TCCHINOOK-8704

FEBRUARY 26, 1987
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THE PACIFIC SALMON COMMISSION

CHINOOK TECHNICAL COMMITTEE REPORT

REPORT TCCHINOOK (87) 4

1986 SUMMARY REPORT

February 26, 1987

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

This executive summary highlights topics relating primarily to assessing progress of the Chinook Rebuilding Program in 1986. More detailed discussions of the various topics are included in several reports already presented to the PSC. Major conclusions of each topic discussed in this report are highlighted at the beginning of each section.

The Committee is encouraged by the continued improvement in 1986 of escapements to many natural chinook systems which continued the pattern observed in 1985. However, the Committee presents the following recommendations and concerns.

I. COMMITTEE RECOMMENDATIONS

1. The Committee recommends that management measures be taken in 1987 and 1988 to conserve mature Lower Georgia Strait chinook in order to minimize further reductions in spawning escapements. The Committee makes these recommendations while acknowledging that the model suggests that further management actions may not be required to rebuild these stocks under certain assumptions. Given the severely depressed status of the lower Strait stock, the Committee strongly believes that conservation of spawners in 1987-88 is critical to a realistic expectation of achieving rebuilding. Further, the Committee recommends reductions of harvest rates in other fisheries to reduce the risk associated with rebuilding the upper and lower Strait of Georgia stocks (consistent with the original intent of the Chinook Rebuilding Program) and assessment of supplemental enhancement possibilities to assist the rebuilding of severely depressed populations.

2. The Committee has not been able to complete an evaluation of the impact (on the rebuilding program) of fishing associated mortalities not accounted for in catch statistics. The Committee recommends reductions of chinook non-retention fisheries in 1987 to be consistent with Treaty requirements to minimize impacts. This recommendation reflects Committee concerns over impacts of additional mortalities on rebuilding early in the program. Monitoring and assessment of non-retention fisheries should continue in 1987.

3. The Committee notes that overages occurred in 1985 and 1986, and recommends early establishment of a policy on overages and underages. This policy should allow for limited variations due to management imprecision and require prompt adjustment if cumulative deviations exceed an agreed to range.

4. The Committee recommends that non-ceilinged fisheries be managed to meet Treaty language which requires savings of depressed natural stocks from ceilinged fisheries be passed through principally to spawning escapements.

II. COMMITTEE CONCERNS

1. Some major hatchery stocks which in the past have contributed significantly to coastal ocean fisheries are now showing severely depressed survival rates. These stocks are from Spring Creek and Robertson Creek hatcheries. Several other wild stocks also show continued depression and/or failure to rebuild. It is important to recognize that the catch ceilings established under the Pacific Salmon Treaty reflect assumptions concerning continued contribution of hatchery stocks at levels observed during the base period for model analysis. If these reductions cause a decline in total abundance, harvest ceilings could have greater than anticipated impacts upon co-mingled natural stocks.

2. Non-retention of chinook increased in 1986 in some areas and fisheries and decreased in others. While some increases were anticipated during the rebuilding program, the Committee believes that further reductions in non-catch mortalities were possible in 1985 and 1986 to fully minimize fishery impacts. Overall impacts of changes in induced fishing mortalities will be assessed.

3. The Committee is concerned about the cumulative effect of quota overages, deviations from pass-through achievement, new induced fishing mortalities and reduced survivals in some major hatchery stocks. Risk of not rebuilding is increased if these biases continue to accumulate.

4. The Committee is concerned that catch overages occurred in Northern B.C. and S.E. Alaska in 1985 and 1986. Deficiencies in reporting and analytical procedures for inseason management can reduce the effectiveness of management measures established to implement the chinook conservation program.

5. Production from Spring Creek, Strait of Georgia, Robertson Creek and several natural spring and summer chinook stocks in Puget Sound and Columbia River stocks is expected to continue to be depressed.

III. CATCH IN 1986 FISHERIES

Conclusion:
Catches in the West Coast Vancouver Island troll and Georgia Strait troll and sport fisheries were less than the catch ceilings in 1986, but ceilings were exceeded in Northern B.C. and S.E. Alaska fisheries.

Actual catches compared with harvest ceilings for fisheries and management areas specified in the Pacific Salmon Treaty are presented below:

(THOUSAND FISH)

AREA AND FISHERY	CEILING	CATCH	DIFFERENCE #'s	DIFFERENCE %
SE Alaska (T,N,S) a/ b/	264.4	278.5	14.1	+5.3
North/Central B.C. (T,N,S)	256	268.7	12.7	+5
West Coast Vancouver I. (T)	360	355	-5	-1.4
Georgia Strait (T,S)	263	229	-34	-12.9

a/ T=Troll; N=Net; S=Sport
b/ 254,000 base plus 10,400 hatchery addon.

Catches in all fisheries of interest to the PSC are documented in Table 1.

IV. ASSESSMENT OF REBUILDING

i. <u>Options for Rebuilding Assessment</u>

Conclusion:
During the first five years of rebuilding, evaluations should involve harvest rates in fisheries and escapements.

In assessing the status of individual stocks under the rebuilding program, three main elements must be examined: (1) spawning escapement levels; (2) fishery harvest and stock-specific exploitation rates; and (3) production responses to increases in spawning escapements. A phased approach that reflects expectations for change in data availability and quality as the program progresses is recommended.

Interim annual targets for spawning escapements, fishery harvest and stock-specific exploitation rates need to be established. For stocks represented in the Canada/U.S. chinook model, a time series of expected rates and escapements can be generated as interim targets. For other stocks, trend lines, step schedules or other measures must be established by the appropriate jurisdiction to depict expected progress.

TABLE 1. PRELIMINARY 1986 CHINOOK CATCHES FROM STOCKS CONTRIBUTING TO U.S./CANADA SALMON TREATY AREAS, COMPARED WITH 1983 - 1985 (numbers of fish in 1,000's).

28-Feb-87 - PRELIMINARY DATA

	TROLL				NET				SPORT				TOTAL			
AREA	1986	1985	1984	1983	1986	1985	1984	1983	1986	1985	1984	1983	1986	1985	1984	1983
S.E. ALASKA a/	236	217	236	271	22	36	32	20	21	25	22	22	279	278	290	313
BRITISH COLUMBIA					b/				c/							
North/Cent. Coast f/	208.2	215	254	254	48.5	51	36	30	12	9	20	20	269	275	310	304
W. Vanc. Island f/	355.3	358	460	385	3.2	11	44	38	d/ 13	14	44		372	383	548	423
Georgia Strait	46.7	52	88	105	31.7	31	20	18	e/ 182	235	369	198	260	318	477	321
Johnstone Strait	4.2	5	9	15	17.5	38	18	28	10	10	10	10	32	53	37	53
Juan de Fuca Strait	0.3	0.4	0.3	0.2	17.7	17	6	0.3	e/				20	17	6	1
sub-total	614.7	630	811	759	119	148	124	114	217	268	443	228	952	1046	1378	1102
WASHINGTON									g/							
Puget Sound	36	14	17	21	189	224	226	180	0	149	177	197	225	387	420	398
Coast	50	51	27	74	22	14	16	14	21	31	16	50	93	96	59	138
sub-total	86	65	44	95	211	238	242	194	21	180	193	247	318	483	479	536
COLUMBIA RIVER	-	-	-	-	/h 276	150	128	58	i/ 62	46	56	42	338	196	184	100
OREGON																
North Coast	6	4	9	6	0	0	0	0	2	4	0	3	8	8	9	9
Central Coast j/	2	3	3	3	0	0	0	0	35	30	29	20	37	33	32	23
sub-total	8	7	12	9	0	0	0	0	37	34	29	23	45	41	41	32
GRAND TOTAL	945	919	1103	1134	628	572	526	386	358	553	743	562	1932	2044	2372	2083

a/ Southeast Alaska troll chinook catches shown for Oct. 1- Sept. 30 catch counting year.
b/ British Columbia net catches includes only fish over 5 lb. round weight. Native food fishery catches are not included.
c/ Sport catches are for tidal waters only, catch updates will be provided as available.
d/ Estimates of tidal sport catches from Barkley Sound only.
e/ Georgia Strait sport catches include Juan de Fuca Strait sport catches. 1986 estimate includes projected catch through remainder of year.
f/ Catches for 1986 are final inseason estimates. Actual count from tickets received through 10/22 are 207,000 for North/Central Coast and 350,000 for W. Vancouver Island.
g/ Sport catches include both marine and freshwater catches, but only adults in freshwater. Preliminary 1986 estimates will not be available until Feb 15, 1987.
h/ Columbia River net catches include Oregon, Washington and treaty catches, but not treaty ceremonial.
i/ Columbia River sport catches are for adults only and include only Washington and Oregon anglers.
j/ Includes only terminal ocean troll and estuary inriver sport catches from Cape Falcon to Cape Blanco.

The responses of the spawning escapements and terminal runs of the indicator stocks are the major direct measures of progress toward rebuilding. Spawning escapements and goals should be expressed in terms of adult females when available.

Stock-specific exploitation rate calculations are more reliable than fishery-specific harvest rates, but will require 3 to 4 years to accumulate the required data for new indicator stocks. Stock specific exploitation rates for all fisheries on individual indicator stocks can be used to assess cumulative effects of all fisheries. Two types of stock-specific exploitation rates can be calculated: exploitation rate for the primary age class(es) in the harvest; and exploitation rate for an entire brood of four to five age classes combined.

Fishery-specific harvest rates for fish of one age in a specific fishery can be used individually or averaged for several indicator stocks to develop an index of age-specific fishery harvest rate. For the near term, age-specific fishery harvest rates for several stocks should be used for rebuilding assessment.

The rebuilding program is premised upon an expectation that increases in spawning escapements will generate increased production in subsequent generations. Indirect measurements of increased abundance may eventually be the best early indicators of success. However, specific techniques to evaluate production responses have not yet been developed.

As more and better information becomes available, adjustments to the interim targets and goals should be expected. Additional indicator stocks and increased rates of tagging since treaty inception will provide new or better escapement and harvest rate information. Productivity information relative to increased escapements will become available during rebuilding and should be incorporated into evaluation of the escapement targets.

ii. <u>Escapement Assessment</u>

Conclusion:
Escapements in 1986 generally continued the improvement observed in 1985, relative to the base period.

Table 2. Spawning escapements to British Columbia (total escapements by region) and escapement indicator stocks in the United States.

Production Unit	Stock Type	Avg. Esc. Base 1/	Esc. Goal	1985 Esc.	1986 Esc.	1985-86 % Base	1985-86 % Goal
Southeast Alaska							
Situk	Spring	1557	2100	1521	2067	115	85
King Salmon	Spring	95	250	146	249	208	79
Andrews Creek	Spring	371	750	510	1131	221	109
Blossom	Spring	165	1300	1134	2045	963	122
Keta	Spring	407	800	998	1104	258	131
Transboundary Rivers Not Addressed in Treaty Annexes(Source of Estimates)							
Chilkat (U.S.)	Spring	213	2000	625	170	187	20
Unuk (U.S.)	Spring	1283	2900	1862	3402	205	91
Chickamin (U.S.)	Spring	344	1400	1531	2683	612	151
Transboundary Rivers Addressed in Treaty Annexes(Source of Estimates)							
Alsek (U.S.)	Spring	4501	5000	2227	4231	72	65
Alsek (Canada)	Spring	5780	12500	2900	5400	72	33
Taku (U.S.)	Spring	7978	25600	10851	12178	144	45
Taku (Canada)	Spring	9967	30000	13600	15200	144	48
Stikine (U.S.)	Spring	6224	13700	10227	8026	147	67
Stikine (Canada)	Spring	8283	25000	13600	10700	147	49
Canada							
North Coast	Spr/Summer	28205	72300	63300	76500	248	97
Central Coast	Summer	19415	45200	30219	42710	188	81
Fraser	Spr/Summer	43480	93700	91242	112768	235	109
U. Georgia Str. 2/	Fall	11655	23300	10435	25856	156	78
L. Georgia Str.	Fall	16667	33300	15456	8170	71	35
Lower Fraser	Fall	83750	175000	106000	154602	156	74
WCVI	Fall	48103	91700	48135	46976	99	52
Puget Sound							
Skagit	Spring	1217	3000	3265	1999	216	88
Skagit	Summer	13265	14900	16298	18127	130	116
Stillaguamish	Summer	817	2000	1409	1230	162	66
Snohomish	Summer	5028	5250	6342	4443	107	103
Green	Fall	5723	5800	2908	4792	67	66
Dungeness 3/	Spring						
Nooksack 3/	Spring		4000	800			
White 3/	Spring						
Skokomish 3/	Spring						
Hoko 3/	Fall		850				
Dungeness 3/	Fall		400				
Washington Coast							
Hoh	Spr/Summer	1325	NA 4/	1000	1700	102	NA 4/
Queets	Spring	925	NA 4/	700	900	86	NA 4/
Grays Harbor	Spring	450	1400	1200	1800	333	107
Grays Harbor	Fall	8575	14600	9500	10500	117	68

Quillayute	Summer	1250	NA 4/	600	1200	72	NA 4/
Quillayute	Fall	5850	NA 4/	5500	6100	99	NA 4/
Hoh	Fall	2875	NA 4/	2300	4000	110	NA 4/
Queets	Fall	3875	NA 4/	3900	4000	102	NA 4/
Columbia River							
Upper River 5/	Spring	28955	84000	28254	38973	116	40
Willamette	Spring	33450	30000	34500	39200	110	123
Upper River	Summer	24275	85000	23400	25900	102	29
Lewis River 5/	Fall	11801	10000	7500	14500	93	110
Upriver Bright	Fall	28325	40000	93300	113200	365	258
Oregon Coast 3/							

1/ Base period for Alaskan and Transboundary stocks 1975-80; base for all other stocks 1979-82
2/ Increased 1986 escapement estimate for Upper Georgia Strait reflects unusual survey conditions
3/ Little or no comparative data are available for these stocks
4/ Stocks managed on the basis of floor minimum and fixed harvest rates
5/ Only includes naturally spawning component

iii. Evaluation of Harvest Rates

Conclusion:
Harvest rate reductions of the magnitude expected were observed only for the Southeast Alaska and Georgia Strait Troll fisheries. For all other areas, ceilings did not result in expected reductions in harvest rates.

The chinook rebuilding program established under the Pacific Salmon Treaty requires reductions in the exploitation rate on depressed natural stocks. Reductions are implemented by incremental decreases in harvest rates over the rebuilding period through the use of catch ceilings and pass-through provisions. The rebuilding program is predicated upon the assumption that fishery harvest rates will decrease as ceilings are maintained and stock abundance increases in response to increased production resulting from higher escapements.

Comparison of estimated changes in harvest rate indices with expectations under the ceilings established under the Treaty, assuming that overall abundance has not changed from base period levels, are summarized in Table 3.

Table 3. Age specific fishery harvest rate indices relative to the 1979-82 base and the expected reduction due to ceilings established under the Treaty.

Fishery	Age	Fishery Rate Relative To Base Period 1985	1986		85-86 Average		Expected Reduction
Southeast Alaska Troll	4	-9%	-31%	(-19%)	-20%	(-14%)	-11%
North/Central Troll	4	0%	6%	(0%)	3%	(0%)	-20%
Georgia Strait Sport	3 & 4	10%	57%		34%		-20%
Georgia Strait Troll	3 & 4	-86%	-67%		-77%		-79%
Georgia Str. Troll+Sport	3 & 4	-29%	8%		-10%		-47%
WCVI Troll	3 & 4	-13%	-4%		-8%		-24%

Note: Figures for Alaska Troll and North B.C. Troll do not include data from Robertson Creek for 1986. This is because there appears to be a serious shortfall of tagged fish entering the hatchery. Total counts of fish (and tags) passing the Stamp Falls fishway indicate that there should have been at least twice as many tags recovered in the hatchery escapement. Figures in parentheses indicate the results when escapement recoveries are adjusted for the apparent shortfall.

Figures 1 thru 6 depict indices of fishery specific harvest rates for principal age classes impacted by five ceilinged fisheries. To provide an evaluation of current management actions we have estimated age-specific exploitation rates for indicator stocks and for the age class which predominates within each of the fisheries. We have used an analysis technique called cohort analysis. The age-specific exploitation rate is the proportion caught of the cohort at age x (catch + escapement + cohort at age x + 1). Harvest rates calculated for the current year (the total cohort being incomplete) require an estimate of the number of fish which are currently alive and which will survive to the next age class. The harvest rate index for a fishery is the average age-specific exploitation rate for each of the indicator stocks present in the fishery. To simplify comparison of 1985 and 1986 harvest rates with base period harvest rates (1979-82) the age-specific exploitation rates by stock within the fishery are divided by the average base period age-specific exploitation rate by stock within the fishery. In figures 1-6, the harvest rate index in one catch year should be compared to the value 1.0 to determine the deviation from the base period harvest rate. The following assumptions are made in the use of the harvest rate analysis:

1.) Maturation schedules are stable from brood to brood for a single stock;
2.) Escapements are estimated consistently over years for a given stock;
3.) The geographic distribution of a stock is similar between years.
4.) Fishing patterns are similar from year to year (e.g. the conduct of one fishery can effect the exploitation rate on a stock in another fishery, however, this will be accounted for when the cohort analysis is applied to the completed brood).
5.) Associated mortalities have not changed over years in the time series.

Given the variability inherent in tagging data relative to the magnitude of expected changes, one index for each fishery has been calculated which reflects the average change in harvest rate across all the indicator stocks within each fishery. However, interpretation of one trend in the fishery harvest rate index should incorporate consideration of the variation over years in stock specific exploitation rates and the range of exploitation rates estimated within each year between indicator stocks.

The average 1985-86 harvest rate index for the Southeast Alaska troll fishery decreased in hte magnitude expected relative to the base period. The harvest rate index for the North/Central troll fishery was essentially unchanged from the base period, compared to expected reductions of 20%. The harvest rate index for the West Coast Vancouver Island Troll fishery indicates a reduction of less than one half the expected level of 24%. The harvest rate of the Georgia Strait sport fishery was 34% higher than the base period level and was 54% above the anticipated level.

A major limitation of the harvest rate analysis is the unavailability of suitable data for spring-type stocks. All analyses involved summer/fall stocks. Over the past two years, the manner in which ceilings have been implemented (in particular the delay in season opening dates) has likely reduced the harvest pressure on maturing spring-type fish, providing differential benefits for spring stocks.

iv. Stock Exploitation Rate Indices:

Conclusions:
Exploitation rates have decreased on two indicator stocks (Quinsam and Spring Creek) and remained equal to base period exploitation rates for three stocks (Upriver Brights, Big Qualicum and Capilano). The 1986 exploitation rate on Robertson Creek is uncertain because of an unexplained low rate of tag recoveries in the escapement.

Indices of age-specific exploitation rate changes for six indicator stocks are presented in figures 7 - 12. The rates were derived from CWT recovery data. The age-specific exploitation rate index is the adult equivalent catch at age X divided by catch + escapement at that age. This calculation becomes a measure of the relative recovery of catch and escapement tags in any catch year. Values greater than one indicate that more tags were caught than escaped during the base period and negative deviations are the reverse. The use of this index as a consistent measure of age-specific exploitation assumes that escapements are measured consistently and that harvest patterns by age in a stock don't change.

Robertson Creek: No conclusions could be reached for this stock due to apparent problems with tag recoveries in 1986 escapements. The sharp increase in the exploitation rate index indicated by the analysis in 1986 was in marked contrast to the downward trends observed in the previous three years. Upon investigation, total counts of tagged and untagged fish passing the Stamp Falls fishway indicated that there should have been at least twice as many tags recovered in the hatchery escapement. An underestimation of tags in the escapement of this magnitude would explain the 1986 increase. No assessment on three-year olds could be made because of survival problems in the 1983 brood; poor survival of this brood indicates that there may be a serious problem in obtaining sufficient females to meet escapement needs for this stock in 1987.

Big Qualicum: There appears to be no significant change from the base period in exploitation rates for three and four year olds in 1985 and 1986 fisheries. This observation is consistent with the harvest rate analysis for the two major fisheries which impact this stock (both increased from 1985 to 1986 catch year). This stock is used to represent lower Georgia Strait stocks. The harvest rate for the combined Georgia Strait sport and troll fishery has not changed from the base period. In addition, escapements of lower Georgia Strait stocks have been steadily declining. The combination of no change in exploitation rate, no change in the Georgia Strait troll and sport harvest rate, a reduction in the Georgia Strait catch, and decline in spawning escapements for this stock infer that stock abundance has significantly declined in recent years.

ALASKA TROLL HARVEST RATE INDEX
AGE 4 CHINOOK

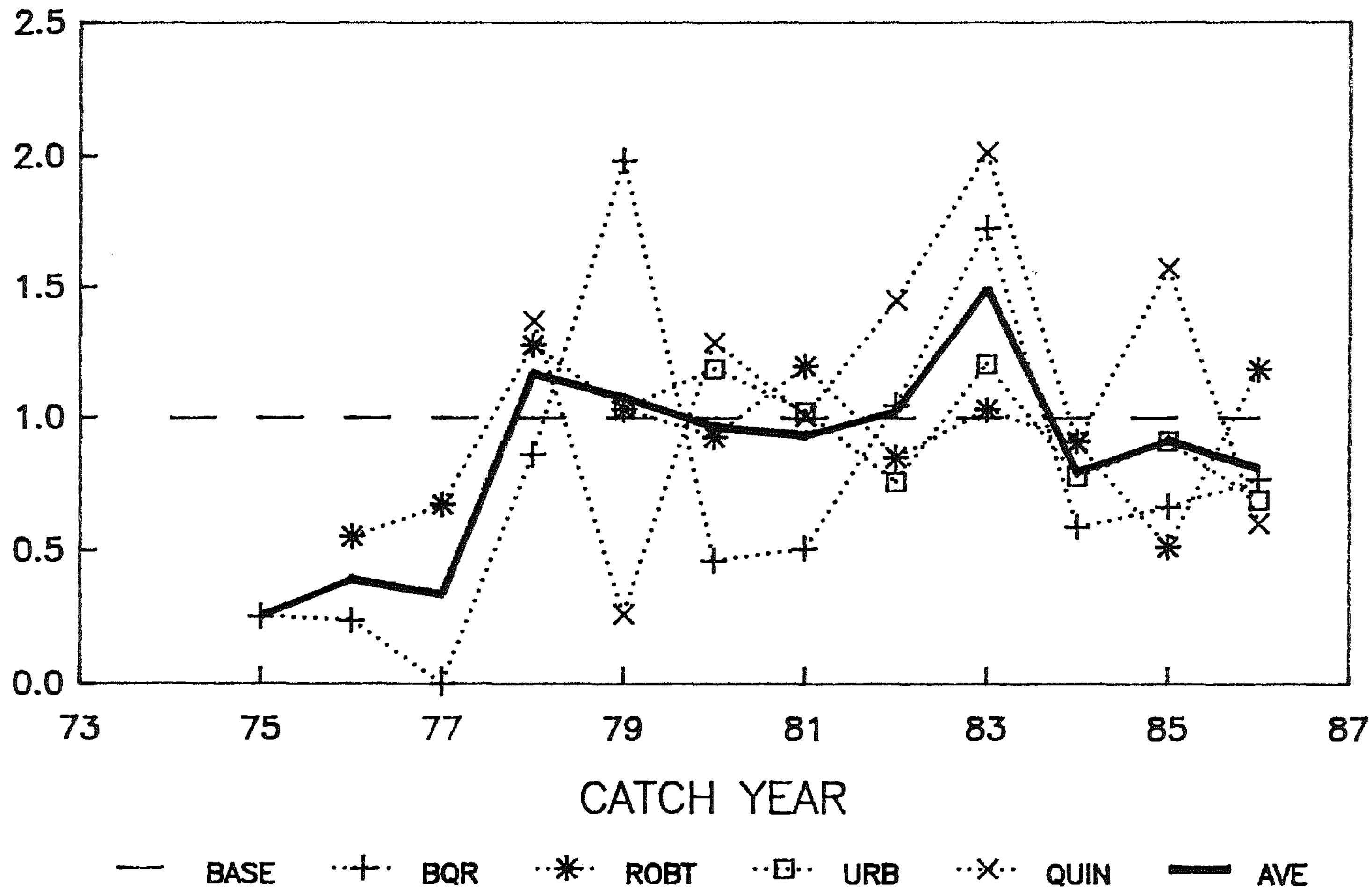


Figure 1.

NORTH/CENTRAL TROLL HARVEST RATE INDEX
AGE 4 CHINOOK

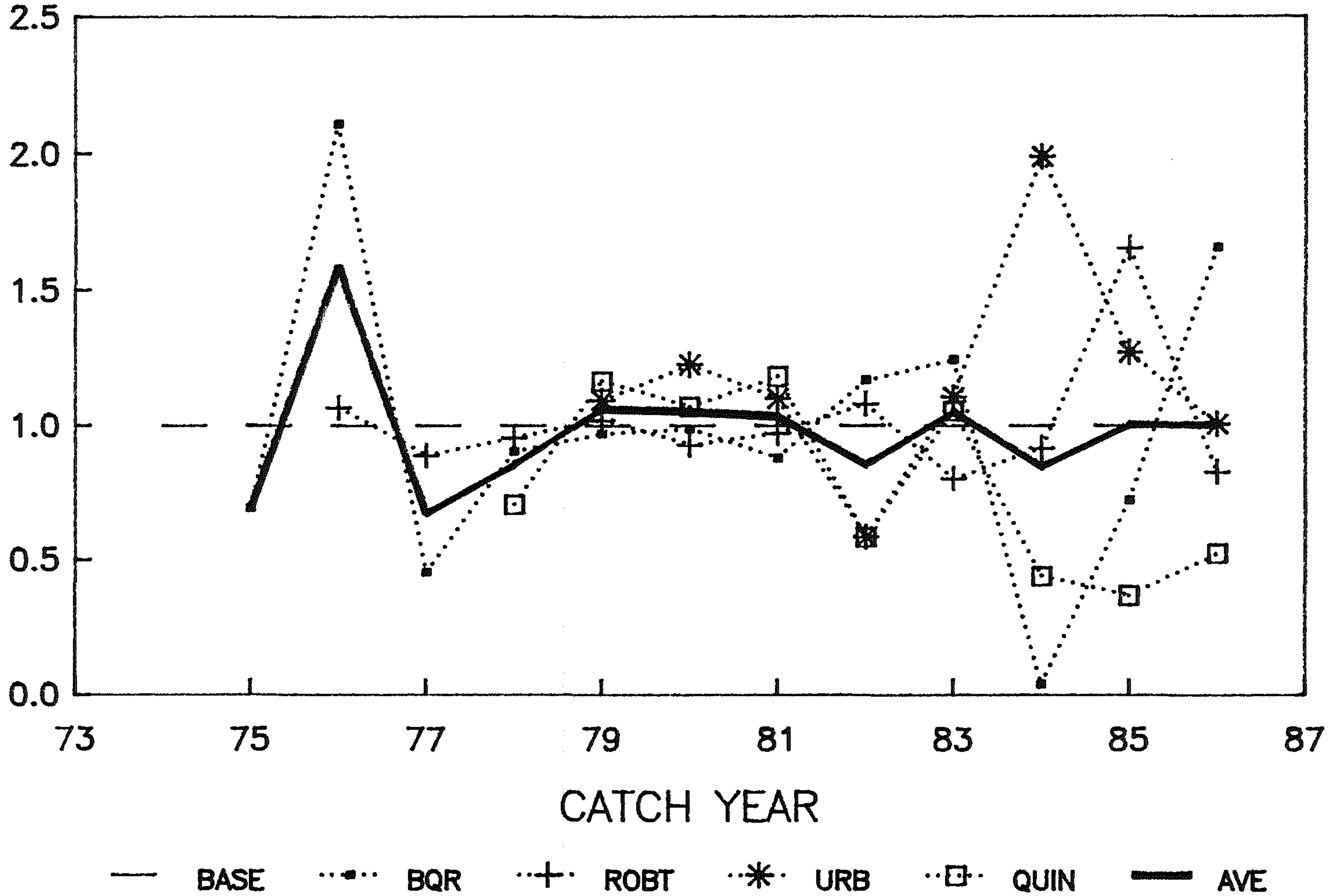


Figure 2.

WCVI TROLL HARVEST RATE INDEX

AGE 3 AND AGE 4 CHINOOK

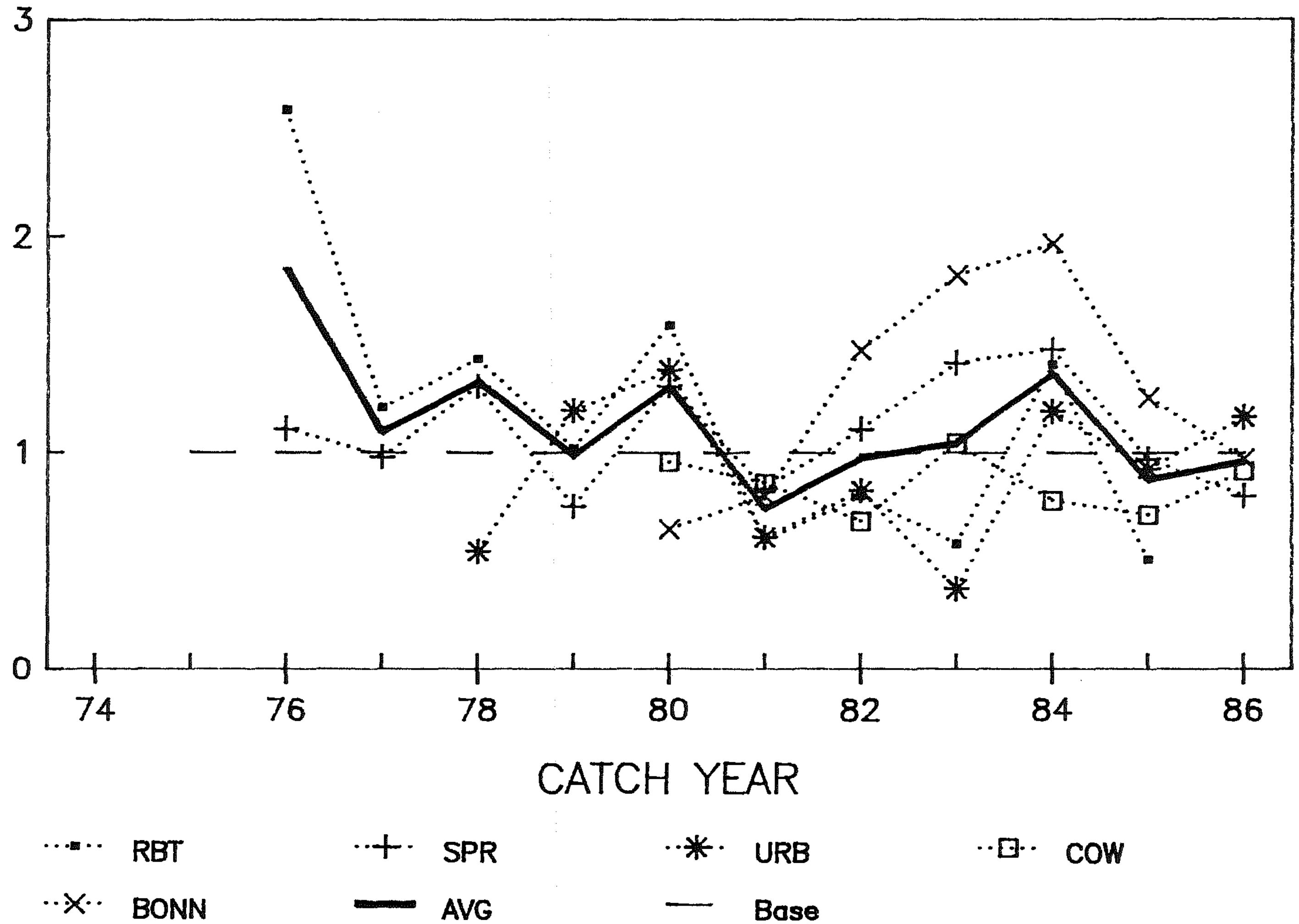


Figure 3.

GEORGIA STRAIT SPORT AND TROLL
HARVEST RATE INDEX AGE 3 AND 4 CHINOOK

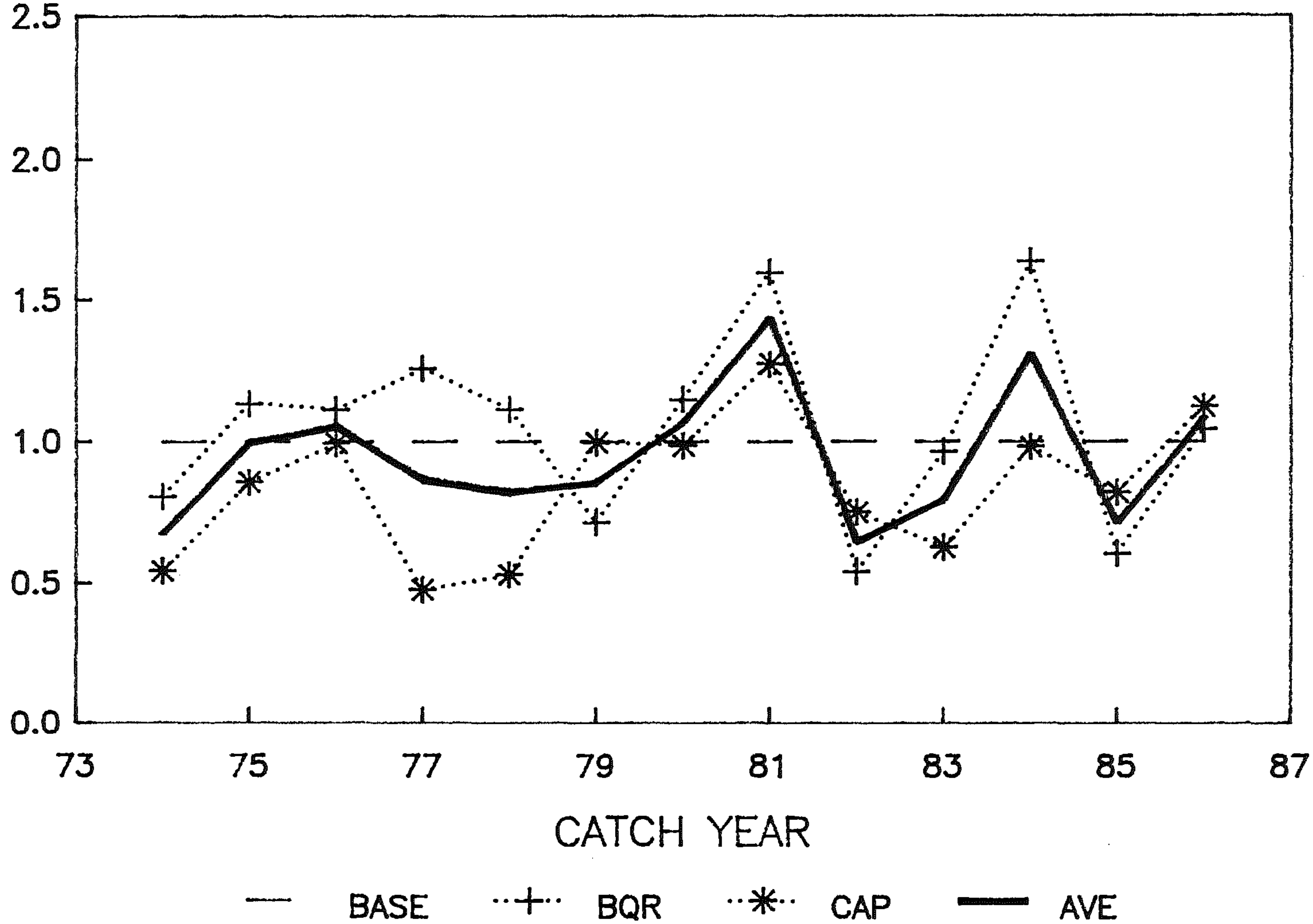


Figure 4.

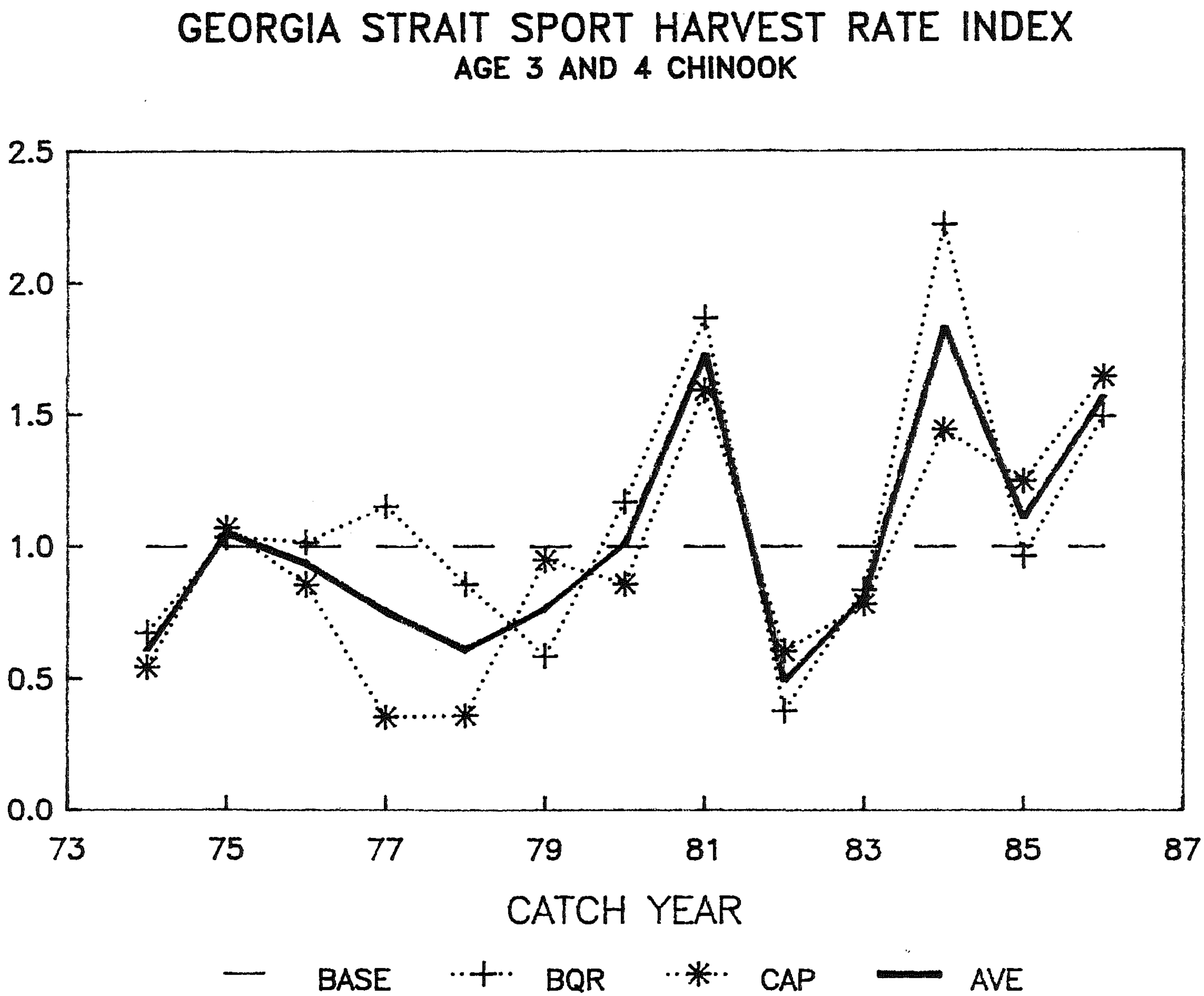

GEORGIA STRAIT SPORT HARVEST RATE INDEX
AGE 3 AND 4 CHINOOK
2.5
2.0
1.5
1.0
0.5
0.0
73
75
77
79
81
83
85
87
CATCH YEAR
BASE
BQR
CAP
AVE

Figure 5.

GEORGIA STRAIT TROLL HARVEST RATE INDEX
AGE 3 AND 4 CHINOOK

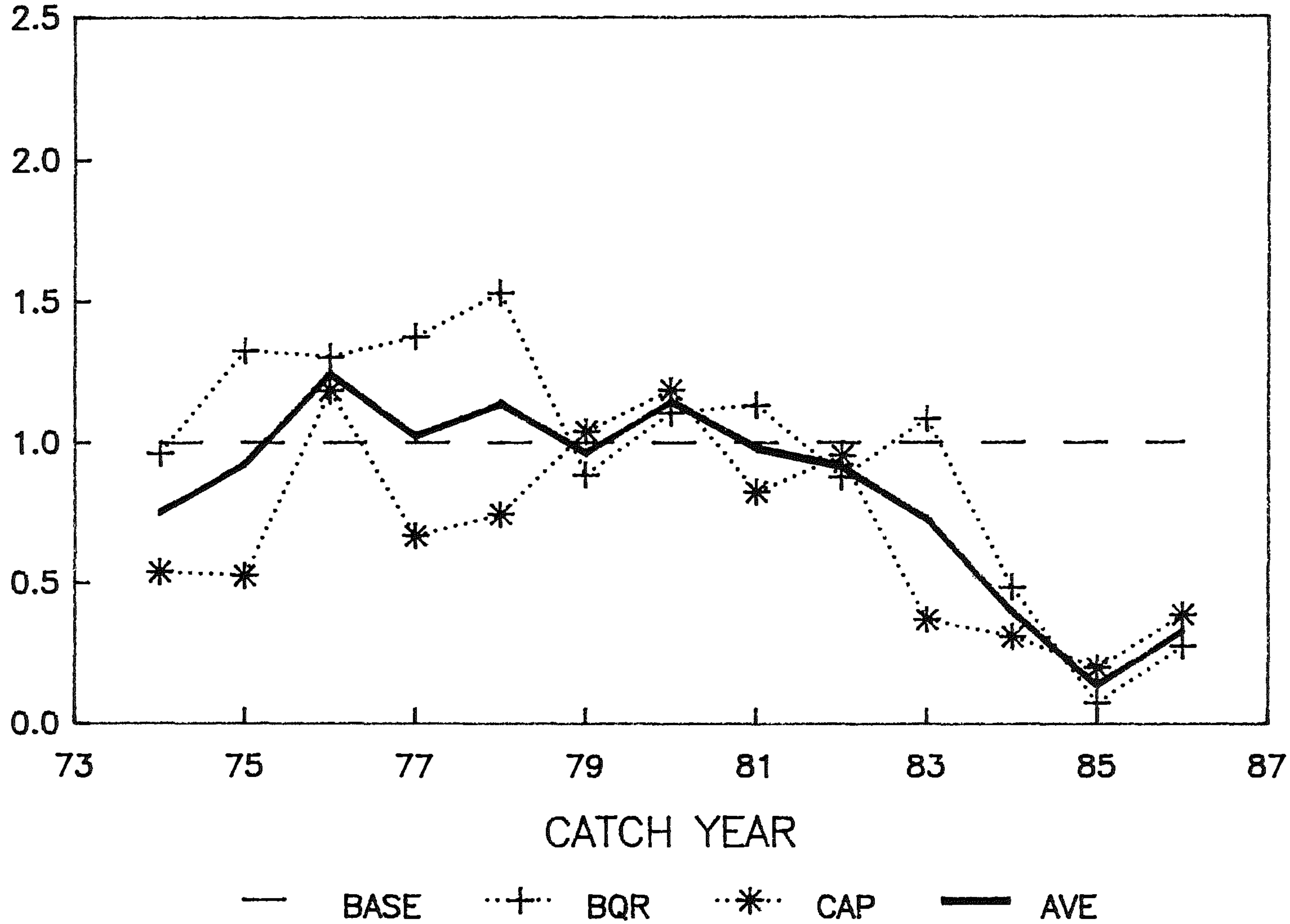


Figure 6.

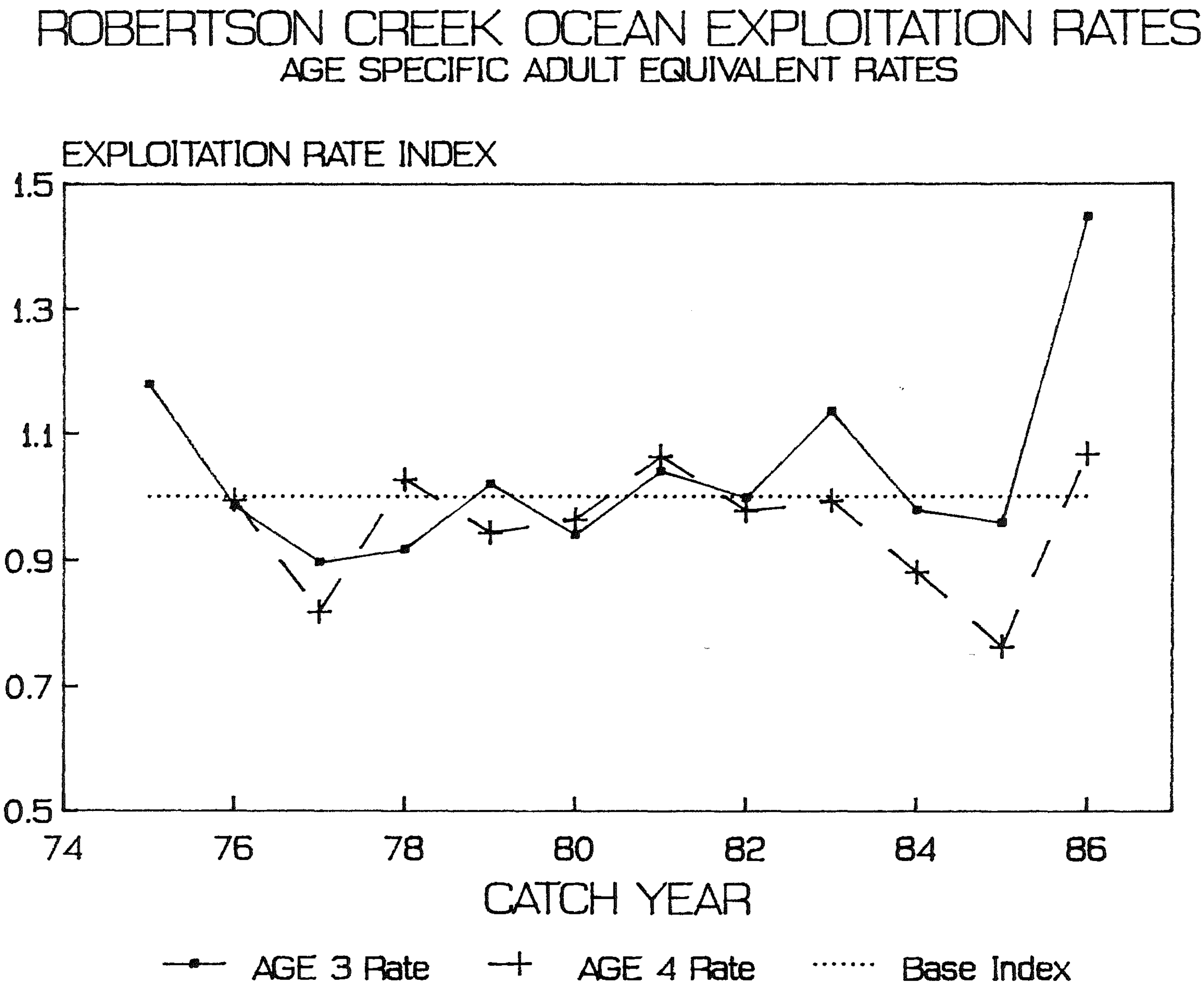

ROBERTSON CREEK OCEAN EXPLOITATION RATES
AGE SPECIFIC ADULT EQUIVALENT RATES
EXPLOITATION RATE INDEX
1.5
1.3
1.1
0.9
0.7
0.5
74
76
78
80
82
84
86
CATCH YEAR
AGE 3 Rate
AGE 4 Rate
Base Index

Figure 7.

BIG QUALICUM OCEAN EXPLOITATION RATES
AGE SPECIFIC ADULT EQUIVALENT RATES

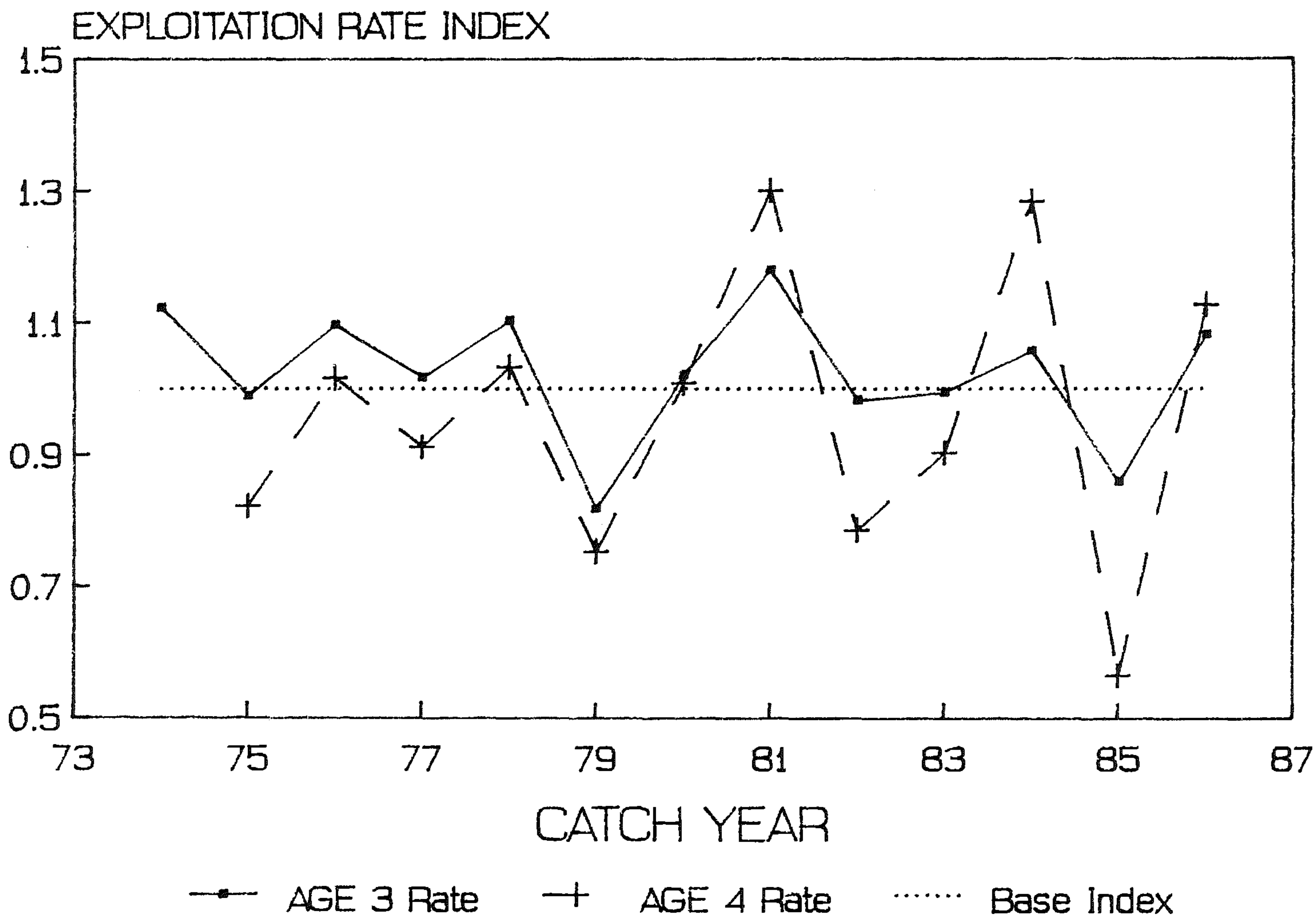


Figure 8.

QUINSAM OCEAN EXPLOITATION RATES

AGE SPECIFIC ADULT EQUIVALENT RATES

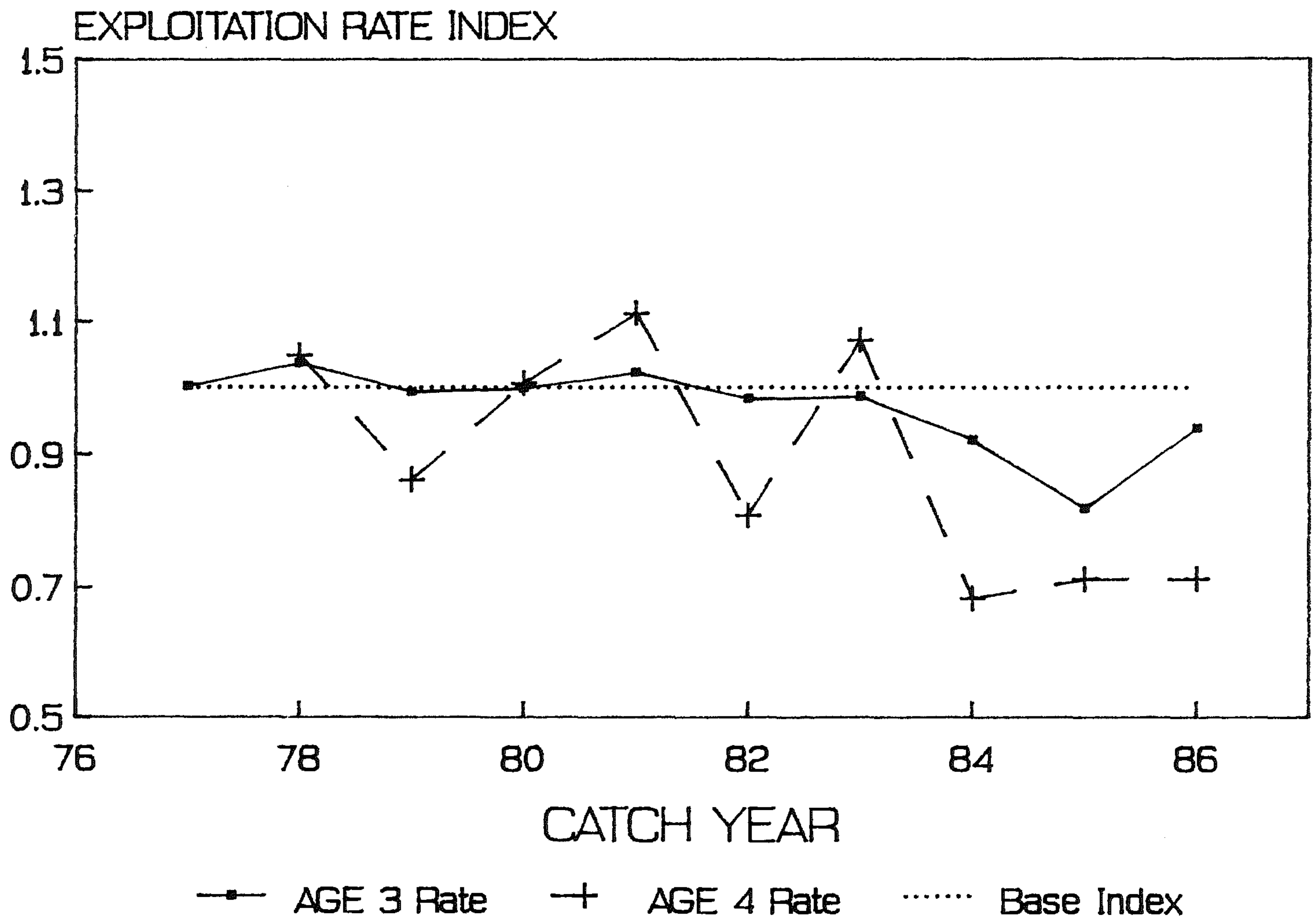


Figure 9.

CAPILANO OCEAN EXPLOITATION RATES

AGE SPECIFIC ADULT EQUIVALENT RATES

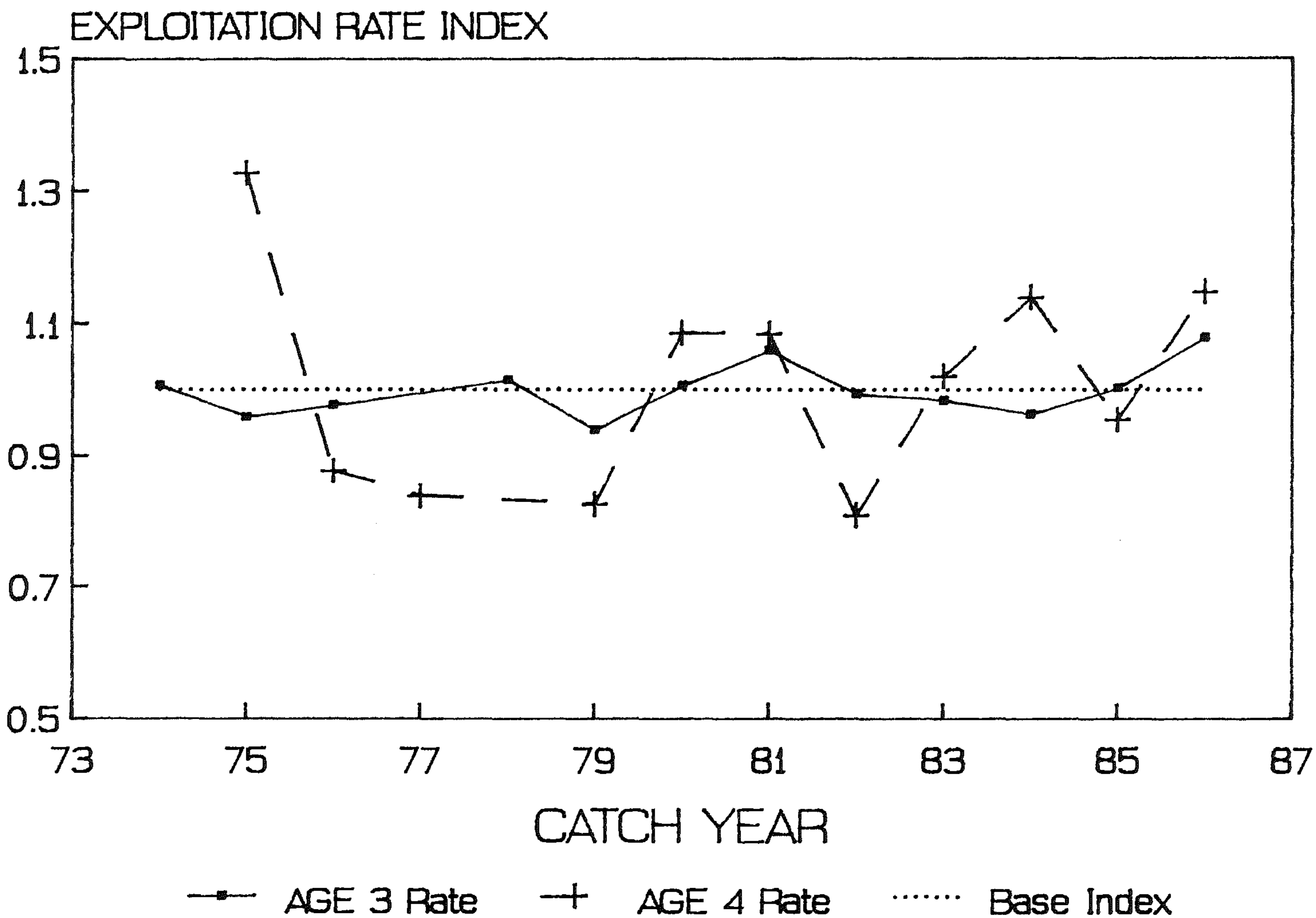


Figure 10.

UPRIVER BRIGHTS OCEAN EXPLOITATION RATES

AGE SPECIFIC ADULT EQUIVALENT RATES

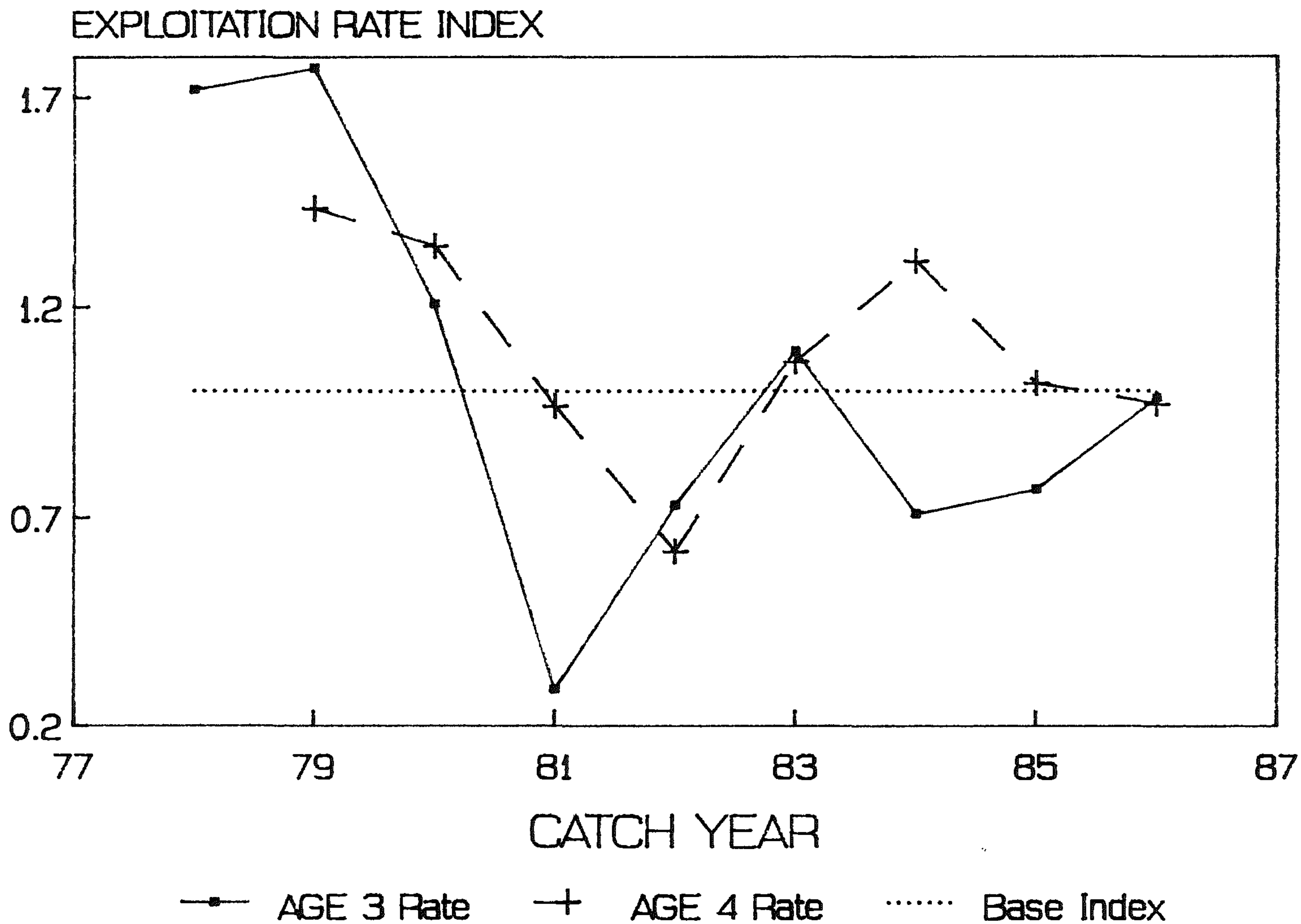


Figure 11.

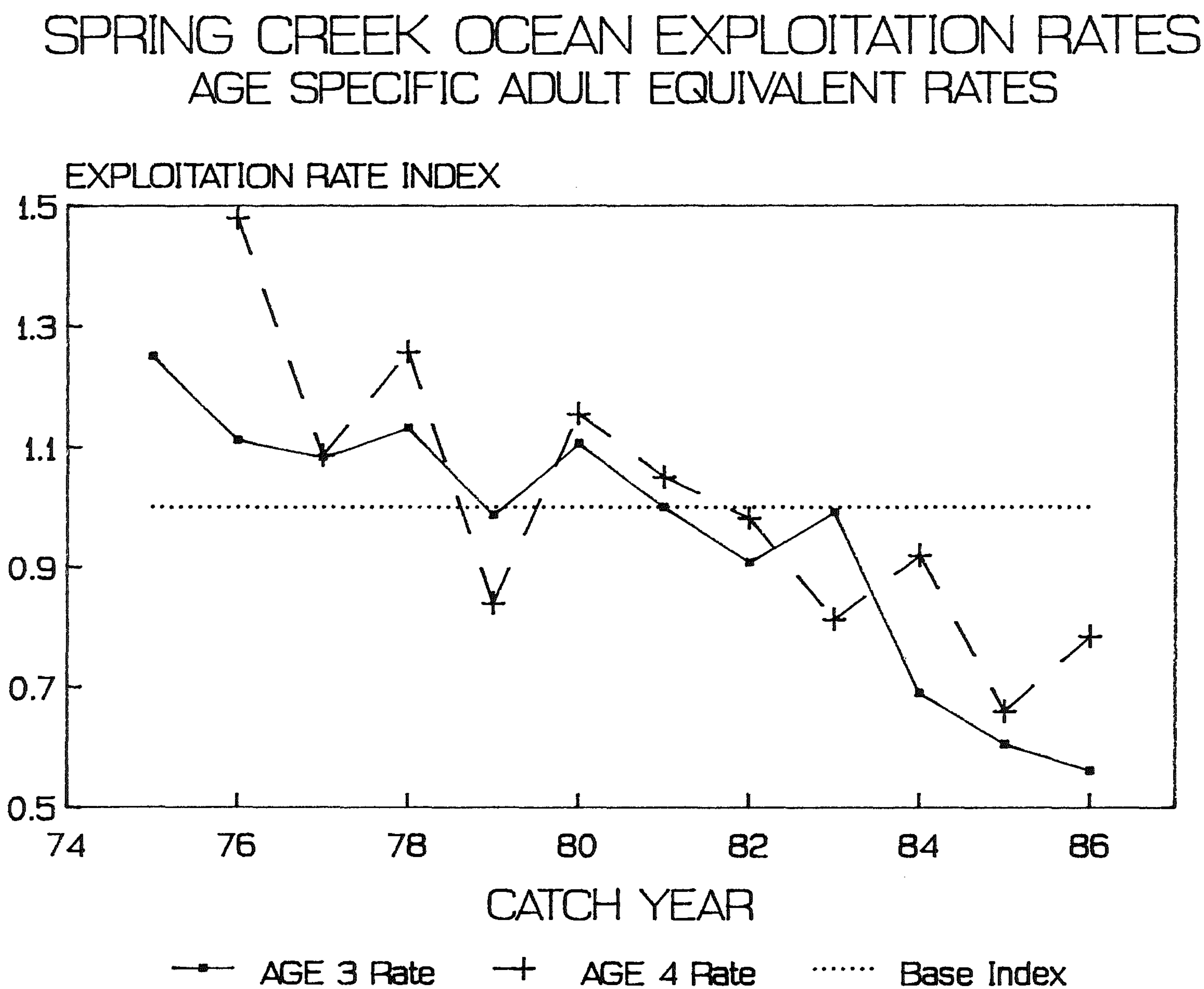

SPRING CREEK OCEAN EXPLOITATION RATES
AGE SPECIFIC ADULT EQUIVALENT RATES
EXPLOITATION RATE INDEX
1.5
1.3
1.1
0.9
0.7
0.5
74
76
78
80
82
84
86
CATCH YEAR
AGE 3 Rate
AGE 4 Rate
Base Index

Figure 12.

v. Identification of Stocks of Concern

Assessment of spawning escapements (Table 2), harvest rate analysis (Table 3. and Figures 1 - 12), and preliminary 1987 stock abundance forecasts, indicate potential problems associated with the following stocks.

Stock	Concern
Transboundary:	see summary of the report on Transboundary Rebuilding Program

Canada:

Lower Georgia Strait:

Declining spawning escapements have not been stopped; harvest rates have increased on the harvest rate indicator stocks. Catch at age and coded wire tag data indicates poor survival of the 1983 and 1984 brood years.

Westcoast Vancouver Island:

Escapement decline has been stopped but escapements have not increased. The 1986 harvest rate assessment is uncertain because of an unexplained low rate of tag recoveries in Robertson Creek Hatchery; survival of the 1983 brood year, Area 23 chinook stocks has been extremely poor.

Washington:

Puget Sound:

Springs: Recent escapements and 1987 expectations indicate continued depressed stock condition. The Nooksack River forecast is for a particularly depressed return in 1987 (85% below goal).

Stillaguamish summer/fall:

Recent escapements and forecast indicate depressed returns in 1987 (60% below goal).

Duwamish/Green River summer/fall:

Recent escapements and 1987 expectations indicate continued depressed stock condition.

Washington Coast:

Grays Harbor Springs:

Continued depressed condition similar to recent years.

Columbia River:

Upriver Springs:

Expectation is for continued depressed status and a decline from 1986 abundance.

Upriver Summers:

Expected to remain at depressed levels of recent years (returns of about 30% of the escapement goal).

vi. Assessment of Transboundary Rebuilding

Conclusion:
Average escapements increased in 1981 - 1985, relative to the base period (1975 - 1980), in 5 of 6 systems. Rebuilding is: ahead of schedule in the Unuk and Chickamin rivers; will not likely meet present escapement goals in the Alsek and Taku rivers; and is uncertain due to a lack of clear trends in escapement in the Chilkat and Stikine rivers.

In response to a request from the Panels, rebuilding progress in six transboundary rivers in northern British Columbia and Southeast Alaska was evaluated. A special report on the status of chinook rebuilding in the transboundary rivers has been presented. These six rivers are the Alsek, Chilkat, Taku, Stikine, Unuk, and Chickamin. Three systems, the Alsek, Taku and Stikine, are addressed under current Treaty annexes; the Chilkat, Unuk and Chickamin are not. A 15-year rebuilding program was initiated in 1981 to increase escapements to target escapement levels in depressed natural stocks. Escapement goals are based on considerations of historical catch and escapement data, and on apparent spawning and rearing area capacities. Data have not been available for spawner/recruit analysis of optimum spawning levels. Estimates of the proportion of the chinook stocks in Canadian and U.S. portions of the Transboundary rivers and their present escapement goals are:

RIVER	SPAWNING DISTRIBUTION in CANADA	UNITED STATES	BASE PERIOD ESCAPEMENTS CDN. EST.	U.S. EST.	ESCAPEMENT GOALS CDN. TARGETS	U.S. TARGETS
ALSEK	95-100%	0-5%	5800	4501	12000	5000
CHILKAT	10-20%	80-90%	N/D	211	N/D	2000
TAKU	95-100%	0-5%	10000	7978	30000	25600
STIKINE	90-95%	5-10%	8300	6224	25500	13700
UNUK	0-5%	95-100%	N/D	1263	N/D	2800
CHICKAMIN	0-5%	95-100%	N/D	346	N/D	1400

N/D = no estimates developed

The first five year cycle of the rebuilding program was completed in 1985. Average escapements increased during 1981-85 in five of six systems. Percentage changes in escapement compared to a base period of 1975-80 by stock were: Alsek -30%, Taku +17%, Chilkat +460%, Stikine +98%, Unuk +54%, and Chickamin +215%. The degree of escapement response has varied substantially between years and river systems. The degree of response is agreed to by U.S. and Canadian management agencies because the evaluation is based on changes in agreed to indexed escapements. Differences in agency escapement goals are due to differences in how agencies expand the index escapements to estimates of total river escapements and to differences in index escapement goals.

Relative to achievement of escapement goals, rebuilding is substantially ahead of schedule for two stocks, the Unuk and Chikamin. Escapements to these two stocks are expected to achieve goals during the second cycle. However, it appears unlikely that current management goals will be met in the Alsek and Taku stocks given current trends. (Information obtained since 1981 raises questions in ADFG's assessment as to the appropriateness of the Alsek goal). Further, lack of clear trends in escapements in the Chilkat and Stikine stocks makes our evaluation of rebuilding in these stocks uncertain. For the Stikine, ADFG's assessment is that achievement of the ADFG goal is still likely; CDFO's assessment is that achievement of the higher Canadian goal is unlikely.

Conservation actions in Southeast Alaska and northern B.C. should be continued. Management options to ensure rebuilding of Alsek and Taku stocks to optimum levels should be investigated. Escapement to the Stikine and Chilkat stocks should be closely monitored during the early period of the second cycle of rebuilding. The management agencies should resolve differences in escapement goals.

vii. Assessment of Strait of Georgia Rebuilding

Conclusion:
The US/CANADA Chinook model indicates that whether the Strait of Georgia stocks rebuild by 1998 is critically dependent upon assumptions about future survival rates, contributions to catch from Strait of Georgia hatchery stocks, and management actions taken in certain fisheries. The expected continued decline in escapement, and the lack of response in exploitation rates on the indicator stock under 1985 and 1986 management actions creates uncertainty about the possibility of rebuilding lower Strait of Georgia stock by 1998. The Committee recommends that management measures be taken in 1987 and 1988 to conserve mature chinook to minimize further reductions in spawning escapements. The Committee makes these recommendations while acknowledging that the model suggests that further management actions may not be required to rebuild these stocks under certain assumptions. While we believe each of the assumptions included in the model is possible, it is unlikely that all will be fulfilled. Given the severely depressed status of the lower Strait stock, the Committee strongly believes that conservation of spawners in 1987-88 is critical to a realistic expectation of achieving rebuilding. Further, the Committee recommends reduction of harvest rates in other fisheries to reduce the risk associated with rebuilding the upper and lower Strait of Georgia stocks (consistent with the original intent of the Chinook Rebuilding Program) and assessment of supplemental enhancement possibilities to assist the rebuilding of severely depressed populations.

In 1985 the Chinook Technical Committee recommended further management measures to conserve fall chinook stocks in the lower portion of the Strait of Georgia. In response to this recommendation the Commission agreed that:

" Canada will invoke management actions, as appropriate, in 1986 and 1987, to return (the lower Strait of Georgia stock) to the rebuilding schedule by the end of 1987."

The Committee has evaluated the potential for rebuilding Strait of Georgia chinook stocks by using the current Pacific Salmon Treaty Chinook Model.

Rebuilding of Georgia Strait fall chinook stocks is dependent upon these critical factors:

1. The survival of natural populations in the 1985-1988 brood years. Information from cohort analysis of indicator stocks and the age composition of the Strait of Georgia catches indicate that the survival of stocks in the Strait have been reduced in the 1980 through 1984 brood years. Modeling evaluations incorporated two assumptions about future survivals:

i) immediate return of the 1985 brood to base period survival levels. Returning to the base period survival in the 1985 brood year is considered very optimistic but it is obviously impossible to predict what future survivals will be.

ii) 3 year delay in return to base period survivals, A less optimistic assumption about survival was simulated by assuming that average survivals observed between 1980-84 is continued for the 1985-87.

However, the latter scenario may still be too optimistic due to the assumption of increasing survival to the average value in 1985 and 1986 broods. If the return to base period survivals is increased in the same pattern as they decreased, then rebuilding is delayed in comparison to scenario 1 (ii).

2. The rebuilding of the lower Georgia Strait stock with present ceilings appears to be directly associated with increased hatchery produciton within the Strait of Georgia. Hatchery production of chinook smolts has increased 4-5 fold since the years contributing to the base period and is expected to contribute significant buffering in the ceilinged fisheries. The Committee noted, however, that returns from hatchery releases of the present magnitude into the Strait have not been previously observed. Productivity of the hatchery stock may be reduced through density-dependent mechanisms. To assess the consequences of this potential effect, the rebuilding scenarios were evaluated with hatchery productivity equal to recently observed levels and at survivals reduced by 25%.

3. The other factor that influences rebuilding success is the fishing policy in net fisheries. The 1984 model assumed that a 25% reduction from base period harvest rates would be achieved in B.C. net fisheries. However, the 1984-1985 negotiation process resulted in catch ceilings in northern B.C. fisheries, and harvest rate reductions in southern B.C. fisheries. Observations in 1985 and 1986 indicated that harvest rate reductions in southern B.C. net fisheries have not been achieved. Therefore, three scenarios of net fishery management were used in the model assessments:

i. assumptions in the 1984 modeling process,

ii. ceilings in northern nets and harvest rate reductions in all B.C. net fisheries,

iii. ceilings in northern nets but no harvest rate reductions in Johnstone Strait net fishery.

4. A number of other key assumptions underlie the modeling analysis:

1. Current catch ceilings remain in place throughout the rebuilding period. Hatchery add-ons are assumed to have no impact on rebuilding.

2. No attempt was made to model changes in harvest rates resulting from alterations in noncatch mortality.

3. Observed deviations from ceiling catch levels have been incorporated into the model. It was assumed that there will be no bias in achievement of ceilings in future years. Catch ceilings are modeled as ceilings and not quotas.

4. No attempt was made to model changes in harvest rate indices.

5. Abundance of Georgia Strait stocks (Lower Georgia Strait wild, Lower Georgia Strait hatchery, and lower Fraser wild) is in proportion to brood year strength estimates. Robertson Creek hatchery stock survival rates were adjusted to reflect recent poor survivals.

6. Productivity and survival of Puget Sound stock remained at levels observed in the base period.

7. Upriver Brights were adjusted to reflect recent increases in total production. Current brood year production levels projected to remain in place throughout the rebuilding period.

8. Spring Creek hatchery production has declined drastically in recent years. Specific estimates of observed brood year survival rates for Spring Creek hatchery production were incorporated. Survivals assumed to return to base period average in Brood year 1985

9. The ceiling for Georgia Strait troll and sport fisheries was apportioned according to catch allocations in 1985 and 1986.

10. Harvest rate reductions resulting from the imposition of ceilings are applied proportionately to all stocks taken within that fishery.

11. Stock productivities were estimated using agency estimates of optimum escapement, annual harvest rates, and recent trend in stock abundance and escapement. To evaluate the sensitivity of the model projections to the stock productivity estimate, a run was made with the lower Georgia Strait productivity reduced by 25%.

12. The reproduction curve used for the natural stocks assumes increased returns per spawner with decreasing escapement below a stock's optimum escapement level.

Figure 13.

Lower Georgia Strait Stock

PSC 1986 Assessment

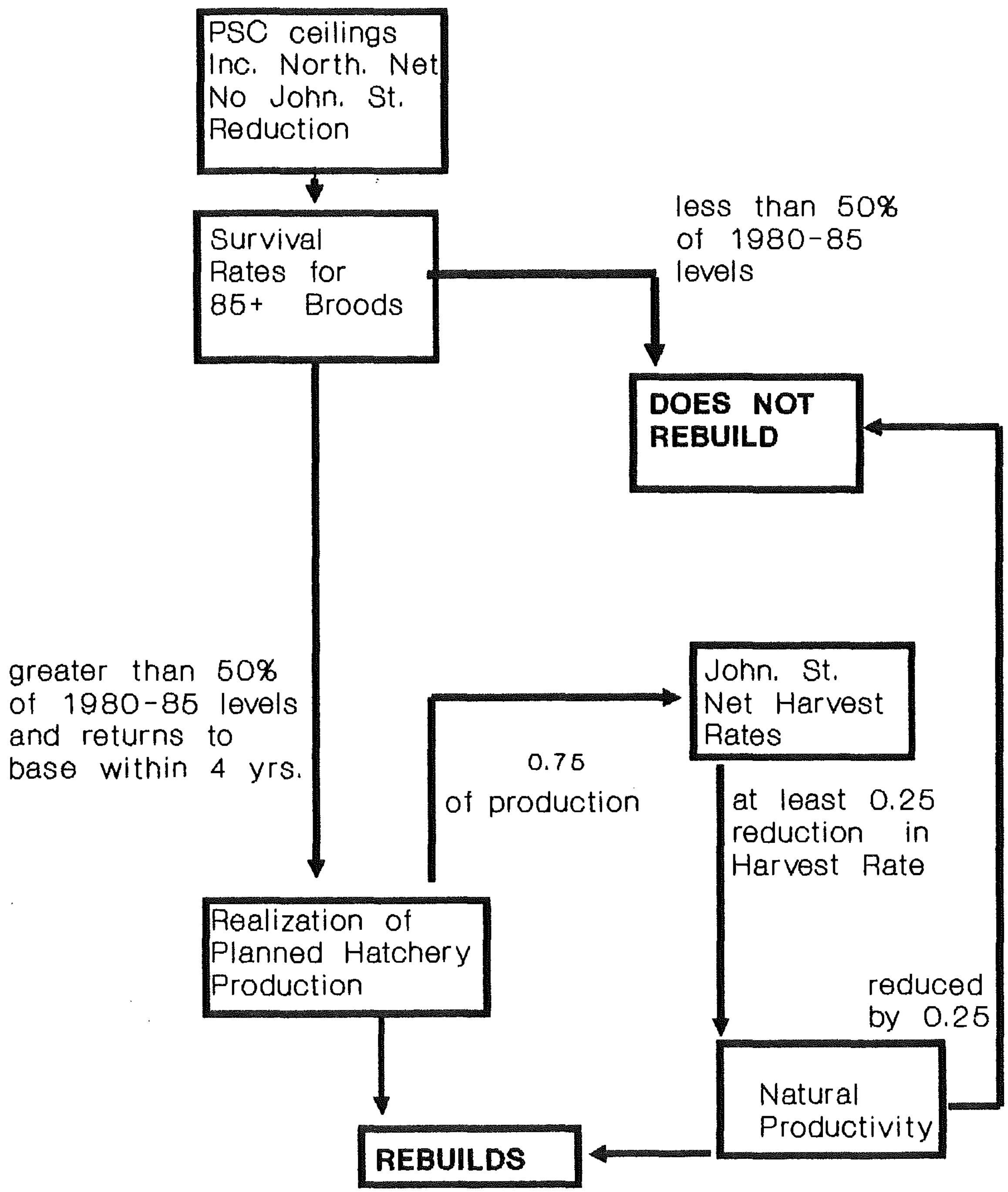
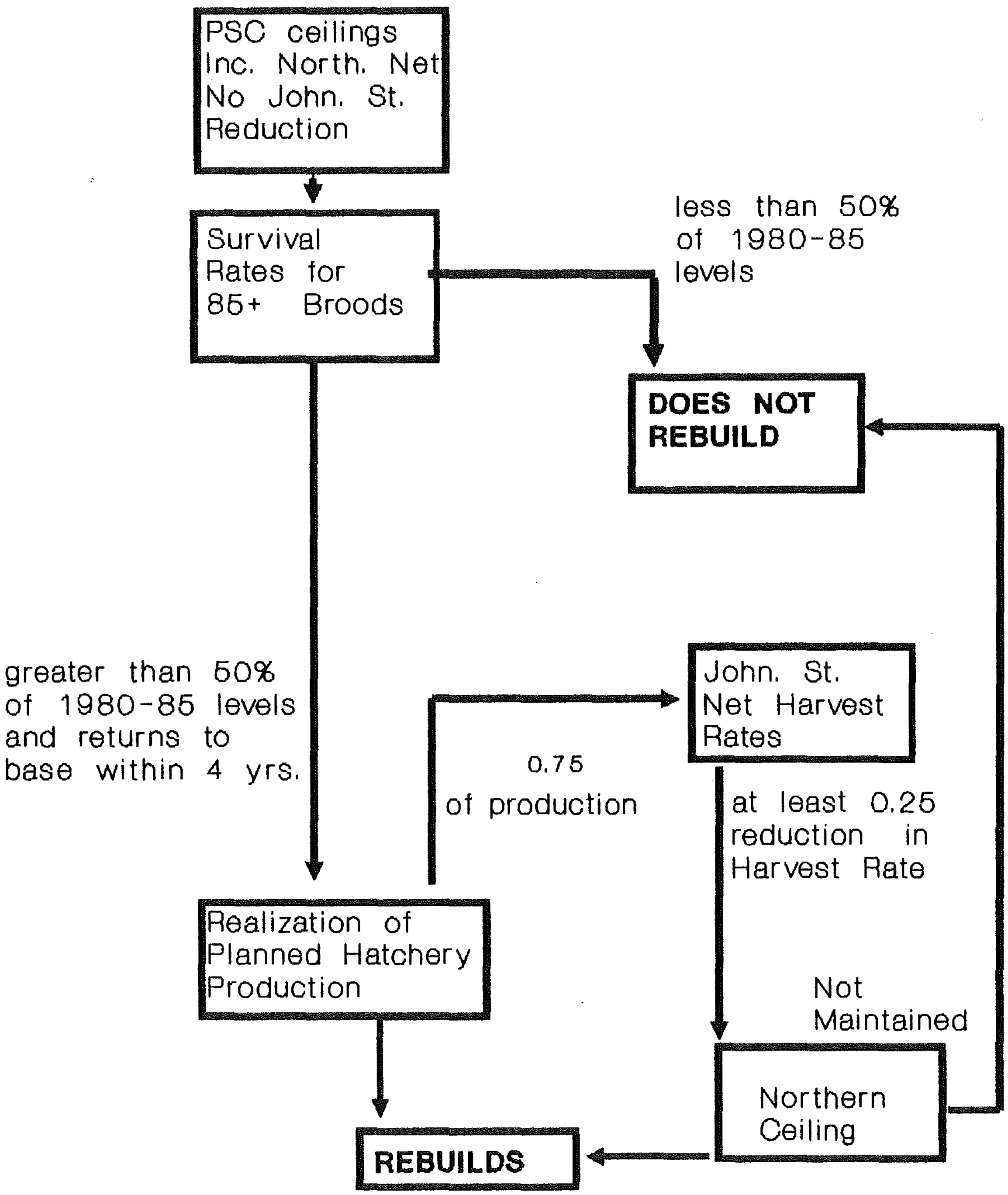


Figure 14.

Upper Georgia Strait Stock

PSC 1986 Assessment



The Committee has evaluated many scenarios incorporating fishing policies, hatchery production and survival of broods from natural stocks in 1985-88. The modeling assessment was performed to evaluate the response of Georgia Strait stocks to key assumptions regarding future patterns of survival rates, impacts of Canadian net fishing management, and potential contributions of hatchery production. The assessment was not intended to represent likely changes in environmental conditions or future hatchery production, or to recommend specific management actions. Rebuilding occurs rapidly if survival rates of the 1985 brood return to base period levels. The Committee felt this was a overly optimistic scenario and have used the 3 year delay scenario in summarizing the results for the lower Strait of Georgia stock (Figure 13) and the upper stock (Figure 14). Figure 13 indicates that the lower strait stock can rebuild but that rebuilding is sensitive to survival in the next 4 brood years, the success of hatchery production, and the ability to achieve a 25% reduction in harvest rate in the Johnstone Strait fishery. In 1984, the Committee noted the sensitivity of the rebuilding program to errors in estimation of stock productivities. This sensitivity is again evident in Figure 13, since at small reductions in productivity of the lower strait stock prevents rebuilding. Figure 14 indicates that the Upper Georgia Strait stock responds similarly to the lower stock. Rebuilding of the upper stock is more sensitive to fishing policies in the net fisheries.

Expected trends in spawning escapement to the Lower Strait of Georgia stock under 3 rebuilding scenarios (no delay in survival recovery, 3 year delay in recovery, and the 4 year delay with recovery pattern similar to the pattern of decline) and observed escapements (1975-86) are presented in Figure 15. It is important to note that escapements are expected to remain depressed for several more years and that rebuilding is sensitive to survival in the next few brood years.

If increases in hatchery production are realized, there will be larger increases in the number of hatchery origin fish returning to terminal areas. If the increased returns are to be harvested management measures would have to be developed that would not significantly impact the co-mingled natural stocks of concern. Expected contributions of the Georgia Strait hatchery stock to ceilinged fisheries and the terminal run of hatchery fish are presented in Figure 16.

Deviations from expectations in the Strait of Georgia will impact stocks originated in other areas. If current catch ceilings are maintained and the abundance of Georgia Strait hatchery and wild stocks do not respond, harvest rates on stocks originating outside the area may increase. These increases could impact the rebuilding of other depressed natural stocks.

Evaluation of the likelihood of rebuilding the lower Strait of Georgia will be insensitive to escapement trends over the next 3-4 years because of expected continued low levels of escapement. Monitoring of the status of rebuilding potential should include:

i) increasing contributions of the Strait of Georgia hatchery to fisheries where the natural stock from the Strait are harvested;

ii) harvest rate reductions in the Strait of Georgia sport and troll, northern B.C. troll, and Johnstone Strait net fisheries;

iii) age composition in the Strait of Georgia chinook fisheries and escapement to the stocks in the Strait;

iv) indices of survival in the hatchery indicator stocks.

Finally, it is important to realize that recent enhancements to the Canada/US Chinook Model and improvements to input data provide for a more effective simulation of fishery characteristics and stock rebuilding. Some modifications to the model which significantly affect simulations of Georgia Strait stock rebuilding are as follows:

1. Productivity estimates (Ricker A values) were fitted to model input data for each stock rather than using a single value for all naturally spawning stocks. The Committee believes that they represent the best available information on stock-specific productivity. Revised estimates of productivity for the Lower Georgia Strait stock is increased by 10% and decreased by 10% for the Upper Georgia Strait stock.

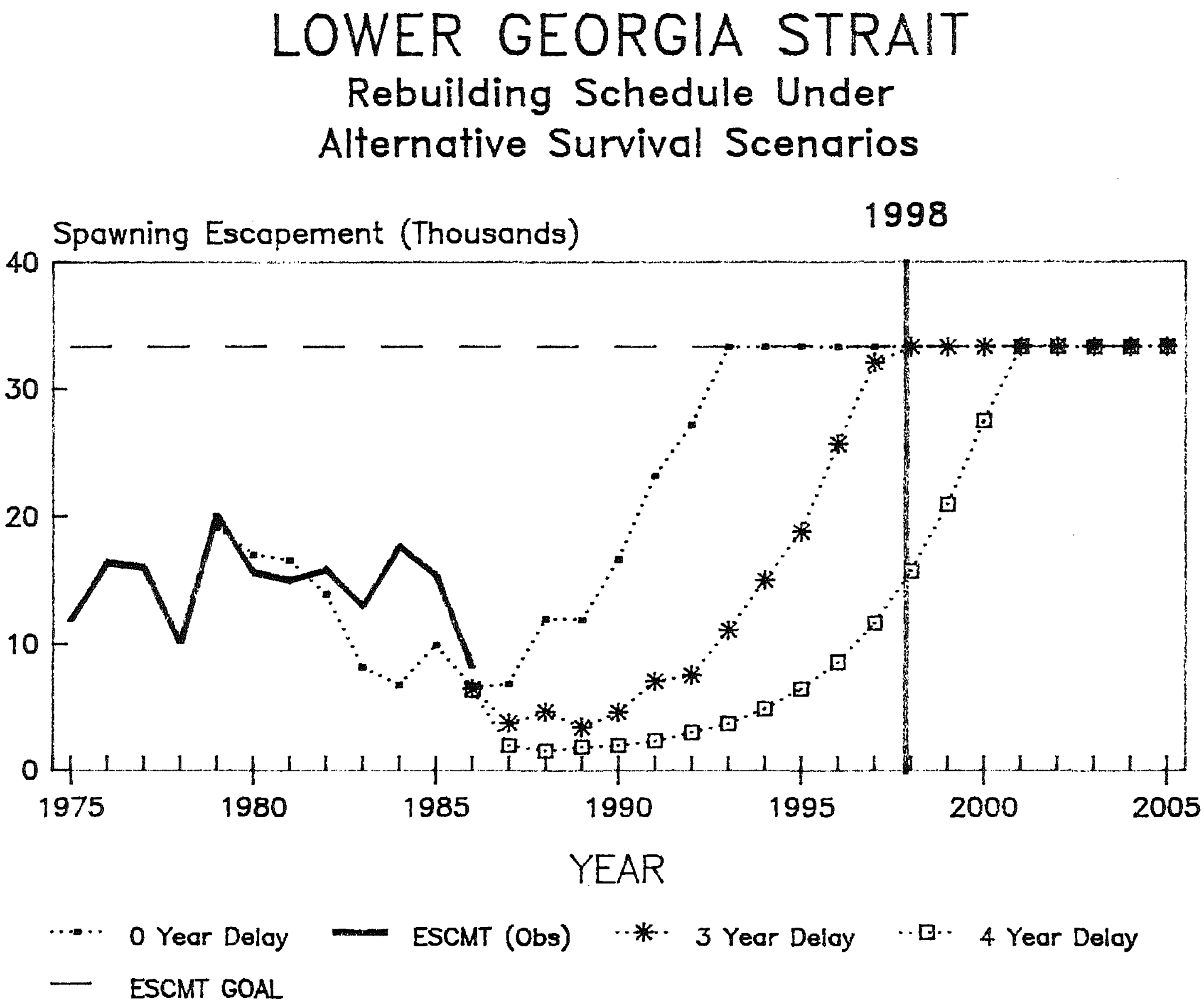
2. Coded-wire tag recovery data have been reviewed in the past two years. Corrections and improvements in the analysis of these data have been incorporated into the model. Two major changes in the analysis of Canadian data have been:

   a. the allocation of Freezer troll catch to emulate patterns observed in the ice troll catch.

   b. the use of calculated expansion factors in the Georgia Strait sport fishery (based on creel survey catch estimates) to estimate tag recoveries rather than using a fixed expansion factor as in 1984. This change increases calculated exploitation rates during the base period and decreases calculated exploitation rates for recent years.

3. The Georgia Strait stock unit used in the initial Canada/US model, has been divided into three stock components (Upper Georgia Strait, Lower Georgia Strait Hatchery, and Lower Georgia Strait natural). This division was made to more accurately represent the stock dynamics of this region.

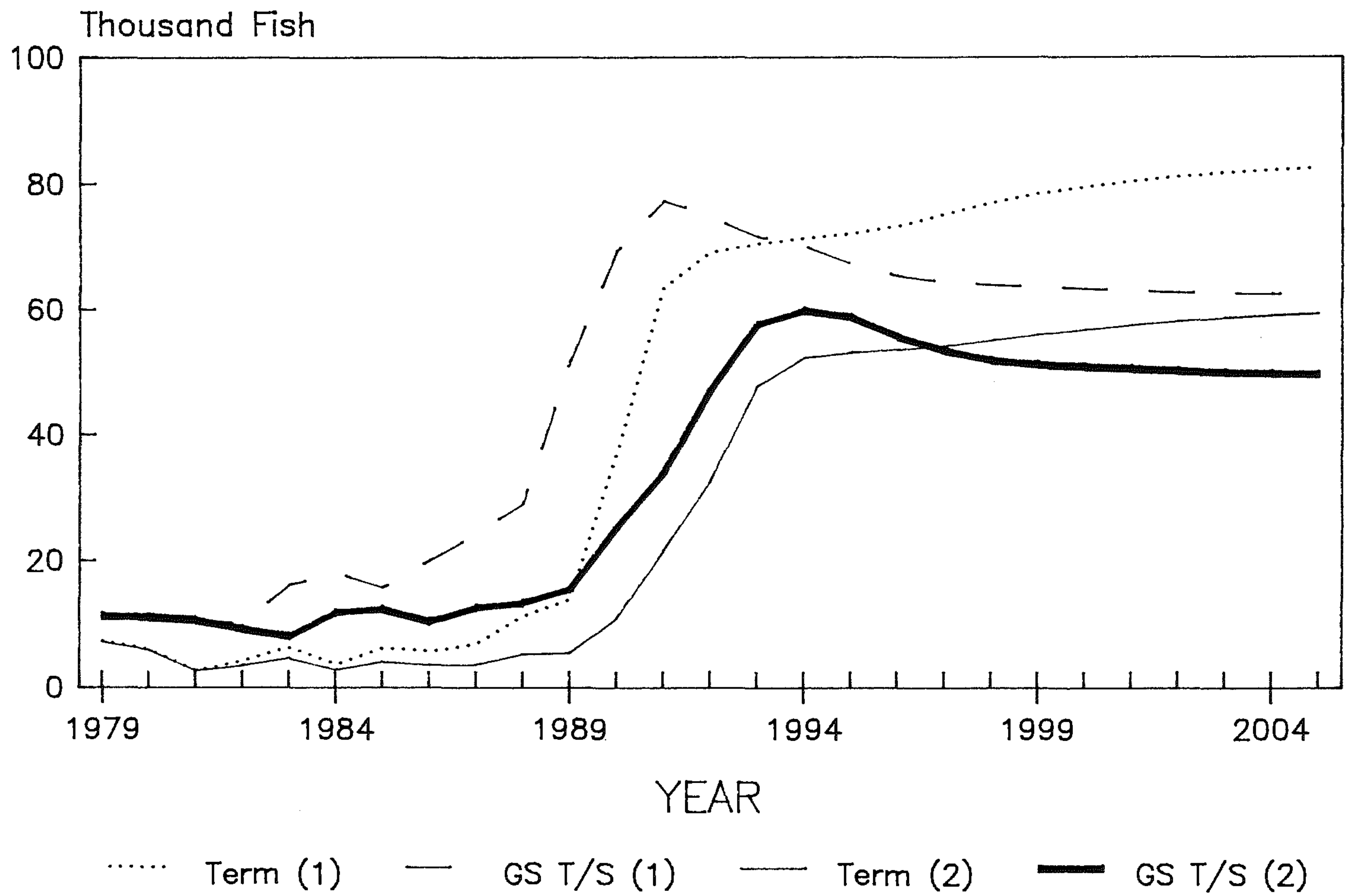
4. The new model includes 16 additional stocks to better represent contributors to coastwide fisheries. An important feature to this modification is the addition of some spring stocks; the old model was comprised of fall stocks only.



LOWER GEORGIA STRAIT
Rebuilding Schedule Under
Alternative Survival Scenarios
Spawning Escapement (Thousands)
1998
40
30
20
10
0
1975
1980
1985
1990
1995
2000
2005
YEAR
0 Year Delay
ESCMT (Obs)
3 Year Delay
4 Year Delay
ESCMT GOAL

Figure 15.

EXPECTATIONS OF HATCHERY PRODUCTION
GEORGIA STRAIT FACILITIES



Current PSC ceilings; base period Johnstone Strait Net;(1) Base period survival; (2) .75 Base period survival.

Figure 16.

V. 1987 PRELIMINARY EXPECTATIONS

Conclusions:
In view of the depressed status of Robertson Creek, Spring Creek and some Georgia Strait hatchery stocks, management and/or conservation options should be explored in 1987 to try to maximize brood-stock collection and survival for these facilities.

Preliminary qualitative forecasts for 1987 are presented below. For most stocks, quantitative forecasts are not made. For a small number of stocks, quantitative forecasts are scheduled to become available this spring. These preliminary forecasts may change within the next two months, but general comments concerning stock status are not expected to change drastically.

STOCK	PRELIMINARY 1987 EXPECTATIONS
Southeast Alaska	Generally above recent year levels
Transboundary	Generally above recent year levels
British Columbia	Returns in 1987 will largely result from escapements previous to the rebuilding program. Increased hatchery production of north migrating stocks will be offset in northern fisheries by a collapse of the 1983 brood year from Robertson Creek hatchery. Lower Georgia Strait stocks have continued to decline and poor survivals are expected from the 1983 and 1984 brood years. Other stocks will be similar to 1986 levels.
Puget Sound	Spring stocks, very poor. Summer and fall stocks, average levels, except for Skagit, Duwamish and Stillaguamish rivers.
Washington Coastal	Generally at recent year average levels. Grays Harbor spring and Quillayute summer stocks continue to be depressed.
Columbia River	Upriver brights, very good. Upper Columbia springs, expected to decline from 1986, still poor. Upriver summers, very poor. Spring Creek Hatchery, very poor.
Oregon	Generally healthy.

VI. MODEL IMPROVEMENTS

The Multiple Stock Model, used in the development and evaluation of the chinook rebuilding program, has been expanded to incorporate a more comprehensive set of stocks and fisheries. The model has also been modified to support simulation of a wider range of management actions and to facilitate analysis and presentation of model output. In addition, the model was converted to a more efficient programming language. The model was modified to allow input of specific adjustment factors to reflect observed trends in abundance as the rebuilding program progesses. Mechanisms providing for adjustments to fisheries harvest rates were incorporated to allow simulation of management actions in fisheries not directly under ceiling management.

In order to provide more effective representation for the range of natural and hatchery stocks, the model was expanded from the 4 stocks included in the original version to incorporate 22 separate stocks. The expansion included both additional stock units, as well as a breakout of the Georgia Strait composite stock to 3 component stocks with different distribution patterns. Specific productivity values for individual stocks have been estimated and incorporated into the model. Those productivity values were calculated using a standardized method employing stock specific exploitation rates and trends in recent historical escapements.

The fisheries represented in the model have been expanded from 9 to 25 to provide for more effective simulation of management actions and fisheries characteristics.

VII. ASSOCIATED FISHING MORTALITY RATE ON CHINOOK SALMON

Conclusions:
The appropriate range of chinook associated fishery mortality rates is 20% - 30% for troll and 50% - 100% for purse seine gear. Agency documents summarizing unaccounted for associated fishing mortalities have been provided.

As stocks begin to rebuild, the Committee expects the magnitude of noncatch mortality to increase. The Committee was unable to precisely quantify noncatch mortality or to conclude that the mortality will prevent achievement of the goal of completing the rebuilding program by 1998. The magnitude of such mortality, and subsequent impacts on rebuilding and distribution of impacted stocks, can vary between fisheries and regions. An evaluation of the impact of induced mortalities on the rebuilding program is scheduled to begin later this spring.

Nonretention of chinook is being used as a means to reduce catch in some seine, troll and sport fisheries. From a fisheries management perspective, induced mortality is a consequence of providing additional harvest opportunities (i.e. prolonged access to chinooks in particular size classes, or for access to comingled species). Fish lost to induced mortality may otherwise have contributed to escapement or to future harvest.

Hook And Release From Commercial Troll Gear

The Committee did not reach a consensus opinion on a point estimate of mortality rate. After much discussion and review of the literature, a range of estimates, rather than a single point estimate, was discussed. The Committee members' opinions were that appropriate point estimates range from 20% to 30% for chinook salmon. Some reasons for these different scientific opinions were: 1) estimates of hooking mortality are size dependent (mortality rates for large fish are probably less than rates for small fish); 2) regional variation in mortality estimates are likely; 3) variation in fishing techniques; and 4) type of fishing gear used. Within the Committee, these kinds of reasons have led to valid differences of professional opinion regarding interpretation of the available data.

Confidence about the appropriate mortality rate to apply may benefit from more research on the size dependence of mortality rates and from replication of studies. To date, only one study evaluated size-dependency and experimental replication has been lacking.

Assessments of hooking mortality can be broken down into two components: immediate mortality (fish that are dead when landed) and delayed mortality (fish that die after release). Estimates of immediate mortality from past studies range from 2.5 to 10.8 percent compared to total mortality estimates which range between 10 and 70 percent. The most difficult problems arise in assessing delayed mortality. Results of available research differ according to study design, area, gear and fishery involved. The wide variation encountered in the interpretation of study data is due to the following fundamental problems: 1) different experimental approaches; 2) differences in methods of capture and handling; 3) differences in the operational characteristics of the fleet; 4) differences in the presence of predators; and 5) the extreme difficulty of comparing the mortality of hooked and released fish with free swimming fish that have been hooked.

Catch And Release From Purse Seine Gear

No study designed to estimate mortality from the capture and subsequent release of chinook salmon in purse seine fisheries was encountered in the literature. However, general observations suggest most chinook that are released from seine fisheries probably die; induced mortality rates may range from a minimum of 50% to as high as 100%. Factors affecting the mortality rate include the size of the fish involved and the number of fish in a haul (chinook and other species).

Associated Mortality Summary

Precise quantification of noncatch fishing mortality is extremely difficult and costly. Substantial technical problems exist to accurately estimate impacts (catch and release rates and mortality) which further monitoring programs are unlikely to totally resolve.

Previous experience suggests that estimated encounter rates may be imprecise and that this imprecision may provide the largest source of potential error to mortality assessments. The number of chinooks hooked and released could be estimated through adequate sampling procedures and is therefore a more tractable problem than refining mortality rate values.

Identifying the range of scientific opinion within the Committee can help in the formulation of management decisions for assessing the impact of hooking mortality. Depending on the status of the rebuilding program and the level of risk deemed appropriate, different values of mortality rate within the specified range may be appropriate for management use. However, within the range of mortality rates presented, an assessment of the induced mortality associated with a particular fishery is probably more dependent upon the number of chinook encountered than upon differences of opinion about which mortality rate to apply.

Estimates of Associated Mortality

The Committee summarized qualitative information about associated mortality (Table 4.) and available quantitative data (Table 5.).

Table 4. Qualitative summary of catch and associated induced non-catch mortality. Quality of information available on induced mortalities and an assessment of the impact of various sources of induced mortalities are indicated. Qualifiers in each cell are: REL = reliable data; ? = uncertain data quality; NONE = no data; and N/A indicates the topic is not appropriate to the gear or situation. Trend indicates the direction of change (UP, DOWN, of NCH) or that the direction of change is unknown (UKN). Data in this table was provided by responsible management agencies.

		TROLL					SPORT					GILLNET					SEINE				
AREA	DATA	CATCH KEPT	RELEASED SUBLEGAL	RELEASED LEGAL	NON REPORT	UNOBS	CATCH KEPT	RELEASED SUBLEGAL	RELEASED LEGAL	NON REPORT	UNOBS	CATCH KEPT	RELEASED SUBLEGAL	RELEASED LEGAL	NON REPORT	UNOBS	CATCH KEPT	RELEASED SUBLEGAL	RELEASED LEGAL	NON REPORT	UNOBS
S.E.ALASKA:	DATA QUALITY	REL	REL	REL	NONE	REL	REL	REL	REL	NONE	REL	REL	N/A	N/A	NONE	REL	REL	?	REL	?	NONE
	TREND	DOWN	DOWN	UP	UKN	DOWN	UP	UP	UP	UKN	UP	DOWN			UKN	DOWN	UP	UKN	UP	UP	UKN
NORTHERN B.C.:	DATA QUALITY	REL	REL	N/A	NONE	NONE	?	NONE	NONE	NONE	NONE	REL	N/A	N/A	NONE	NONE	REL	NONE	N/A	?	NONE
	TREND	DOWN	DOWN		UKN	UKN	UP	UKN	UKN	UKN	UKN	DOWN			UKN	UKN	DOWN	UKN		NCH	UKN
WEST CST. a/ VAN. IS.:	DATA QUALITY	REL	REL	N/A	NONE	NONE	?	NONE	NONE	NONE	NONE	REL	N/A	N/A	NONE	NONE	REL	NONE	N/A	?	NONE
	TREND	DOWN	DOWN		UKN	UKN	UP	UKN	UKN	UKN	UKN	DOWN			UKN	UKN	DOWN	UKN		NCH	UKN
GEORGIA ST a/	DATA QUALITY	REL	?	REL	NONE	NONE	REL	NONE	NONE	NONE	NONE	REL	N/A	N/A	NONE	NONE	REL	NONE	N/A	?	NONE
	TREND	DOWN	DOWN	UP	UKN	UKN	DOWN	UP	UKN	UKN	UKN	DOWN			UKN	UKN	DOWN	UKN		NCH	UKN
PUGET SD.:	DATA QUALITY	REL	?	?	NONE	NONE	REL	?	NONE	NONE	NONE	REL	N/A	N/A	NONE	NONE	REL	REL	N/A	NONE	NONE
	TREND	UP	UP	UP	UKN	UKN	DOWN	DOWN	UKN	UKN	UKN	NCH			UKN	UKN	DOWN	DOWN		UKN	UKN
WEST CST. b/ WASHINGTON:	DATA QUALITY	REL	?	?	NONE	NONE	REL	?	?	NONE	NONE	REL	N/A	N/A	NONE	NONE	N/A	N/A	N/A	N/A	N/A
	TREND	DOWN	DOWN	DOWN	UKN	UKN	DOWN	DOWN	DOWN	UKN	UKN	DOWN			UKN	UKN					
COLUMBIA RIVER	DATA QUALITY	N/A	N/A	N/A	N/A	N/A	REL	?	?	NONE	NONE	REL	N/A	N/A	NONE	NONE	N/A	N/A	N/A	N/A	N/A
	TREND						UP	UP	UP	UKN	UKN	UP			UKN	UP					

a/ Georgia Strait catch area includes net fisheries in Johnstone Strait and the West Coast catch area includes net fisheries in Juan de Fuca.

b/ Includes catches north of Cape Falcon, Oregon.

Table 5. Estimated catch and associated induced mortality in west coast salmon fisheries impacting chinook salmon along the Pacific west coast. Blanks in the table indicate that quantitative estimates are are not available. BP = base period (1977-1982).

AREA	PERIOD	TROLL					SPORT					GILLNET					SEINE				
		KEPT	RELEASED SUB LEG	RELEASED LEGAL	NON RPT	UNOBS	KEPT	RELEASED SUB LEG	RELEASED LEGAL	NON RPT	UNOBS	KEPT	RELEASED SUB LEG	RELEASED LEGAL	NON RPT	UNOBS	KEPT	RELEASED SUB LEG	RELEASED LEGAL	NON RPT	UNOBS
S.E.ALASKA:																					
	BP	298,257	301,000	17,888			17,754					12,154					13,912		0		
	1983-84	247,049	190,920	81,000			21,599					8,666					17,179		0		
	1985-86	211,308	169,867	91,125			22,304					10,853					18,227		18,206		
NORTHERN B.C.:																					
	BP	252,225	174,566	0								26,800			10,100		43,900			33,100	
	1983-84	265,794	270,710	0								9,200			6,300		22,400			22,400	
	1985-86	208,272	200,757	0								22,100			9,500		27,050			36,700	
WEST CST.a/ VAN. IS.:																					
	BP	500,327	478,960	0								26,400			8,600		10,700			31,300	
	1983-84	422,838	442,590	0								41,145			3,510		2,700			11,100	
	1985-86	345,825	368,680	0								10,950			7,185		13,020			34,085	
GEORGIA a/ ST.:	BP	236,000	297,200	0			332,400	332,400				48,600			7,600		31,600			16,700	
	1983-84	96,800	78,100	0			283,900	283,900				21,650			11,750		20,400			21,900	
	1985-86	50,900	53,600	8,800			208,600	208,600				35,050			4,050		25,200			4,800	
PUGET SD.:																					
	BP	13,300					211,000					173,300					50,500	146,480 c/			
	1983-84	19,000					187,000					158,500					41,000	102,502 c/			
	1985-86	23,000					149,000 b/					169,000					35,500	101,510 b/ c/			
WEST CST.e/ WASHINGTON:																					
	BP	149,100					109,400					41,100									
	1983-84	36,800					29,300					15,800									
	1985-86	49,700					27,300					26,600									
COLUMBIA R.:	BP											169,400									
	1983-84						37,600 d/					92,800									
	1985-86						49,100 d/					213,200									
							53,900 d/														

a/ Georgia Strait area includes catch in the Johnstone Strait net fisheries and West Coast catch area includes the net fisheries of Jaun de Fuca
b/ 1985 only; 1986 not yet available
c/ Areas 7/7A & 8-13; these are overestimates
d/ Mainstem Columbia River plus tributary spring chinook catches for Willamette, Cowlitz, Kalama and Lewis Rivers.
e/ Includes catches north of Cape Falcon, Oregon.

VIII. PASS-THROUGH IN FISHERIES WITHOUT HARVEST CEILINGS

Various reports have been prepared for specific management regions and fisheries not covered by PSC harvest ceilings. These reports for southern areas were distributed at the February 8, 1987 PSC meeting and for Canadian fisheries at the February 21, 1987 meeting. These reports document substantial work by the agency staffs, but the Committee has not had the opportunity to jointly review and discuss the results of these agency efforts. However, based on agency conclusions contained in these reports most pass-through fisheries of concern to the PSC appear to not be presenting problems at this time. The Canadian agency assessment did identify a potential problem with Canadian net fisheries in Johnstone Strait where harvest rates have remained, on average, equal to the base period averages. This is in contrast to the expectation that they would be reduced during rebuilding to 0.75 of the average base period harvest rates. The southern U.S. area agency report identified a potential problem with increasing troll fishery harvest in Juan de Fuca Strait and with variable recreational fisheries in the Juan de Fuca and northern Puget Sound areas.

IX. REVIEW OF ALASKA HATCHERY ADDON

The Committee reviewed the State of Alaska's report: "Preliminary Review of 1986 Chinook Salmon Hatchery Addon For Southeast Alaska Fisheries And Projected Addon For 1987 - January 12, 1987". The Committee concluded that: (a) the State of Alaska's assessment procedures for the 1986 addon are adequate; (b) the current plans for assessing 1987 addon are adequate with the provision that the coefficient of variation term in the risk calculations be updated with data available through 1986 and tagging rates for stocks expected to contribute to 1987 fisheries. The State of Alaska has agreed to provide the Committee the results of this update for review and comment.