Peninsula.

Existing Escapement and Catch Composition Program

Project	Request	Description
North Alaska P. Escapement	252.9	Count and sample sockeye in Bear, Nelson, and Ilnik Rivers. Conduct aerial surveys
South Alaska P. Escapement	103.2	Count and sample sockeye in Orzinski Lake weir. Conduct aerial surveys
Sandy River Weir	37.4	Count and sample sockeye in Sandy River
P/A Catch Sampling	107.2	Collect age, size, and sex composition of the commercial catch
P/A Test Fishery	44.9	Assess magnitude of sockeye salmon run

South Unimak Test Fishery	28.0	Assess relative magnitude of sockeye and chum salmon abundance
June Fishery Stock Identification	131.5	Stock Identification June Fishery Chum Salmon Catches
Total	705.1	

Proposed Programs to be Funded with CIP Request:

Escapement Assessment and Fishery Stock Identification.

Identification of Stocks of Sockeye Salmon in North Alaska Peninsula Fishery

A GSI study is proposed to identify stocks in the North Alaska Peninsula fisheries. The study will determine the extent Bristol Bay sockeye salmon are harvested in the North Alaska Peninsula commercial salmon fisheries, as well as local stocks. Scale pattern analysis has already been tried in the North Alaska Peninsula with poor results due to the myriad of stocks potentially involved. To incorporate Bristol Bay run timing, sampling will be conducted, June 25 to July 20 from catches in the, Bear River, Three Hills, and Ilnik Sections.

Annual Project Costs $380,000

Identification of Stocks of Chum Salmon from Western Alaska

The current CIP-based program has funded the development of genetic stock identification methods for chum salmon from the June and post-June South Alaska Peninsula fisheries. One additional year of sample collection (1997) for the post-June fishery remains. When completed in FY98 or early FY99, data will be available for the 1993-1996 June fishery and the 1996-1997 post-June fishery. The current baseline discriminates among major regional groupings of chum salmon including Japanese, Russian, Northwest Alaska Summer, Fall Yukon River, Southeast Alaska/Prince William Sound, British Columbia, and Washington. However, additional DNA-level markers are needed to discriminate among Northwest Alaska summer chum complex (Bristol Bay, Kuskokwim, Lower Yukon, and Norton Sound).

Annual Project Costs $126,000

Western Alaska Salmon

KUSKOKWIM AREA

The Kuskokwim Salmon Management Area includes all waters of the Kuskokwim River, Kuskokwim Bay and waters that flow into Kuskokwim Bay. With a population of about 16,000 people, population centers include Bethel, Aniak and McGrath, plus about 35 smaller communities mostly clustered along the lower Kuskokwim River and coastal areas. Both subsistence and commercial salmon fishing are vital to the economies of local communities. Sport fishing is important in only a few discrete locations. Subsistence fishing occurs throughout the Kuskokwim Area, but commercial fishing is limited to two

districts in the lower Kuskokwim River and two districts in Kuskokwim Bay. The species of greatest interest are chinook, sockeye, chum and coho salmon, with average annual harvests of 130, 190, 650, and 780 thousand fish, respectively.

Management of Kuskokwim Area salmon fisheries is difficult due to the shortfalls in fundamental stock information and basic assessment tools. Kuskokwim River fishers harvest from a mixed aggregate of species and stocks whose run timings overlap. In nearly all instances identification of discrete stocks or manageable stock aggregates is lacking, even though such aggregates likely exist. Also lacking are projects for monitoring annual spawning escapements to well distributed geographic stock aggregates. One of the Kuskokwim Bay fishing districts has no current escapement assessment other than an occasional aerial survey. Managers are also without a reliable means of assessing abundance in the Kuskokwim River in a manner timely enough for in-season information needs. Scheduled resumption of Kuskokwim River sonar by about 1999 should address this need, but the expected funding level will exclude enumeration of coho salmon. Assessment information for coho salmon is grossly inadequate in the Kuskokwim Area, yet the Kuskokwim River drainage supports the largest coho salmon harvest in the state and that harvest is increasing. During the past few years modest efforts have been made to improve on some of these shortfalls through cooperative projects with local community groups funded through federal grants, but annual funding is unstable and the modest efforts are not sufficient. These cooperative ventures need to be expanded. It is not possible to mange individual stocks or stock aggregates in the Kuskokwim Area based on current knowledge and funding.

Existing Escapement and Catch Composition Programs

Project	Request	Description
Kuskokwim Bay Fishery Monitoring	25.3	Catches sampled for age, sex, and size
Kuskokwim Bay Escapement Surveys	5.4	Aerial surveys of Kanektok and Goodnews Rivers
Goodnews River Weir	38.5	Monitor chinook, sockeye, chum, pink and coho escapement
Kuskokwim River Fishery Monitoring	58.4	Catches sampled for age, sex, and size
Kuskokwim River Run Assessment	67.4	Test fishing to determine run size and timing
Kuskokwim River Escapement Surveys	8.2	Aerial surveys of principle spawning areas
Kogrukluk River Weir	44.6	Monitor and sample escapement
Aniak River Sonar	57.2	Monitor and sample escapement
Kuskokwim River Sonar	16.5	Monitor and sample escapement
Kuskokwim Stock Biology	27.5	Sample catch and escapement for age, sex, and size
Total	349.0	

The following are projects proposed to improve discrete stock assessments for chinook, chum, and coho salmon in the Kuskokwim Area. Although SB 40 does not specifically

mention chinook and coho salmon, projects for those species have been added because of their subsistence and economic importance.

Description	Start-Up Costs	Annual Costs
Stock Identification Projects:		
• Kuskokwim Bay tagging study (chinook, chum and coho) to address potential interception of Kuskokwim River stocks	100.0	150.0
• Kuskokwim River tagging in the lower river for stock run timing and distribution (chinook, chum and coho)	100.0	200.0
• Genetic stock identification baseline (sockeye and coho)	20.0	100.0
• Increase aerial survey time		20.0
Escapement Assessment Projects (many to be operated cooperatively):		
• Extension of Middle Fork Goodnews weir through coho season		20.0
• Operation of Kuskokwim River sonar through coho season		50.0
• Development of a new sonar project in the Kuskokwim River near Stony River to assess contribution of upper Kuskokwim tributaries to total run sizes(operated for all species)	200.0	200.0
Total	420.0	750.0

FISCAL NOTE

STATE OF ALASKA
1997 LEGISLATIVE SESSION

BILL NO. SB40

Revision Date:
Title: An Act relating to management of discrete slamon stocks, to salmon management assessments, and to the fishery business tax.
Sponsor: Senator Halford
Requester: Senate Resources

Dept. Affected: Fish and Game
BRU: Commercial Fisheries (Limited) Entry Commission
Component: Limited Entry Program Administration
COMPONENT SERIAL NO. 0471

Expenditures/Revenues (Thousands of Dollars)

OPERATING EXPENDITURES	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	0.0	0.0	0.0	0.0	0.0	0.0
CAPITAL EXPENDITURES						
CHANGE IN REVENUES ( )						

FUND SOURCE (Thousands of Dollars)

1002 Federal Receipts						
1003 GF Match						
1004 GF						
1005 GF/Program Receipts	0.0	0.0	0.0	0.0	0.0	0.0
1006 GF/MHTIA						
Other						
TOTAL	0.0	0.0	0.0	0.0	0.0	0.0

Estimate of any current year (FY97) cost: $ 0.0

POSITIONS

FULL-TIME						
PART-TIME						
TEMPORARY						

ANALYSIS: (Attach a separate page if necessary.)

No fiscal impact.

Prepared By: Roger Kolden
Phone: 789-6160
Agency: Commercial Fisheries (Limited) Entry Commission
Date: 4/9/97

Approved by Commissioner: Bruce Twomley
Agency: Commercial Fisheries (Limited) Entry Commission
Date: 4/9/97

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MEMORANDUM April 10, 1997

SUBJECT: Sectional Summary of draft CSSB 40(RES) (version L; dated 4/8/97); An Act relating to assessment of discrete salmon stocks and to discrete salmon stock assessment surcharges. (CSSB 40(RES))

TO: Senator Rick Halford
Attn: Brett Huber

FROM: George Utermohle
Legislative Counsel

You have requested a sectional summary of a draft version of CSSB 40(RES)(version L; dated 4/8/97); An Act relating to assessment of discrete salmon stocks and to discrete salmon stock assessment surcharges.

As a preliminary matter, note that a sectional summary of a bill is not an authoritative interpretation of the bill. The bill itself is the best statement of its contents.

Section 1 of the bill sets out the purpose and intent of the bill.

Section 2 of the bill amends AS 16.05 by adding a new section relating to discrete salmon stock assessment projects. The Board of Fisheries, in conjunction with the Department of Fish and Game, shall identify those salmon stocks for which discrete salmon stock assessments are needed. The department shall annually develop a list and priority ranking of proposed research projects to collect information for assessment of salmon stocks identified by the board. The department shall solicit public comments on the list of proposed projects and revise the list as appropriate. The revised list of discrete salmon stock assessment projects must be submitted to the governor. The governor shall request funding for the projects included on the revised list as part of the budget and annual appropriation bill submitted to the legislature.

Section 3 of the bill adds a new subsection to AS 16.05.340 to provide for imposition of a one dollar stock assessment surcharge on resident and nonresident sport fishing licenses. The revenue collected from the surcharge may be appropriated to fund expenditures for the discrete stock assessment program.

Section 4 of the bill adds a new subsection to AS 16.05.480 to provide for imposition of a $10 stock assessment surcharge on crew member fishing licenses. The revenue collected from the surcharge may be appropriated to fund expenditures for the discrete stock assessment program.

Section 5 of the bill adds a new subsection to AS 16.43.160 to authorize the Alaska Commercial Fisheries Entry Commission to collect a stock assessment surcharge at the time of renewal of limited entry permits and interim-use permits for salmon fisheries. The total amount of revenue collected from the surcharge must equal $500,000. The revenue collected from the surcharge may be appropriated to fund expenditures for the discrete stock assessment program.

Section 6 of the bill provides that (1) the Department of Fish and Game shall develop the first annual list and priority ranking of proposed salmon stock assessment projects for submission to the governor for inclusion in the proposed budget for the department for fiscal year 1999; and (2) the stock assessment surcharges imposed on sport fishing licenses, crew member licenses, entry permits, and interim-use permits under secs. 3 - 5 of the bill are applicable to licenses and permits issued for 1998 and subsequent years.

Section 7 of the bill provides that AS 16.05.340(g), added by sec. 3 of the bill, is repealed on January 1, 1998 if a version of SB 7, increasing certain sport fishing license fees, is passed by the First Regular Session of the Twentieth Alaska State Legislature and is enacted into law.

GU:jdr
97-254.jdr

Alaska Department of Fish and Game
Commercial Fisheries Management and Development Division

EVOS-CIP Status Report

Project: Susitna River Sockeye and Coho Salmon Escapement Studies

Principal Investigators: Stan Carlson, Biometrician II, Project Leader; Patrick Shields, Fishery Biologist II, Project Biologist; Gary Todd, Fishery Biologist II, Radio Tagging

Date: 1/16/98

This project is a cooperative venture between the Commercial Fisheries Management and Development (CFMD) and Sport Fish (SF) Divisions initiated to develop and improve estimation techniques of the escapement of sockeye and coho salmon in the Susitna River drainage. Results from this project will be used by both divisions to better understand salmon production in the Susitna River and to aid fishery management planning in Upper Cook Inlet (UCI). The 1997 field season (begun FY98) consisted of a weir operated at Larson Lake (upper Susitna River) to enumerate the escapement of sockeye salmon. In addition, a study was conducted at Larson Lake to evaluate assumptions in mark-recapture estimation. The Study planned for 1998 will take place primarily on the Yentna River and will focus on evaluating the sonar counting program currently operated by UCI/CFMD Division staff. Accurate and precise estimates of sockeye and coho salmon in the Yentna River are crucial to developing escapement estimates for the entire Susitna drainage. This study will require operation of weirs at Chelatna and Judd lakes (Yentna River drainage). The Larson Lake weir will be operated again in 1998 to continue monitoring sockeye salmon escapement in the upper Susitna River.

Larson Lake Project (1997)

Primary objectives of Larson Lake study were to (1) determine the escapement of sockeye salmon into Larson Lake and compare the ratio to Yentna River escapement (sonar estimate) with ratios observed in the mid-1980s, and (2) conduct a mark-recapture (M-R) experiment to evaluate recovery sampling in spawning grounds. Inherent to the second objective were analyses of tag retention and temporal effects on recovery rates. Escapement counts and tagging operations were conducted at a weir placed just below the outlet of Larson Lake. The principal findings given below should be considered preliminary. The project report is due March 1, 1998.

Total escapement of sockeye salmon into Larson Lake was 40,282. Because of low stream velocities and the large substrate (boulder) at Larson Creek, weir integrity was not compromised and the counts were considered highly accurate. The estimated escapement of sockeye salmon in the Yentna River in 1997 was 157,797. The Larson Lake

escapement was therefore 25.5% of the Yentna count. This ratio is similar to those observed 10 years earlier during the Su-Hydro studies, which are as follows: 1984 = 24.6%; 1985 = 35.4%: 1986 = 35.1%; and 1987 = 25.4%.

The M-R study primarily consisted of tagging every tenth fish passing the weir with a coded spaghetti tag. Of these, every fourth fish also received a jaw tag to estimate tag loss. All tagged fish were measured for length, identified by sex, and scale sampled for age determination. All tag recoveries were obtained from spawning grounds using a beach seine. The lake was divided into 6 distinct geographical areas and sampled on a 5-day rotation. All captured fish were observed for marks; if none were observed, the fish was measured for length, identified by sex, and marked with a fin punch prior to re-release.

A total of 9,812 sockeye salmon were captured in the recovery surveys, 8,170 (83.3%) of which were unique (first time) recoveries. Tag recovery rates declined over time and could not be accounted for by tag loss. We hypothesize that this decline was induced by tagging or handling which decreased the time available for recapture because of increased mortality or faster ripening. After accounting for tag loss, the M-R estimate of 47,855 was 19% higher than the escapement through the weir. Spawning grounds are therefore not recommended for tag recovery surveys because of the likelihood of an unknown positive bias in the estimate.

Yentna River Project (1998)

The Yentna River sonar counting program was developed by the CFMD Division to enumerate the escapement of sockeye salmon using fishwheel apportioned counts. Proposed methods to estimate sockeye and coho salmon escapements in the Susitna drainage depend on reliable sonar estimates in the Yentna River. Therefore, the 1998 project will focus on evaluating critical aspects of sonar counting. The project will be conducted cooperatively with UCI/CFMD research staff who will perform a sonar calibration study. Primary objectives of the Yentna River project are to (1) investigate migration patterns of coho salmon around the sonar counters and to their spawning areas, and (2) assess error or bias in the current sonar counting technique (for sockeye and coho salmon). The following is a preliminary overview of the proposed project. A draft operational plan is due March 31, 1998.

Objective 1 will be undertaken using radio telemetry methods. Coho salmon will be radio tagged at north and south bank fishwheels and released downstream. One component of the study will examine spatial dispersion of the fish (nearshore/offshore distribution) to determine availability to the sonar counters and fishwheels. A second component will involve aerial radio tracking of the fish upstream to determine major spawning areas. The percentage of fish that move downstream of the release site will also be estimated. The radio tagging study may also be used provide an independent M-R estimate of coho salmon escapement.

Objective 2 will involve the following components: (1) evaluation of species selectivity of the sonar site fishwheels using M-R methods; (2) a M-R recapture experiment to independently estimate sockeye salmon escapement; and (3) a comparison of estimates of otolith marked returns (from hatchery releases of sockeye salmon fry in Chelatna Lake) from apportioned sonar counts and sampling at the Chelatna Lake weir. Component 1 entails downstream releases and recoveries of marked fish in the fishwheels to evaluate recapture consistency. Component 2 involves tagging sockeye salmon at the fishwheels and recovery sampling at the Chelatna and Judd Lake weirs to compute a M-R estimate. The third component requires otolith sampling at the two sites as well as sonar and weir counts to calculate independent abundance estimates of otolith marked fish.

Budget Summary

A total of $500k was allocated to the Susitna River project, which covers FY98/99. Total expenditures for the 1997 Larson Lake project (FY98) were approximately $91k. Total projected expenditures for the 1998 field season, which includes the remainder of FY98 and partial FY99 allocations, are $329k. Approximately $80k is reserved for the remainder of FY99 as startup funds for the 1999 field season.

BUDGET

The following budget summary is for the 1998 field season, which includes the remainder of FY98 and partial FY99 allocations. Total expenditures for the 1997 Larson Lake project were approximately $91k. This budget leaves adequate startup funds ($80k) for the 1999 field season.

Line	Position	Amount ($k)
100 - personnel	Biom II, Range 19 (Stan Carlson) - 3 mo.	18
	FB II, Range 16 (Pat Shields) - 6 mo.	30
	FB II, Range 16 (Gary Todd) - 4 mo.	20
	FB II, Range 16 (John Edmundson) - 3 mo.	15
	FB I, Range 14 - 2 x 2 mo.	18
	FWT III, Range 11 - 3 x 2 mo.	24
	FWT II, Range 9 - 4 x 2 mo.	28
	FWT I, Range 7 - 4 x 1.5 mo.	20
	Subtotal	**173**
200 - travel	Field trips, meetings	4
	Subtotal	**4**
300 - contractual	Equipment repair	2
	Freight	3
	Vehicle lease	5
	Air charters	16
	Cabin rentals	3
	Subtotal	**29**
400 - commodities	Structural/institutional supplies	12
	Radio Tags - 250 x 0.18k	45
	Dart tags - 26,000 x $.38	10
	Fishwheel maintenance/repair	3
	Weir materials (Judd Lake only)	5
	Field structures (cabins, tents, platforms)	4
	Field supplies (waders, life vests, gas, etc.)	5
	Laptop computers - 2 x 2.5k	5
	Food	10
	Subtotal	**99**
500 - equipment	Radio receiver/loggers - 4 x 6.0k	24
	Subtotal	**24**
100-500	**TOTAL**	**329**

MEMORANDUM

STATE OF ALASKA
COMMERCIAL FISHERIES ENTRY COMMISSION

TO: The Honorable Rick Halford
Chairman, Senate Resources
Alaska Senate
M/S: 3100

DATE: April 1, 1998

PHONE: (907) 789-6160 VOICE
(907) 789-6170 FAX

FROM: Commercial Fisheries Entry Commission
Marlene Johnson, Commissioner
Mary McDowell, Commissioner
Bruce Twomley, Chairman

SUBJECT: Permit Surcharges Under Proposed CSSB 40 (Work Draft 0-LS0296\Q 2/23/98) on Discrete Salmon Stock Assessments.

Brett Huber, your legislative aide, requested that we provide the Senate Resources Committee with an estimate of the magnitude of the management surcharges that would need to be imposed on salmon permit and interim-use permit holders under the draft Committee Substitute for SB 40 (Work Draft 0-LS0296\Q 2/23/98). Our rough estimates are shown in the table below:

ALL SALMON INTERIM-USE AND ENTRY PERMIT HOLDERS
Estimated Management Surcharge By Fee Class Required to Raise $500,000

Fee Class	*Number of 1997 Permits Issued*	*Estimated Management Surcharge*	*Revenues Raised*
$15	684	$4.28	$2,927.52
$50/$150	3,045	$14.26	$43,421.70
$100/$300	1,095	$28.52	$31,229.40
$150/$450	879	$42.78	$37,603.62
$200/$600	1,799	$57.04	$102,614.96
$250/$750	3,958	$71.30	$282,205.40
Totals:	11,460		$500,002.60

CSSB 40 (Work Draft 0-LS0296\Q 2/23/98) requires that the Commercial Fisheries Entry Commission (CFEC) apply an annual stock assessment surcharge to all salmon interim-use and entry permits. The surcharges are supposed to reasonably reflect the different rates of economic return for different fisheries and are supposed to raise approximately $500,000 annually.

CFEC currently sets annual permit renewal fees to reasonably reflect the different rates of economic return for different fisheries in accordance with AS 16.43.160. CFEC annually places permits for different fisheries into one of five fee classes in accordance with the methodology described in 20 AAC 05.240. These fee classes are simple multiples of each other ranging from $50 to $250 for residents and from $150 to $750 for nonresidents as shown above. Permit holders who qualify under AS 16.43.160 (c) can pay a "poverty" renewal fee irrespective of the fee class of the permit being renewed.

The Honorable Rick Halford April 1, 1998

If CSSB 40 (Work Draft 0-LS0296\Q 2/23/98) is enacted into law, CFEC would attach the stock assessment surcharge to permits by fee class. The surcharge would vary across fee classes in the same proportion as the fee classes vary with each other. For example, the annual renewal fee in our highest fee class is five times as great as the annual renewal fee in our lowest fee class. Therefore the stock assessment surcharge for the highest fee class would be five times as great as the stock assessment surcharge for the lowest fee class.

The estimates in the table on page one of this memorandum were based upon active permits where the 1997 renewal fees have been paid. The number of permits would have been slightly higher and the stock assessment surcharges would have been slightly lower if we had included both renewed and unrenewed permits to make the estimates.

Additionally, draft CSSB 40 (Work Draft 0-LS0296\Q 2/23/98) asks CFEC to impose an additional surcharge on the renewal of an entry permit or interim-use permit held by a nonresident to the extent permitted by law. We continue to litigate the *Carlson* challenge to all nonresident fee differentials. Therefore, we do not yet have a final judgment as to what, if any, differential can be defended.

Until the state has a final judgment in Carlson, it cannot be known whether any nonresident fee differential can be defended. Any additional fee differential struck down by the court would generate even greater damage claims by the plaintiff class in *Carlson*. For these reasons, we have used the same annual stock assessment surcharges for both residents and nonresidents for the estimates provided in the table on page one of this memorandum.

CFEC stands ready to implement the bill as enacted. As soon as we have a final judgment in Carlson telling us the extent to which the law permits an additional surcharge on nonresidents, we will impose the additional surcharge.

We hope that this information is useful to the Senate Resources Committee. If you have any questions about the estimates or this memorandum, please let us know.

MEMORANDUM

STATE OF ALASKA
COMMERCIAL FISHERIES ENTRY COMMISSION

TO: The Honorable Rick Halford
Chairman, Senate Resources
Alaska Senate
M/S: 3100

DATE: April 8, 1997

FILE: memos\RHSB40.w61

PHONE: 789-6160/Voice
789-6170/FAX

FROM: COMMERCIAL FISHERIES
ENTRY COMMISSION
Dale Anderson
Marlene Johnson
Bruce Twomley, Chair
M/S: 0302

SUBJECT: Permit Surcharges
Under SB 40

I. Introduction:

Brett Huber, your legislative aide, requested that we provide the Senate Resources Committee with estimates of the magnitude of the management surcharges that would be imposed on Alaska interim-use and limited entry permit holders if SB40 were enacted. We were asked to make the estimates under two different assumptions about who would pay the surcharge:

1. Salmon interim-use and limited entry permit holders only.

2. All CFEC interim-use and limited entry permit holders.

This memorandum provides rough estimates and explains how CFEC would propose to establish the management surcharge on an annual basis should SB 40 be enacted.

II. Background:

SB40 (1/13/97) would require CFEC to collect an annual management surcharge on every salmon entry permit and interim-use permit at the time of renewal. The surcharge is supposed to reasonably reflect the different rates of economic return for different fisheries. CFEC is also required to set these surcharges each year to generate $500,000 in revenue.

Additionally, SB40 requires CFEC to impose a greater surcharge on the renewal of nonresident permits to the extent permitted by law. We continue to litigate the Carlson challenge to all nonresident fee differentials. Therefore we do not yet have clear direction from the Alaska Supreme Court as to what, if any, differential can be defended.

Until the Alaska Supreme Court gives us clear direction, we believe that it would be unwise to impose an additional management surcharge on nonresident permit holders. Among other things, an additional surcharge would generate even greater damage claims by the plaintiffs in Carlson. Therefore the estimates in the following sections assume that the annual management surcharge for a permit for a particular fishery will be the same for a resident and a nonresident.

CFEC currently sets annual fees to reasonably reflect the different rates of economic return for different fisheries in accordance with AS 16.43.160. CFEC annually places permits for different fisheries into one of five fee classes in accordance with the methodology described in 20 AAC 05.240. These fee classes are simple multiples of each other ranging from $50 to $250 for residents and $150 to $750 for nonresidents.

If SB40 is enacted into law, CFEC would propose attaching the management surcharge to each fee class. The management surcharge would vary across fee classes in the same proportion as the fee classes vary with each other. For example, the annual fee in our highest fee class is five times as great as the annual fee in our lowest fee class. Therefore the management surcharge for the highest fee class would be five times as great as the management surcharge for the lowest fee class. The estimates in the following sections demonstrate how this methodology might work in practice.

III. Management Surcharge On All Salmon Interim-Use Permit and Entry Permit Holders.

This section provides an estimate of the management surcharges that would be required to raise $500,000 if surcharges were imposed on all salmon permit holders irrespective of the area in which they fish. The estimate makes the following assumptions:

1. The number of salmon permits issued in each fishery will be exactly the same as the number of permits issued in 1996.

2. Persons paying poverty fees will pay exactly the same management surcharge as other permit holders in their fishery.

3. 1996 Fee Classes remain in effect.

ALL SALMON INTERIM-USE AND ENTRY PERMIT HOLDERS			
Estimated Management Surcharge By Fee Class Required To Raise $500,000			
Fee Class	*Number Of 1996 Permits Issued*	*Estimated Management Surcharge*	*Revenues Raised*
$50 / $150	5,402	$16	$86,432
$100 / $300	1,959	$32	$62,688
$150 / $450	954	$48	$45,792
$200 / $600	1,171	$64	$74,944
$250 / $750	3,257	$80	$260,560
Totals:	12,743		$530,416

As can be seen, the management surcharge required to achieve $500,000 in revenues would range from about $16 to $80 (rounded to the nearest dollar) if the number of permits issued for each salmon fishery were exactly the same as in 1996 and if the fee classes for these fisheries were exactly the same as in 1996. Under these assumptions, examples of fisheries where permit holders would pay the $16 management surcharge would be the SE Alaska hand troll fishery and the AYK salmon fisheries. Examples of fisheries where permit holders would pay the $80 management surcharge would be the Bristol Bay salmon drift gill net and the Alaska Peninsula salmon purse seine fishery.

Under SB40, the management surcharges would be altered annually when fee classes for the different fisheries were determined. So, the above estimate should be regarded as a rough "ballpark" figure only.

IV. Management Surcharge On All Interim-Use Permit and Entry Permit Holders.

This section provides an estimate of the management surcharges that would be required to raise $500,000 if surcharges were imposed on all types of permits irrespective of the species or area of the permit. The estimate makes the following assumptions:

1. The number of permits issued in each fishery will be exactly the same as the number of permits issued in 1996.

2. Persons paying reduced poverty fees will pay exactly the same management surcharge as other permit holders in their fishery.

3. 1996 Fee Classes remain in effect.

ALL INTERIM-USE AND ENTRY PERMIT HOLDERS			
Estimated Management Surcharge By Fee Class Required To Raise $500,000			
Fee Class	*Number Of 1996 Permits Issued*	*Estimated Management Surcharge*	*Revenues Raised*
$50 / $150	17,714	$9	$159,426
$100 / $300	2,304	$18	$41,472
$150 / $450	2,417	$27	$65,259
$200 / $600	1,355	$36	$48,780
$250 / $750	4,583	$45	$206.235
Totals:	28,373		$521,172

As can be seen, the management surcharge (rounded to the nearest dollar) required to achieve $500,000 in revenues would range from about $9 to $45 if the permits issued for each fishery were exactly the same as in 1996 and if the fee classes for these fisheries were exactly the same as in 1996.

Under these assumptions, examples of fisheries where permit holders would pay the $9 management surcharge would be the AYK salmon fisheries and the Norton Sound Herring gill net fishery. Examples of fisheries where permit holders would pay the $45 management surcharge would be the Bristol Bay salmon drift gill net fishery and the Southeast Alaska roe herring purse seine fishery.

Under SB40, management surcharges would be altered annually when fee classes for the different fisheries were determined. So, this particular estimate should be regarded as a rough "ballpark" figure only.

V. Additional Considerations:

The legislature may want to consider the following points when discussing proposed revisions to SB 40:

A. It Is Not Possible To Set Management Surcharges Prior To The Season To Obtain Exactly $500,000 Of Revenue.

SB40 requires that the "total amount of revenue generated by the management surcharge must equal $500,000." In order to set management surcharges prior to the season to raise exactly $500,000, CFEC would need to know exactly how many permits would be issued in each fishery prior to the season. In practice we do not know that.

Many factors can alter the number of permits that are issued in a fishery in a particular year. This is particularly true in unlimited fisheries where the number of participants can vary widely on an annual basis. CFEC can estimate each year the management surcharges needed to raise approximately $500,000, but we cannot guarantee that precisely $500,000 will be raised. Language directing us to set surcharges to raise "approximately $500,000" or "at least $500,000" would be more practicable.

B. Should Management Surcharges Be Applied To Permit Holders Qualifying For Poverty Fees?

AS 16.43.160(c) allows holders of permits who have incomes below poverty guidelines to renew permits for a reduced poverty fee irrespective of the permit's fee class for the year. Reduced fees are $15 for residents and $45 for nonresidents. Each year many permit holders take advantage of this provision. Does the legislature want a management surcharge applied to permits renewed under the poverty provision?

The numbers and types of permits that will be issued each year under the poverty provision is also difficult to predict in advance. If permit holders who qualify for the reduced fee do not have to pay the management surcharge, estimation of the appropriate surcharge will be less precise.

C. How Should Management Surcharges Be Handled If A Fishery Is Closed For The Year?

When a fishery is closed for the year before any fishing has occurred, CFEC refunds the annual permit fee or allows the fee to be applied toward the next year's renewal. CFEC also waives the annual renewal fees for persons who did not renew. Under such conditions, would the legislature want CFEC to retain or refund the management surcharge? If CFEC is to retain the surcharge, would the legislature want CFEC to collect the management surcharge from those whose annual renewal fees were waived before they renewed their permits?

Upstream

Salmon and Society in the Pacific Northwest

Committee on Protection and Management of
Pacific Northwest Anadromous Salmonids

Board on Environmental Studies and Toxicology

Commission on Life Sciences

1995

National Research Council

BACKGROUND

11

Salmon-Fishery Management Concepts

While Pacific salmon fisheries developed rapidly during their early history, our ability to manage them did not. Much of the basic biological understanding of Pacific salmon and information that could be used to manage salmon fisheries were being developed as the fisheries developed, but their application to management developed much more slowly. In his review of salmon management during the first century of Pacific salmon fisheries, Larkin (1970) suggested that almost from the beginnings of the industry two ideas were implicit in attempts at management: that salmon returned to their home stream to spawn and that catches in each river had to be limited. Those continue to be the biological bases for management, and we continue to struggle with their incorporation into a sustainable management concept.

Papers by McHugh (1970) and Larkin (1970) provided historical perspectives on the development of fishery science and management of Pacific salmon in North America. Initially, scientific investigations consisted largely of descriptive biology and examination of the "home-stream concept." The scientific basis of that concept was debated long after its acceptance in management (see, for example, Jordan 1925, Moulton 1939). But acceptance, coupled with the early recognition that salmon eggs were easily cultured, resulted in hatcheries' becoming the major management activity during the first 50 years of the industry. By the late 1930s, however, management of Pacific salmon was in transition. Larkin (1970:226) reported that "regulations for controlling harvest were inadequate, but insufficient information existed on which to construct better techniques; hatchery practices were fairly advanced but of dubious value; inroads on salmon production as a consequence of the development of other resources were beginning to cause concern." The 1930s began a period of more-quantitative assessment in fishery management (Cushing 1988, McHugh 1970). The quantitative basis of salmon management was provided by Ricker's 1954 seminal paper on stock and recruitment. Since then, management of Pacific salmon fisheries has been premised on his stock-recruitment theory.

STOCK[1] AND RECRUITMENT

Salmon-fishery management assumes that there is surplus production below some upper size of the spawning population. *Surplus* in the case of salmon means that a given number of spawners in an adult generation produces, on average, more progeny than needed to replace the parents and overcome all natural mortality sources from the time fertilized eggs are deposited in the gravel of natal streams, through juvenile and immature life phases, to adulthood. The number of surplus animals varies with the size of the population and the natural mortality rate. Smaller populations tend to have higher productivity than larger populations (i.e., number of

[1] The terminological difficulties associated with the word *stock* are discussed in Chapter 4. To permit comparison of the discussion in this chapter with much of the published literature on fisheries, we use the term *stock* here, although we use the term *population* in most of the rest of the report.

progeny returning per adult spawner), and their total production is limited mostly by the number of eggs deposited. In larger populations, production depends more on the interactions between spawners and habitat required for sustaining survival and growth of progeny.

Ricker (1954) noted that factors that become more effective at high densities, called "compensatory" factors by Neave (1953), control or regulate salmon populations. Compensatory mortality factors place more pressure on high-density than on low-density populations. For example, when large numbers of pink salmon reach their spawning grounds, some adults are forced to use less-suitable gravels at stream margins; in crowded conditions, late spawners might even dig out developing embryos deposited by earlier spawners. Those factors decrease the number of progeny produced per female. When chinook or steelhead spawners are less abundant, the resulting fry, fingerlings, and pre-smolts have more access to feeding positions and cover, so they may grow faster and be less vulnerable to predation.

Ricker (1954) termed the relationship between the number of spawners (stock or S) and the production of progeny (recruitment or R), the stock-recruitment function. The term *recruitment* refers to the potential availability of fish to a fishery or to form the next spawning generation. The stock often is referred to as the *escapement*, because these fish escaped capture by a fishery and return to spawn.

Fishery managers have attempted to maximize surplus production (i.e., animals available for catch) by maintaining the number of spawners at an abundance at which, according to Ricker's stock-recruitment theory, they are likely to produce the largest sustainable catch. Figure 11-1 is an example of a hypothetical Ricker stock-recruitment function. In reality, the function would be fitted statistically through a scatter of data points collected over time. The function represents the average response expected given an escapement under the environmental conditions that existed when the data were collected. If escapements merely replaced themselves in the next generation, those returns would fall along a "replacement line" where R = S (line A in Figure 11-1). However, if the function value R_1 expected for a particular S_1 exceeds the replacement value, then a surplus production ($R_1 - S_1$) could be caught and the population maintained in equilibrium at the same future S and R numbers. Salmon populations can maintain themselves at several levels of abundance, and different salmon populations have different stock-recruitment curves. In Figure 11-1, curve B describes a population with greater productivity than curve C, but one with greater density-dependence at large spawning stocks. Populations with greater productivity can sustain their production at higher exploitation rates.

The S number that, on average, maximizes the catchable number of fish generation after generation is referred to as the optimum escapement, and the associated catch is the maximum surplus reproduction or maximum sustained yield (MSY). The escapement expected to provide MSY is indicated as S_{MSY} in Figure 11-1. It occurs where the slope of the recruitment curve is 1.0, the tangent to the curve parallel to the replacement line. Once S_{MSY} is determined, the rate of exploitation that can be sustained by the population to maintain MSY can also be determined, i.e., $(R_{MSY} - S_{MSY})/R_{MSY}$. In this figure, the surplus production ($R_1 - S_1$) is equal to MSY.

Other stock-recruitment models have been proposed. The Beverton-Holt model (1957) predicts that the number of recruits increases with spawning stock ever more slowly and never exceeds a particular value (asymptote). This model does not turn downward at high S, as with Ricker's model.

Stock-recruitment functions, whether Ricker's or Beverton-Holt's, share several serious limitations for application to salmon management. The principal limitations are related to

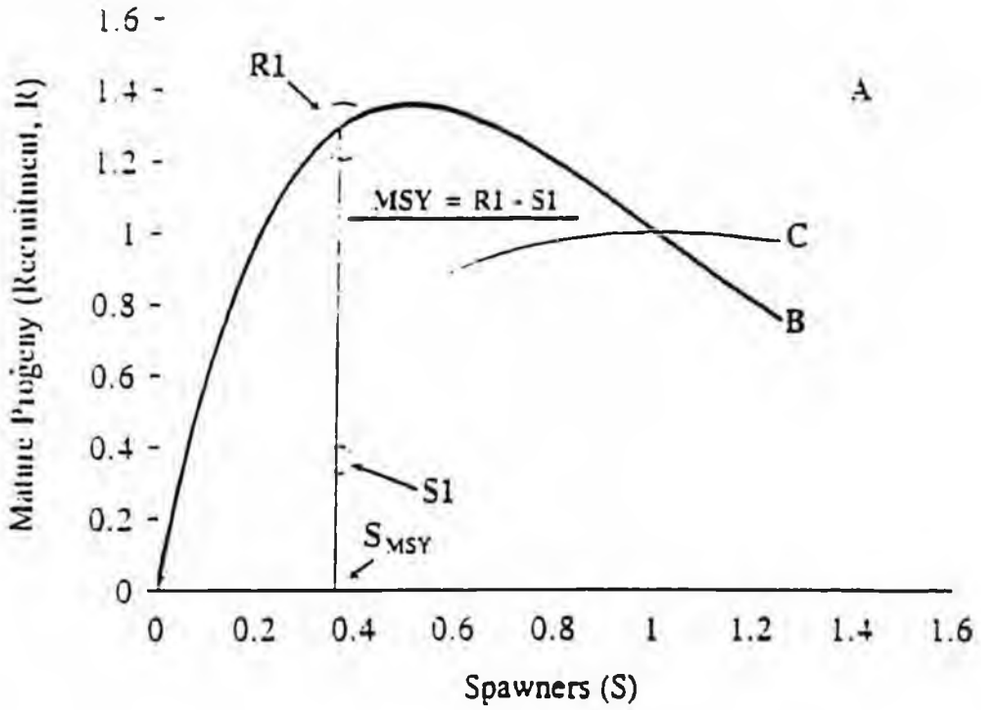


Figure 11-1 Hypothetical Ricker stock-recruitment curves relating number of animals reproducing (spawners) and production of mature progeny (recruitment). Other letters explained in text.

- The estimation of the biological production function in a highly variable natural environment.
- Differences between populations and change over time within populations.
- The necessity for accurate data on total fishing mortality by age and population over all fisheries, on number of spawners by age, and on future production.

An individual data point (i.e., the recruitment from a parental spawning stock) reflects biological processes, effects of environmental variability, and random events. Determining an appropriate production function in the presence of this variability requires a long series of data on returns over a wide range of spawning-stock sizes. The uncertainty about a recruitment function is usually high. For example, even in a sockeye population with 41 years of good assessment information, a characteristic recruitment function is not evident (Figure 11-2a). The relationship between spawners and juvenile production in freshwater is more evident (Figure 11-2b), but variability in marine survival weakens both the relationship between spawners and adult returns (Figure 11-2a) and between downstream migrants (smolts) and adult returns (Figure 11-2c). The latter relationship would already account for variation in returns attributable to variation in freshwater survival. Even in the population modeled in Figure 11-2, the estimate of S_{MSY} is uncertain; S_{MSY}= 332,000 with a 90% confidence range between 203,000 and one million spawners. This confidence range was estimated from 1,000 computer simulations of the

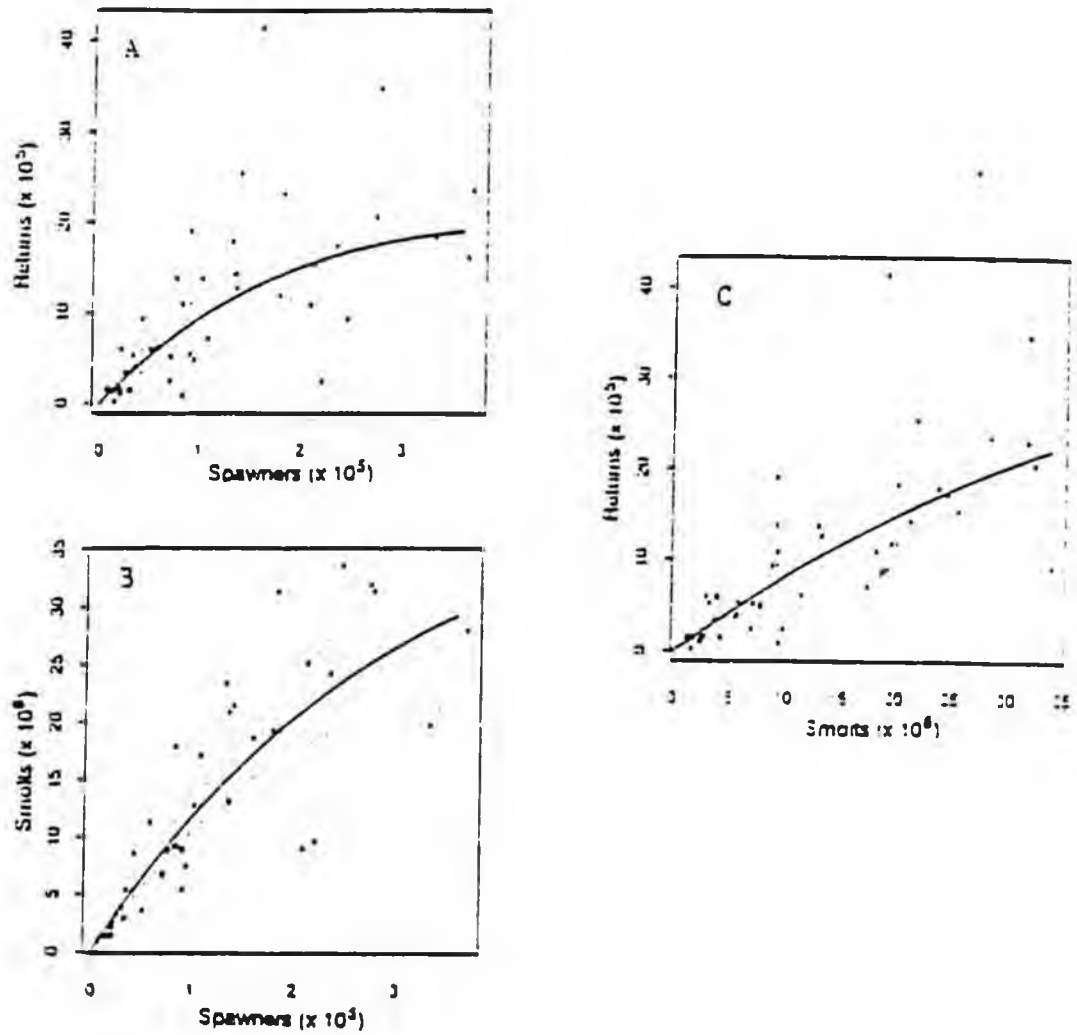


Figure 11-2 Ricker stock-recruitment data and functions for Chilko Lake sockeye salmon from Fraser River. A, adult spawners and adult recruitment; B, adult spawners and juvenile downstream migrants (age 1 = smolts); and C, migrants and adult returns.

relationship between adult spawners and adult recruitment. The distribution of the simulation results (Figure 11-3) indicates the uncertainty associated with estimates of the optimal escapement value for this population. Furthermore, the scatter plot of alpha versus beta values (S/R parameters in the Ricker function) indicates that these parameters are correlated (the oval shape of the 90% joint confidence limit indicates correlation). The wide variation in the alpha

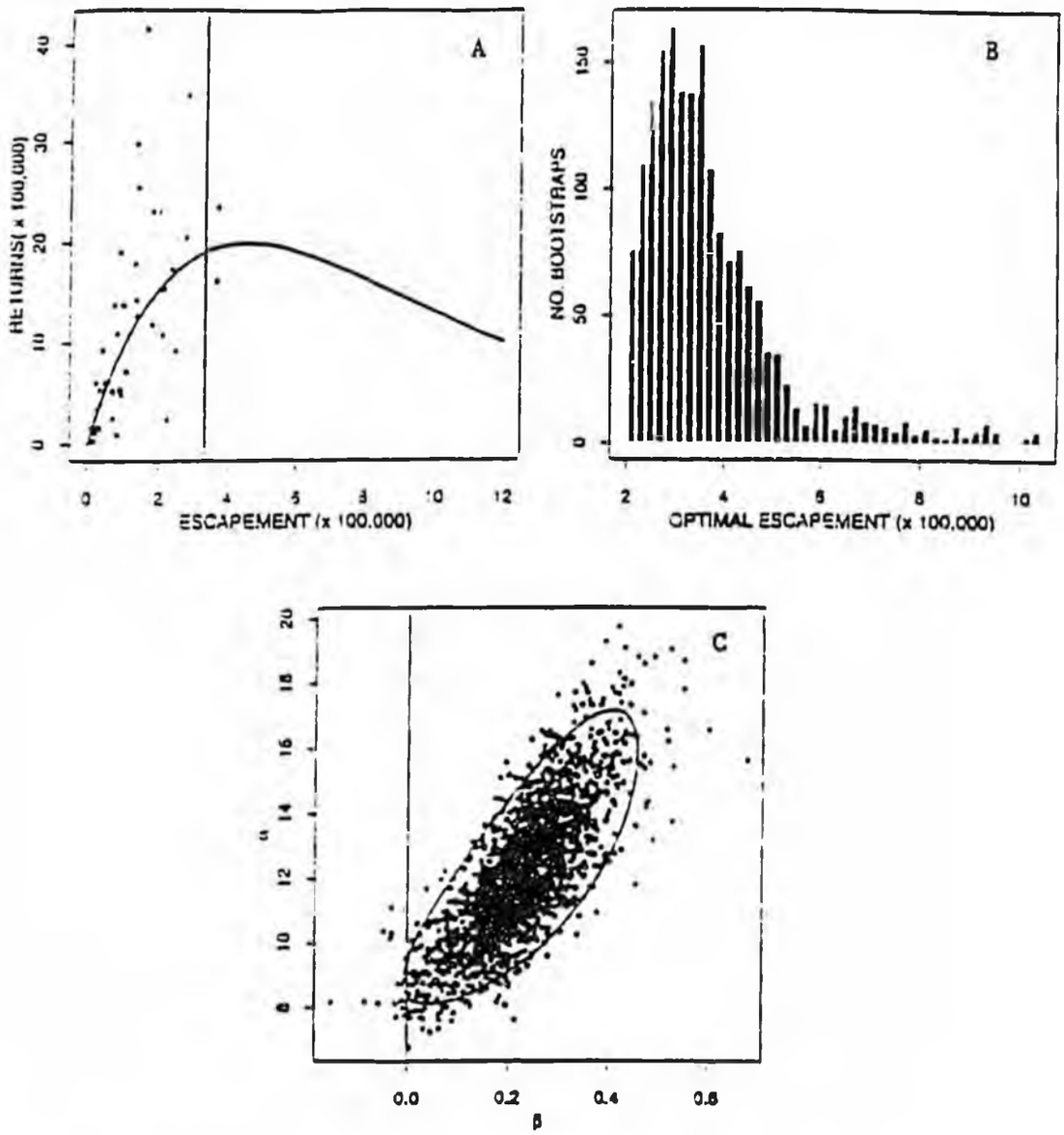


Figure 11-3 Results of 1,000 bootstrap simulations of Chilko sockeye Ricker stock-recruitment function (top left). Top-right figure is distribution of 90% confidence interval for optimal spawning-stock sizes determined by simulations. Lower figure is bivariate scatter plot of Ricker stock-recruitment parameters determined from each simulation.

value is associated with wide variation in beta; this results in a highly uncertain stock-recruitment function for this population. In salmon populations in which recruitment and spawning stock sizes have been monitored, annual variation in the ratio of returns to spawners can vary by a factor of 10. Recently the marine survival rate of chinook salmon released from Robertson Creek Hatchery (on the west coast of Vancouver Island, B.C.) has been shown to vary by a factor of more than 100 (0.1% - 13.7% survival to the second year).

Many years of data would assist in accounting for that variability, but long-term data can

involve another problem. The function calculated reflects returns per spawner under past environmental conditions. If the environment changes, the stock-recruitment function changes. An obvious example is deterioration of freshwater environments, as evidenced in increased deaths associated with dams, reduction in area available for spawning or rearing because of water abstraction, or sedimentation in spawning gravels. Change in marine survival (see Beamish and Boullion 1993) also can alter the stock-recruitment function. Environmental variability makes questionable how representative any stock-recruitment function will be for current and future environmental situations. Limiting data to periods considered to be more "typical" of existing conditions might be possible, but the resulting decrease in data points would increase uncertainty substantially.

The most common concern about managing for MSY in salmon fisheries is that stock-recruitment functions vary among populations. The MSY for a population is determined by its productivity and sources and magnitudes of density-dependent mortality rates, which reflect the life history of the species and the specific habitat in which the population lives. Stock-recruitment functions are expected to vary, but the paucity of reliable data on population-specific functions makes it hard to account for the differences. An obvious example is the comparison of wild-spawned versus hatchery-reared salmon. A hatchery population can sustain its maximum catch at substantially greater exploitation rates than can a natural population because mortality associated with spawning and freshwater rearing is much lower in a hatchery than in natural systems. Assuming that after release marine mortality sources do not compensate, fewer parents are needed to reproduce the recruitment from a hatchery population (see Chapter 12). Direct comparisons of stock-recruitment functions for hatchery and wild populations (in the same geographic area and period) are rare. One good comparison involves sockeye salmon in the lower Fraser River (Figure 11–4), where an artificial spawning channel in Weaver Creek enhances the fry productivity of that population but later rearing occurs in the natural environment. Two other populations, from Birkenhead and Cultus lakes, are produced naturally and have the same adult run timing as Weaver Creek; all three populations are fished simultaneously. The catchable surplus from Weaver Creek is greater than that in the natural populations. The exploitation rates to sustain these populations at MSY are 0.76 for Weaver Creek, 0.70 for Birkenhead Lake, and 0.62 for Cultus Lake. The spawning channel has increased the productivity of the Weaver Creek sockeye, but fishing to maximize the catch from Weaver Creek would mean overfishing returns to both natural populations.

The hatchery-wild dichotomy presents an extreme example of the "mixed-stock" fishing problem. If fishing responds to apparent abundance without consideration of the stock composition (i.e., the mixture of portions of stock from source populations) or if fishing levels are based on hatchery production, the natural population will be overfished and its production will, on the average, decline. Alternatively, if the fishery is managed to sustain the natural population, substantial surplus production will return to the hatchery or could be caught in a single-population, terminal fishery.

The example of mixed-stock fishing represents a much more general problem. Differences in productivity between natural populations cause the same problem, and by-catch of other species in fisheries that are directed at a more productive species is an analogous problem. When fishing occurs on a mixture of populations with different stock-recruitment functions and fishing cannot be regulated at a rate appropriate for each component population, the stage is set

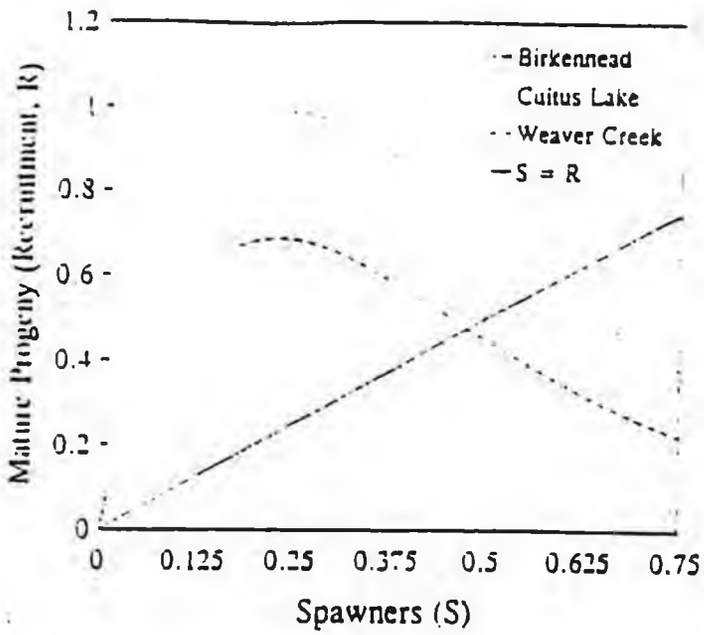


Figure 11-4 Ricker stock-recruitment curves for three Fraser River sockeye salmon populations. Weaver Creek population is enhanced but Cultus and Birkenhead populations are both naturally spawning. Source: data collected 1946-1990 by International Pacific Salmon Fisheries Commission and Canada's Department of Fisheries and Oceans.

for overfishing of the less-productive components (Ricker 1958, 1973; Hilborn 1985). For example, extinction of wild coho salmon in the lower Columbia River has occurred as fishing pressures at sea and in the lower Columbia increased to take hatchery returns; catch levels of 85-95% were directed at the returning fish (Cramer et al. 1991). The less-productive stocks are referred to as "weak stocks," but that term leads to confusion. "Weak" cannot be equated with "small", nor does it imply anything maladaptive, inferior, etc., about animals in the population. The "mixed-stock" (or mixed-population) fishery problem is related to differences in *production rates*, not the relative size of populations.

Apart from natural variability and variation among populations or over time, estimating the S_{MSY} for just one population raises a serious question. Larkin's (1977) discussion of MSY as a management concept identifies the issue of the poor quality of the data available for use in stock-recruitment analysis, and recently the joint U.S.-Canada committee on chinook salmon stated (PSC 1993b:87):

> At present, complete information necessary to determine stock productivity is not available for any individual chinook stock! For a few stocks, enough information has been available to apply stock-recruitment type analyses to estimate productivity parameters, but even these had to involve some major assumptions about age structure in catch and/or escapement and about the error structure of these data. And none include environmental factors, which are known to produce variability in annual production. . . .

To determine stock-recruitment functions is data-intensive, expensive, and statistically nontrivial. Data and cost issues are related to accurate determination of a population's mortality in each fishery and its spawning escapement by age so that production can be related to the parental generation. Salmon tend to be caught in many sequential, mixed-stock fisheries, and their escapement is not determined easily. There are few cases in which this challenge has been met to study salmon population dynamics, and the sensitivity of stock-recruitment analyses to errors in the data is poorly understood. Hilborn and Walters (1992) stated that stock-recruitment analyses can provide "terribly misleading answers" and that (p. 287)

> the types of misleading answers produced by stock and recruitment analysis are almost always the same; the answers mistakenly lead you to believe that recruitment will not decline very much with spawning stock. We think that bad stock-recruitment analyses have been a significant factor leading to over-exploitation and stock collapse for some major fisheries. . . .

Hilborn and Walters reviewed the problems associated with stock-recruitment analyses in greater detail than is appropriate here, but the committee has developed an example of the consequences of such analyses (Box 11-1). The most common outcome of simple stock-recruitment analyses is that the optimum exploitation rate is overestimated and the S_{MSY} underestimated. The consequence of this outcome could be management advice that unintentionally would lead to overfishing and contribute to declining production.

Although MSY concepts have provided the basic paradigm for salmon management since the 1950s, the paradigm has been inadequate, given the fishing pressure and economic development in the Pacific Northwest. Mixed-population fisheries, habitat change, and uncertain assessment advice have all contributed to overfishing and loss of less-productive populations. The committee reiterates Larkin's caution about the inadequacy of the MSY concept for salmon management (Larkin, 1977:9):

> The foregoing has demonstrated, I hope, that MSY is not attainable for single species and must be compromised: (1) to reduce the risk of catastrophic decline and reduction of genetic variability; and (2) to accommodate the interactions among the species of organisms that comprise aquatic communities.

Given that the limitations of stock-recruitment analyses have been known for many years, why are management strategies based on those models? Part of the answer is that technical improvements in analyses has led to unjustified confidence in abilities to compensate for deficiencies. Much of the answer, however, lies in the socioeconomics of fisheries and fishery management. In the United States and Canada, marine fish are generally viewed as "common property" resources, owned by no one—or by the public—until they are caught. Such a situation is well known to lead to excessive investments in capital and labor and to pressures to overfish resources, particularly when there is open entry (i.e., no limit on the number of people who can fish) (Gordon 1954, Scott 1955, Crutchfield and Pontecorvo 1969). However, salmon fishing in the Pacific Northwest is not now (and has not been for a long while) an open-entry fishery. The states of Washington, Oregon, and Alaska and the province of British Columbia have limited

Box 11-1 Stock-Recruitment Simulation

Stock-recruitment functions are usually nonlinear, which means that natural environment fluctuations can produce systematically skewed estimates of the long-term response of salmon populations to exploitation. The direction of this error appears to lead to overexploitation, even when statistical procedures generally accepted by fisheries biologists are properly applied. In this example, the committee develops ideas suggested by Hilborn and Walters (1992) to show how advice to management might produce serious errors.

The simulation begins with a "known" stock-recruitment relationship, the values for which are typical for chinook salmon in the Pacific Northwest: $R_t = S_{t-1} \exp(a - bS_{t-1}) \exp^{\sigma\varepsilon}$ where a = 1.6, b = 0.2, and sigma (σ_ε) = 0.7.

Each brood year was fished at a 75% exploitation rate: this is common for many fall chinook populations but exceeds the 60% rate sustainable at MSY for this stock-recruitment function.

Each simulation was run for 100 years, and data from the last 30 years were collected for stock-recruitment analysis. At the end of each simulation, stock-recruitment parameters (a, b, S_{MSY}) were estimated from the 30 data points. The effects of three known error sources were examined:

Type 1: Environmental variation in recruitment, normally distributed with mean zero and standard deviation σ_ε. The value of σ_ε was chosen so that production varied by a factor of 2–4.

Type 2: Environmental variation plus observation error in spawning-escapement estimation. The error about S_t was simulated as $S_t \cdot \exp^{\sigma\varepsilon_t}$, where the random normal error has mean zero and standard deviation = 0.57. This value of σ_ε was chosen to produce escapement-estimation error of ± 50% about the true S_t.

Type 3: Environmental variation, observation error in spawners, and error in catch estimation. Catch error was simply generated by smoothing the catch (three-point moving average) to simulate assumed age structures or errors in catch allocation between populations.

One thousand simulations of each type were conducted, and frequency distributions for parameters a and b were compared with values of the "known" function. The solid vertical line in the figures represents the parameter values of the "known" function, and the dashed lines encompass 95% of the estimates.

Both a and b have been rescaled for clarity in presentation. The a values are expressed as the expected recruits per spawner ($\alpha = \exp^a$), and b as logarithms to spread out the distribution.

The distributions of results for Type 1 to 3 simulations are presented from top to bottom. In each distribution, the most common result of the simulations is represented by the tallest bar. In every case, the most common result is to the right of the value that we are trying to estimate (i.e., the values in the original, or "known", stock-recruitment function). Furthermore, for the productivity parameter (α), the effects of the error types are compounded as the most common value progressively deviates from the vertical line. Comparing the means of the simulations demonstrates the tendency for errors in stock-recruitment analyses to overestimate productivity and underestimate the number of spawners needed to sustain MSY.

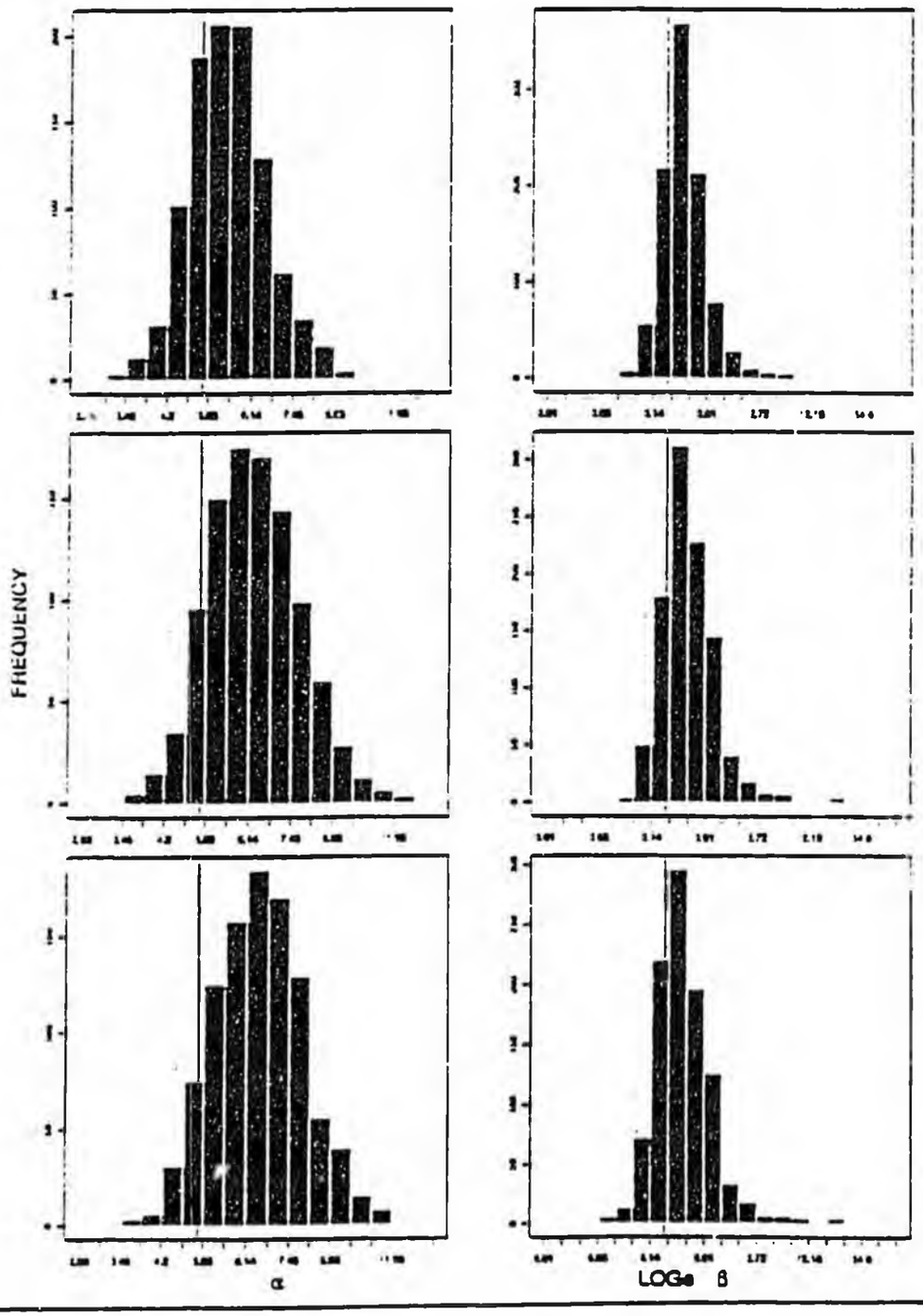
	Recruits/spawner	S_{MSY}	Sustainable exploitation rate at MSY
"Known" function	4.95	3.43	0.60
Type 1 results	5.51	1.44	0.63
Type 2 results	6.28	0.98	0.67
Type 3 results	6.49	1.11	0.675

These analyses are clearly very limited and were intended only to demonstrate, under realistic assumptions about error, the potential for misleading information (see Hilborn and Walters 1992). Advice based on these analyses would recommend a sustainable exploitation rate, at MSY, 12.5% greater than could actually be sustained by the population. While we thought we were managing correctly, the population would continue to decline.

. . . *continued on next page*

Box 11-1 (continued)

Simulation results for Type 1 to 3 errors described in this box. Solid vertical lines in each figure are true parameter values. Frequency histograms on left show distribution of estimated returns per spawner, and on right, natural logarithm of beta parameter (natural lags used to spread distribution). Results of 1,000 simulations for Type 1 to 3 errors are presented from top to bottom.



entry into the salmon fishery since the 1960s; this has not prevented overcapacity in boats, gear, and fishing technology, but it has raised greatly the costs of participating in the fishery and reduced overall numbers of people and boats in it. Higher costs of entry and higher investments increase the needs of fishers to pressure regulatory agencies to allow higher catches at the expense of spawning requirements.

The problem has long been recognized (e.g., Wright 1981, Ludwig et al. 1993). Wright stated (p. 38)

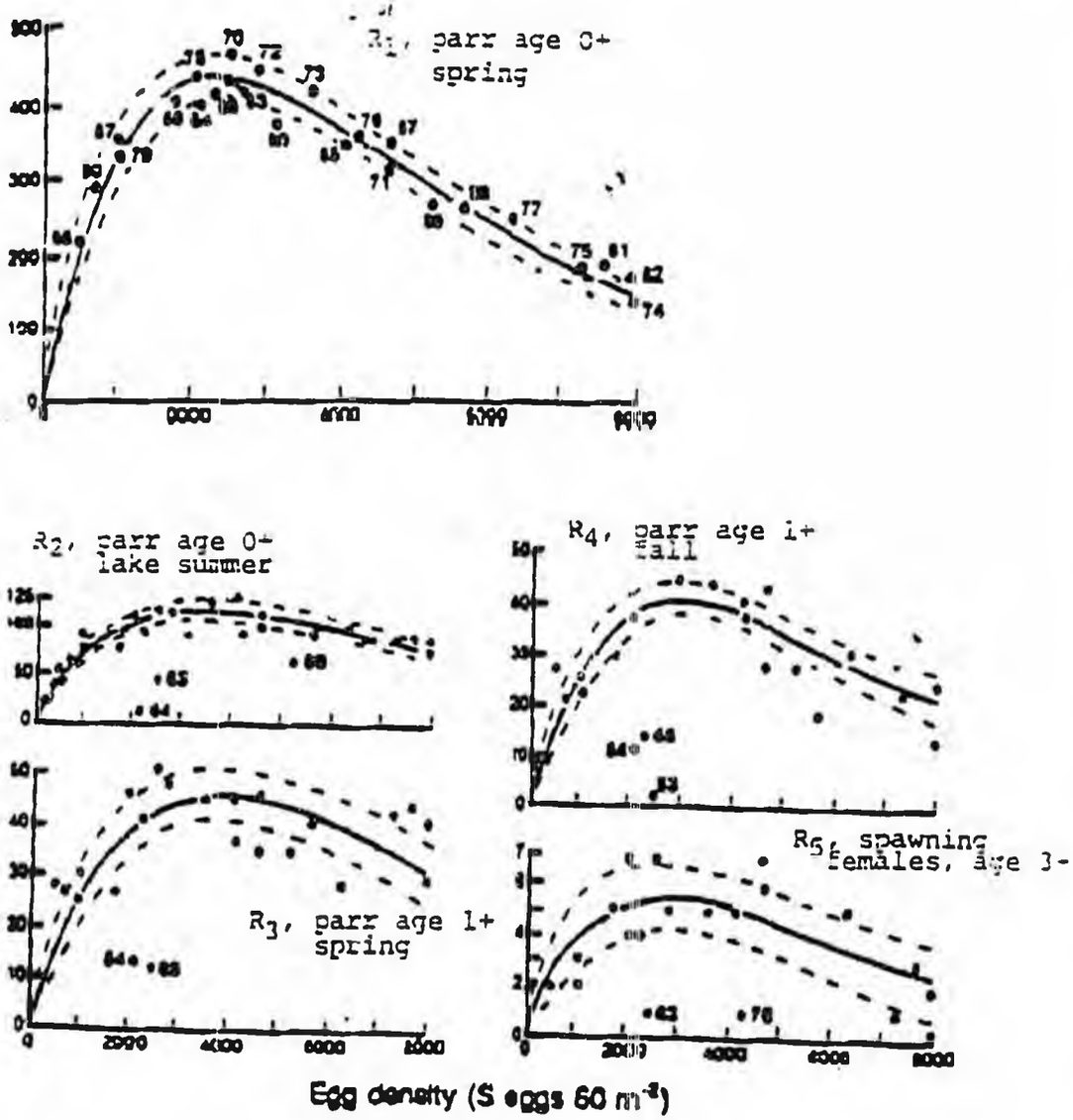
> Fishermen make poor management allies due to their perpetual optimism about strengths of the salmon runs and their understandable preoccupation with short-term economic considerations.
>
> There can be little doubt, however, that the salmon fishery lobbyists are currently winning the battle against the spawning-escapement protectors. A team of fishery scientists formed by the Pacific Fishery Management Council concluded that 40% more chinook salmon and coho salmon were needed to meet spawning-escapement requirements, under existing habitat conditions, for the combined areas of California, Oregon, and Washington (PFMC 1978:39).

Similar appraisals can be found in Fraidenburg and Lincoln (1985), Walters and Riddell (1986), and National Research Council (NRC 1994). The remedies suggested most commonly, besides complete but preferably temporary closures of the fisheries (as occurred in 1994), include restructuring managing bodies to remove apparent conflicts of interest (NRC 1994) and privatizing rights of access to salmon stocks through individual transferable quotas or similar devices, perhaps combined with buyouts or other compensations for displaced fishers. A third approach, paradoxically, is to strengthen the involvement of fishers in the management process so that they are encouraged to take more responsibility as stakeholders in either a common property or a privatized fishing situation (cf. Scott 1993). Hanna (1994) suggested that the Pacific Fishery Management Council (PFMC) has already moved a long way toward involving fishers in the management process, at least for other species of fish.

The application of stock-recruitment theory and MSY as the basis of salmon management is complex and of limited applicability. The multitude of populations and habitats, the extent of enhancement programs, and the variability and uncertainty in the data make determining an accurate optimal escapement goal elusive. However, where the necessary data are available, stock-recruitment relations can be clear (see Box 11-2). The definition of the relationship depends on the degree of environmental variability, the causes of density-dependent mortality, and data quality. Given the poor quality of the data available on almost all Pacific salmon populations, we cannot test the stock-recruitment theory rigorously. We have learned that the theory is more applicable in freshwater phases of salmon life history and that environmental variability in the marine habitat ultimately can determine the number of returning adults. Principal lessons are that salmon stock-recruitment relationships are inherently uncertain, that the determination of a specific escapement goal (S_{MSY}) is seldom justified by available data, and that the MSY concept has been inadequate for conserving population diversity or production.

Box 11-2

A most striking example of stock-recruitment relations in a salmonid is the detailed study of Elliot (1994) on anadromous brown trout (*Salmo trutta*). The figures below from Elliot's recent book show a clear curvilinear relation between spawning (measured as egg density) and recruitment to later life phases. Note that recruitment is more strongly associated with egg density at the lower ages (R_1 to R_3). The relation becomes much more variable when adult returns (R_5, age 3+ female returns) are related to egg density. The committee readily acknowledges, however, that this population inhabits a spring-fed stream not subjected to extremes of climate or high water velocities.



FISHERY MANAGEMENT IN THE FUTURE

The committee explored four general options for managing fisheries to help frame the process of developing a new management paradigm: status quo, no fishing, limited entry, and terminal fisheries.

The Status Quo

One management option is to continue to use the MSY concept while working to improve its predictive powers. The committee has concluded, however, that the MSY concept by itself is inadequate and impractical as a basis for salmon management because the model implies the existence of a continued surplus production, which is fundamentally inconsistent with historical data. In overfished populations, most stock-recruitment data will be from the lower range of escapement numbers. We can adjust for biases in data, but we cannot correct for the absence of data at larger escapements without actual observations. If we estimated S_{MSY} on the basis of historical data and managed perfectly by annually achieving this value, we would learn nothing about the productive potential or dynamics of a population: we would learn more only about natural variability in recruitment because all the return data would be scattered vertically above the S_{MSY}.

The prevailing social acrimony, particularly in connection with listings under the Endangered Species Act, argues for change in management objectives and a fuller understanding of the salmon problem. As the economic return from the salmon resource declines, debates have become increasingly polarized because action would increase economic disruption in other resource industries. The committee heard considerable testimony lamenting the inability to make the changes needed. No one is willing to accept responsibility; each interest feels that another should do more. The status quo in this social environment will perpetuate further decline and will not sustain salmon population diversity or production.

The No-Fishing Option

One solution is to stop fishing. In many situations, such as those of the Chesapeake Bay striped bass and North Sea plaice, populations have rebounded after cessation of fishing. Because of recent emergency measures taken by the PFMC, this option is in effect for most river and most ocean fisheries in Oregon, California, and Washington waters and in federal waters off those states. In other cases where fishing was stopped, such as the California anchovy fishery, depressed populations have not rebounded. One common argument is that stopping catch certainly cannot hurt and that fishing should not continue when threatened and endangered species are mixed with salmon targeted for catch.

The major problem with the no-fishing option is that the social and economic hardships caused by stopping are substantial, particularly to those who depend on salmon fishing for their livelihood. Fishing cessation usually occurs only when the overall benefits from continued fishing are so reduced that every party gets little from the population. Furthermore, people always expect the factors causing the decline to go away soon and more favorable conditions to return.

Fishers argue that commercial and recreational uses of salmon constitute an important value. They say that fishing is an excellent way of keeping the status of the populations in the public eye. Fishing is a livelihood for professional fishers. Catches are important for economic, subsistence, and ceremonial purposes for American Indians, and the expectation that catches are possible drives the recreational fishery. Eliminating fishing makes salmon less valuable economically.

Eliminating fishing is not a simple issue. Salmon are caught from southern Alaska to the central California coast by netters, trollers, anglers, and charter boats and by both Indian and non-Indian fishers. Should fishing be stopped for Alaska salmon fishers whose runs are generally in much better shape than those returning to the Columbia River? The position of Alaska salmon fishers is that salmon problems in the Pacific Northwest are due to choices made by people of the Pacific Northwest and that Alaskans should not be penalized to fix the region's problems (Pacific Salmon Commission 1993). Salmon from the Pacific Northwest are also caught in Canadian fisheries, and U.S. treaty and nontreaty fishers catch salmon from Canada. The position of Alaskan salmon fishermen has prevented the Pacific Salmon Commission (PSC) from making progress in protecting threatened and endangered salmon runs.

When elimination or control of fishing is discussed, people often think only of commercial fishing, but that is too restricted a view; all fishing kills fish. Is it legally possible to stop treaty fishing? As long as any salmon are available, treaty fishing will continue. Thus, the no-fishing option is complex: it does not imply just a simple decision to close a fishery. Closing one part of the fishery results in another group's getting a larger catch. Treaties give tribes the right to fish in their usual and accustomed places in common with non-Indians. And treaties require the United States to maintain the health of salmon stocks. In a legal sense, treaty fishing would be difficult or impossible to stop; and as long as there is fishing, other fishers will demand fishing opportunities.

If fishing cannot be eliminated legally for some peoples, such as Canadians and treaty fishers, which fishers can be restricted from fishing? Should recreational and charter fishing be stopped? Recreational and charter fishers take relatively few fish and contribute substantially to the economies of coastal communities. One variant of the no-fishing option could be for the United States to stop all ocean recreational, charter, and commercial fishing for salmon in Alaska and the Pacific Northwest. Such a ban would have favorable effects on negotiations with Canada in the PSC. However, it would be fought by all those affected. Another variant of this option would be to close all ocean fisheries in the Pacific Northwest. A complete ban of ocean fishing is close to being realized. It was proposed in 1993 for coho by the PFMC. It was proposed again in 1994 and implemented for coho, leaving only limited fishing periods for chinook. That was not the first time a no-fishing option has been proposed. In 1904, J. P. Babcock, the British Columbia fisheries commissioner, unsuccessfully proposed closing fishing on the Fraser River during 1906 as a conservation measure to build up sockeye stocks. The problem with any partial closure is that, although it might allow some increased escapement, it also redistributes catch among different fishing interests.

Canada and the United States have many points of complementary and cooperative interest that might be negotiated on a smaller, more-specific scale, rather than simple wide-scale closures. One point of complementarity is the catches of Pacific Northwest coho and chinook off the west coast of Vancouver Island and Puget Sound catches of Fraser River sockeye.

Another point of complementarity is the possibility of opening ocean fishing areas to a joint fishery of trollers from Alaska, Canada, and the Pacific Northwest.

The Limited-Entry Option

If cessation of fishing is too strong an option, limiting the number of fishers might be helpful. All West Coast commercial salmon fisheries have some form of limit on the number of gill-net and troll licenses. The underlying idea is that the number of fishers should be limited to correspond to the size of catch that can be taken. The objective of the license- limitation program is to restrict fishing capacity to a level closer to the effort that can be maintained. One problem with limited entry is that it has many of the same elements as the status quo. Limiting entry to the degree necessary to produce the needed effect is perceived as a severe step.

A second problem that limited entry does not solve is the natural tendency of fishers to become more effective. New technology, knowledge, and fishing methods make fishers more efficient with the gear that they have. Thus, a limited-entry program must continually reduce the number of fishers in accordance with both resource availability and the capacity of fishing vessels and fishers to catch salmon (Smith and Hanna 1990); a reliable way to do this has not been perfected.

A third problem is that, as with open-access fisheries, successful application of limited entry depends on the ability to calculate accurately the quantity available for fishing. People want a consistent number, but fisheries are inherently variable; no stable number can be given. A safe number would have to be conservative, and fishers would probably complain that it is too low. The MSY mode of management has continually overestimated the amount available for fishing. With management for genetic diversity, as we have been recommending throughout this report, the focus is on achieving spawning escapements. That will mean highly variable catch opportunities for a much smaller fleet of vessels.

The Terminal-Fishery Option

Catching salmon closer to the place where they spawn allows greater separation of hatchery from wild and threatened from nonthreatened populations. A way to achieve that separation is to allow only terminal fisheries. The separation can be even better achieved with live traps. With live-trap, terminal fishing, salmon needing protection can be released if they are identifiable with minimal potential for harm. Because natural mortality in the ocean, after early transitions to ocean life, reduces biomass more slowly than body growth adds biomass to the population, fishing closer to the spawning grounds would increase salmon yields.

Ocean fishers might question the quality of salmon taken in terminal fisheries; the meat of fish caught nearer to their spawning grounds will tend to be less oily and the skin more colored, and they will be less preferred by some consumers. Salmon do deteriorate in quality as they get closer to spawning, but terminal fisheries in estuaries and river mainstems would not necessarily decrease quality and the average size of the fish would be greater. Two advantages of live-trap, terminal fisheries are the potential to separate populations from one another and the

ability to set catch rates for what each population can sustain. For example, salmon from threatened populations could be released. The treaty fishery in the middle Columbia would be a place to experiment with terminal fishing. Shifting to a live-trap fishery also has the potential to increase employment. Recreational fishers view set nets as wasteful of the resource and as yielding lower-quality fish. Live traps would improve the perception of Indian fishing on both conservation and quality grounds.

A major problem with the no-fishing option is at least partially solved by adopting terminal fisheries. Alaskan fishers catch salmon destined for Alaska and British Columbia streams, as well as for the Columbia River and the north coastal area. Alaskan ocean fishers question why their opportunity to fish for healthy Alaskan populations should be jeopardized by habitat and hydropower problems in the Pacific Northwest. Canadian fishers who fish mixed U.S., Canadian, and Alaskan populations do not see a reason to limit themselves when the problem is not theirs. They have not built dams on the Fraser River, and in British Columbia the habitat is less altered.

Although the current catch situation—which is unbalanced between areas—will make it politically difficult to restrict fishing to locations of origin, the committee concludes that it is worthwhile and important. Salmon management—especially population-specific management—is likely only practical if catch were allowed only near the point of origin, and in the long run, the salmon and many fishers would benefit once production increased, although which fishers benefit most would involve social factors.

Developing a New Management Paradigm

Given the complexity and scope of the salmon problem, developing a new management concept will be difficult and contentious. The committee starts by identifying several premises based on its experience:

- In Pacific salmon, the presence of many diverse, spatially distributed spawning populations is closely aligned with genetic diversity, maximal use of available habitat, and potential for increasing production from natural spawners.
- The sustainable exploitation rate is a function of a population's productivity determined over all life phases. Catch is only one of numerous mortality sources and cannot be viewed as independent or as an alternative to other sources over which we do not have control. The fishable portion of a return is determined by the brood-year survival to the time of the fishery and the desired spawning-stock size.
- Salmon are a component of ecosystems and they exist in a dynamic evolutionary process. Their production is variable and interconnected with the condition of their communities and habitats.
- Catch is a function of the fishing rate exerted by a fishery and the abundance of salmon recruited to the fishery. A low fishing rate and a high abundance can yield the same catch as higher fishing rate and a lower abundance.
- Productivity varies among populations and over time. The projected return from any

population and brood year is highly uncertain. Any management process must acknowledge and account for limitations and uncertainty in assessment information and management capabilities.

Those premises consider only biological aspects of fishery management. But the sustainability of salmon in the Pacific Northwest also is inextricably linked to economic development and social values. Society in the Northwest has exchanged natural salmon populations for economic development or argued about who was to blame as the resource declined. Figure 11-5, based on data from Matthews and Waples (1991), demonstrates the decline in Snake River spring and summer chinook salmon since the late 1950s. In spite of a progressive decline, major corrective actions were not taken until 1992, when the chinook were listed as threatened under the Endangered Species Act. The greater the decline in the resource, the greater the disruption will have to be to correct the problem. The committee believes that a stronger social commitment to the biological-resource base must be established if salmon are to be sustained. For the fishery-management process to be effective, a strong commitment to the salmon must be an integral part of the process.

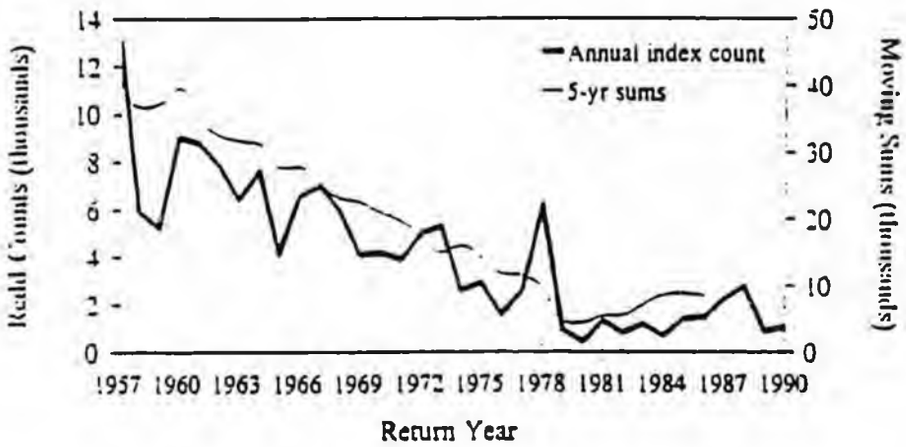


Figure 11-5 Trend in spawning-escapement index for Snake River spring and summer chinook salmon. Trend in annual redd counts and 5-year sum (for smoothing) are presented. Data from Matthews and Waples (1991) for Snake system minus Grande Ronde returns.

A management cycle for fisheries involves four activities: stock assessment to provide the biological advice, development of management plans, conducting the fisheries, and evaluation. The critical elements are sound biological advice, explicit and assessable management objectives (biological, social, economic, etc.), an institutional process for developing management plans, control of fisheries, and accountability in achieving management objectives. We consider those elements below, except for institutional processes and accountability, which are discussed in Chapter 13.

Stock Assessment and Biological Advice

Biological advice is only as sound as the information on which it is based. Advice must recognize limitations and uncertainties in knowledge and in abilities to predict recruitment. For example, the committee suggests that the concept of "optimum escapement" be replaced with a more conservative notion of a minimum sustainable escapement (MSE). An MSE concept avoids a single target escapement value and acknowledges that estimates of S_{MSY} are often biased low and rely on weak historical data. The committee emphasizes that MSE is a minimum and that actual escapements would exceed it and not be scattered about it. The committee's notion was based on protecting against the continued decline in salmon production and on concern about the use of an uninformative, possibly misleading, statistic.

The concept of MSE is analogous to minimum viable population size (Shaffer 1981, Simberloff 1988) and population viability analysis (Gilpin and Soule 1986, Shaffer 1990). It acknowledges that the longer-term sustainability of salmon populations depends on reducing the risk of extinction due to over-fishing and stochastic events (environmental and demographic variability). However, in assessing these risks, society must determine the level of security desired for salmon populations over what time period (i.e., how confident do we want to be that a population will exist in 100 or 200 years).

The MSE level could initially be determined from historical stock-recruitment data, when available. Where the data are not available, initial escapement levels may be derived from habitat assessments and/or historical escapement trends. This information may then be incorporated in demographic or life history models to determine MSE at a particular level of confidence. Uncertainty about the biological basis of this level must be allowed for when assessing the risk of extinction, but in many cases, the appropriateness of the initial MSE will be unknown. However, under the MSE concept, populations would generally be at less risk than under the earlier MSY approach, because escapements should exceed the minimum value (unless survival is so poor that the MSE is not achievable even under the absence of fishing mortality).

Estimates of MSE should ideally include information about the composition of spawning populations, the maintenance of connections between salmon demes, the role of carcasses as nutrient sources for freshwater ecosystems, intraspecific competition in reproduction, mate selection, and gene flow, but relatively little attention has been given to these factors. The need for levels of escapements that promote competition and fertilization or that maintain niches used by salmon is not well demonstrated with direct research.

In summary, the committee recommends the establishment of minimum safe levels of spawning escapements to reduce the risk of continued loss of salmon populations and production. Actual escapements should always exceed this value, with allowances for assessment error for abundances near this minimum level. Escapements would vary above the minimum depending on the population abundance and sources of mortalities. Escapements substantially above these minima will be needed to maintain salmon productivity (and therefore, sustainable exploitation rates) in many more populations than are presently available. These increased escapements are also likely to have benefits in expanding the number of spawning populations, increasing genetic diversity within populations, and enhancing natural ecological processes.

Management Objectives

The major change in objectives related to the sustainability of salmon must be to broaden the set of biological objectives. That does not imply a priority of biological objectives over socioeconomic objectives, but socioeconomic objectives should complement biological objectives. The committee concludes that the resource base necessary to sustain salmon production consists of genetic diversity (both within and between natural breeding populations) and the habitat used by all life stages of the species. Genetic diversity provides for the continuing evolutionary process and is the biological basis of future salmon production. Therefore, the committee recommends managing for the joint biological objectives of MSE and increased diversity in local breeding populations, which will result in increased production in the long run. Increasing the size and number of spawning populations will, on average, increase the abundance of salmon. The committee acknowledges that increasing diversity will require initial reductions in catch because animals must survive to reproduce. However, catch in future years should increase as salmon production increases, even though fisheries probably would be managed at lower catch rates to maintain the diversity within local breeding populations and promote the development of interpopulation diversity.

Figure 11-6 shows what is expected in accordance with MSE. Graphs A, B, and C represent what has occurred commonly in the past. Natural or wild (N) and hatchery (H) populations have been fished simultaneously, but the hatchery population has higher productivity. As total population (N + H) increases, catch often increases to a maximum (Figure 11-6b), but the catch rate (i.e., the portion of the available salmon abundance that is caught) may not be sustainable by N. Consequently, the catch of N + H begins to decrease because of the declining production from N. Eventually, management responds to conservation concerns for N and reduces the catch to conserve N. If that situation is visualized over many natural populations, loss of population diversity can be characterized by Figure 11-6c. Diversity, if measured simply by the existence of spawning populations, would be maintained for a longer period than the catch (N + H). But under increased fishing pressures, the less-productive N will begin to be lost. Diversity would probably stabilize as catch is curtailed to conserve population diversity. Under a management policy to increase interpopulation diversity and achieve minimum escapement levels, the expected outcomes would be increased habitat use by spatially and temporally more diversified salmon populations and an increased catch achieved at a lower, sustainable rate of fishing (Figure 11-6d). The potential cost of this plan is an initially decreased catch of N while diversity is increased. The magnitude of initial loss depends on the specific situation.

A useful analogy of this plan is the idea of salmon runs as a tree. Each stem, branch, and twig on the tree is a potential home for a local breeding population, an isolated reproductive group adapted to the conditions of that particular stem, branch, or twig. Some salmon climb mighty trees like the Columbia and Sacramento with complex branching. Others climb much smaller, less-complex trees like coastal streams. Cutting limbs from the dendritic structure of these salmon "trees" or placing obstructions on major limbs prevents local breeding populations from filling out the evolutionary potentials offered. That reduces the genetic diversity and viability of the salmon population as a whole and reduces habitat use and the potential production of salmon. A more holistic approach in salmon management would focus attention

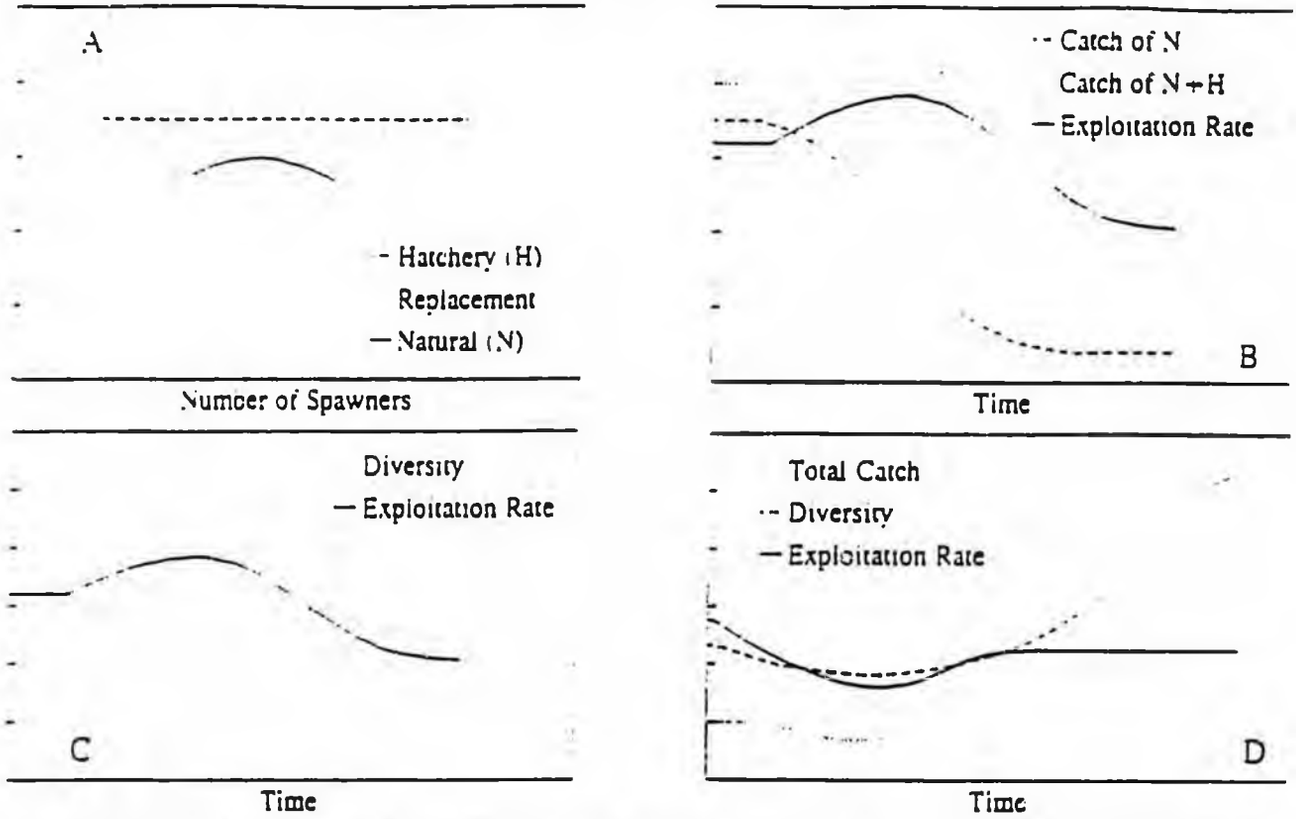


Figure 11-6 Schematic portrayal of observed historical trends in salmon populations, catch, and exploitation (plots B and C) and the expected outcome of managing for a minimum safe escapement (MSE) objective and rehabilitation of interdemic diversity (plot D). Plot A is a stock-recruitment curve showing number of recruits as a function of the number of spawners. In plots B - D, the vertical axes represent numbers of fish (for catch curves), numbers of populations (for diversity curves), and percentages (for exploitation rates). The exploitation rate is the total mortality associated with fishing activities, including the landed catch, incidental catch, discards, and hooking mortality. See text for further details.

on filling out the trees' foliage so that viable local breeding populations of salmon inhabit as many branches as possible.

How could those joint biological and socioeconomic objectives be implemented in a management plan? The committee has considered only a general process because details of implementation would involve social values and decisions. For example, how quickly diversity increases will be associated with how much social change is acceptable or with the array of economic alternatives in a specific area. A possible process would involve the following:

• Identification of natural populations with the quantitative information needed for a credible population assessment and determination of an MSE and exploitation rate that, on average, would be allowable at this level of spawning-population size. Currently there are few of these "assessment" populations, but the application of a safe escapement level will reduce the risk of misapplication to other populations and should provide reasonable starting points in the plan development. Total fishing mortality would initially be limited to the exploitation rates at the MSE.

• Predictions of available abundance to fisheries. The methods might vary between regions, species, etc., but should account for spawning-population sizes, environmental variation,

and interceptions in fisheries outside the management zones. Abundance forecasting also might prove to be highly uncertain, but methods to incorporate in-season information with pre-season estimates (see Noakes 1989) could be useful in controlling fishing impacts.

- Establishment of survey designs for estimating diversity within local breeding populations. The essential need is to measure diversity and how it changes over time. Surveys would be designed to be repeatable annually and to measure quantitatively the spatial and temporal diversity of local breeding populations.
- Conduct of annual evaluations involving quantitatively assessed indicator populations, surveys of the spatial and temporal diversity of local breeding populations within geographic areas, and fishery dynamics. The indicator populations would include natural populations on which accurate stock-recruitment data can be collected and whose dynamics (e.g., freshwater and marine survival rates, productivity, etc. [see Holtby and Scrivener 1989]) can be studied, natural populations that are conducive to repeatable annual estimates of spawning escapement, and hatchery populations whose exploitation rates can be determined. Fishery dynamics are assessed to understand units of effort, relationships between catch and effort, and effort responses to abundance and ultimately to estimate catch levels for a fishery.
- Assessment of progress toward the biological objectives and incorporation of what is learned from evaluations into future management plans. Given the limitations in our knowledge and the inherent variability in the environment, the committee strongly endorses adaptive management (Walters 1986) to achieve sustainability for salmon. For example, the response of natural populations to management changes can be confounded by environmental variability. Experimental designs can be useful in controlling this interaction (see Walters et al. 1988) and in improving detection of changes in diversity over time and under different management plans or fisheries. The use of adaptive management, however, emphasizes the need for effective institutional processes for communication and participation in the development of longer-term management plans.

Control of Fisheries

Meeting the joint management objectives of achieving the MSE and increasing diversity of local breeding populations diversity will not resolve the mixed-population fishing problem or settle allocation debates. Without greater control on fishing impacts, meeting the objectives could even exacerbate these problems. Furthermore, the sequential alignment of fisheries in the Pacific Northwest, from ocean mixed-population fisheries to more terminal fisheries involving fewer populations, could result in inequitable disruption of fisheries. But sequential fisheries also present an opportunity to compensate for fishing impacts among fisheries. Given the complex of fisheries, variations in population size, and the need for social decisions in establishing a fishing plan, the committee felt that it was impractical to comment on any specific fishing options. There are only two general kinds of strategies for meeting the objectives through fishing controls:

- Reducing exploitation rates over all populations in a fishery—fishery-oriented strategies.
- Increasing the specificity (in time, area, gear, species, etc.) of a fishery to avoid or minimize impacts on particular populations—population-oriented strategies.

There are many ways to implement each kind of strategy. Fishery strategies can vary from no fishing through allowing exploitation only in specific fisheries to reducing exploitation rates in all fisheries. Population strategies can divert fishing effort to another time or area, develop a selective fishery for only marked animals (i.e., prohibit retention of unmarked fish), or develop selective fishing gear, such as live traps and fishwheels. Strategies can also be combined to limit exploitation of some populations while maintaining a fishery on others. For example, an ocean troll or recreational fishery might be managed at low exploitation rates that are sustainable by most populations. Terminal fisheries could then be managed to compensate for these ocean-fishery mortalities by either increasing or decreasing further exploitation on a population.

In developing a fishing plan, managers have to balance fishing capacity (number of vessels, effort, market prices, etc.), availability and quality of biological data (on abundance, stock composition, previous fishing impacts, etc.), and social agreements (allocation requirements, treaty vs. nontreaty, ocean recreational vs. ocean troll, etc.). Each balance has problems. In the Northwest, more people would participate in fisheries if there were more fish. The potential for additional fishing pressure is an important source of uncertainty in how a fleet will respond to a particular fishing plan. The quality of biological data varies among fisheries, but the catch rate is seldom known until after the fishing has ended for the season. Achievement of allocation agreements is uncertain because population-specific fishing mortalities often are unknown or a substantial portion of the allowable catch might be taken in fisheries outside the management region, e.g., in Canada or southeastern Alaska. The most common problem, though, is our limited ability to control in-season fishing impacts, especially on a population-specific level. In the absence of reliable pre-season predictions of population and fishery abundance, fishery managers have developed in-season estimation procedures to monitor abundance and run timing. These procedures normally compare historical test-fishery catches or catch-per-unit effort from specific fisheries, with run-size estimates to develop in-season prediction models. These models frequently also have large uncertainties due to variation in run timing, stock compositions, and environmental conditions; or simply due to measurement error in historical data. In summary, the quality of biological data varies widely between fisheries, and exploitation rates in fisheries are seldom known. This uncertainty places the objective of increasing genetic diversity at risk and argues for the continued application of conservative fishing plans, particularly in the mixed-population ocean fisheries. Fishers should recall, however, that fishing at a lower rate on an increasing population will eventually restore catch levels.

Developing fishing plans for each of the Pacific Northwest regions will necessitate consideration of specific resource problems, distribution of fisheries, and social groups. Choosing a strategy requires establishing priorities and making a number of difficult social choices. But fishing is only one mortality factor. Fishers can enhance the spawning population by forgoing catch, but salmon also require habitat for long-term sustainability. The control of fishing as a means to approach sustainability in salmon will be only as successful as our ability to address the freshwater-habitat issues. We would also expect greater support from fishers if they could see a successful return on the spawners invested. Presumably, the same would be true of Canada's participation in the Pacific Salmon Treaty

CONCLUSIONS

Since the nineteenth century, in an effort to maximize catch, salmon fisheries of the Pacific Northwest have exploited a mix of wild-spawning and hatchery-produced salmon. Fishing moved farther into the ocean to catch more and better-quality salmon earlier in their life cycle, but the stream origins of these fish were unknown. Social pressures pushed catch levels toward those which only the most-productive populations could sustain, but they were often too high for natural populations. Mixed-stock fisheries developed for human convenience, and society watched as local breeding populations of salmon went to extinction or were depressed severely. Fishing impacts and the promotion of regional economic growth combined to alter salmons' environment to their detriment. The existing technocratic model for fishery management, productivity enhancement, and environmental modification has not been able to sustain salmon catches or the diversity of salmon populations. The result has been a major reduction in economic opportunity for fishers. All fishers have without doubt suffered possibly irreparable injury from the status of salmon and the management prescriptions to deal with it. The decline in income is much greater than that in any other major resource industry in the Pacific Northwest, and catches by American Indian fishers are now smaller in numbers of fish than before the Boldt decision.

The committee concludes that fishery management objectives must explicitly recognize the need to conserve and expand the genetic diversity of the salmon resource. To accomplish this, emphasis must be given to minimum sustainable escapements and filling out the dendritic structure of salmon habitats.

A more holistic management approach must recognize the connections between the genetic resource base, habitat, and the resulting salmon production; it must also account for the uncertainty in our scientific advice and for inherent environmental variability. The committee has outlined a process intended to improve the potential sustainability of salmon in the Pacific Northwest. Furthermore, the committee does not believe that the sustainability of Pacific Northwest salmon can be achieved without limiting the interceptions of U.S. salmon in Canada and obtaining the cooperation of Alaska. An effective and cooperative Pacific Salmon Treaty is necessary. The committee does not provide specific recommendations about altering specific fisheries, because there are numerous options and interactions between fisheries. Achieving agreement on changes in fisheries will be difficult and necessitates an effective institutional process.

Executive Summary

Pacific salmon have disappeared from about 40% of their historical breeding ranges in Washington. Oregon. Idaho, and California over the last century, and many remaining populations are severely reduced. Most runs that appear plentiful today are largely composed of fish produced in hatcheries. Recreational and commercial fishing for several salmon species has been restricted or even prohibited from the coastal waters of the region to the headwaters of many streams, and tribal fishing has been much reduced. Petitions have been filed to list several populations as endangered or threatened under the Endangered Species Act; a few have been listed, and more could be soon.

Salmon have great cultural, economic, recreational, and symbolic importance in the Pacific Northwest. As a result. their declines—which have numerous interacting causes—have resulted in much concern. The often expensive efforts to reverse the declines have been controversial and unsuccessful in many cases. Faced with the possibility of dozens or perhaps even hundreds of listings of Pacific salmon under the Endangered Species Act, and faced with controversies over the effectiveness of proposed actions to slow, halt, or reverse the salmon declines, Congress requested advice from the National Research Council (NRC). In response. the NRC's Board on Environmental Studies and Toxicology assembled the expert Committee on Protection and Management of Pacific Northwest Anadromous Salmonids to review information concerning the seven species of anadromous salmonids[1] in the Pacific Northwest.

The committee was asked to "evaluate options for improving the prospects for long-term sustainability of the stocks, and [to] consider economic and social implications of such changes" (statement of task; see Preface). It was asked to perform the following tasks:

- Assess the status of the salmon stocks.
- Analyze the causes of declines.
- Analyze options for intervention.

The committee was asked to consider all stages of salmon life histories, including the ocean phase, and to consider the appropriate roles of hatcheries. Congress did not request advice on whether society *should* make the investments needed to halt and reverse salmon declines. However, the committee's analysis of options for intervention and their likely effectiveness should help to inform that policy decision.

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[1] This report deals with anadromous forms of the seven species of the genus *Oncorhynchus*. They are chinook. chum. coho, pink, and sockeye salmon and the anadromous forms of rainbow and cutthroat trout: steelhead and searun cutthroat. In this report, the general term *salmon* refers to all seven species.

STATUS OF SALMON POPULATIONS

The status of many specific salmon populations in the Pacific Northwest is uncertain, and there are exceptions to most generalizations with regard to overall status. Nevertheless, a general examination of the evidence of population declines over broad areas is helpful for understanding the current status of species with different life cycle characteristics and geographical distributions, and with some caution, the following generalizations are justified:

- *Pacific salmon have disappeared from about 40% of their historical breeding ranges in Washington, Oregon, Idaho, and California over the last century, and many remaining populations are severely depressed in areas where they were formerly abundant.* If the areas in which salmon are threatened or endangered are added to the areas where they are now extinct, the total area with losses is two-thirds of their previous range in the four states. Although the overall situation is not as serious in southwestern British Columbia, some populations there also are in a state of decline, and all populations have been completely cut off from access to the upper Columbia River in eastern British Columbia. Even if the estimate of population losses of about 40% is only a rough approximation, the status of naturally spawning salmon populations gives cause for pessimism.
- *Coastal populations tend to be somewhat better off than populations inhabiting interior drainages.* Species with populations that occurred in inland subbasins of large river systems (such as the Sacramento, Klamath, and Columbia rivers)—spring/summer chinook, summer steelhead, and sockeye—are extinct over a greater percentage of their range than species limited primarily to coastal rivers. Salmon whose populations are stable over the greatest percentages of their range (fall chinook, chum, pink, and winter steelhead) chiefly inhabit rivers and streams in coastal zones.
- *Populations near the southern boundary of species' ranges tend to be at greater risk than northern populations.* In general, proportionately fewer healthy populations exist in California and Oregon than in Washington and British Columbia. The reasons for this trend are complex and appear to be related to both ocean conditions and human activities.
- *Species with extended freshwater rearing (up to a year)—such as spring/summer chinook, coho, sockeye, sea-run cutthroat, and steelhead—are generally extinct, endangered, or threatened over a greater percentage of their ranges than species with abbreviated freshwater residence, such as fall chinook, chum, and pink salmon.*
- *In many cases, populations that are not smaller than they used to be are now composed largely or entirely of hatchery fish.* An overall estimate of the proportion of hatchery fish is not available, but several regional estimates make clear that many runs depend mainly or entirely on hatcheries.

Chapter 4 discusses some of the difficulties in evaluating the status of wild populations and how these difficulties have been addressed in recently published status reports. Regional trends are summarized, and the overall conditions of the species are presented.

THE SALMON PROBLEM

The salmon problem is the decline of wild salmon runs and the reductions in abundance

of salmon even after massive investments in hatcheries. The declines—largely a result of human impacts on the environment caused by activities such as forestry, agriculture, grazing, industrial activities, urbanization, dams, hatcheries, and fishing—are widespread, although not universal. They have a variety of causes, and they are exacerbated by the unusual life cycle of Pacific anadromous salmon, which spawn in freshwater, migrate to sea to grow and mature, and return to their natal streams to reproduce. Salmon thus require high-quality environments from mountain streams, through major rivers, to the ocean. Economic development and population growth have created widespread declines in anadromous salmon abundance in the Pacific Northwest. Variations in ocean conditions—especially in water temperature and currents and the associated biological communities—also contribute to the rise and fall of salmon abundance, often thwarting the interpretation of events in freshwater and the surrounding terrestrial systems.

GENERAL CONCLUSION

To achieve long-term protection for a diversity and abundance of salmon in the Pacific Northwest, two general goals must be achieved:

- The long-term survival of salmon depends crucially on a diverse and rich store of genetic variation. Because of their homing behavior and the distribution of their populations and their riverine habitats, salmon populations are unusually susceptible to local extinctions and are dependent on diversity in their genetic make-up and population structure (Chapter 6). Therefore, management must recognize and protect the *genetic diversity* within each salmon species, and it must recognize and work with local breeding populations and their habitats. It is not enough to focus only on the abundance of salmon.
- The social structures and institutions that have been operating in the Pacific Northwest have proved incapable of ensuring a long-term future for salmon, in large part because they do not operate at the right time and space scales. As described in Chapter 13, differences among watersheds mean that different approaches are likely to be appropriate and effective in different watersheds, even where the goals are the same. This means that institutions must be able to operate at the scale of watersheds; in addition, a coordinating function is needed to make sure that larger perspectives are considered.

As a framework in which to approach its deliberations, the committee chose to focus on *rehabilitation*—a pragmatic approach that relies on natural regenerative processes in the long term and the selected use of technology and human effort in the short term—rather than on attempts to restore the landscape to some pristine former state and rather than on a primary reliance on substitution, i.e., the use of technologies and energy inputs, such as hatcheries, artificial transportation, and modification of stream channels. Rehabilitation would protect what remains in an ecosystem and encourage natural regenerative processes.

The solutions will not be easy or inexpensive to implement; even a holding action to prevent further declines will require large commitments of time and money from many people in many segments of society in the Pacific Northwest. Therefore, broad-based societal decisions are needed to successfully provide a long-term future for natural salmon populations.

ENVIRONMENTAL FACTORS

Natural and human-caused environmental changes affect all aspects of salmon life histories. Although humans can do little in the short term to control or even predict large-scale changes in environmental conditions, salmon-management programs must expect such changes and take them into account. Managers must also recognize that the natural variability in environmental conditions and people's desires for large and stable catches of salmon are often not compatible. Natural changes in environmental conditions in the ocean, in fresh water, and on land occur continually; sometimes they can lead to increased salmon productivity in an area; at other times they can lead to decreased productivity.

The emerging understanding of interdecadal changes in the ocean climate and the related mechanisms that affect salmon at sea have implications that are both exciting and disconcerting to scientists thinking about resource management. Humans are beginning to understand what happens to salmon during the majority of their lives—the portion spent at sea. Although we know little of the details, the new insights already demonstrate that variations in salmon abundance are linked to phenomena on spatial and temporal scales that humans and human institutions do not ordinarily take into account. Consider that the apparent effectiveness of hatcheries might have resulted from favorable ocean and climatic conditions in the era when the hatcheries were built; what looked like human manipulation of the total number of salmon might have been only a reapportionment among different populations. Or consider that the decline of some populations might be a direct result of introducing new hatchery populations into an ocean pasture of limited capacity.

The scale of human endeavor often has been incommensurate with the scale of salmon ecology. Some of our current policies are based on deep ignorance: it is not reasonable to assume that ocean conditions vary in ways that are generally uniform and random in their impacts on populations of salmon. Interdecadal variations and the importance of the ocean phase should be incorporated into human thought, planning, and actions in response to the effects of and attempts to repair damage that occurred during the freshwater phases of the salmon lives. The possible overriding effects of interdecadal changes in ocean conditions on salmon, the results of freshwater salmon management, and the overwhelming focus of human attention on the more-visible freshwater phases of the salmon history combine to provide the key ingredients for surprises in future.

Recently, natural environmental conditions in the Pacific Northwest appear to have been unfavorable to salmon production. As changes continue to occur, environmental conditions will probably favor salmon and lead to larger runs in some areas for a time, even without human intervention. If such changes do occur, they should be regarded as providing time to develop better strategies for rehabilitation of salmon populations. They should *not* be used as reasons for abandoning efforts to rehabilitate salmon, for they will surely be followed by other natural changes. Inappropriate short-term responses to large-scale environmental changes at sea or on land should be avoided, because there can be long lags between causes and effects.

LIMITS ON SALMON PRODUCTION

The salmon production cycle has three principal components that determine abundance:

reproductive potential of adults returning from the sea to spawn, which is affected by their growth at sea; production of offspring from natural reproduction in streams and artificial propagation in hatcheries; and sources of mortality (including natural mortality, fishing mortality, dam-caused mortality, mortality from habitat alterations and changes in environmental conditions, and so on). All three components are affected by changes in environmental conditions as well as by human activities. Variation in the three components and their interactions ultimately determine the ability to sustain salmon populations and their production. These limitations cannot be easily overcome through technology. Although it has been widely assumed that a loss of natural salmon production can be compensated by enhancement (e.g., by increasing hatchery production), chapters 6, 11, and 12 show that such an assumption is untenable by explaining the need to conserve sufficient genetic variation in natural populations to support the evolutionary and ecological processes needed for sustained salmon production. Compensating for salmon loss from any source over the long term therefore requires reducing other losses. Furthermore, an increasing appreciation of the marine environment and its effects on the above components is emerging as an essential consideration in salmon management.

VALUES

The salmon problem, like many other environmental issues, has been addressed through choices made within economic, political, and individual ethical frameworks. Values and ethical positions held by people involved in and affected by the salmon problem encompass a pluralistic, pragmatic and evolutionary approach to natural resource management. Recognizing and articulating that pluralism is important because problems in managing and protecting fish populations are due in part to the failure to articulate divergent interests, goals, and values and to address them explicitly. Chapter 5 describes how the widely varied ways that humans intervene in salmon populations are linked to socially validated values.

From a policy perspective, the salmon problem is one of long-standing and serious conflict in fact, interest, and values. People often invoke widely held values to protect particular interests, but values are genuine sources of conflict in themselves. Value conflict stems from different assessments of the desirable goals of public action. From a scientific perspective, wild salmon populations are an example of an ecosystem's natural capital. Our greatest success has been in designing ways to use human-food benefits from wild salmon. Our corresponding failure has been in protecting indirect and nonhuman benefits.

One way to present the salmon problem is to say that the value of the Pacific Northwest's salmon-capital asset has depreciated over time as its productivity has declined. A major problem is that the market does not account for the full range of costs and benefits of salmon. That is called a market distortion. When such market distortions exist, some resources are underpriced and overused, and others overpriced and underused. Many nonmarket values of salmon are underrepresented and are not easy to measure or compare. Thus management decisions often do not adequately reflect the importance of salmon to society and decisions about resource use may not achieve societal goals. To correct the discrepancy between social values and resource use, attempts can be made to design policies that reflect the full range of resource values.

Full value is a public, not a private, question. Consequently, public choices are central to the salmon problem. Public choices have to take into account many owners with multiple

preferences, attributes that are not fully observable and sometimes unknown, and prices that reflect only part of the resources' full value to society. The concept of full value points to the problem of "externalities"—the problem that some costs and benefits are beyond the accounting of the decision-making unit.

Environmental variability creates economic uncertainty, which causes people to discount the future more heavily, and this leads to pressures to increase rates of immediate, direct use. Environmental variability also creates scientific uncertainty about biological processes, which can be perceived to call for a cautious approach and lead to pressures to lower rates of immediate, direct use. The resulting tension between economic and scientific responses to uncertainty adds complexity to decisions about appropriate rates of resource use. That tension is widespread in decisions concerning the salmon problem.

Problems like these emphasize the need to develop more appropriate interdisciplinary approaches. The idea of rebuilding the salmon runs of an industrialized ecosystem is heroically optimistic—a hope that might not have occurred to anyone except those who had rehabilitated the Willamette River basin in Oregon or Lake Washington near Seattle. Those environmental successes came through the disciplined execution of the planning paradigm that has been fitfully applied to the much larger Columbia basin. The extension of those experiences to the multijurisdictional, multifunctional situations of the Pacific Northwest would require coordinated action and learning on a new, larger scale—a scale on which planning and action have been tried but have not been successful. A more explicit appreciation of the values, interests, and institutions involved in this undertaking is required. Chapter 13 explores this further and urges constructive change in institutions that include cooperative management, bioregional governance, and adaptive management.

GENETICS AND CONSERVATION

Pacific salmon reproduce in freshwater streams. Their progeny migrate to the sea to grow and mature, and then return to freshwater streams to reproduce and (nearly always) die. This pattern of freshwater reproduction and growth at sea is called *anadromy*. Most of the adults actually return to the streams where they hatched. This behavior—called *homing*—is an essential part of salmon biology and makes their genetics and conservation unusual. There is a great deal of environmental variation among the various streams and lakes where salmon spawn and in the rivers through which they migrate. Because of their anadromous life cycles and homing behaviors and the variety of environments they occupy, each salmon species tends to differentiate into local breeding populations—called *demes*—that are in general reproductively isolated from other populations and adapted to each stream. To sustain productive natural populations of salmon, it is crucially important to maintain this genetic variation and local adaptation. Chapter 6 describes examples of such local adaptation.

However, more is involved than only local adaptation to various streams. Natural environmental fluctuations, including major disruptions caused by geological activity, can cause the extinction of local populations. Because homing is not perfect, fish that stray from nearby streams can replenish those populations. Strays are more likely to re-establish a population if the environment in the new stream is similar to that in the stream where they hatched. Thus, strays

into tributaries in the same major river system or into nearby streams are more likely to succeed than those that stray into very different environments. This network of local populations (known as a *metapopulation*) provides a balance between local adaptation and the evolutionary flexibility that results from exchange of genetic material among local populations (Chapter 6). It likely also explains why artificial attempts to re-establish populations from a captive broodstock have often failed—too often, the gene pool of the broodstock has had reduced variation or has been derived from a population adapted to a different environment (Chapter 12). The metapopulation structure provides a balance between local adaptation and evolutionary flexibility; therefore, maintaining a metapopulation structure with good geographic distribution should be a top management priority to sustain salmon populations over the long term. Many of the committee's recommendations are based on this crucial conclusion.

There is no "correct" answer to the question of precisely how much biological diversity and population structure should be maintained or can be lost to provide a long-term future for salmon. Scientific estimates—including uncertainties associated with them—are only part of the argument. Society must decide what degree of biological security would be desirable and affordable if it could be achieved, i.e., the desired probability of survival or extinction of natural populations, over what time and what area, and at what cost. Nonetheless, biological diversity and the structure of salmon populations are being lost at a substantial rate, and this loss threatens the sustainability of naturally reproducing salmon populations in the Pacific Northwest.

HABITAT LOSS AND REHABILITATION

The main habitat requirements of salmon in freshwater include a stream or lake, the adjacent border of vegetation (riparian zone) that serves as the interface between aquatic and terrestrial ecosystems, and the quality and quantity of water (Chapter 7). The water must be clean enough and cool enough to support returning adults, for eggs to hatch, and for young to survive and grow until they migrate to sea. There must be enough water in the rivers at crucial times to make migration possible, to allow fish to escape predators, and to allow fish to find adequate food. Well-aerated streambed gravels are important for spawning. Streamside vegetation provides shade, which keeps the water cool; it provides a buffer against soil erosion, which maintains water quality; it provides living space for various animals that provide food and nutrients for streams; and it provides a source of large woody debris, which plays a key role in the formation of physical habitat and storage of sediment and organic matter and provides habitat complexity in stream channels, thus improving the stream environment for salmon. These requirements for environmental conditions in streams and adjacent riparian zones depend on the condition of the entire watershed in which they occur.

Many human activities—such as forestry; agriculture; grazing; industrial uses; commercial, residential, and recreational development; and flood control—have a variety of adverse effects on salmon habitats. For example, they can increase soil erosion, reduce the amount of woody debris in streams, raise the water temperature, add contaminants to the water, affect water flow, and reduce the amount of water available, with resultant loss or degradation of riverine and adjacent riparian and near-river habitat. Therefore, protection and rehabilitation of riverine and riparian habitats and associated watershed processes will be an integral part of

rehabilitating salmon populations, although it is a major and difficult undertaking (Chapter 8). In the past few years, genuine improvements in protecting forested streams have been initiated. Nonetheless, for real progress to occur, habitat protection must be coordinated at landscape scales appropriate to salmon life histories, and they must be more consistent across different types of land use (chapters 8 and 13).

DAMS

Hundreds of dams have been built on rivers of the Pacific Northwest. They range from small irrigation dams with a hydraulic head of only a few feet to massive dams at Grand Coulee, Dworshak. and Hells Canyon on the Columbia and Snake rivers that are several hundred feet high and completely block upstream and downstream passage of anadromous fish. Dams on various rivers—some of them impassable—have greatly reduced wild runs. Even smaller dams (e.g., those associated with many hatchery operations and irrigation-diversion dams) can block salmon runs. In addition to their effects on migration, large storage dams affect the quantity and timing of water flow in the river as well as flow velocities, water chemistry, and water temperatures. Reservoirs behind dams can also inundate extensive areas of spawning and rearing habitat, although in some cases the reservoirs provide new (but different) rearing habitat. Many water diversions for irrigation lack protective fish screens of modern design; installing such screens would reduce mortality of smolts as they migrate downstream.

Even when fish ladders provide passage for adult salmon, many young salmon (smolts) migrating downriver die at dams. Although as many as 90% of young salmon might survive passage over, around, and through any single major project on the Columbia-Snake mainstem, the cumulative reduction in survival caused by passing many projects has adversely affected salmon populations. To counteract these effects, it is essential to improve the survival of smolts migrating through hydropower projects, especially in the Columbia and Snake rivers. Serious consideration needs to be given to all available alternatives for doing so; even a small improvement in survival would be helpful if it were repeated at several dams.

Controversy surrounds the effects of dams and how best to mitigate them. Alternatives include removal of dams, modification of turbines and other structural aspects of dams to improve fish survival during passage, drawdown of the water during the seaward migration of smolts to restore the river's profile to its pre-dam (river-grade) configuration to increase the flow rate and diminish the smolts' travel time, drawdown of the river to some level above river grade, augmentation of water flows during smolt migration to speed their passage downriver, transportation of smolts around dams by truck or by barge, control of predators in reservoirs and below dams, and spilling of water over dams instead of through the turbines. However, there is a dearth of good scientific information on which to base evaluations of the alternatives, some of which would be very expensive and would cause large losses of hydropower revenues.

Dam removal and drawdown of those rivers to river grade would be enormously expensive, would take many years, and probably would have long-term adverse impacts on the rivers. However, because the many dams on the Columbia River and its tributaries cumulatively have large effects on salmon survival, the addition of any new major dams in undammed reaches in the system (e.g., the Hanford Reach of the Columbia River) would make the situation worse;

existing dams should have adequate fish-passage facilities where feasible and appropriate before being relicensed. The committee is unaware of any scientific data that unequivocally support drawdown to a level above river grade as the best available dam-mitigation option for the Columbia River or the Snake River. Based on limited information, transportation appears to be the most biologically effective and cost-effective approach for moving smolts downstream. It should be continued on an adaptive basis (i.e., in such a way that additional information can be obtained about its effectiveness). Additional information is needed on effects of transportation on survival to the adult return stage, on homing, on success of natural spawning, and on genetic diversity of returning adults. Because any action that could jeopardize all of the fish in a stream must be avoided, not all the fish in any stream should be transported.

Research is needed on the effects of various options on the survival of both smolt and adult migration through dam and reservoir systems. Any management option should be applied on an adaptive (experimental) basis. The committee is not recommending that the salmon be "studied to death," a criticism often leveled at those who urge further studies. Indeed, enough is known now to take some actions. In recommending "adaptive" actions, the committee is recommending that any mitigative actions be taken in a way that allows their effects and effectiveness to be measured and assessed objectively. For example, if some fish in a stream are transported downstream, the action should be designed so its effectiveness can be assessed and compared with other alternatives. Despite the paucity of information, it is clear that no single approach would eliminate the adverse effects of dams on salmon.

HATCHERIES

Hatcheries have been used for more than 100 years in attempts to mitigate the effects of human activities on salmon and to replace declining and lost natural populations. As a result, a major proportion of salmon populations in the Pacific Northwest now consist largely of hatchery fish. These hatchery fish appear to have had substantial adverse effects on native fish populations.

For many years, people did not recognize the potential for hatchery fish to affect wild fish and did not believe that there was any limit to the ocean's capacity to provide food for growing salmon. It therefore seemed that producing more juveniles would result in more returning adults. The difficulties and shortcomings of hatchery production did not become apparent until fishing pressure and habitat-related mortality increased and marking technologies became available. As a result, hatcheries were not part of an adaptive-management program; that is, they were not considered as scientific experiments—they were not even adequately monitored—so many of their effects were not well known.

It is now clear from synthesis of experience and from consideration of well-established biological knowledge that hatcheries have had demographic, ecological, and genetic impacts on wild salmon populations and have caused problems related to the behavior, health, and physiology of hatchery fish. They have resulted (among other effects) in reduced genetic diversity within and between salmon populations, increased the effects of mixed-population fisheries on depleted natural populations, altered behavior of fish, caused ecological problems by eliminating the nutritive contributions of carcasses of spawning salmon from streams, and

probably displaced the remnants of wild runs (Chapter 12). Hatchery fish have at times exceeded the capacity of streams and are increasingly being associated with reduced marine growth and survival in wild salmon populations (Chapter 12).

Many of the problems stem from purposes to which hatcheries have been put—mainly to provide substitutes for natural populations lost or displaced because of human development activities. Because of their deleterious impacts, however, hatcheries should no longer be viewed solely as factories for producing fish. Hatcheries should also be thought of as laboratories that can provide controlled environments for studying juvenile fish and for testing treatments to improve our understanding of what happens to juveniles after they leave spawning areas. Seen in that light, hatcheries can be a powerful tool for learning about salmon.

Hatchery planning, management, and operations should be changed so that their goals are to assist recovery of wild populations and to increase knowledge about salmon. As described above and in many parts of this report, especially chapters 6, 11, and 12, precautions must be taken to protect the genetic diversity and ecological productivity of naturally spawning populations of salmon. Those precautions will include an overall decrease in hatchery-fish production and—over the short term—in fishing opportunities. The basic guideline is to ensure that any hatchery production for fishing is not detrimental to natural populations. Because adaptive-management experiments should be tailored to the circumstances in different watersheds of the Pacific Northwest, decisions about use of hatcheries will differ across these watersheds. Therefore, decisions about uses of hatcheries should include a focus on the whole watershed and its linkage to the region and the ocean pasture, rather than only on the fish.

FISHING

Fishing for salmon is important in the Pacific Northwest. It includes commercial, recreational, and treaty fishing at sea and in rivers and is an important source of mortality, especially for adults returning to spawn. Salmon mortality caused by other human activities and structures such as dams, habitat loss or degradation, pollution, and water diversion and by natural factors such as predators, disease, and environmental variability together usually exceed fishing mortality. Those causes of mortality have a major effect on the production of adult fish and thus influence the rate of fishing that can be sustained. However, fishing is the easiest mortality factor to control. Control of fishing has rehabilitated marine and anadromous fish populations in various parts of the United States.

Managing salmon fisheries is more difficult than managing many other fisheries because of the geographic distribution of salmon, their metapopulation structure, and the fact that most adult fish spawn only once and then die. In the jargon of Pacific salmon fisheries, managers refer to groups of salmon populations that are identifiable for management as *stocks*. Frequently, *stock* refers to a geographic aggregate of populations that includes many local breeding populations of varied size and productivity; this is too large a unit for conservation of genetic diversity and rehabilitation of salmon production. Managing at the stock level obscures critical biological complexity. But even managing such large units is difficult because of the complex relationships, responsibilities, and obligations among a large number of institutional entities in the region, including nations, states, provinces, federal agencies, tribes, interest groups, and

other organizations), the mandates of the Endangered Species Act and other laws, and the diverse array of interests and values in the region.

For rehabilitation of salmon populations, the aim for fishery management—as for other management efforts—should be to achieve long-term sustainability based on maintaining diversity of gene pools and population structures. Therefore, a successful fishery-management component for protecting natural salmon runs in the Pacific Northwest should explicitly recognize the need to maintain and rehabilitate the genetic diversity of salmon and recognize the interdependence of genetic diversity, habitat, and salmon production. It must also account for the uncertainty in scientific predictions and the inherent variability of biotic and abiotic environmental factors.

In general, the aim should be to assure adequate escapements for depleted populations. To achieve long-term sustainability, which requires sufficient genetic diversity, fishing should occur only where the identity (i.e., the originating population) of the salmon is known, when total fishing mortality is consistent with productivity of the fish, and when the catching technology ensures minimal mortality in depleted demes. This will require fishing methods that allow different degrees of fishing effort on various salmon populations and that allow identification of fish taken from depleted demes so that they can be avoided or released alive. Two methods of achieving these goals (but not the only ones) are terminal fisheries and live-catch fisheries.

In general, the serious declines of wild salmon populations show that not enough fish are being allowed to return to spawn. The number of fish returning to spawn (escapements) must be substantially increased to conserve genetic diversity within and between demes, use available habitats, rehabilitate ecological processes (including the return of nutrients to aquatic ecosystems), and increase the sustainable production of salmon. Increasing escapements will disrupt fisheries, industry, and communities, but it is necessary for restoring production. As salmon abundance increases and fisheries begin operating at lower, but sustainable, catch *rates*, actual catches will gradually increase, although probably not to the sizes of some historical catches, because those were based on excessive catch rates. Implementing this recommendation will initially require low fishing effort in many areas, especially in the ocean, and it will require cooperation from British Columbia and Alaska, because many salmon that originate in the Pacific Northwest are caught at sea in British Columbia and southeastern Alaska (chapters 10 and 11).

INSTITUTIONAL CHANGE

The long and serious decline of salmon in the Pacific Northwest has been promoted—often unwittingly—by human institutions; effective remedies, if they are to be found, will have to involve changes in those institutions. Growth in human populations and economic activity threatens the continued existence of salmon in the Pacific Northwest. Institutions developed in different times for diverse purposes have been asked to do things foreign to their original objectives and capabilities. Political changes have hindered attempts to take a long-term perspective. There has been fragmentation of effort and responsibility.

Changing institutional structures is notoriously difficult, but it is possible. Because the

problems facing salmon have many aspects, a multidisciplinary approach to their solution is essential. Indeed, if the money that has been spent to date on salmon research had been spent with a more unified, regional vision, greater progress would have been made in maintaining viable salmon populations (Chapter 14). Unless agencies cooperate more effectively, salmon populations are unlikely to recover.

One problem is that current institutions and the boundaries of their jurisdictions usually do not match the spatial, temporal, or functional scales of the salmon problem. In addition, current institutional structures lack both a fine-grained aspect to respond to local concerns and variations and a coarse-grained aspect to integrate across small regions and to make sure that the interests of a few small areas do not jeopardize larger regional interests.

Because we often do not know what the effects of a management option will be, management must be undertaken with an experimental, adaptive point of view. Flexibility must be built into institutional structures to allow for changes in management practices based on experience. Institutions must allow and encourage refocusing the energies of salmon management to recognize the importance of demes in maintaining genetic processes and to maintain and expand their diversity. The goal of management should be to achieve a biologically sound escapement (instead of focusing on a "sustainable" or permissible catch) for each metapopulation and an explicit adoption of time scales for management and planning that are commensurate with the multiyear scale of salmon life cycles.

Beyond those facilitating changes, the formal institutions that manage salmon need to be restructured or refocused to reflect three important institutional principles. First, decision-making authority should be shared among all legitimate interests (cooperative management); legitimate interests that are excluded from decision-making are likely to block desirable changes. Second, the organizational structures and decision-making processes should allow for local conditions and variations and the management strategies should vary accordingly. Third, systematic learning using appropriate experimental designs (adaptive management) should be an essential goal.

As a first step, the relevant agencies in the Pacific Northwest, including the National Marine Fisheries Service, should agree on a process to permit the formulation of salmon recovery plans *in advance* of listings under the Endangered Species Act, and the Pacific Northwest states, acting individually and through the Northwest Power Planning Council, should provide technical and financial assistance to watershed-level organizations to prepare and implement these preemptive recovery plans.

A SCIENTIFIC ADVISORY BOARD TO ADDRESS SALMON PROBLEMS

A great deal is known about salmon and their difficulties, but a great deal remains unknown or controversial despite the expenditure of large amounts of money and time on research. Part of the reason for the lack of knowledge is that people have not agreed on what information is needed, have duplicated each other's work, and have been unwilling to fund needed research. An independent, multidisciplinary, standing scientific advisory board should be established to ensure that the limited money available for research is spent most productively

to answer the most critical questions in a timely manner. A standing scientific advisory board would also help to ensure that when urgently needed actions are taken, they are designed so that their effects and effectiveness can be properly assessed. The board's reports should be public.

AN APPROACH TO SOLVING THE SALMON PROBLEM

The salmon problem took many years to develop, and its solution will require the commitment of considerable time, money, and effort. The committee's analyses of the problems and potential solutions lead to the conclusion that there is no "magic bullet." Therefore, like the problem itself, solutions will be complex and often hard to agree on; to be successful, they will need to be based on scientific information, including information provided by social and economic sciences. In addition, to be successful, consensus will be needed about the size of the investments to be made in solving the problem and how the costs should be allocated. This means that solutions will have to be regionally based, just as the salmon problem has regional variations (see Chapter 13).

The committee recommends the following general approach. *For each major watershed or river basin*, the following should be assessed.

- All causes of salmon mortality, including their estimated magnitude and the uncertainties associated with the estimates. Factors known to decrease natural production should also be listed.
- Ways of reducing those sources of mortality or compensating for them, their probable effectiveness, and their drawbacks.
- The probable costs of each method of reducing mortality. To be most useful, the estimates should include both market and nonmarket costs. To the degree possible, it is important to identify what societal groups would bear the major portion of the costs of each method and significant uncertainties in the estimates. (For example, reductions in catch rates would primarily affect fishers and tourists; changes in water use could affect agricultural interests or ratepayers; changes in riparian management could affect forest-products industries or private landowners.)

All the estimates would include substantial uncertainties, due both to lack of knowledge and to fundamental environmental, socioeconomic, and biological uncertainties. Nonetheless, such a process of assessment and evaluation is essential for rational decision making. They will provide a basis for evaluating options—for weighing benefits and costs—and for identifying areas where research is critical. *All the recommendations in this report should be viewed in this context: they need to be considered on a regional basis (i.e., major watersheds) and in a comprehensive framework that includes an analysis of their costs, probable effectiveness, and the ability and willingness of various sectors to bear the costs.*

This will be challenging for several reasons. First, in many cases, the desired information has not been collated or does not exist. Second, considerable time and resources will be needed to perform such analyses even for one watershed. But the most important reason

is that estimates of costs and how they might be distributed will require intimate knowledge of each watershed and of people's preferences and habits. These essential estimates should be made with input from the people involved. The committee believes this approach will lead to improved effectiveness and—if not reduced costs—at least increased cost-effectiveness and reduced controversy.

THE FUTURE

The best approach to establishing a sustainable future for salmon in the Pacific Northwest is to use currently available information to develop workable, comprehensive programs rather than reacting to crises. This report has analyzed many parts of the salmon problem and assessed many options for intervention. However, if current trends continue, the Pacific Northwest will continue to see the effects of more people, more resource consumption, changing economic demands and technologies, and changing societal values. Because the success of programs to improve the long-term prospects for salmon in the Pacific Northwest will depend on the societal and environmental contexts, it is important to develop ways for improving our ability to identify changing contexts and to respond to them. As long as human populations and economic activities continue to increase, so will the challenge of successfully solving the salmon problem.

FINAL REPORT

COOK INLET FISHERIES MANAGEMENT STRATEGY

Submitted to the

ALASKA DEPARTMENT OF FISH AND GAME

by

THE MEDIATION INSTITUTE OF ALASKA
217 Second Street, Suite 204
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Cook Inlet Fisheries Management Strategy

CIFMS Science Committee Final Report and
Minutes of October 16, 1995, as amended by review of the committee

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I. Introduction

A.. Statement of Purpose

The Science Committee is a fact finding body for the mediation process known as the Cook Inlet Fisheries Management Strategy. The Science Committee is formed to identify data gaps which may inhibit conservation of Cook Inlet salmon, and to further support the mediation process by addressing the ability of available information to permit implementation of proposed allocation regulations, and to identify data gaps that make a proposed allocation regulation untenable. The Science Committee is expected to identify, define, integrate, and synthesize relevant information. The Science Committee is charged to remain free of advocacy, proposal of allocation actions, and debate of allocation options, other than in a scientific context.

APPENDIX V

Specifically, the function of the CIFMS Science Committee is to develop a list of data gaps which are either relevant to conservation of the salmon resources, or which may foreclose options for managing all types of the harvest of the resource. The list of data gaps is to be placed in order of priority to the extent possible. As the mediation process develops, the Committee is likely to be asked to address the kinds of information necessary to implement specific management options, as well as the feasibility of acquiring of such information. A further task is to identify relevant bibliographic sources and data bases for the final report of the Committee.

The basic ground rules for the committee are; 1) Committee work is limited to scientific issues, including harvest management, habitat and land use: individuals contribute professional expertise without regard to institutional affiliation, 2) Comments made within the committee process are not for attribution; contributors remain anonymous in the work of the Committee, 3) Members take the floor when recognized by the convener; everyone gets to speak in the order recognized.

B. Networking information from the committee

1. Other current committees working on comprehensive plans or reports of relevance, committee contact in parentheses.

- Economic study of marginal impacts of salmon allocation, U. Alaska Anchorage, Institute for Social and Economic Research (Richardson)
- Exxon Valdez Oil Spill Trustee Council Research (Mundy, Fried)
- Kenai Peninsula Borough Kenai River Working Group (Mears)
- Kenai River Interagency Habitat Task Force, Board of Fisheries (Doug Vincent-Lang, ADFG/SFD)
- Kenai River Special Management Area Plan Update (Richardson, Pres. of the SMA board)
- Kenai Area Land Use Plan, Alaska Department of Natural Resources (Trasky)
- Interagency Planning Team on the Upper Kenai River (Sonnevil)
- Mat-Su Valley Forest Plan, Mat-Su Borough (Trasky)
- Public Use Planning, USFWS, Kenai National Wildlife Refuge (Sonnevil)
- Regional Planning Team, Salmon Enhancement (Mears)
- State/federal Interagency Summit on the Kenai River, Nov. 1, 1995, (Wenger; Chair Steve Zemke, USFS)
- Statewide Sport Fishing Guide Task Force, Alaska Board of Fisheries, (McBride; Doug Vincent-Lang)

2. Past committees working on comprehensive plans or reports:

- Kenai River Sockeye Salmon Task Force (McBride)
- Kenai River Comprehensive Management Plan (ADNR; Trasky)
- Comprehensive Summary of Actions. Glenn Siemans
- Carrying Capacity Study, (ADNR; Trasky)

3. Reports of past committees

- Recommendations for Protection of Fish Spawning and Rearing Habitat on the Kenai River, Kenai Peninsula Borough Working Group
- McBride and Hammarstrom (1995)
- Governor's (Cowper) Fisheries Task Force (Meacham)
- State Game Refuge Management Plans (Palmer Hay Flats, Training Bay, Redoubt Bay, Kustatan, MacArthur) (Trasky)
- Board of Fisheries Reports
- Kodiak Interceptions Task Force. Ivan Vining Report (Swanton, ADFG/CFMDD)

4. Comprehensive data bases available, electronic copies

- Commercial Fisheries Entry Commission
- fish tickets and limited entry permit registration data, commercial catch by species, date, locality

- Commercial Fisheries Management and Development Division
- Registration of permits by subdistrict, since 1993; Annual Management Reports have summaries of commercial catch and effort, prices paid by species
- Private Nonprofit Hatchery Annual Reports (Fried; Ellen Simpson and Steve McGee, ADFG/CFMDD),
- Commercial catches and escapements by year, system, and age

- Sport Fish Division ADFG

- Annual Harvest, Catch, and Participation

- Kenai Sockeye Salmon Task Force, Summaries and Analysis of Catch, Escapement
- Fish Transport Permit records, ADFG, Irv Brock (SFD)

- Board of Fisheries
- History of fishing regulations. the codifieds. (Laird Jones, ADFG)

- Cook Inlet Aquaculture Association
- Hatchery releases and rack returns, eggs taken. (Mears)
- Alaska Department of Environmental Conservation
- List of impaired water bodies

- Habitat and Restoration ADFG
- Anadromous Waters Catalogs Atlas
- Alaska Habitat Guides, 1986 (abundance, distribution. life history, harvest)
- Alaska Department of Natural Resources Geographic Information System on the 29 areas of the Kenai Peninsula scheduled for logging within next five years

- Coded Wire Tag Recoveries of Upper Cook Inlet hatchery reared salmon
- Fishing Guide Data Base for Kenai and Deep Creek, ADNR
- Kenai Area Land Use Plan (ADFG/HRD)
- Public Access Data Base. ADNR
- Susitna Area Plan (ADFG/HRD)
- Subsistence(Tyonek, Nanwalek, Port Graham), educational (Kenaitze, Ninilchik and Eklutna), and personal use fisheries data bases (Jeff Fox and Linda Brannian, ADFG/CFMDD; see also Sport Fish Division Annual Management Reports)
- Recreation Rivers Management Plan (Susitna) (ADFG/HRD)
- List of current and proposed logging sites
- Library automated reference database

5. Bibliographies, Bibliographic sources, electronic copies

- ADFG/CFMDD Library, Anchorage (Fried)
- Technical Data Reports (1972-1988)
- Technical Fishery Reports (1987-1994) now
- Regional Information Report
- Informational Leaflets, (1961-1988)
- Fishery Research Bulletin (1987-1992)
- Alaska Fishery Research Bulletin (1994-present)

- Upper Cook Inlet Management Reports (1974-1987) merged with Regional Information Reports
- Upper Cook Inlet Data Reports, (1961-1987) merged with Regional

Information Reports

- Regional Information Reports. Upper Cook Inlet, 1988-present, including Annual Management Reports

- ADFG/HR Library, Anchorage (Trasky)
- ADFG/CFMDD Library, Juneau (Paul DeSloover)
- Special Publications
- Professional Publications (journal manuscripts)
- ADFG/CFMDD Publications Juneau (Bob Wilbur)
- US Fish and Wildlife Publications List (Sonnevil)
- US Forest Service - Forest Service Information (Wenger)
- ADNR/Various information bases

II. Data Gaps: Information Necessary to Salmon Conservation or Allocation Presently Unavailable

The Science Committee has not placed the data gaps in order of priority. The data gaps are broadly organized into allocation and conservation, although there is some overlap between the two.

II. A. Data Gaps Relating Primarily to Conservation of Fisheries Resources

II. A. 1. Relative importance of freshwater, nearshore marine and offshore marine survivals to salmon productivities

A better understanding of freshwater salmon productivity, as measured by survivals, and early marine survivals is needed. This information is needed to set escapement objectives for salmon species appropriate to sustained yield management, to identify and maintain critical freshwater and nearshore marine habitats, and to forecast future adult salmon returns and harvest levels. Better information is available for Kenai River sockeye than other drainage-species combinations. Relatively little information on survival by life history stage is available for species other than sockeye salmon. It is important to develop understandings of survival for coho and chinook salmon, because populations of these species can be heavily exploited due to strong public demand, particularly among sports harvesters.

The full extent of freshwater rearing areas has not been confirmed by direct observation for most species, so this information is needed to complete the anadromous stream catalog. Under existing laws, state biologists can only control

activities in streams where the presence of salmon has been physically confirmed. Such information is therefore essential to managing the effects of urbanization and development on salmon. and it is essential to understanding and predicting the effects of development on salmon productivities.

Partitioning freshwater effects from marine effects is essential to understanding the effects of habitat degradation on salmon production. Smolt to adult survivals, when measured close to the estuary, provide a composite of nearshore and offshore marine effects which can be distinguished from egg to smolt freshwater effects. Return per spawner analyses integrate the effects of all life history stages, marine and freshwater. Consequently, marine and freshwater habitat effects are statistically confounded in return per spawner analyses. In a return per spawner analysis, excellent marine conditions for salmon rearing can mask the effects of freshwater habitat degradation on salmon productivity for extended periods of time, approximately ten to fifteen years. This is undesirable in a sustained-yield salmon management context because, when poor marine conditions for salmon rearing return, either the habitat degradation is too far advanced for remedies to be socially acceptable, or the losses in freshwater continue to be ascribed to marine conditions until salmon population levels reach critically low levels. Both circumstances are contrary to the interests of sustained yield management of the salmon resources. Hence being able to distinguish freshwater mortalities from marine mortalities is essential to sustained yield salmon management.

Measuring adult escapements is an essential part of sustained yield salmon management. Upper Cook Inlet Coho salmon in general, and early and late run Kenai River coho escapements in particular, need attention in enumeration and escapement goal formulation (see Fried 1994, Table 3).

II. A. 2. Impacts of resource extraction and land development on habitat

There are data gaps on the effects of logging, road building, residential and commercial construction on fish bearing habitat. Such habitat alterations result in erosion, siltation, introduction of contaminants such as petroleum products, blockage of migratory fish movements, and alteration of flow and thermal regimes. Although information is available for other regions such as southeastern Alaska and British Columbia, quantitative data are needed on the status of Cook Inlet's salmon bearing habitat, and approaches for estimating impacts of habitat alterations on salmon production. Some relevant information exists for riparian zones of the Kenai River (Liepitz 1994), but more work is needed, both on the Kenai and in other watersheds. There are not enough local studies to keep up with

the number of habitat alterations now occurring.

Some studies are now in progress. For example. the Division of Forestry, ADNR, has a $500K study in progress, and the Tongass National Forest has a history of studies. Assessment (model) of impacts of logging and roading on the salmon productivities of affected streams. Refer to the U.S. Forest Service's Moose Pass Plan for an example of a study of proposed logging.

II. A. 3. Impacts of fishing activities on habitat

There are data gaps on the effects of fishery activities on salmon bearing habitat. Such activities as stream bank erosion from stream bank angling, disturbance of stream banks and spawning grounds from walking and motoring to fishing sites, results in increased siltation which probably lowers primary productivity and renders spawning habitat unsuitable. Studies are needed in the areas of the habitat impacts of fisheries management actions, and the role of boat wakes in stream bank erosion. A model which relates horsepower and number of angler trips to stream bank erosion would be useful. Follow-up studies on the effects of past remediation efforts could provide useful information on how to design future efforts.

II. A. 4. Impacts of exotic species of fish on production of salmon and resident native fish species. At present four species of piscivorous (fish eating) fishes have been introduced into the Kenai River from some other locality (Arctic grayling, Alaska blackfish, Northern pike and burbot (lush). Northern pike, an especially effective predator species, are now known to occur in parts of the Kenai River system which support rearing of coho juveniles, a suitable prey species. The extent to which these introductions have impacted salmon production in the Kenai needs to be understood. Further introductions by members of the public is a matter of serious concern in an area as heavily utilized by the public as the Kenai Peninsula.

II. B. Data Gaps Relating Primarily to Allocation of Fisheries Resources

II. B. 1. Stock identification of catches

Stock identification information is essential to sustained yield management, and to allocation among user groups, for any species or stock of salmon which is harvested extensively in mixed stock situations. Resource managers need to know when and where the various spawning stocks are to be found in the harvest areas, if they are to effectively control harvests. Specifically, it is important to understand where salmon originating in Cook Inlet are harvested in directed fisheries and as

bycatch, in the waters of Cook Inlet and elsewhere, such as in fisheries in Shelikof Strait and near Kodiak Island. Whenever hatchery contributions become a factor in the management of the populations, it is important to be able to identify hatchery contributions to catches, and to be able to identify hatchery reared salmon on the spawning grounds.

At present the stock identification capabilities contributing to harvest management decisions are limited to Kenai River sockeye salmon (genetic stock identification), wild chinook salmon from Deep Creek and the Kenai River (coded wire tagged) and hatchery reared chinook and coho salmon, all of which are presently coded wire tagged. Since 1995 genetic stock identification of Kenai River sockeye has been available to managers during the harvest season. Coho salmon smolt (juveniles) have been marked with coded wire tags and adipose fin clips in the Kenai River since 1992, and in the Deep Creek since 1995. Chinook and coho salmon juveniles have been similarly marked in the Kenai River and in Deep Creek since 1993.

II. B. 2. Migratory paths and relative timings of stocks and species

Understanding where and when salmon species and stocks transit harvest areas is essential to understanding the impact of mixed-stock harvests on these species and stocks. Distinct differences in migratory paths and timings among stocks in mixed stock harvest areas can serve the purposes of stock identification information. At present the best understanding and implementation of stock identification capability in Upper Cook Inlet is for Kenai River sockeye. Historical information is available for the Central District of Upper Cook Inlet as a whole for the four major sockeye drainages (i.e. Mundy et al. 1993). Unfortunately the programs which produced the historical sockeye salmon stock identification information had to be discontinued. These programs (see Marshall et al. and Cross in Mundy et al. 1993) were replaced by genetic stock identification techniques which presently identify only the Kenai River sockeye in commercial catches.

The information on coded wire tags recovered from adult catches now accumulating for hatchery produced coho and chinook holds promise for understanding the migratory paths of these stocks. Recoveries of adult wild chinook and coho which were marked in Deep Creek and the Kenai River as juveniles may provide the ability to discern migratory paths and timings for these stocks. It may also be possible to make crude inferences on wild coho and chinook paths and timings of stocks which are not presently tagged by analogy to the coded wire tag recoveries from those stocks which are.

Stock identification capabilities and programs for chum and pink salmon originating in Cook Inlet are presently lacking, although genetic stock identification tools may be appropriate.

II. B. 3. Organization and accessibility of information

The public needs ready access to harvest and biological data, and analyses of these data by the concerned agencies in an understandable format. There are publication series by the agencies, and there are electronic data bases from which the public may draw, if they know how. Yet there is no one source which the public and concerned scientists can access in a common format and location for Cook Inlet salmon data. As item number I.B.4 above attests, there are many sources located across a large number of concerned agencies.

II. C. Data gaps submitted by individual members after the meeting of October 16, 1995.

II. C. 1. Analysis of existing data on Knik arm drainages with respect to run sizes, escapements, and factors limiting production for each salmon species.

II. C. 2. Integration and analysis of present status of critical harvest management information, including genetic stock identification, Central District marine sonar, freshwater sonar escapement estimation, Anchor Point offshore test fishing, and historical scale pattern analysis. An analysis is needed on the current status of the ability of the Anchor Point offshore test fishery to estimate sockeye catches and abundances in light of new knowledge on Central District run strength developed from sonar surveys and genetic stock identification. To what extent can the Anchor Point Test fishery now be calibrated without using catches from the drift gill net fleet? To what extent will it still be necessary to use drift catch data to calibrate the offshore test fishery in order to make estimates of total abundance of sockeye salmon in the Central District? The report should focus on the ability of the test fishery to make total abundance estimates by time period, and by locality, in order to provide more precision in harvest management.

II. C. 3. Analysis of sport harvest rates in the rivers on Northern Cook Inlet chinook and coho salmon stocks and habitats.

II. C. 4. Timely reporting of harvest by sport fishing guides.

II. C. 5. Analysis of the socioeconomic effects of the Upper Cook Inlet Management Plan on the native village of Tyonek. Has the historical pattern of

reliance on commercial fishing by the village been sustained? What is the time series of the number of commercial fisheries entry permits at Tyonek from 1974 to present? What are the reasons for the changes in commercial fishing activities. and how do these impact the social and economic factors in the community?

III. Questions posed by the Strategy Group

The following are questions raised by the participants at the meetings of Oct 13-14, except that questions with the same general answer are grouped under a single question in square brackets [ ].

1. Are there harvest management methods [for the set nets] which promote delivery of kings into the Kenai River? [Please identify size and species specific harvest methods as they may be applicable to Cook Inlet salmon.] [Please look into the feasibility of limits on commercial bycatch of individual commercial harvesters daily, annual.]

Yes. Time and area closures can promote delivery of chinook salmon into the Kenai River, however little information exists which would permit the effects from these types of actions to be evaluated. A study now in progress under the ADFG Sports Fish Division is designed to produce this type of information. Gear modifications, web material, reductions in length, and depth of net, may also provide reduction of king salmon bycatch in sockeye set net fisheries. ADFG Sport Fish Division initiated a study (under Mike Bethe) on July 1, 1995 to address information needed to design such regulations. The Eastside Set Net Monitoring Program (ADFG/CFD March 1984) provides some information relevant to management measures. The 1984 study noted a problem with catch reporting in that fish retained for personal use by commercial harvesters were not required to be reported. Personal use fish are now required by law to be reported. Data on the amount of set net gear by harvest period fished in each period are also lacking. Legal counsel is needed to determine if it would be possible to draw closure lines that would exclude harvest of individual permit holders.

2. Can we partition freshwater and marine mortality in order to determine the ability of freshwater habitat to support spawning and rearing?

Yes, we can, but so far we have not done so for most salmon stocks. This constitutes a major data gap for sustained yield management of Cook Inlet salmon. Studies on the sockeye salmon of the Kenai and Kasilof Rivers have provided data which infer density dependent freshwater mortality, and which could permit differentiation of marine and freshwater effects for some brood years. Survival

studies of Bristol Bay sockeye salmon production are available for comparison. Smolt-to-adult survivals (mostly marine) may become available for chinook and coho stocks to which coded wire tags have been applied. While the technologies are available, each application entails substantial expense to adapt the technology to the stocks, species and localities of interest in Upper Cook Inlet.

3. Questions related to the "overescapement" issue. What are the differences between single stock or single species Maximum Sustained Yield (MSY) strategies and multiple stock and multiple species sustained yield management? How do these differ in terms of management objectives and information requirements?[Please describe means to maximize productivity of all Cook Inlet salmon. How do we maximize productivity?] [Please contrast information needs for single stock, single species versus integrated management of multiple stocks and species.][Please develop a discussion paper on the overescapement issue, and the implications and impacts of overescapement, as an introduction to a joint policy and science committee briefing on the issue.]

Salmon allocation issues in Cook Inlet often involve the concept of overescapement. While there is only one basic biological theory relevant to "overescapement," the variability in the quality and quantity of data available for a salmon stock can cause reasonable scientists to have different opinions on what constitutes overescapement. The purpose of the text which follows is to explain how the concept of overescapement is defined, and how the fact of overescapement for one salmon stock can mean underescapement for another stock or species of salmon.

The question of how best to divide any salmon resource between catch and escapement is complex, regardless of how the catch is allocated. In principle there is an annual number of spawners, an escapement goal, which allows each spawner in a salmon stock to produce the most offspring which survive to adults (recruits). The appropriate catch limit then becomes what is left over after the escapement goal is subtracted from the total number of adult salmon in the stock that year. That much is easy, at least in principle. With respect to this single stock of salmon, any number of spawners in excess of the escapement goal may be termed, overescapement, and any number of spawners less than the escapement goal may be termed, underescapement.

The complexity is introduced because, in practice, escapement goals are often set for species of salmon in river systems, and not for individual salmon stocks. The escapement goal for sockeye salmon in a river system such as the

Kenai is the average of the escapement goals of all the stocks in that drainage, so that even when the river's escapement goal is achieved exactly, there will necessarily be overescapements and underescapements with respect to the individual salmon stocks. This combination of overescapements and underescapements also can occur when mixtures of salmon species, such as sockeye and coho, are managed to attain the escapement goal for one of the species in one, or more, river systems.

The foundation of escapement goals is the concept that managers can influence the productivity of stocks (groups of spawners, usually from the same watershed or river) by harvest which is widely accepted in all areas of natural resource management, including wildlife, fisheries and forest management. The basic idea is that populations such as Douglas fir trees, coyotes, sockeye, and other types of plants and animals grow fastest when they number about half the maximum amount the environment can support, the carrying capacity. At this level there are not so many individuals as to create competition for limiting resources such as food and sun light, but there are enough individuals around to make full use of the limiting resources to produce wood or fish. The exact population level, i.e. escapement level, at which the total amount of wood or fish grows the fastest is the level of maximum sustained yield, MSY, or so the theory goes. Through controlled harvests fish populations can be kept at levels of sustained yield other than those at which the harvestable surplus is the greatest, if other constraints compel.

Each identifiable group of spawners, a stock, may have a different level of maximum sustained yield, due to differences in the number of eggs per female, the average size of the eggs produced, and the critical qualities of the spawning and rearing environments. There are obvious differences in MSY among species; salmon produce more offspring per female than do coyotes. But within species there are differences in MSY as well, even if all the biological factors are the same. For example, sockeye salmon stocks coming from two lakes identical in every way, except that one is smaller than the other, will have different MSY harvest levels. This is true because the population level at which total production is the fastest is about one-half the carrying capacity of the environment. In general, big environment means big MSY, and conversely, all other factors being equal. So the actual population level, or escapement goal, which provides the greatest rate of return on a mixture of stocks is not the escapement goal which gives the theoretical maximum sustained yield on a single stock. The mixed stock MSY is a somewhat higher escapement level than the single-stock MSY which permits the mixture of stocks actually harvested to survive and produce at the highest rate possible for the combination of stocks. All salmon escapement goals

in Alaska are most likely to be based on data collected from mixtures of stocks, although the mixture may be arbitrarily designated a single stock. For example, the many spawning aggregates of the Kvichak River sockeye of Bristol Bay have been managed effectively as a single stock, even though one of its two major rearing lakes, Iliamna, has more surface area than Puget Sound.

In a mixed stock management context, as well as in an ecosystem management context, overescapement and underescapement for individual stocks and species is a given, no matter what the escapement goal may be. Even when escapement goals can be identified for individual salmon stocks, when these stocks are harvested in mixed stock fisheries, some stocks experience "overescapement" relative to their theoretical MSY escapement level, and some experience "underescapement," even when the average escapement goal for the stock mixture is perfectly achieved. In this context, overescapement is not waste. Overescapement is the price to be paid for keeping the entire mixture of stocks producing on a sustained yield basis. Further, when the importance of escapements to the production of other species resident in the watershed such as rainbow trout, grayling, char, bald eagle, bear, and others is considered, overescapement of a salmon stock may be fully consistent with maximum sustained yield objectives for these other species.

So far, the approach of most fishery management agencies to sustained yield is to harvest the most economically prominent group of fish stocks at an annual rate which produces the maximum average rate of return for that mixture of stocks. The more stocks and species which are managed simultaneously in a mixed stock scenario, the greater the information requirements, and the greater the costs. The "economically important stocks" approach is so often taken because governments typically provide only enough funds to collect the information necessary to manage the economically most important stocks, if for those. So, as previously noted, the management escapement goal is not defined in terms of the yields or productivities of other stocks of the same species, or of other species.

When it comes to the question of maximizing the productivity of a natural resource, there are several questions which policy makers must answer before scientists can even begin to frame an answer. Which species? Which stocks? Within what time frame, years, decades, or centuries? What do you want to maximize; present dollar value to a gear type, future dollar value to a gear type, biomass, population viabilities, recreational opportunities, or whatever? Which stocks or species are you willing to sacrifice to this maximization? How much are you willing to pay to have what you want? Each of these questions has already been answered explicitly in Board of Fisheries actions, or during the

implementation of the Board's intentions during the management season. In framing proposals to the Board it is important to 1) understand the present answers to each question. and 2) the answers your own interests would pose to each of these questions.

4. Please look at the feasibility of weak stock management.

Weak stock management may or may not be feasible depending on the nature of information available for the smallest, or most chronically under seeded, group of spawners. A "weak stock" is the smallest identifiable spawning group of salmon for which 1) there is sufficient information on which to base fishing regulations. and 2) for which the responsible parties have agreed to provide a stated escapement or harvest rate objective. In general. the wider the data gaps, the more terminal the harvest management regime must be in order to effect weak stock management. Terminal fishing refers to fishing as near to the spawning grounds as product quality concerns permit. For example, the east side Bristol Bay sockeye salmon fisheries in the nearshore marine waters adjacent to the river mouths of the Naknek, Kvichak, Egegik and Ugashik are considered terminal fisheries, whereas the west side Bristol Bay sockeye fisheries in Nushagak Bay are mixed stock, working on the salmon from at least three river systems. Mixed stock fisheries generally require more information and are much more expensive to manage on a sustained yield basis than are terminal fisheries. See also the answer to number three, immediately above.

5. Please look at the impacts of hatchery fish on the fishery management and reproduction of wild stocks in Cook Inlet.

In general. production of salmon from hatcheries, and the harvest of that production, may impact wild salmon stocks in a number of different ways. Salmon from hatcheries may interbreed with wild salmon producing effects which appear to depend on the degree to which the hatchery and wild stocks differ. Transmission of disease among hatchery and wild stocks is another concern. Mixed stock harvest of wild and hatchery stocks at rates appropriate to the hatchery stock would result in loss of productivity and increased risk of extirpation for the wild stock. Data gaps exist on all three of these areas of impact.

Data are not available to address the degree to which hatchery salmon may have spawned with wild salmon, nor is it possible to tell what effects this may have had on the fitness or viability of the wild population, if they did. Since hatchery coho and chinook are now all coded wire tagged, in instances where spawning ground surveys allow collection of carcasses, if any, the proportion of

hatchery fish in the escapement might be roughly estimated. Collection of carcasses would not give any indication of whether the hatchery fish spawned successfully, nor whether it may have spawned with a wild salmon as opposed to another hatchery fish.

Contributions of hatchery production of coho and chinook salmon to Cook Inlet, and other, harvests can now be determined by the recovery of coded wire tags. All such production is being coded wire tagged prior to release from the hatcheries, and there is a program in place to sample fisheries for the tagged fish which are recognizable by the absence of an adipose fin, clipped at time of tagging, or by the use of a metal detector. The extent to which fishery management decisions for these species are influenced by the presence of hatchery fish can be determined in post season analysis of tag recoveries. It should be noted that harvest decisions for wild chinook salmon in Crooked Creek, the Ninilchik River and salt water south of Bluff Point are being driven by the real and perceived levels of returning hatchery fish.

Harvest decisions for wild stocks of sockeye salmon in Upper Cook Inlet have not been determined by the level of returning hatchery sockeye, but by the total numbers of wild and hatchery fish escaping to the Kenai River, as measured at the sonar site. Between 1976 and 1995 sockeye salmon escapements to Hidden Creek hatchery program averaged 3.5% of the total escapement to the Kenai River. In only two of those years, 1990 and 1991, did hatchery escapements exceed 10% of the Kenai River total, reaching the maximum of 17.5% in 1991, and 11.8% in 1990. Since the brood years which produced the bulk of the 1990 and 1991 escapements, levels of hatchery production of sockeye salmon have been deliberately held at levels which produce returns far smaller than the natural return. Hatchery escapements as a percent of total Kenai river sockeye salmon escapement were 3.3%, 1.4%, 0.6%, and 1.2% in 1992 through 1995, respectively. In the peak year of hatchery escapements, 1991, the difference between the hatchery escapement of 112,792 and the sonar count of 645,000 sockeye was above the lower boundary of the Kenai River sockeye escapement goal, as was the case in the next largest hatchery escapement year, 1990. Since the hatchery escapement had an effect on the apparent rate of increase in Kenai River sockeye salmon escapement in 1990 and 1991, and since fishery management decisions in the commercial fishery take into account the rate at which the Kenai River sockeye salmon escapement is building, it is fair to say that the hatchery escapements could have influenced fishery management decisions. As a consequence of the ability to identify hatchery production in the samples at the Kenai river fishwheels, hatchery escapements on the fishery management decisions of 1990 and 1991, did not inhibit managers from providing the Kenai River with wild sockeye salmon

escapements within the optimum range.

During the 1991 sockeye harvest management season, escapements were sampled from fish wheel catches in the lower Kenai River at the sonar counting sites. Hatchery sockeye from Hidden Lake were identified by examining growth rings on the fish scales. Sockeye scales of the hatchery origin sockeye reflect the large amount of freshwater growth which typically occurs in Hidden Lake relative to other sockeye rearing Lakes in the Kenai River system. Sockeye smolt (emigrants) from Hidden Lake commonly attain the length of 120 mm, whereas smolt from the larger glacial lakes, such as Skilak, would be quite a bit shorter, usually less than 100 mm. As it happened in 1991, sockeye salmon from Hidden Lake were obvious in the escapements from inspection of scale samples. Consequently harvest management intentionally tried to attain escapements toward the upper end of the Kenai River sockeye escapement goal of 700,000 in order to achieve full seeding of spawning areas other than those attendant to Hidden Lake. In the opinion of management it would have exceeded their statutory authorities to intentionally permit escapements of sockeye above the upper limit set by the Board of Fisheries.

Concerns over the ability to manage the large hatchery related sockeye returns to Hidden Lake have lead to the current conservative stocking limit of two million spring fry. The stocking limit also serves to address water quality concerns of the U.S. Fish and Wildlife Service. The Service also supported the limit in order to control financial and habitat costs of managing the harvest of very large sockeye returns to Hidden Lake. In order to harvest Hidden Lake surplus it is estimated to have cost the Service approximately $1.00/fish and the large number of harvesters had negative impacts on the habitat.

6. Do we need better detection of in season impacts in terms of who is [illegible]ing what?

Yes we do, especially at the level of stocks. At present it is only possible to determine the origin of Kenai River sockeye salmon caught by commercial harvesters in mixed stock areas. When harvests occur inside major river systems, such as the Susitna or the Kenai, it is not usually possible to identify the spawning grounds to which the fish were returning. The river of origin of coho and chinook salmon caught in the commercial fisheries of the Central District is a matter of speculation, although those caught near the river mouths are presumed to be from that river. Studies of straying behavior in chinook salmon using radio tags do not necessarily support this presumption. Implementation of multiple species sustained yield management, any Susitna Management Plan, or any Coho

Management Plan will require some assumptions about the origins of the harvests in the Central District based on timing and geographic location.

8. Please identify methods to increase passage to Northern Cook Inlet with minimum impact on the [catches of non-Susitna sockeye in the] Central District.

Corridor openings which hold the drift gill net fleet relatively close to the east side beaches have been effective at reducing the efficiency of the commercial drift fleet (Mundy et al. 1993) with respect to Susitna bound sockeye in the Central District, while permitting harvest of Kenai bound fish. Kasilof special harvest areas have allowed targeting of commercial fishing effort on Kasilof bound sockeye, while apparently sparing Kenai and Susitna bound sockeye. Impacts of corridor openings on rate of catch of other species, such as Kenai River king salmon, need to be examined. Possibilities other than corridor openings have been identified in proposals to the Board of Fisheries which involve time and area closures need to be evaluated.

9. Describe harvest methods and regulations that promote the avoidance of waste.

Time and area regulations which avoid peak periods of abundance, and which evenly space relatively short openings, and which control the amount of gear which an individual harvester may employ, are all conducive to controlling waste in general. Specific objectives in terms of times, areas, and harvests, and/or escapement objectives by species and/or stock need to be supplied in order for the science committee to respond further.

10. Comment on the feasibility of developing a management plan for the Susitna.

Specific objectives in terms of times, areas, and harvests, and/or escapement objectives by species and/or stock need to be supplied in order for the science committee to respond. Data gaps and basic salmon migratory behavior may define the degree of specificity which management could achieve with respect to stocks and species.

11. Comment on the feasibility of developing a coho management plan for Cook Inlet.

See answer to preceding question on Susitna Plan.

12. Identify the effects on commercial harvesters of reducing the commercial season from July 1 - August 15 to July 7 - August 9.

The impacts on commercial harvesters can be estimated from available historical for the data of each fishery (gear-locality combination) by looking at the percent of the annual harvest which occurs during these time periods, July 1 - July 6, and August 10 - 15, as an average over all available years of record. Each fishery may experience a different impact from this option. Such information may be available from previous analyses, or it may require requesting a fish ticket run from Juneau. The Science Committee needs clarification of whether the request includes deletion of special openings for commercial fishing prior to July 1 under circumstances indicating an early and or heavy sockeye run? If so, the best approach may be to consider all commercial harvest prior to July 7 as an average percent of total annual harvest.

Miscellaneous issues, briefly addressed due to lack of time

1. Spread sport fish impact on Kenai River habitat by opening other areas to fisheries (fairness). Data gap exists, impacts are not quantifiable.

2. Allocation of current sport priority to other sectors (early run/late run). Specific objectives in terms of times, areas, and harvests need to be supplied in order for the science committee to respond.

3. Non residents commercial harvesting with sport gear. Legal tools may not be available to enforcement. Need a legal opinion. Specific objectives in terms of times, areas, and harvests need to be supplied in order for the science committee to respond.

4. Enforcement (limits). Specific objectives in terms of times, areas, and harvests need to be supplied in order for the science committee to respond.

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January 17, 1977

Alaska Boating Association • P.O. Box 210430 • Anchorage, Alaska 99521

Senator Rick Halford
Alaska State Senate
State Capitol, Interdepartmental Mail Stop: 3101
Juneau, AK 99801-1182

Dear Senator Halford:

This letter is in response to your proposed SB0040 relating to the management of discrete salmon stocks. At a regularly scheduled meeting of the Alaska Boating Association held on January 16, 1997, our organization voted unanimously to support this legislation. This letter communicates to your our official position on the legislation.

In addition, many of our individual members will be corresponding with individual letters, POM's, testimony at teleconferences, etc. This bill is important to all of us as non-commercial consumptive users, for the commercial sport-fishing industry, and the tourist industry to assure ongoing yields of the resource.

Thank you for your efforts and continue to keep us informed of any and all related legislative matters we can be effective in supporting.

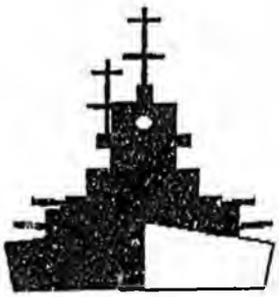
Yours truly,

Roy J. Burkhart

Roy J. Burkhart, Legislative Affairs Officer
Alaska Boating Association
Voice:(907)495-6337 FAX:(907)495-6338 E-Mail. rjburk@alaska.net

cc: Donald Sherwood, President, Alaska Boating Association
Senator Lyda Green, Co-Sponsor SB0040, Alaska State Senate
Senator Dave Donley, Co-Sponsor SB0040, Alaska State Senate

Donald E Sherwood
1640 Brink Dr
Anchorage, Alaska 99504
Fax 333-6211
Home Phone 333-6268



FAX COVER SHEET

DATE: 25 Jan 1997

- **TO:** State Senate
- **ATTN:** Sen R Halford
- **FAX NO:** 1-907-465-3805
- **PAGE:** 1 **OF** 1

- **SUBJECT:** Act Relating to Management of Discrete Salmon Stocks
- **REF:** SB-40

Sen Halford:

The Alaska Boating Assoc is supporting SB-40. Our time is running out for saving our existing stocks. The Feds have said they will implement various methods to relieve the overharvest but you know how that will be. Our State must step in and stop the fish board from making total biased regulations both now and in the future and the only way to do it, is move this bill forward as soon as possible.

We do have one problem and that can be resolved and that is on page 1 line 14 "1} by Jan 1, 2004, shall adopt regulations", we think this time should be shorted to possibily "2001", due to the fact, the Upper Cook Inlet fishery is in rapid decline in some rivers as have been seen by ADF&G studies. The record harvest are here every year but thats hatchery fish not wild stock and this is harvested way below the Upper Cook Inlet rivers and streams.

If there is a way to help in getting this bill moved, do not hesitate to call and we will try to help. Keep up the great job you all are doing.

President
Alaska Boating Assoc

ALASKA COUNCIL OF TROUT UNLIMITED
P.O.Box 3055, Soldotna AK 99669
(907) 262-9494 Fax: 262-5920

February 24, 1997

Senator Rick Halford
fax: 465-4928

Re: SB 40

The Alaska State Council of Trout Unlimited supports this bill. Discrete stock management addresses several conservation issues of concern to T.U. including: the Alaska Constitutional mandate for sustained yield of all salmonid resources (not just commercially exploitable stocks), concerns over loss of species diversity, ecosystem health, and last but not least the burden of conservation, which the Alaska Board of Fisheries acknowledges is disproportionately shares among users.

The problems inherent to a discrete stock management approach are not insignificant. 1) Data development for discrete stock management is dependent upon both funding and expediency. While it is not possible to have all of the information at once this is a significant management direction change for both the Board of Fisheries and the Department of Fish and Game and as such will requlre a constant data stream designed to provide at least initially the minimum information necessary for discrete stock management decision making.. 2) The funding necessary for successful implementation is imperative and we believe that this bill's approach to funding shares that burden among all of the users of the resource. 3) Finally, assurance for success in this effort will require a commitment from ADF&G. Lower level management and field staff must believe in the sincerity of that commitment as well.

Scientific data (both recent and historic) indicates that mixed stock fisheries management does contributed to the decline of discrete salmonid stocks. Most recently the National Research Council's Pacific Salmon study (Upstream: Salmon and Society in the Pacific Northwest) recognizes mixed stock management as conflicting with efforts to manage for healthy (or restore to health depleted) discrete salmon stocks.

T.U. supports SB 40 as a necessary first step toward responsible management of Alaska's renewable salmonid resource.

Dennis H. Randa, President
cc: Charles Gauvin, T.U. National President
Bill Robinson, T.U. Westcoast Rep.

MAR 03 1997

MATANUSKA-SUSITNA BOROUGH

Borough Manager
350 E. Dahlia Avenue, Palmer, Alaska 99645-6488
Phone (907) 745-9689 • FAX (907) 745-0886

February 28, 1997

Senate Resources Committee
State Capitol
Room 508
Juneau, AK 99801-1182

Re: Senate Bill No. 40 - "An Act relating to management of discrete salmon stocks, to salmon management assessments, and to the fishery business tax."

Dear Committee Member:

For the past several years the Borough has been working diligently to improve the management of our fishery resource. We have testified at Alaska Board of Fishery meetings as well as submitted written testimony requesting changes to the Cook Inlet Salmon Management Plan. Many of the changes we have requested are addressed by Senate Bill 40, such as:

1) Require the Department of Fish and Game to prioritize their management of salmon harvests for escapement, thereby ensuring a sustained return of all salmon species to all waters of Cook Inlet.
2) Survey small streams in Upper Cook Inlet for biological escapement of all stocks and species of salmon to determine where a conservation emergency exists and take corrective measures to abate the emergency.
3) Require the Board of Fisheries to address management of salmon harvests throughout the entire migration route of each salmon species and stock.

Current management policies of the Board of Fisheries and Department of Fish and Game have resulted in the closure of some of the Borough's most popular sport fishing areas. Senate Bill 40 is a major stride in improving the management capabilities for this valuable resource. The Act requires the Board of Fisheries to adopt and implement management policies that are consistent with the constitutional requirement of managing the resource for a sustained yield. It also provides a means to offset the costs incurred by the state in implementing the management policies.

The Matanuska-Susitna Borough supports Senate Bill No. 40 and encourages adoption and implementation of the management policies as proposed.

Sincerely,

Donald L. Moore
Borough Manager

cc: Alaska Board of Fisheries
Matanuska-Susitna Borough Assembly
Mayor's Blue Ribbon Task Force

pln/pmg/dm/1287

HOUSTON CHAMBER of COMMERCE

RESOLUTION NO. HCC97-03

A RESOLUTION OF THE HOUSTON CHAMBER OF COMMERCE SUPPORTING SENATE BILL 40 "AN ACT RELATING TO THE MANAGEMENT OF DISCRETE SALMON STOCKS".

WHEREAS, The current salmon management centers around heavy exploitation of mixed stock fisheries and disregards the negative effects this policy has on discrete stocks of all salmon species; and

WHEREAS, the salmon resources available to the Houston area are an integral part of our community; and

WHEREAS, Senate Bill 40 would maintain genetic variation and local adaptation; and

WHEREAS, the long-term survival of salmon depends crucially on a diverse and rich store of genetic variations; and

WHEREAS, Senate Bill 40 would redirect our attention from the past mistakes of allocation driven management system toward a system which will fully meet our constitutional responsibility to sustained yield.

NOW THEREFORE BE IT RESOLVED by the Houston Chamber of Commerce that it supports Senate Bill 40 and urges all governing bodies and communities to support and approve Senate Bill 40.

I certify that this resolution reflects the wishes of the Houston Chamber of Commerce.

APPROVED:

Robert Hall

Robert Hall

ATTEST:

Nathan Dunn

March 3, 1997

Via Fax and First Class Mail
Senator Rick Halford
Room 121
State Capitol
Juneau, AK 99801-1181

Re: Senate Bill No. 40, "An Act relating to management of discrete salmon stocks . . ."

Dear Senator Halford:

Dennis Randa, Trout Unlimited's Alaska Council Chairman, has brought the above-referenced bill to my attention and asked that I analyze it and provide you with the comments of Trout Unlimited's national organization on the bill and the problem of mixed stock salmon fisheries generally. Trout Unlimited is a 100,000 member organization whose mission is to conserve, protect, and restore North America's coldwater fisheries. Major priorities in Trout Unlimited's national conservation agenda are protection of healthy Pacific salmon stocks and restoration of weak ones, and a principal goal in our conservation strategy for Pacific salmon is discrete stocks management.

The scientific and management literature is virtually unanimous in decrying the negative impacts of mixed stock management as a major factor in the weakening of discrete wild salmon stocks and the extirpation of weak stocks. (See, e.g., National Research Council, 1990. Upstream: salmon and society in the Pacific Northwest.) Although fortunate not to have experienced the widespread salmon stock declines that have occurred in Washington, Oregon, and California, Alaska has healthy stocks that are at risk and weak stocks that are failing to recover due substantially to mixed stock management.

S. 40 is a solid first step toward ending mixed stock management in some of the places where it is currently doing the greatest damage and in redirecting, over the longer term, fishery management policy toward selective harvest measures in other places where there are still opportunities to prevent the down-spiraling of healthy stocks. The measures that it would direct the Board of Fisheries to undertake are essential to the sustainability of Alaska's salmon and the current and future well being of all resource users: commercial, subsistence and recreational. Moreover, commercial and recreational users would share equitably the burdens of implementing the new stock management policy.

I urge that the Alaska Senate pass S.40 and begin the task of managing discrete salmon stocks.

Thank you for the opportunity to comment on this important legislation.

Sincerely yours,

Charles F. Gauvin
President and CEO

cc: Dennis Randa
Bill Robinson
Rick Applegate
Ron Holtcamp

Official Business

COMMITTEE: SENATE RESOURCES

DATE: 4/11/97

Subject of meeting: SB 40 Discreet Salmon Assessment and Management

SIGN-IN

PLEASE PRINT!

NAME	ADDRESS (MAILING) & (ZIP)	PHONE	REPRESENTING	DO YOU WANT TO TESTIFY?
Gerod Bruce	BX 25526 Juneau AK 99802	465-6143	Fish / Game	Yes
John Sund	Box 91739 Anchorage AK 99509	463 2628	Alaska Seafood Council	Yes.
Dean Paddock	PO Box 21851 Juneau AK 99802	463-4970	Bristol Bay Drift netters Assn	Yes
Jym mc Cune	4th 211 45 St Suite 112 Juneau Ak	586-2820	UFA	Yes
Chris Kelly	8800 Glacier Hwy #109 Juneau AK 99801	789-6150	CFEC	Yes
Cliff Skillings				

04/11/97 LEGISLATIVE TELECONFERENCE NETWORK SYSTEM LTN1150

15:49:08 PARTICIPANT LIST (ALL PARTICIPANTS) BY:ANC

TCN:70593 SCHEDULED FOR:04/11/97 15:30 TO 17:00 FOR:ANC

PUBLIC HEARING SENATE RESOURCES

LOCATION:ANCHORAGE

SB 40		~~SAM~~	MCDOWELL		TESTIFY
SB 40		~~EMMET~~	HEIDEMANN		TESTIFY
SB 40		~~LOUIS~~	CLARK		TESTIFY
SB 40		KEVIN	DELANEY	AK F&G	TESTIFY
SB 40		EUGENE	SVETC		TESTIFY
SB 40		DON	SHERWOOD		TESTIFY
SB 40		MARGO	SHERWOOD		TESTIFY
SB 40		WILLIAM	YOUNG		TESTIFY
SB 40		KENNETH	SVETC		TESTIFY
SB 40		BUD	HODSON		TESTIFY
SB 40		RANDY	BJORGAN		TESTIFY

LOCATION:BETHEL

SB 40	DR.	JOHN	WHITE	BOARD OF F&G	TESTIFY

LOCATION:CORDOVA

SB 40	MS.	CHERI	SHAW	CDFU	TESTIFY

LOCATION:HOMER

SB 40	MR.	DAN	WINN	SELF	TESTIFY
SB 40	MR.	YAKOV	REUTOV	SELF	TESTIFY

LOCATION:KENAI LIO

SB 40	MR.	~~LEONARD~~	EFTA	SELF	TESTIFY
SB 40	MS.	KATHY	TIKKA	SELF	TESTIFY
SB 40	MR.	DALE	BONDURANT	SELF	TESTIFY
SB 40	MR.	KARL	KIRCHER	KPFA	TESTIFY
SB 40	MR.	RON	RAINEY	KRSI	TESTIFY
SB 40	MR.	ARTHUR	ROBINSON	SELF	TESTIFY
SB 40	MR.	PHIL	SQUIRES	UCIDA	TESTIFY
SB 40	MR.	DREW	SPARLIN	SELF	TESTIFY
SB 40	MR.	DICK	BOWER	SELF	TESTIFY

04/11/97 LEGISLATIVE TELECONFERENCE NETWORK SYSTEM LTN1150

16:20:08 PARTICIPANT LIST (ALL PARTICIPANTS) BY:KOD

TCN:70593 SCHEDULED FOR:04/11/97 15:30 TO 17:00 FOR:KOD

PUBLIC HEARING SENATE RESOURCES

LOCATION:KODIAK

SB 40	MR	LARRY	MALLOY	KOD AQUA. ASSOC	TESTIFY
SB 40	MR	BRUCE	SCHACTLER	SEINERS_ASSOC	TESTIFY
SB 40	MR	JOE	MACINKO		TESTIFY

LOCATION:MATSU

SB 40	MRS.	JUNE	BURKHART		TESTIFY
SB 40	MR.	ROY	BURKHART		TESTIFY
SB 40	MR.	JAMES	TUTT		TESTIFY
SB 40	MR.	RICK	BRAY		TESTIFY
SB 40	MR.	BILL	PACE		TESTIFY
SB 40	MRS.	NANCY	PACE		TESTIFY
SB 40	MR.	TOM	NAMTREDT		TESTIFY
SB 40	MR.	LEONARD	HAIRE		TESTIFY
SB 40	MR	LARRY	ENGEL Board		TESTIFY
SB 40	MR	RON	WILSON		TESTIFY
SB 40	MR	BRUCE	KNOWLES Guide		TESTIFY
SB 40	MR	ROBERT	MARTINSON		TESTIFY
SB 40	MR	ROBERT	PEACOCK		TESTIFY
SB 40	MR	DAVE	GLASON		TESTIFY

LOCATION:PETERSBURG

SB 40	MS.	LIZ	CABRERA	PVOA	TESTIFY
SB 40	MS	GERRY	MERRIGAN		TESTIFY

LOCATION:SITKA

SB 40		GRANT J.	MILLER	BD. OF FISH	TESTIFY

To Senate Resources
SB 140/Testimony
T/C 70593 4/11
4928

Alaska Boating Association * PO Box 210430 * Anchorage Alaska 99521
E-Mail to ..... loneagle@alaska.net

TO: **To All Legislatures** **11 April 97**

FROM: Francisca M Sherwood

SUBJECT: Support of SB40
Afternoon Chairman

~~My name is~~ I'm **Margo Sherwood ~~and~~ I live at 1640 Brink Dr Anchorage 99504. As a proud resident for over 31 years, and who has raised and educated my family in this great state, I have come to testify in support of SB40.**

This is one bill that will actually pay for itself, by collecting money from those who use the resource. What a change coming out of Juneau. It provides a funding mechanism for the discrete stock assessment program through a surcharge on both sport and commercial users. This funding proposal shares the burden of the cost of increased information among these user groups in a fair and equitable way.

This bill requires the Department to prepare a list of projects and their costs that will address the stocks identified by the Board. The Department will also prepare a list of future and/or potential projects. This in itself coming from a mother and a grandmother is just like raising a family. List, Prioritize, and then Pay for it,not charge it.

There are many fine points in this bill that will be ~~disgust~~ discussed **today, but as a User, we are in need of something that will guarantee me and my family a fair allocation of fish on a continuing base ,which is not happening now.**

I want to thank you for listening to my comments and also say, Thanks for doing a great job in determining the future ,and our renewable resources is and always will be ,the future of our great State.

Margo Sherwood
Wife, Mother, & Grandmother

Dedicated to the rights of Alaskan Boaters

Blase A. Burkhart
1161 W. 79th
Anchorage, Alaska 99518
Secretary - Alaska Boating Association

Alaska State House and Senate
c/o Senator Rick Halford
Twentieth Legislature - First Session

Re: Senate Bill No. 40

Dear Representatives and Senators,

I am a lifelong Alaska resident writing in support of Senate Bill No. 40, referring to discreet salmon stock management.

As you know, there has been a continual controversy regarding allocation of fish resources between the interests of sport and commercial fishing. I have always believed resolution of these concerns would require some fair, honest, and "common sense" compromises. And it is imperative that we always approach allocation and fishing regulations with the concern for the resource renewal above all else.

I believe this bill heads in the right direction for my concerns.

I SUPPORT SENATE BILL NO. 40

Sincerely,
Blase Burkhart - Secretary, Alaska Boating Association

ALASKA SEAFOOD COUNCIL, INC.
PO Box 91239 Anchorage, AK 99509-1239 Phone/Fax: 907/463-2628

April 1, 1998

Senator Rick Halford, Chairman
Members
Senate Resources Committee

Dear Senator Halford,

The Alaska Seafood Council is an umbrella organization representing the Alaska seafood industry. It is comprised of almost 2,000 individual members which include harvesters and processors, processing workers, and Alaskans working in supporting businesses. We have members in the banking, insurance, transportation, fuel, legal and manufacturing sector.

We are opposed to SB 40 for the following reasons:

1) SB 40 requires the Board of Fish to prioritize discrete salmon stock assessment projects based on several new criteria including the importance of the fishery to the state, and the magnitude of the conflicts among users of a certain salmon stock.

We believe this may lead to a situation where only the "squeaky wheel gets the grease", so to speak. We can envision political allocation battles determining research priorities rather than true management and scientific needs getting the attention and research funds they deserve. Good science, not emotion, needs to determine research priorities.

2) The bill fails to define what a "discrete" stock is , and fails to identify the problem it is trying to fix.

3) Commercial fishermen and the industry are already taxed in Alaska in many ways-through the raw fish tax which goes to shoreside communities, by the tax paid to the Alaska Seafood Marketing Institute for marketing of Alaskan fish, and in many cases, by a tax for the continued production of salmon stocks through aquaculture associations. This is in addition to other taxes paid through property taxes, business taxes, and taxes on fuel, permit fees, and every day operations. In addition, fishermen throughout the state will be taxed, but many will never see any research done in their areas.

We are supportive of the ADF&G having adequate funding to provide for good management and collection for Alaska's fishery resources. We believe the present relationship between the ADF&G and the Board of Fisheries is healthy.

We also support research and scientific data, and it's the feeling of the Alaska Seafood Council that the authority to accomplish the intent of this legislation, to gather information and assess the health of salmon stocks, already exists in the state constitution, statute and in the ADF&G regulations and policies.

Thank you for the opportunity to submitt this testimony for your review.

Sincerely,

Kris Norosz

Kris Norosz, President

PO Box 3662
Soldotna, AK 99669
April 11, 1997

TO: Senate Resources Committee

FROM: Dick H. Bower

SUBJECT: SB 40 - Discrete stock salmon assessment

The following represents my written testimony regarding SB 40 prepared for the Committee's first statewide teleconference hearing held on this date:

I would first like to state that I fully support the intent of this proposed legislation. In its present form several elements have been deleted from the bill proposed during the last legislative session. I have mixed feelings regarding some of the deletions because the present form represents less of a commitment to required management action regarding salmon stocks which may be troubled or in serious jeopardy. However, this version of the bill is less specific in several ways and may result in more appropriate action statewide.

The Alaska Board of Fisheries has too often found itself faced with a lack of appropriate and relevant data in its decision making process. In many cases data received has been inconsistent, inaccurate, and in some instances represents extrapolation from insufficient or inaccurate data. The results of this legislation **could** help overcome this problem. I say **could** because unless there are specific procedures and criteria for the gathering, assessment, evaluation, interpretation and formatting of the data collected the potential of this effort will not be realized. This consistency must be assured on a year to year basis and should be carefully crafted so that computerization will result in relatively easily understood results.

I believe that it is inherent within this purpose that the Department prepare and review with the Board of Fisheries a five year assessment plan in one year increments which can be reviewed and evaluated annually.

The committee substitute for SB 40 describes the funding mechanism for this effort as "...a user-pay system for the discrete stock assessment program". This prompts me to register several concerns:

1. Given the interpretation that there is a Constitutional prohibition of designated funds and the reluctance of the Legislature to clarify this issue the process proposed has some pitfalls.

2. The "user" groups identified are those holding either sport or commercial licenses or permits. This applies equally to both resident and non-resident recipients. However, there is no recognition of the subsistence category which I assume is not to be involved as a paying "user" group. **I do not propose that subsistence users pay as the other groups.** There are also a number of Alaska seniors who do not directly pay for fishing privileges. However, I believe that the purpose of the legislation is not the allocation of fish stocks to any user group, but rather the commitment to the protection and continuation of the salmon resource. In this regard it seems that there should be a designation of some monies from the general fund to support this program since it is clearly directed toward the protection of a critical renewable resource of importance to the state as a whole.

3. It is indicated that funds generated and appropriated in this manner are "...not intended to replace, funds appropriated for the operation of the division of commercial fisheries management and development or the division of sport fish". The division of sport fish does not now receive general fund monies, however one would not want to see assessment funds replace its federal and license fee expenditures. An unrecognized division in this critical effort is the **habitat division.** This division has one of the most important roles in accomplishing the intent of this legislation.

4. This legislation is directed toward discrete stocks of salmon, however to fail to take advantage of the program to assess other fish stocks will be a major mistake. For too long management of specific salmon species as if they were discrete from not only other salmon species but also other fish species present within the ecosystem has occurred. This has resulted in some known problems and undoubtedly unknown problems not identified because of either their lack of economic value or lack of importance to those persons who do not view them as their responsibility.

This legislation represents a first step long overdue in the management of Alaska's fishery resource. I would like to urge two additional steps for your consideration:

1. Encourage (mandate) the establishment of a Research Division within the Department which will have the responsibility for conducting or coordinating all research activities. This department must be separate from the sportfish and commercial fisheries divisions to assure maximum objectivity within the highly charged atmosphere which exists in these two divisions.

2. Establish an active and ongoing relationship with the University of Alaska in both research and scientific studies. The benefits of this effort will be at least twofold. First, it may bring a degree of objectivity to both the studies and results which may defuse problems which now often result. Secondly, given budget shortfalls of both the Department and the University this may be a means to accomplish joint objectives in a meaningful and cost effective manner. The scientific resources found within the Universities general academic staff and its School of Fisheries and Ocean Sciences should represent a significant resource to the Department and to the state of Alaska in programs such as are represented by this legislation.

I appreciate the opportunity to comment upon this legislation and hope that you will not hesitate to call upon me if I can be of any further assistance . Two of Alaska's most important renewable resources are its fish and its forests. Both offer considerable economic return through their harvest. We need their use, but must avoid their abuse. Wise and responsible use will assure their presence for years to come. Less than that may soon find Alaska in the position of many of the states in the lower forty-eight.

Bob Martinson CO-CHAIR GILLNET - DIVISION,
CORDOVA DISTRICT FISHERMEN UNITED.

900 Iroquois Dr.
Wasilla, AK 99654

Dear Honorable Members of the Senate:

I have seen politics interfere and undermine fisheries' health from California, to Oregon, to Washington and British Columbia. Living in the Mat-Su valley, and being a lifetime commercial fisherman, it angers me that those who are chosen to represent me are the ones who are always trying to take away my livelihood, one piece at a time, or sometimes all at once. This time it may be all at once.

In a nutshell, SB40 is essentially a sportfish-driven ploy to fill the streams of Alaska with fish. Sounds good doesn't it? It's not good, Alaska's Department of Fish and Game would tell you so. All the ADF+G managers that I spoke with are against it. Is it a coincidence that sportfishing guide Rick Halford sponsored this bill? NO!

If this bill were to be stripped of its technical garble, it would say: "We should go out and tag every fish from every stream and if one of those fish comes up missing, then all we have to do is close down commercial fishing!"

Well, commercial fishing is the State of Alaska's #1 employer and provides revenues for the state while generating millions in revenue sharing for coastal communities. For FY96 com-fish revenues of the State of Alaska exceeded expenditures for fish management by 9 million dollars.

In 1995, my vessel license renewal fee more than doubled and there was the 1% tax for marketing seafood. Then they increased our marine fuel tax last year also. The legislature's decision to cut the ADF+G's budget is not a justification for SB40.

Why are we the fishing industry, being asked to pay again, and again, and again!?

The Department hasn't asked for any changes to the current policy. It would create another whole batch of state employees with another fish lab and on and on and on . . .

Keep in mind this is all because sportfish guide Rick Halford says it's a good idea.

Remember, this is a very misleading, allocative measure, and allocation is to be left to the BOARD OF FISHERIES . This research would be prioritized by the B.O.F.- a budget supplement controlled by the B.O.F. This amounts to a serious and radical disruption of the public budget process.

Good fish management has been underway in Alaska since the late 1800's. Let the biologists continue to do their jobs which have created the most successful management in the world, and don't befuddle it with more unneeded bureaucracy.

Cordova District Fishermen United

Celebrating 62 Years of Service to Commercial Fishermen in Cordova, Alaska
P.O. Box 939 Cordova, Alaska 99574 / Telephone (907) 424-3447 / Fax (907) 424-3430

April 11, 1997

Oral testimony to be given April 11, 1997 re: SB 40 (Discreet Stock Assessment)
Sent via facsimile to Senate Resources Committee

Good afternoon. Mr. Chairman and committee members, my name is Cheri Shaw. I am the executive director of Cordova District Fishermen United and will be speaking on behalf of the organization today.

For convenience, my testimony with attachment were faxed directly to each of your offices earlier.

The old saying "don't fix what isn't broken" comes to mind when reading SB 40. The State of Alaska has had the good fortune of having the highest quality finfish management in the world. Managing a watershed as opposed to assessing discreet stocks is extremely successful and is supported in an article recently published in the Coos Bay, Oregon paper The World which I have included with my testimony. Let's learn from other people's mistakes, not our own.

Sound management comes from good science which we all agree is important. Assuring sustainable fisheries is in the best interest of everyone including commercial fishermen. Ask yourselves these questions, is SB 40 the way to accomplish better management? Is this bill just a disguise to fund fish and game without going through the budget process? Commercial fishermen already pay their way in the State. We most recently had an increase in the marine fuel tax and the vessel licensing fee. In addition, CDFU is supporting the reauthorization of the 1% ASMI tax. When will it stop? Is giving the Board of Fisheries an open checkbook in the best interest of the resource?

Another concern CDFU has is the allocative nature of this bill. After reviewing the fiscal note with attached FY98 projects, it appears that putting more salmon in the rivers from the Cook Inlet region seems to be a priority. It looks as though the sport/commercial battle in this area has gained the attention of the legislature.

Ask yourselves, will this bill force the commercial fleet into the terminal harvest areas? During the Salmon Strategy Forum last January the State agreed that managing for quality by placing harvesters away from the terminal harvest areas was a necessity in stabilizing and increasing the net worth of our fisheries. SB 40 will be in direct conflict with this thought pattern. Decreasing the intrinsic value of commercially harvested salmon will only increase the problems we face in the world market today.

One final concern is the lack of complete definitions for the terms discreet stock, sustained yield and biological health which can be interpreted as one sees fit. To understand the intent of SB 40 one must define the terms contained within so as not to confuse the interpreter.

Committee members, thank you for the opportunity to testify before you today and please consider the concerns of Cordova District Fishermen United and do not pass this bill out of committee.

Sincerely,

Cheri Shaw

Cheri Shaw, Executive Director
Cordova District Fishermen United

/attachment

Bob Martinson CO-CHAIR GILLNET - DIVISION,
CORDOVA DISTRICT FISHERMEN UNITED.

900 Iroquois Dr.
Wasilla, AK 99654

Testimony to ~~Legislature~~ Legislative Committee Mr. Chair ~~Committee~~ ladies & Gentlemen ~~Department of the Legislature~~,

I have seen politics interfere and undermine fisheries health from California, to Oregon,to Washington and British Columbia. Living in the Mat-Su valley, and being a lifetime commercial fisherman, it angers me that those who are chosen to represent me are the ones who are always trying to take away my livelihood, one piece at a time, or sometimes all at once. This time it seems to be all at once.

In a nutshell, SB40 is essentially a sportfish driven ploy to fill the streams of Alaska with fish. Sounds good doesn't it? Well its not good and Alaska's Department of Fish and Game would tell you so. All the ADF+G managers that I spoke with are against it. Is it a coincidence that the [redacted] sportfishing guide Rick Halford sponsored this bill? NO!

If this bill were to be stripped of its technical garble, it would say: "We should go out and tag every fish from every stream and if one of those fish come up missing, then all we have to do is close down commercial fishing!"

Well, commercial fishing is the State of Alaska's #1 employer and provides revenues for the state while generating millions in revenue sharing for coastal communities. For FY96 com-fish revenues of the State of Alaska exceeded expenditures for fish management by 9 million dollars.

In 1995, my vessel license renewal fee more than doubled and there was the 1% tax for marketing seafood. Then our marine fuel tax was increased last year also. The legislatures decision to cut the ADF+G's budget is not a justification for SB40.

Why are we the fishing industry, being asked to pay again, and again, and again!?

The Department hasn't asked for any changes to the current policy. It would create another whole batch of state employees with another fish lab and on and on and on.....

Keep in mind this is all because sportfish guide Rick Halford says its a good idea.

Well its a poor way to disguise the Fish Initiative while trying to ram it down the residents throats.

Good fish management has been underway in Alaska since the late 1800's . Let the bioligists continue to do their jobs which have created the most sucessful management in the world, and don't befuddle it with more unneeded bueracracy.

See this for what it is, an expensive, unecessary , cloaking of the truth. The public will know,I will see to it. Vote no on SB40. THANK YOU.

Robert A. Martinson

Robert Martinson

Cordova District Fishermen United
P.O. Box 939
Cordova, Alaska 99574
(907) 424-3447 FAX (907) 424-3430

April 18, 1997

The Honorable Rick Halford, Chairman
Senate Resources Committee
State Capitol (Mail Stop 3101), Room 121
Juneau, Alaska 99801-1182

Dear Senator Halford:

I would like to go on record in opposition to SB 40 (Discreet Stock Assessment) for the following reasons:

1. This bill creates another tax on an already over-taxed industry. I am amazed, in a year when Republicans are taking stands opposed to any new taxes, that this bill would be introduced. No matter how you justify it, the people of this state do not need more money taken out of their pockets to fund more government, **PERIOD!**

2. This legislation is unnecessary. Protecting the health of Alaska's Salmon returns is already the number one priority of the Alaska Department of Fish and Game and the Board of Fish. The local advisory committee and Board process is working. Why attempt to fix something if it is not broken?

3. This bill does not contain definitions of critical terms, nor is there consensus in the scientific community on these definitions. If this bill becomes law, we can look forward to years of debate about what it really means.

4. I believe that this legislation has far reaching implications that are not clearly understood. Implementation of this bill would cost far more than the revenues generated and would result in further increases in taxes on users or a drain on state funds.

In conclusion, I believe that this bill is both unnecessary and poorly written and strongly oppose its passage. Thank you for your consideration.

Sincerely,

Stephen C. Riedel

Stephen C. Riedel
Chair, CDFU Seine Division

Cordova District Fishermen United

Celebrating 62 Years of Service to Commercial Fishermen in Cordova, Alaska

P.O. Box 939 Cordova, Alaska 99574 / Telephone (907) 424-3447 / Fax (907) 424-3430

April 21, 1997

Written testimony submitted on April 21, 1997 re: SB 40 (Discreet Stock Assessment) Sent via facsimile to Senate Resources Committee

Good afternoon. Mr. Chairman and committee members, my name is Cheri Shaw. I am the executive director of Cordova District Fishermen United (CDFU) and will be speaking on behalf of the organization today. CDFU opposes the passage of SB 40.

Sound management comes from good science which we all agree is important. Assuring sustainable fisheries is in the best interest of everyone, especially commercial fishermen. Ask yourselves the following questions. Is SB 40 the way to accomplish better management? Alaska has the proud distinction of being world renowned for its fisheries management. Do we need this change or is this a bill disguised to fund fish and game without going through the proper budget process? Commercial fishermen already pay their way over and above the cost of management in this state.

CDFU has another concern with the allocative nature of this bill. After reviewing the fiscal note with attached FY98 projects, it would appear that putting more salmon in the drainage rivers in the Cook Inlet region is a priority. It looks as though user conflicts in Cook Inlet have gained the attention of the legislature. If this is the intention of SB 40, to resolve allocation conflicts, why should *all* fishermen in the state be subject to funding these studies?

Will this bill force the commercial fleet into the terminal harvest areas? During the Salmon Strategy Forum last January the State agreed that managing for quality by placing harvesters out of the terminal harvest areas was a necessity in stabilizing and increasing the net worth of our fisheries while still managing for sustained yield. SB 40 will be in direct conflict with this approach. Decreasing the intrinsic value of commercially harvested salmon will only increase the problems we face in the world market today. The commercial fishing industry supports the largest work force of any industry in the State. Does the legislature think that the passage of SB 40 will help an already struggling industry that has recognized its problems and is in the process of rectifying them?

One final concern is the lack of comprehensive definitions for the terms "discreet stock", "sustained yield" and "biological health" - interpretation is as varied as the reader's bias. To understand the intent of SB 40 one must define the terms contained within so as not to confuse the interpreter.

Committee members, thank you for the opportunity to testify before you today and please consider the concerns of Cordova District Fishermen United. We urge you to not pass this bill out of committee.

Sincerely,

Cheri Shaw

Cheri Shaw, Executive Director
Cordova District Fishermen United

Mr. Chairman and members of the Senate resources committee, my name is Liz Cabrera and I am testifying on behalf of the Petersburg Vessel Owners Association (PVOA). For the record, we are opposed to the provisions of Senate bill 40, which create a tax and spend mechanism for the development of a discrete salmon stock assessment program.

The sponsor statement for Senate bill 40 states that "far too much of our fishery management is being driven by allocation battles..., instead of by sound science and pertinent information." In our opinion, SB 40 is a perfect example of management of our resources being driven by allocation, not sound science. Currently, the authority to manage and allocate our fishery resources is divided between the Department of Fish and Game and the Alaska Board of Fisheries. The Department is charged with conservation, i.e. the biology and the Board allocates our resources among competing users. This system of checks and balances is one of the strengths of the Alaska management system and has resulted in record salmon returns, generated substantial revenue to our state in the form of commercial fisheries tax and in the form of tens of thousands of jobs in the commercial and charter/guide industries.

Senate bill 40 jeopardizes the division of authority by allowing the Board of Fish to cross into an area under the purview of the Department of Fish and Game. While Board members are knowledgeable about our fisheries, they are not stock assessment biologists. The real danger with this legislation is it would allow the Board to develop the science. The Board could substantiate their allocation decisions with their science. Given this possibility, the state will run the risk of eroding public confidence in the Board process and further polarizing the user groups. The Department of Fish and Game is more than capable of developing stock assessments to assist the Board in making informed decisions, the only real problem is getting the Legislature to fund the request.

Despite our industries contribution to the state's general fund, the legislature continues to cut funding for management of our fisheries resources. Now, we are being asked to pay for development of a new tool, which isn't necessary to manage for sustained yield, biological health or genetic diversity. While we are not opposed to improving our management techniques or gathering new information, we fail to see why we would want to "improve" by using management tools which failed in the Lower 48. SB 40 does not mandate a discrete stock policy, but it does the next best thing and allows the Board to make decisions based on discrete stock assessments. Discrete stock management has never proven a successful method of managing salmon and contributed to the destruction of salmon runs in the Pacific Northwest. In other words, why should we pay for something which could ultimately compromise the health of our stocks and why would we want to repeat the mistakes of the Pacific Northwest ?

In short, allocation battles are sufficiently contentious is some areas of the state without adding the provisions of sb 40 and politicizing our science. We urge you to vote no on Senate bill 40.

Liz Cabrera
PO Box 232
Petersburg AK 99833

Anne Herschleb

Telephone (907) 783-3153
Fax (907) 783-1223

P.O. Box 447
Girdwood, Alaska USA 99587
e-mail: soundodv@customcpu.com

Senate Resources Committee Members
State Capital Building
Juneau, AK

RE: CSSB 40- Public Hearing 4/11/97, 3:30 p.m.

Senators,

I am against CSSB 40 for the following reasons:

- There is no definition of "discrete stock management of salmon," "biological health," "sustained yield," "conflicts," and "importance of stock" included in the bill. If this is to be a viable bill these terms need to be defined in order to avoid subjective judgments by the Board of Fish and ADF&G.

- Commercial fishing already contributes revenues to the state in excess of the cost of expenditures for management. (For documentation please see Fish and Wildlife Revenues and Expenditures of State Government in FY 95, Geron Bruce and Tuula Marquardt, November 5, 1996). Why tax the commercial fishing industry once again to pay for a legislative action that does not benefit the industry?

- This bill is an attempt to micro-manage state fisheries by the legislature and politicizes the Board of Fisheries & ADF&G decision making process.

- This bill is allocative in nature in that the Board of Fish determines discrete stocks in need of assessment, it allows political pressure to drive science.

- There is no scientific method defined or mandated in the bill with which to carry out "discrete stock management."

- "Importance of the stock to fisheries," and user conflicts are listed as priorities used in ranking before biological health of the stock and sustained yield. This signifies the allocative intent of the bill and is mismanagement of the highest degree.

I hope that you will not let this bill pass out of your committee and I thank you for your time and efforts.

Sincerely,

Anne Herschleb

Testimony of
Dale Kelley, Executive Director
Alaska Trollers Association
Before the Alaska Senate Resources Committee
on SB 40
April 11, 1997

Good afternoon Mr. Chairman and members of the committee. My name is Dale Kelley, I'm the executive director of the Alaska Trollers Association (ATA). ATA opposes SB 40, which seeks to establish an industry funded discrete salmon stock assessment program. Our opposition to this bill stems from the following issues:

SB 40 is a bill of dubious intent and definitely appears to be an allocation bill and a funding mechanism dressed up in a cloak of conservation. Such 'cross-dressing' should never be permitted in the world of salmon management and is the very reason the legislature should steer clear of such *initiatives*, so to speak. What does the magnitude of user conflicts have to do with sustained yield and genetic diversity? What "problem" does SB 40 seek to correct?

The sponsor statement speaks more clearly to user conflict than science. If the point is to analyze who is taking what and then fairly apportion the conservation burden, and the sponsor wants fishermen to pay for it, why not just say that? But why ask fishermen to pay when they already contribute so heavily to the general fund? And why ask fishermen to pay who aren't even involved in the dispute?

If ADF&G and the Board of Fisheries are missing critical data, they should identify those needs and request the necessary funding. On this point, we urge the legislature to take a hard look at the state of the ADF&G budget. Over one third of the entire FY97 ADF&G budget relied on federal funds. That's a precarious position for a state with more fish and game than entire regions of this country. The state has an obligation to manage its resources and adequate research is the cornerstone of good management. ADF&G simply must have more money to do their very large job.

SB 40 politicizes the state's salmon stock assessment program, by blurring the line that has so plainly divided authorities between Fish & Game and the Board of Fisheries. The state currently holds ADF&G responsible for conservation and gives the Board of Fisheries authority to allocate harvestable surpluses. Fish and Game said it best themselves in a recent publication: "The clear separation of management authority from allocation authority is one of the strengths of the Alaska management system."

As drafted, ADF&G becomes nearly subservient to the Board of Fisheries, since the Board *shall* identify the stocks in need of analysis *in consultation with the Department.* Hopefully, the agency experts will always be at the helm when identifying and setting research priorities intended to address conservation concerns. Through the years I've been privileged to work with some of the finest stock assessment biologists on the coast, most of whom work for ADF&G. As a former member of the Northern Panel and a Commissioner on the Pacific States Marine Fisheries Commission, I'm familiar with key fisheries professionals in the Pacific Northwest. Alaska can be proud of its talented research and management staff, as there are none better on the west coast. The health of our resource and fisheries are a testament to that fact. Surely they are capable of identifying research priorities. Which begs the question, what problem does SB 40 seek to correct?

SB 40 provides an increased opportunity for public comment about stock selections, but the purpose of this provision isn't clear – unless it's about the criteria in Section 2 about "*conflict among users*". While ATA strongly supports the public process, research programs built around user conflict seem destined to be driven by political whim instead of good science.

This isn't to say the Board of Fisheries or constituents shouldn't have input into fisheries research. If the Board lacks sufficient data to make sound decisions, it's perfectly reasonable to make recommendations to the Department and work to secure the necessary funding.

SB 40 calls for a series of long term, costly research programs, many of which aren't necessary to secure sustained yield. To establish meaningful escapement goals will mean the development of many years of data, which varies greatly by species. A spawner/recruit analysis will require a *minimum* of 16 years escapement data for chinook, and 12 years for pink salmon; 10 years of harvest data; and, 10-13 years of age composition estimates for all but pink salmon. River size and quality of available spawning and rearing habitat are also important factors to assess.

To estimate who's catching what/where, will require an exploitation rate analysis complete with years of extensive in-stream tagging, followed by even more years of tag recovery and analysis.

Similar catch and escapement programs in Southeast, even where some data existed and programs where in place, have cost from $150,000 to well over a quarter of a million dollars a year.

If core data is currently lacking, it could be years before enough data is gathered to be useful for policy makers. Ironically, if "user conflict" is a criteria for selecting stock analysis programs, some of these unhappy fishermen may retire before the answers are in hand. For instance, although the Columbia River drainage has been studied since the mid-1800s, when the Pacific Salmon Treaty was signed in 1985, only 4 stocks formed the basis of the chinook model due to the lack of good data.

More information is always good, but isn't always necessary to manage for sustained yield or genetic diversity. Given there are 15,000 salmon streams in Alaska, it's unlikely we'll ever know it all. ADF&G utilizes information from key indicator stocks and area biologists manage intensively in-season. Our biologists are on the ground, in the air and on their computers monitoring fisheries activity and analyzing data. Fisheries are opened and closed on a daily basis, to ensure the continued health of salmon. Alaska's program is more rigorous than any on the west coast and overall ADF&G is meeting the sustained yield mandate. So, what problem does SB 40 seek to correct?

SB 40's emphasis on discrete stocks is contrary to the state's management program and positions in federal arenas. The sponsor tabled a similar bill last session in an attempt to manage for discrete stocks, ostensibly to protect sustained yield and genetic diversity. While this bill doesn't specify a change in management philosophy, it's definitely walking down the path of weak stock management -- the very form of management that has helped to annihilate fish stocks, fisheries and communities in the Pacific Northwest.

Abundance based management is working in Alaska, as exhibited by vibrant production in most rivers statewide. The current Board of Fisheries process and emergency order authority vested in ADF&G provides maximum flexibility to manage stocks. This includes the option of conducting more selective fisheries when appropriate. However, one prescription definitely does not fit all in salmon management.

Weak stock management is contrary to Alaska's positions in key national and international forums, like the Pacific Salmon Treaty and the Endangered Species Act. Under the ESA, Alaska fishermen have lost fishing time and over 56,000 salmon since 1993, to save a handful of Snake River fall chinook. This is weak stock management at its finest!

SB 40 is punitive when added to the taxes and fees already paid by the commercial salmon industry. Deckhands will have to pay nearly as much as permit holders in some fisheries. To add insult to injury, this bill mandates sport and commercial fishermen foot the bill for stock analysis regardless of whether they harvest the stock in question.

Commercial fishing pays it's way, far beyond that of most state industries. The commercial fishing industry is made up of thousands of small family businesses, which are being placed at risk by the same elected officials that talk about jobs and families. Despite the seafood industry's substantial general fund contributions, some legislators continue to ask for more while reducing services. 'User pay' has been amped up to 'user pay more'. When will it end?

Oh, and what is the problem SB 40 seeks to correct?

ATA urges you to vote no on SB 40. Thank You.

Testimony before the
Senate Resources Committee
on SB 40
By Ron Rainey
Member of the Board of Directors
Kenai River Sportfishing Association
April 11, 1997

The Board of Directors of the Kenai River Sportfishing Association support the concept that the Alaska Board of Fisheries and Department of Fish & Game will gather needed information to more scientifically manage discrete salmon stocks.

We also support a funding mechanism for such a program through a surcharge on sport and commercial crewmembers licenses and commercial entry permits. We are not sure in the Commercial Fish Division, but paying for stock identification work is not new or unusual for the Sport Fish Division. Currently, they have at least $1-$3 million in sock ID programs in the field. I'm sure Sport Fish Director Kevin Delaney, who I believe is in the Anchorage LIO, can explain specifically what they are doing and how much the division is spending for this type of information if anyone is interested.

We would stress funding must be shared equally between commercial and sport users. Placing the entire or even the majority of the financial burden on the sport angler would be improper and, in some cases, illegal.

An important aspect of this assessment concept is that it involves the Alaska Board of Fisheries. They would be required to annually identify salmon stocks for which discrete stock assessment is needed. What better board to do this than the one set in statute to address fisheries issues. We have also heard from many legislators for many years to keep fisheries issues under the Board of Fisheries purview. We agree. This concept would support those beliefs.

The Board would also be required to prioritize the projects with the assistance of the Department and involving the public. This should allay any fears that this assessment will circumvent the public process.

It would also require the Department to submit a prioritized list of projects to the Governor to be included as a separate item in the Governor's operating budget for the following fiscal year. This could provide for more credibility in the legislative budget process.

And this concept would elevate discrete stock salmon assessment by establishing such a section in the Fish and Game statutes.

We believe such assessments will create new information which will lead to a more scientific management paradigm. That, in turn, should provide for healthier more sustainability salmon populations. It is a concept supported in the National Research Council's publication Upstream Salmon and Society in the Pacific Northwest. It is a concept that we hope you support.

Such a model will benefit commercial and sport users and, more importantly, will help preserve diverse salmon populations for generations to come.

Alaska State Legislature

Please enter into the record my testimony to the Senate Resources committee name

committee on SB 40 bill/subject, dated April 11, 1997.

Discrete Stock Management is not clearly defined, it is not the Business of Rick Halford to Manage Wild Stock Salmon through some Vague Bill, it Sounds like a power grab, a means to Collect more revenue, unfair revenue, I might add, from fishers to mis manage their fisheries without representation; there isn't anything good about it, therefore fifty times over No, no, no and Hell no!

Signed: Gracie D. Kendall
Testifier

Representing (Optional)

P.O. Box 2523 Soldotna, AK. 99669
Address

Phone No.

Public Opinion Message

Anchorage Legislative Information Office (LIO)
• 716 W 4th Avenue, Suite 200, Anchorage, AK 99501 • Phone: 258-8111 Fax: 258-1251

This form MUST be completely filled out. You may phone, fax, or deliver your POM to any LIO.

From Please PRINT the information below.

Mr., Mrs., ...	First name	MI	Last name	Jr., Sr., II, ...
	LAUREN	E	MOSS	

Mailing address	Zip code
P.O. BOX 869 GIRDWOOD AK	99587
Residence (street) address if different from mailing address: SAME	Zip code

Daytime telephone number	Group affiliation (if applicable)	Signature	Date
783-1312			4-11-97

To: Put a √ in the appropriate box(es).

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		Finance (fin)
		Health, Ed., & Social Services (hss)
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X	Sharp (sha)
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X	Torgerson (tor)
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Subject: Fill out the boxes below OR enter a Subject.

HB or SB	Bill number
CSSB40	40

and check one: → X Support / Oppose / Amend

OR enter a general Subject (LIO staff may modify):

Message: Your PRINTED message cannot exceed 50 words or contain any vulgar language.

CSSB 40	IS	A	POLITICALLY	LOADED
SUBSTITUTE	FOR	GOOD	SCIENCE.	THIS
BOF	SHOULD	NOT	HAVE	D.S.M.
DECISION	POWER.	THIS	COULD	BE
ALLOCATNE	IN	NATURE.	ADFG	ALREADY
HAS	STATEWIDE	SALMON	MANAGEMENT	IN
PLACE	AND	THE	LEGISLATURE	SHOULD
NOT	MIXROMANAGE	A	SUCCESFUL	PROGRAM
WHICH	IS	ALREADY	FULLY	FUNDED
BY	COMMERCIAL	FISHING	[illegible] THANK YOU	[illegible]

WILLIAM & NANCY PACE
HC 31, Box 5079P
Wasilla, Alaska 99654
(907) 376-2286

April 21, 1997

Re: SB 40

Dear Members of the legislative committee:

Once again, like the annual returning of salmon, commercial fisherman must once again rally to defend and justify our existence. Yet we are the largest employer in the State of Alaska and the second largest revenue generator in the State.

In preparing my statement to SB 40, I realized that over the years and numerous attempts to undercut commercial fisherman's ability to make a living, it is not the Alaska resident sport fisherman who introduces the bills. The bills are sponsored by guides and lodge owners and other parties that have a financial interest in the passage of bills that restrict commercial fisherman. It is the same parties that testify at the hearings, not Alaska sport fisherman. For and example, at the last hearing held in the Mat-Su on SB 40, not one Alaska sport fisherman appeared to testify. Yet, Guides and Lodge Owners Testified. So is it any surprise that SB 40 was introduced by Senator Halford, a registered fishing guide.

SB 40 is nothing more that another FISH initiative disguised as a scientific approach to save all the fish, in all the rivers. all the time. However, by restricting commercial fisherman to put more salmon in the rivers, it gives guides and lodge owners more fish for their paying clients. SB 40 is vague and ambiguous and probable not enforceable if challenged in a court of law. It has no defined purposed or direction on how to accomplish the unstated goal of SB 40. Discrete stock does not even have a definition, yet the Department of Fish and Game is to carry out the unstated purpose of SB 40, without knowing what they are to accomplish.

In addition, the Department of Fish and Game will be answering to two masters. One being the legislatures, which is the proper body to fund the Department of fish and Game. the second being the Board of Fisheries, which is a politically driven body. By controlling funding for assessment of discrete stock, Department of will be required to dance to any tune the Board of Fisheries dictates, whether it is good for the overall salmon population or not.

If SB 40 is passed, I would like to see the cost of the program shift from commercial fisherman, who are paying their way, to the parties who will benefit directly from its passage, guides and lodge owners, who are paying little or nothing. After all, guides and lodge owners are commercial entities. The one big difference is that they get paid whether they catch fish or not.

Alaska State Legislature

Please enter into the record my testimony to the Senate Natural Resources
committee name

committee on ~~SB 40~~ CSSB 40 (RES), dated 4/11/97.
bill/subject

The problem with this bill is that it will further divide the BOF and the commercial and sport user groups. If SB 40 passes, user groups will be vying for research on pet projects as well as additional allocation of stocks. I realize that BOF tries to be impartial, but it is still a political body driven by the agendas of the various groups it represents.

Regarding the funding issue; if the research is so valuable, why can't the legislature fund it from the general fund which already has a most generous contribution from the commercial fishing industry.

With the research projects determined by BOF we are again allowing science to be controlled politically and thereby dictating the scientific data.

The days of testimony involved in ~~proposal~~ BOF meetings ~~for~~ will be multiplied exponentially if the bill becomes law. It will promote added confusion, misunderstanding and lack of trust between user groups.

Signed: Bill Pace
Testifier

F/V Evergreen Express
Representing (Optional)

Hc 31 Box 5079-P Wasilla AK 99654
Address

(907) 376-2226
Phone No.

Alaska State Legislature

Please enter into the record my testimony to the Senate Natural Resources committee name

committee on CSSB 40 (RES) bill/subject, dated 4-11-97.

I want to register my OPPOSITION to SB40/CSSB 40(RES) as still another attempt by legislators to micro-manage fisheries issues.

There is adequate money going to the gen'l. fund from commil. fishing taxes/assessments to pay for any research deemed necessary by ADFG. Let ADFG prioritize the research projects needed to support their already successful management of Alaska's wild runs. Let the legislature fund the budget requests of ADFG for this research and management effort. Let ADFG manage.

Commercial fishing has had numerous tax and fee increases in the past few years. More surcharges/taxes/fees or whatever you want to call them will unduly burden the already struggling comm'l. fishers of this state.

We have ADFG - give them the funds and the opportunity to do the job they were created to do. They were created to manage fish and game - that includes research, setting seasons, setting bag limits, establishing harvestable surpluses, setting escapement goals and managing harvest efforts to meet those goals. They need our support and the legislature's funding to do these jobs. They don't need more interference by non-professionals.

Signed: Nancy J. Power
Testifier

F/V EVERGREEN EXPRESS
Representing (Optional)

HC 31 Box 5079-P WASILLA AK 99654
Address

(907) 376-2286
Phone No.

Roys

April 22, 1997

Senator Rick Halford
Chairman, Senate Resource Committee
State Capitol
Juneau, AK 99801-1182

Dear Senator Halford,

Thank you for your efforts to emphasize Alaska's constitutional mandate for sustained yield. Alaskans should unanimously agree with your position that it is our responsibility to pass along a healthy and diverse resource to future generations. CSSB 40 (RES) has evolved to help focus the crucial need to gather information on stocks which present both biological and user complexities, and for which little information is available to aid the Board of Fisheries and fishery managers in their decisions. Decisions based on good information will help Alaska achieve its constitutional mandate and provide for a rich and diverse resource for our children.

The Copper River sockeye and chinook fisheries are very real examples for which CSSB 40 can provide direction. A great deal of ADFG and Board of Fisheries time and resources have been devoted to Copper River stock and user conflict issues. Not only has the Copper River sustained a significant gillnet fishery for almost 100 years, but the growing participation of personal use dip net fishermen, subsistence users and sport fishermen has focused the need for careful fishery management and re-allocations as the fisheries expand. The most unfortunate aspect of this situation is that so little is currently known of the up river stocks. This was clearly evidenced at the 1997 Board of Fisheries meeting held in Cordova. In addition, with increased harvest pressure up river during the early wild stock sockeye return, stocks may suffer while hatchery produced sockeye entering the system later in the season may not be subject to the same harvest pressure yet provide a more ample and less critical harvestable component. Conversely managing for the Copper River delta sockeye stocks presents managers with complexities due to run timing similarity with that of the up river hatchery stocks. It was also pointed out at the Board of Fisheries that delta stock escapement has recently suffered.

To help address these issues Prince William Sound Aquaculture Corporation recently put forward (March, 1997) a proposal to otolith mark Gulkana Hatchery sockeye salmon. The fish enter the Copper River system after over-wintering in several lakes in the Copper Basin area after release from the Gulkana Hatchery. Almost 30 million sockeye fry are released into these lake systems. The program began in 1974 and has been quite successful. In 1996 it is estimated the program contributed more than $3.58 million dollars to the commercial fishery and more than 28,000 sockeye valued at $300,000 to the personal use, subsistence and sport fisheries. With better baseline and inseason information we believe the upriver contribution can be significantly increased and lessen the harvest rate on wild stocks. We believe that through information gained by the otolith mark and recovery program, ADFG and the Board of Fisheries will have substantial new insights to manage the Copper River fisheries while addressing the complex mixed stock issues and fulfilling user needs as they increase and shift.

With passage of CSSB 40(RES) Alaska will be given a significant opportunity to gain information, to develop a better understanding of our salmon stocks, and to fulfill both sustained yield and conservation of our wild stocks. We can help in this effort and therefore ask you to consider our proposal for funding

the otolith marking program for Gulkana Hatchery sockeye salmon under authorization of the proposed statute to assess discrete salmon stocks.

Sincerely,

Bob Roys
CEO

cc: Senate Resource Committee
House Resource Committee
Senate Finance Committee
House Finance Committee
Senator Georgianna Lincoln
Representative Gene Kubina
Governor Tony Knowles
Members, Alaska Board of Fisheries
Advisory Committees: Cordova, Glennallen, Fairbanks
Frank Rue, Commissioner, ADFG
Bob Clasby, Director, CFMDD, ADFG
Kevin Delaney, Director, Sport Fish Division, ADFG
John Hilsinger, CFMDD Area Supervisor Central Region, ADFG

(hf)

Prince William Sound Aquaculture Corporation

Proposal to Otolith Mark Gulkana Hatchery Sockeye Salmon

March 1997

Contents

Proposal:

Prince William Sound Aquaculture Corporation (PWSAC) seeks funding to purchase, install and operate a thermal marking system to identify sockeye salmon produced by the Gulkana Hatchery. To achieve full scale marking, a three phase ramp-up program will be carried out. Thermally induced otolith marks will be first applied to pre-hatch alevins beginning in the Fall of 1997 at a feasibility scale. Full scale marking will take place in 1999. Assessment of thermally marked fish will contribute significantly in the future to more accurate identification of hatchery stock contributions and migration routes in the mixed stock Copper River fisheries. Such information will give resource managers an edge in managing for both conservation of wild stocks under the maximum sustained yield principle, and maximum utilization of hatchery produced fish. **The three year project will cost $427,214**. Thereafter annual operating costs ($69,000 year 2000 and beyond) and annual otolith recovery and analysis ($62,500 year 2003 and beyond) will be incorporated into PWSAC's annual budget.

Significance:

The 1996 enhanced sockeye salmon return to the Copper River was worth over $3.58 million to commercial fishermen, and an additional 28,000 sockeye salmon (valued at $300,000 using commercial fisheries prices) were caught in the personal use, subsistence and sport fisheries. Hatchery contribution to the resource users of the region is significant. However, to manage the complexity of the mixed stock fishery to maintain wild stock escapement for sustained yield and to maximize harvest of hatchery salmon, a comprehensive mark and recovery program is vital. Current hatchery operations, coded wire tagging and adult enumeration studies are paid for by PWSAC through a 2% assessment paid by Copper River commercial fishermen on the value of their catch. Other user groups contribute nothing to the enhancement program.

Background:

The Gulkana Hatchery is located on the Gulkana River, a head water tributary of the Copper River. The first Gulkana facility was built in 1973 and operated by the Alaska Department of Fish and Game until 1992 when the program was transferred to PWSAC; complete operational takeover occurred in 1993. The Gulkana program is actually comprised of two facilities (GH I and II). Gulkana I is permitted to take

35.5 million sockeye eggs. Gulkana II is permitted to take 2.5 million sockeye eggs. It is estimated the Gulkana Hatchery annually contributes approximately 250,000 sockeye to the Copper River. Adults are harvested primarily by the commercial fleet, but Chitina personal use dipnetters, subsistence fish wheel operators and sports fishermen also harvest large numbers. Unharvested fish return to the hatchery site and lakes where released as fry. Brood stock are taken at the hatchery site. Although many adults go unharvested, they cannot be exploited more intensively in the delta and river fisheries without accurate and timely assessment information. To do so could jeopardize wild stock escapement.

Adult Gulkana Hatchery sockeye return with large components of upper Copper River and Copper River Delta wild stocks. As a result, management of the fishery is complex and resource managers are challenged to achieve wild stock escapement goals, particularly in the delta. As Gulkana Hatchery returns increased, harvest strategies and harvest pressure increased during mid and late stages of the season to target returning hatchery fish. This pressure particularly coincides with delta stock migration. A review of historic Copper River sockeye commercial harvests (**Figure 1**) clearly indicates a shifting cumulative harvest as the season progresses. It is also notable that delta stock spawning escapement has not been achieved in recent years coinciding with hatchery increases. As a result of this concern the Board of Fisheries (12/96) mandated delta escapement goals be met.

Recognizing potential complexities with wild stock management, in 1990 ADF&G published the "Gulkana Hatchery Policy Paper" (RIR No. 2C90-06). Expressing concerns for large and overlapping hatchery contributions to Copper River wild stock sockeye production, the Department articulated the policy that "hatchery production at the current level or at an increased level must occur in conjunction with evaluation programs that ensure maintenance of wild stock escapements."

Copper River management tools include escapement goals for up river and delta stocks, a sonar enumeration program on the Copper River at Miles Lake, delta stock escapement aerial estimates, commercial harvest enumeration and forecast methods. Additionally, hatchery fry and smolt survival studies have been conducted as have coded wire tag (CWT) recovery programs to assess hatchery stock adult survival and estimations of hatchery contributions to overall Copper River production. Annual adjustments to the hatchery component contributed to total Copper River production is required to avoid over exploitation of wild stocks. The adjustment factor is based on projected hatchery return. However, should the forecast not be accurate, potential exists for increases in over exploitation. As hatchery fry production and adult returns increased (**Table 1**), the fishery became more complex and increased potential for both assumption error and over exploitation. Although stocks have been coded wire tagged, validity of CWT programs has been questioned. Differential mortality between tagged and untagged fish can result in statistical expansion errors; CWT tag shedding rate is unknown; adult fish often occur with naturally missing adipose fins (adipose fins are clipped by hatchery staff to visually mark CWT fish); 10 million fry released into Paxson Lake do not get represented by tagged lots, all of which can result in erroneous assumptions and inaccurate assessments.

Due to numerous weaknesses with coded wire tagging and resultant analyses, thermal marking otolith programs have gained significant support. Results of multi year otolith mark, recovery and analysis programs in Southeast Alaska and more recent but preliminary otolith marking in Prince William Sound underscore the significance of the technology and procedures. ADF&G supports implementation of otolith marking programs and is preparing to establish an otolith analysis lab at its Cordova field office to manage the otolith program in PWS. With financial support of the *Exxon Valdez Oil Spill* Trustee Council, ADF&G and local PNP hatchery programs, all hatchery produced pink salmon were successfully and differentially marked beginning 1995. Otolith recovery and inseason analysis beginning 1997 will provide resource managers a new, highly accurate and very rapid tool to discriminate hatchery

contribution in the mixed stock pink salmon fisheries.

An otolith program appears to be the most effective tool currently available to mark and recover sockeye in the Copper River in order to provide managers the tools necessary to manage the resource. Advantages of such a program include:

all hatchery fish can be marked (Gulkana I site);
thermal marking is the most cost effective, least risky and environmentally sound method to mark hatchery incubated fish;
sampling costs will decline because all returning hatchery fish are marked;
no assumptions regarding marked to unmarked ratios will be required for in season or post season estimations;
differential marks can readily be applied to fish released at different locations;
more comprehensive, accurate and timely assessments can be made;
accurate and timely stock assessment provides resource managers with information to adjust strategies to assure wild stock escapement and maximum utilization of the hatchery resource.

Objectives:

Construct and evaluate small scale prototype gravity feed thermal marking program based on naturally occurring temperature differentials and heat exchange principles.

Construct and implement production scale marking program at Gulkana I site. Gulkana II fry, approximately 8% of total hatchery production, will not be marked.

Provide accurate and timely assessment tool to help resource managers identify in season the hatchery component of the mixed stock Copper River sockeye. This information will enable managers to achieve maximum exploitation of hatchery stocks while meeting escapement goals for wild stocks under the sustained yield principle mandated in the Alaska Constitution and articulated in the Department of Fish and Game escapement goal policy.

Project Phases:

Phase 1. Following prototype designs from National Marine Fisheries Service and Northern Southeast Regional Aquaculture Association, equipment will be acquired, assembled, installed and tested at the Gulkana Hatchery site for operation during the desired mid-winter (1997-98) marking time frame. Otolith marks will be applied to a small sample lot (one or two incubators). Evaluation of otolith marks, operational and climate issues, plus suitability and requirements for full scale marking program will be undertaken. Wild stock sampling and otolith analysis will provide background information to both define an identifiable hatchery mark and differentiate hatchery marked fry from wild stock fry. **Cost: $26, 685**

CWT marking will continue through year 2001and overlap otolith applications. CWT recovery will continue through year 2003, the first year when the entire return of adult Gulkana Hatchery I sockeye will be otolith marked.

Phase 2. Dependent to a large degree on Phase 1 results, the second phase will expand marking and evaluation of equipment under severe conditions of interior Alaska. Currently, thermal marking equipment is deployed in moderate climate coastal locations. Significant alterations to provide protection against the environment may be necessary. It is anticipated that during Phase 2, only the

on-site release group (approximately 40% of the fry) would be marked. Marking of all Gulkana I fry will require installation of short term holding capacity for approximately 15 million fry. This equipment has not yet been installed or tested. Phase 1 testing should provide answers to most, if not all of the issues anticipated for operation of Phase 2. To the extent possible, cooling will be used for marking using water source temperature differentials. Using cooled water will dramatically reduce the recurring cost of marking by eliminating nearly half the fossil fuel needed if only heating is used for marking. **Cost: $273,960**

Phase 3. Phase 3 will be the first full facility marking effort and as such will represen the "operational level" of marking for Gulkana. Three distinct groups of fry will be marked with differential marks to allow identification when they are recovered in the commercial fishery or other recovery sites. Essential to Phase 3 is installation of short term holding capacity for 15 million fry. Without a short term holding facility, Phase 3 cannot occur. **Cost: $70,845**

Phase 4. Adult sockeye otolith recovery will begin May 15 each season or at a later date if evidence supports sampling schedule changes. Samples will be taken in various fisheries and at various locations according to sampling protocol. ADF&G field technicians will be assigned to sample adults, analyze otolith marks and report on hatchery contributions to the mixed stock fishery.

Methods:

Phase 1: Develop small scale prototype to evaluate assumptions.

Run one or two incubators (15 gpm each).
Acquire baseline data for temperatures, flow requirements, mark quality and other parameters.
Evaluate need for degassing supply water.
Determine feasibility of gravity flow system (if not entirely gravity flow, what degree can gravity flow be achieved).
Determine feasibility of using cooling rather than heating to generate mark.
Evaluate using river water (32.5 degrees F) to cool hatchery water (37.5 degrees F) to approximately 34 degrees F using heat exchanger.
Compare estimated costs for cooling some or all of the required flow to estimated heating costs and or combined system costs to achieve marking goal.
Develop associated plumbing controls for system.
Collect (March '98) and evaluate fry otoliths from wild stock systems in the Copper River and Copper River delta area including Eyak Lake, Clear Creek, Summit Lake, McKinley Lake and Bering River stock.

Phase 2: Heat or cool 40% of entire facility, mark all releases to Paxson Lake, can occur in cycles with 20% per alternating cycle.

All on site (Paxson Lake) releases marked; remote releases marked with CWT's as done currently.
Production design equipment (full scale) to heat/cool 800 gpm or half of mark group each cycle with 400 gpm.
Assume continuous on site personnel requirement.
Requires alarm system for both flow and temperature variations.
Requires recording thermograph to document temperature cycles for evaluation of otolith marks.

Phase 3: Expand capacity to mark entire facility using mark cycles to reduce cooling and/or

heating costs and logistics. Full production marking.
Minimum requirement approximately 35-40% of facility capacity marked in a cycle.
All Phase 2 requirements continue to Phase 3.

Phase 4: Mark recovery; recovery by fishery.
Recovery mandatory in commercial fishery and personal use dipnet fishery plus hatchery and remote release sites.
Recovery in subsistence and sport (rod and reel) fisheries desired but not critical.
Recovered otoliths analyzed in area ADF&G otolith lab (Cordova).

Technical support:

Alaska Department of Fish and Game will provide technical support through its fishery management division and the state's otolith lab.

Budget **Phase 1-3 Development and Marking** (see attached budget detail: Table 2)

100	Personnel	$37,000	
200	Travel	2,170	
300	Contractual	154,000	
400	Commodities	86,220	
500	Equipment	92,100	
	Subtotal	**$371,490**	
	Admin (15%)	55,724	
	Total	**$427,214**	**Grant request**

Budget **Phase 4 Recovery and Analysis** (see attached budget detail: Table 2)

100	Personnel	$57,400	
200	Travel	0	
300	Contractual	1,100	
400	Commodities	4,000	
500	Equipment	0	
	Total	**$62,500**	**PWSAC annual operating cost**

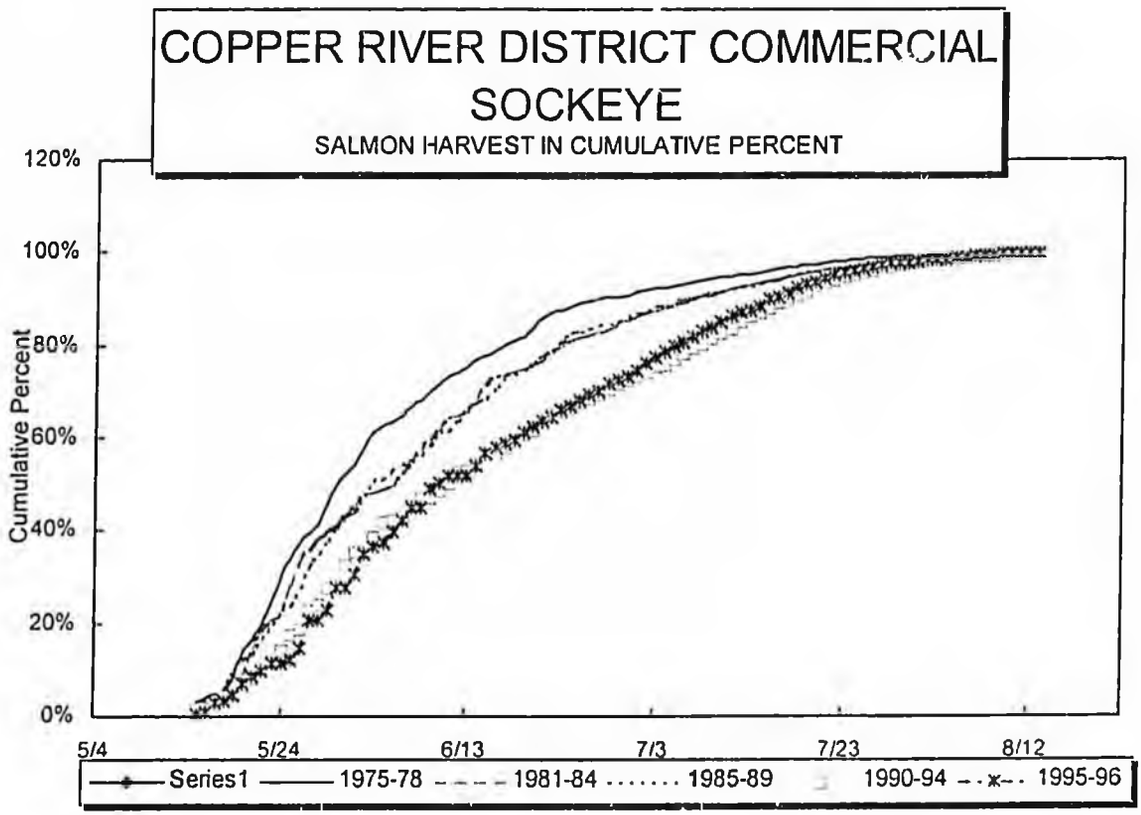
COPPER RIVER DISTRICT COMMERCIAL SOCKEYE
SALMON HARVEST IN CUMULATIVE PERCENT
120%
100%
80%
60%
40%
20%
0%
Cumulative Percent
5/4
5/24
6/13
7/3
7/23
8/12
Series1
1975-78
1981-84
1985-89
1990-94
1995-96

Table 1

Number of sockeye salmon fry released at the Gulkana Hatchery (Paxson Lake) and remote releases at Summit and Crosswind lakes, 1974-1996.

Release year	Number released			
	Gulkana (I&II) (Paxson Lake)	Summit Lake	Crosswind Lake	Total
1974	79,691			79,691
1975	785,110			785,110
1976	627,080			627,080
1977	514,922			514,922
1978	477,219			477,219
1979	940,974			940,974
1980	1,105,397			1,105,397
1981	3,368,642	1,340,660		4,709,302
1982	5,985,270	1,860,491		7,845,761
1983	5,470,056	2,047,947		7,518,003
1984	6,162,450	4,312,628		10,475,078
1985	9,261,785	4,741,759		14,003,544
1986	8,586,509	8,451,782	1,287,042	18,325,333
1987	9,905,907	14,999,085		24,904,992
1988	6,204,332	12,491,926	2,487,396	21,183,654
1989	10,105,238	12,026,642	3,130,373	25,262,253
1990	13,288,695	12,004,491	4,906,005	30,199,191
1991	10,522,819	6,455,011	5,469,759	22,447,589
1992	10,553,621	7,048,536	5,420,351	23,022,508
1993	5,295,017	2,651,542	4,495,966	12,442,525
1994	9,405,449	7,637,009	9,144,382	26,186,840
1995	10,317,116	7,418,311	9,973,600	27,709,027
1996	12,241,896	8,400,148	9,732,911	30,374,955
Total	141,205,195	113,887,968	56,047,785	311,140,948

April 24, 1997

Senator Rick Halford
Chairman, Senate Resource Committee
State Capitol
Juneau, AK 99801-1182

Dear Senator Halford,

It seems there is some misunderstanding and confusion regarding my April 22 letter and Copper River sockeye otolith marking proposal addressed to you. Clearly the letter spoke to CSSB 40(RES), the discreet stock assessment bill. **HOWEVER, the letter did in no manner suggest that PWSAC supports the proposed bill.** Rather, the letter spoke to the constitutional mandate for sustained yield, the need for information gathering, developing understanding of our salmon stocks, passing along a healthy and diverse resource to future generations, and needed stock research on the Copper River.

I have a very real impression that my message has been misinterpreted. To clarify my position to you, the legislative and administrative offices contacted, and general public who have had the opportunity to review my April 22 letter, let it be very clear that:

PWSAC did not "state" support for the bill.
PWSAC will not comment on the funding sources prescribed in the bill.

Further, PWSAC did not comment on other specifics of the bill which may be contentious including:

The relationship of the Governor, Legislature, Board of Fisheries and Department of Fish and Game in prioritizing projects.
"Discreet stock" terminology which has no commonly accepted definition and may be determined by regulation after serious review by experts.

Whether the bill positions the Board of Fisheries to exceed its authority and administratively infringe on the Department of Fish and Game's authority and responsibilities.

PWSAC has a mandate to produce fish for all users. Therefore nothing in this or the previous letter can be construed as allocative.

The sole reason for writing the April 22 letter was to request that you consider the importance of Copper River salmon resources, and consider funding our stock marking proposal should funding for such stock investigations become available.

Sincerely,

Bob Roys

Robert S. Roys
CEO

cc: Senate Resource Committee
House Resource Committee
Senate Finance Committee
House Finance Committee
Senator Georgianna Lincoln
Representative Gene Kubina
Governor Tony Knowles
Members, Alaska Board of Fisheries
Advisory Committees: Cordova, Glennallen, Fairbanks
Frank Rue, Commissioner, ADFG
Bob Clasby, Director, CFMDD, ADFG
Kevin Delaney, Director, Sport Fish Division, ADFG
John Hilsinger, CFMDD Area Supervisor Central Region, ADFG

(hf)

Alaska State Legislature

Please enter into the record my testimony to the Senate Resources committee name

committee on HB 40 bill/subject, dated 4/11/97.

after listening to the many testimonies presented today, I find that my opposition to the bill is very adequately stated by Misters Carl Christianson Wallon, and Bates. Teleconference input by me would be redundant, therefore, so I would like to go on record opposing SB 40. Let the ADF+G continue the good job they are doing without interference, and don't let another play at unfair allocation and scapegoating succeed. Thank you

Signed: James Tutt
Testifier

Representing (Optional)

Box 878810, Wasilla, Ak. 99687
Address

(907) 892-8167
Phone No.

UCIDA
UNITED COOK INLET DRIFT ASSOCIATION
P.O. Box 389 • Kenai, Alaska 99611 - 0389
(907) 283-3600 • FAX (907) 283-3306 e-mail: ucida@kenai.net

April 23, 1997
Sent via fax

To: Senator Rick Halford
Chair, Senate Resources Committee
State Capitol
Room 121
Juneau, AK 99801-1182

Subject: UCIDA opposition to CSSB 40 (RES)

Dear Senator Halford,

United Cook Inlet Drift Association (UCIDA) represents the 585 salmon drift permit holders in Upper Cook Inlet. Some 350 permit holders are current members of our association. UCIDA is also active at the state and federal levels as a member of the Executive Committee of United Fisherman of Alaska (UFA).

UCIDA would like to express it unequivocal opposition to CSSB 40 (RES) for the following reasons:

1) Contrary to the sponsor's statement, this version is **NOT** a great deal different than the original bill which mandated that the Board of Fisheries adopt discrete stock management.

   - Sec 2 (b) mandates development of new discrete stock escapement objectives and forecasts. This is nothing more than the intent of the original version - escapements objectives **REQUIRE** management.

2) CSSB 40 (RES) is **NOT** an attempt to assure necessary stock assessments to provide for healthy stocks. CSSB 40 is special interest legislation designed to use "science" to create a de facto sport priority.

3) CSSB 40 undermines the current public process for the resolution of allocative conflicts.

   - Under the current process, the public and F&G Advisory Committees (A/C's) interact with the BOF and ADF&G to establish the "importance of stocks," "magnitude of conflicts," "biological health" and appropriate levels of "sustained yield" to create viable and stable sport and commercial fisheries.

   - Under this bill the public and A/C's **DO NOT** help identify stocks for which discrete stock assessments are needed.

- Under this bill the public and A/C's can comment only "after the fact" when stocks and projects have already been identified.

4) CSSB 40 politicizes the ADF&G budget process.

5) CSSB 40 politicizes ADF&G decision making by allowing the Governor's office to submit the project list to the Legislature.

6) Last, but not least, CSSB 40 politicizes the current process by allowing the legislature to enter **ANNUALLY** into the allocative "project process".

- Politics and the allocative desires of individual legislators will be the **RULE**, not the exception.

- Regions of the state with the greatest political clout "du jour" will prevail in the annual battle of ADF&G's "allocation projects".

In conclusion, UCIDA would like to note that the underfunding of the comfish budget by the legislature is not an adequate reason to support tax and spend special interest legislation.

We appreciate this opportunity to comment and request that you share our comments with the rest of your committee members.

Sincerely,

Philip Squires

Philip Squires
President
UNITED COOK INLET DRIFT ASSOCIATION

/PS:kmt

cc: Senator John Torgerson
Senator Jerry Ward
Representative Gary Davis
Representative Mark Hodgins
Representative Gail Phillips, House Speaker
Commissioner Frank Rue, ADF&G
UNITED FISHERMEN OF ALASKA

UNITED FISHERMEN OF ALASKA

211 Fourth Street, Suite 112
Juneau, Alaska 99801
907/586-2820
Fax: 907/463-2545

Points of Objection
Committee Substitute for Senate Bill 40
(CSSB40)

* Removing the mandate for discrete stock management does not improve this bill. In effect, the legislation still directs the board and department toward discrete stock management. If this research is so important why isn't stock assessment research part of the department budget? Clearly, this bill is a fish allocation bill under another name.

* We do support science and research on critical stocks of concern. However, the Board of Fish is subject to intense political pressure where highly charged allocation issues are often cloaked as conservation concerns. Having the Board of Fish identify discrete stocks in need of assesament allows politics to drive science. We do not support politically driven science .

* Commercial Fishing already pays it's way, providing revenues for the state while generating millions in revenue sharing for coastal communities. For FY 96 commercial fishing revenues ot the state of Alaska exceeded expenditures for fish management by $9 million. The Marine Fuel Tax was increased last year. In 1995 vessel fees were increased, and before that there was the 1% marketing tax for seafood. The legislature's decision to cut the ADF&G budget is not a justification for SB 40. Why penalize an industry that pays it's way? It is unfair to tax the fishing industry again and again and again.

* This research would be prioritized by the Board of Fisheries - a budget supplement controlled by the Board of Fisheries. This amounts to a serious, and radical, disruption of the public budget process.

* Apparently, resident sport fishing licensees would not share in the cost of the studies in CSSB40 if SB 7, which is now in the House, passes into law. If so, all the costs would be forced onto the fishing industry alone.

* What is a discrete stock of salmon? This term is undefined. Because of the varied interpretations in the scientific community, the Board of Fisheries and the ADF&G are currently working on defining this term.

CSSB 40 - Tax and Spend on Special Interest Science

CONTACT YOUR LIO - GET ON THE TELECONFERENCE

FRIDAY APRIL 11, 3:30 p.m. - SENATE RESOURCES

CALL LEGISLATORS - SEND IN P.O.M's

Member Organizations
Alaska Longline Fishermen's Association • Alaska Trollers Association • Bristol Bay Driftnetters Association • Concerned Area "M" Fishermen • Cook Inlet Aquaculture Association
Cordova District Fishermen United • Kenai Peninsula Fishermen's Association • Kodiak Regional Aquaculture Association • Kodiak Seiners Association • North Pacific Fisheries Association
Northern Southeast Regional Aquaculture Association • Northwest Setnetters Association • Peninsula Marketing Association • Petersburg Vessel Owners Association
Prince William Sound Aquaculture Corporation • Purse Seine Vessel Owners Association • Seafood Producers Cooperative • Southeast Alaska Seiners Association
Southern Southeast Regional Aquaculture Association • United Cook Inlet Drift Association • United Southeast Alaska Gillnetters

TOTAL P.01

Mr. Chairman and members of the resources committee. My name is Liz Cabrera & I am testifying on behalf of the P.V.O.A. (Petersburg Vessel Owners Association).

While our organization supports increased research for our fisheries, we oppose the committee substitute for senate bill 40. We consider this a tax & spend bill. ~~Incidentally~~ As you've already heard, the commercial fishery pays its way in this state & we are opposed to additional taxes for our industry.

In terms of the discrete stock assessments provisions, we are concerned that this will lay the groundwork for changing management of our fisheries resource. It is difficult to understand why the state would move toward a discrete stock management policy which has failed in the lower 48.

By passing this bill, the legislature is in effect "micro-managing" our (1)

...fisheries. Unfortunately, the legislatures priorities are often driven by politics, not by the need for research. In fact there are plenty of resource problems in our state that the legislature continues to ignore such as Dungeness crab in Kodiak + Yakutat & Tanner + king crab in Kodiak. Some of these fisheries have been ~~restricted~~ shut down, + in some cases, the personal-use + subsistence fisheries have been restricted. If the legislature is serious about fulfilling its constitutional mandate and adhering to its responsibility to pass along a healthy and diverse resource to future generations of Alaskans, then rather than spending time, energy + money developing new legislation, we suggest the legislature consider appropriating adequate funds to the Department. The entire state benefits from our fisheries resource and management, and ~~research~~ research should funded to reflect that fact.

Fa Cabrera PO Box 232 (?)

United Southeast Alaska Gillnetters
PO Box 22427
Juneau, Alaska 99802
(907) 586-5860 Fax (907)780-6621
E-mail: usag@alaska.net

March 31, 1998

Senate Resources
Senator Rick Halford, Chairman
Alaska State Legislature
State Capitol, Room 121
Juneau, AK 99801-1182

Re: Opposition to SB 40 "Discrete Stock Assessment"

The United Southeast Alaska Gillnetters Association (USAG) is an organization which represents the Southeast Alaska drift gillnet salmon permit holders. There are 480 drift gillnet permits in Southeast Alaska. Our membership last year was 202 members with over 150 members joined so far for 1998. USAG is a member of United Fishermen of Alaska and the Alaska Seafood Council.

USAG is in opposition to this bill for the following reasons:

- USAG first questions in regard to SB 40 include:
  1. What is this bill trying to fix?
  2. The term discrete stock is never defined. What does it mean?
- SB 40 would be harmful to the resource as science is not driving the need for information but the allocation battle and political fights will determine the ADF&G research priorities.
- SB 40 turns the state's salmon stock assessment program into a political process. USAG feels that the present division between ADF&G management & research authority and the Board of Fish allocation authority is balanced and healthy. SB 40 would have the Board of Fish and ultimately the Legislature determining where the research and science should be directed at and not the department's need to gather information for management purposes. Under SB 40 you could have the situation occur where the large systems get all the attention because of allocation battles at the Board of Fish and due to nonexistent allocation concerns, smaller systems would be damaged because of a lack of attention and money available for research.
- USAG fully supports ADF&G having adequate funds available to properly manage and gather scientific information/data on all resources. Due to budget cuts over the last 5 years, ADF&G does not have adequate funding to do all aspects of their mission properly. This should be addressed in the course of the normal budget process by fully

resources.

- SB 40 raises the money for the discrete stock assessment by a combination of sport, crew member and limited entry permit fee increases. The commercial fishing industry already provides the State revenue, including revenue sharing for communities. The commercial fishing revenues generated exceeds the expenditures for management of ADF&G.
- USAG objects to the funding source for SB 40. The stock assessment surcharge is to reasonably reflect the different rates of economic return for different fisheries. Under this system, you are asking a fishermen that is barely able to survive and maintain their commercial fishing lifestyle to pay for years and years for a program that might never be conducted within their fishing region.
- The projects that get a priority on the discrete stock assessment list may be there one year and gone the next, depending on the way the list is developed by a political process. These projects need to be looked at on a long-term basis. Depending on the species of salmon it might be a minimum of 16 years to fully develop the data needed for discrete stock assessment. These projects need to be identified by ADF&G and adequate funding provided in a regular budget to gather the scientific data for proper management and to provide the Board of Fish with adequate scientific data for allocation determinations.

USAG is opposed to SB 40. The commercial fishing industry feels that it is an allocation bill disguised as a conservation and research assessment tool. While the draft CS bill introduced last April states the bill no longer manages for discrete stock, this bill still implies discrete stock management when you assess and set escapement goals for a discrete stock.

Thank you for considering our testimony as you consider this legislation. United Southeast Alaska Gillnetters strongly urges you to vote no on SB 40.

Sincerely,

Kathy Hansen
Executive Director

4/10:1-4928

Alaska State Legislature

Please enter into the record my testimony to the Senate Resources
committee name

committee on SB 40, dated April 11 '97.
bill/subject

I came to the LIO to testify not to be ignored. You took public testimony from one person from the most productive fishing town in Alaska maybe the U.S. I'm pretty disgusted, you let Dan Fadback talk for 10 minutes previsited Anchorage and the M.L.-S. The B of Fish members can communicate at other times not waste my time.

Signed: [signature]
Testifier

self
Representing (Optional)

7625 Spruce Cape Rd
Address

486-3643
Phone No.

Jewish and Catholic traditions. INSIDE

SPORTS, PAGE 11

clouds late, high 50s. *Forecast, Page 10*

TY NEWSPAPER

The World Weekend

SERVING OREGON'S SOUTH COAST 75¢

Biologists: Stream repair not enough

Field work: People who built stream structures say Oregon's plan won't succeed.

BY JEFF BARNARD
Associated Press Writer

GLENDALE — As a biologist for the U.S. Bureau of Land Management in the 1980s, Jeff Dose built about 1,000 structures to enhance fish habitat in small streams of the South Umpqua Basin.

"We built them and they didn't come," Dose said Friday as he gazed at a big log he had anchored across Bull Run to created a pool for young coho salmon grow up in before migrating downstream to the ocean as a smolt.

"The engineering was perfect. The ecological consequences were nothing. We wasted a bunch of money."

Based on the failure of those structures and others to turn around the continuing decline of wild salmon over the past 15 years, Dose and other members of the American Fisheries Society have concluded that Oregon's plan to save coho salmon and prevent listing them as an endangered species is doomed to failure.

To be successful, Gov. John Kitzhaber's Oregon Coastal Salmon Recovery Initiative must address conditions throughout the watershed that have led coho salmon and other anadromous fish down the road to extinction, rather than just addressing the symptoms seen in individual streams, Dose said.

Now a biologist on the Umpqua National Forest, Dose collaborated with two other members of the American Fisheries Society,

See Salmon, Page 6

Traveler finds job on Lady's crew

NATIONAL NEWS

Trio: Salmon runs need more protection

Salmon from Page 1

the nation's leading organization for fisheries biologists, on an article to be published in the May issue of the organization's journal, "Fisheries."

The others are Brett Roper, a fisheries biologist on the Idaho Panhandle National Forests in Coeur d'Alene, Idaho, and Jack E. Williams, senior aquatic ecologist for the BLM in Boise, Idaho.

After reviewing more than 100 scientific articles and a dozen books, the three concluded that few in-stream habitat enhancement projects have resulted in long-term success. To be successful, they must be combined with restoration of ecological processes in the entire watershed.

For the private lands that account for more than two-thirds of coho habitat, that translates into significantly less logging on slopes above streams, Dose said.

It also means drastically reducing the network of logging roads, particularly those running along streams on valley floors, and better protection for the riparian zones along rivers than Oregon logging regulations now provide.

Protections on federal lands, where steps to save the northern spotted owl and salmon have resulted in an 80 percent reduction in logging, are more in line with what is needed, Dose added.

After reading the Oregon coho restoration plan, Dose concluded that it depends more on the kind of projects that failed on Bull Run and less on the kinds of watershed restoration he and his colleagues feel are necessary to rebuild salmon runs.

Jim Martin, Kitzhaber's chief salmon advisor, countered that while the Oregon plan calls for in-stream projects, it also takes major steps to improve watershed health.

"All the work being done right now on the issue of erosion says the number one issue threatening these streams right now is roads," he said.

German quick to learn ship's ropes

German from Page 1

adapted to ship life fairly well.

"Everybody teaches you. In the watch, your watch leader, he's responsible ... but pretty much everybody helps you. It's a training vessel, so people are used to teaching you," she said.

As to her duties, Kuenstler said, "I'm one of the average deckhands, so I have to do everything they tell me to do."

On an average day, this starts after breakfast at 7 a.m. with swabbing the decks, doing the dishes, polishing the brass and other shipkeeping chores.

When in port, this is followed by hosting tours and groups on educational visits, Kuenstler said. When out at sea, things settle down a bit more, with crew members serving [illegible]

During sea voyages, things settle down more with time divided between doing shipboard chores, handling the tiller or doing bow watch.

Like hauling up sails and heaving lines, handling the tiller of the 170-ton Lady Washington takes some muscle, Kuenstler said.

"It's heavy and when the sea's rough, you need a lot of strength," she said.

Although authentic in many respects, the present-day Lady Washington has been fitted with many modern-day amenities which an 18th-century crew would have appreciated.

"We have a forecastle where we sleep, but 200 years ago, they would have slept on the cargo. They didn't have bunks, we have bunks," she said.

Members lost to families

Cult from Page 1

Among the relatives was actress Nichelle Nichols, who played Lt. Uhura on the original "Star Trek" and has been promoting a line of telephone psychics. She was shocked and under sedation at the news that her brother, Thomas Nichols, was among the dead, said her manager, Jim Meecham.

Miss Nichols said on Larry King Live Friday that her brother had been talking about the comet that would come some day as early as 1994.

"He made his choices and we respect those choices," she told King, adding that she felt it ironic that they chose Hale-Bopp, "this wonderful celestial event," as the trigger for the decision to die.

Cult members had told acquaintances that leader Marshall H. Applewhite, 66, preached celibacy.

In the house, investigators discovered pictures of a dome-headed alien they apparently thought the would encounter by killing themselves and joining a UFO they believed is traveling behind the comet Hale-Bopp.

"It's the head of an alien, like you see in 'The X-Files,'" the medical examiner said.

Blackbourne acknowledged that some relatives were upset that officials released a two-minute videotape shot inside the mansion that showed investigators walking through the death scene, pointing to the bodies.

For Nancie Brown, the grieving began when her teen-age son went to check out a cult meeting at a park in the San Francisco Bay area. That was 21 years ago.

"It's been, I'd say, 21 years of losing," she told The Washington Post. In the years since, she hear[d] from him just twice. Then came a call that 41-year-old David Geoffery Moore was dead.

The oldest cult member, 72-year-old Jackie Leonard, left her Iowa home in the early 1970s, according to her son-in-law.

Columbus visited Indian village

City from Page 1

same one whose brutal destruction in 1503 is described in an account

insight into the Taino then has ever been known before," said Charles Becker, director of the underwater science program at Indiana

last week to investigate the area around a cenote, or natural well, that the Indiana archaeologist has been studying for several months