Newfoundland East and Southeast Coast Herring - 1989 Assessment

by

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Abstract

Data analyses from 1989 are presented for the five herring stock complexes within the Newfoundland Region: 1) White Bay-Notre Dame Bay, 2) Bonavista Bay-Trinity Bay, 3) Conception Bay-Southern Shore, 4) St. Mary's Bay-Placentia Bay, and 5) Fortune Bay. Commercial landings decreased from 19,200 t in 1988 to 8,100 t in 1989. All stocks continue to be dominated by the single 1982 year-class; however, substantial numbers of immature herring (primarily 1987 year-class) were reported from the 1989 commercial fishery. Biomass estimates are presented for the two southern stock areas from an acoustic survey conducted during the winter of 1990. Research gillnet catch rates at age for all five stock areas were examined using the multiplicative model and preliminary results are presented examining the relative strengths of recent year-classes.

Résumé

On présente ici l'analyse des données de 1989 portant sur les cinq zones de stock de hareng de la région de Terre-Neuve, soit celles des baies 1) White-Notre Dame; 2) Bonavista-Trinity; 3)Conception et côte sud; 4) St. Mary's-Placentia et 5) Fortune. Les débarquements commerciaux, qui s'élevaient à 19 200 t en 1988, sont tombés à 8 100 t. Tous les stocks continuent d'être dominés par une seule classe annuelle, celle de 1982. Toutefois, on a signalé la présence de nombreux harengs n'ayant pas encore atteint la maturité (provenant essentiellement de la classe de 1987) dans la pêche commerciale en 1989. On présente aussi des estimations de la biomasse des deux zones de stock du sud fondées sur un relevé acoustique réalisé durant l'hiver 1990, ainsi que les résultats préliminaires de l'analyse effectuée à l'aide du modèle multiplicatif appliqué aux taux de prises selon l'âge obtenus lors d'essais au filet maillant dans les cinq zones de stocks. Ces résultats révèlent la force relative des dernières classes annuelles.

Introduction

Description of the 1989 Fishery

The 1989 herring management plan provided the following allocations to each gear sector: fixed gear (gillnets and traps), bar seines and purse seines within each stock area (Fig. 1):

Stock area	Fixed gear allowance (t)	Bar seine (t)	Purse seine (t)	Reserve (t)
White Bay-Notre Dame Bay (WB-NDB)	1,000	1,000 1,000	5,000 5,000	1,000
Bonavista Bay-Trinity Bay (BB-TB)	900	500 500	2,000 2,000	1,000
Conception Bay-Southern Shore (CB-SS)	200	100 100	500 200	400
St. Mary's Bay-Placentia Bay (SMB-PB)	300	100 100	500 500	0
Fortune Bay (FB)	500	1,000	0	0
Labrador coast	500	200	0	0
South coast Newfoundland	100	100	0	0

As in 1988, the management plan was devised prior to the spring fishery. For each of the three northern areas (WB-NDB, BB-TB, and CB-SS), a portion of the TAC was held in reserve. The fall fishery allocations included uncaught portions of the spring fishery allocations plus a portion of the reserves, where necessary. Quota transfers were permitted between the purse seine and bar seine sectors.

Nominal Catches

TAC's and landings (x 10^3 t) by stock area are listed below for 1982 to 1989:

		1982	1983	1984	1985	1986	1987	1988	1989
WB-NDB	TAC	1.2	0.0	1.5	2.0	5.5	32.5	34.7	14.0
	Catch	2.0	0.4	1.5	1.8	2.8	13.5	7.3*	3.4*
BB-TB	TAC	0.7	0.0	0.4	0.8	3.8	13.7	16.2	6.9
	Catch	0.5	0.1	0.2	0.6	1.8	6.1	10.1*	3.1*
CB-SS	TAC	0.2	0.0	0.1	0.2	0.6	3.5	0.6	1.5
	Catch	0.1	<0.1	<0.1	0.1	0.2	1.0	0.5*	1.1*
SMB-PB	TAC	0.0	0.0	0.0	0.6	2.1	2.5	8.9	1.5
	Catch	<0.1	<0.1	0.1	0.1	0.1	0.3	1.2*	0.4*
FB	TAC	0.0	0.0	0.0	0.3	0.7	2.4	4.7	1.5
	Catch	<0.1	<0.1	<0.1	0.1	0.1	0.1	0.1*	0.1*

* 1988 and 1989 catches are preliminary.

Anecdotal Information

As in the previous three years, quotas were not taken in any of the stock areas due to poor market conditions. Catches declined in three of the five stock areas and increased in the Conception Bay-Southern Shore area only (Tables 1-5). In the two most northern areas, where the fall purse seine fishery is normally concentrated, there was a general reduction in effort due both to the poor market conditions and also due to the mixing of substantial numbers of immature herring (primarily 1987 year-class) with the larger commercial size herring. This was reported by several seiner skippers as the reason for the reduction in their landings. The increased catch in the Conception Bay-Southern Shore stock area was due to a further allocation of 500 t to purse seines during the fall fishery. Catches in St. Mary's Bay-Placentia Bay declined as the two seiners which accounted for 60% of the total catch, changed to the more lucrative cod fishery before the herring quota was taken. The Fortune Bay fishery continued as a bait fishery only, as no purse seine vessels were licenced to fish in the area.

INPUT DATA

Biological Sampling

There were 15,126 herring sampled in 1989 from the commercial fishery and research programs (Table 6), an overall increase of 11% from 1988. The increase in sampling was due to the further increase of the research gillnet program during the spring along the northeast coast in addition to its continuation during the fall in the same areas. This resulted in an increase of 28% in the number of fish from research samples, whereas the number of fish from commercial samples decreased by 20%. When apportioned by stock area, month, and gear type (Table 7), samples were available for 93% of the commercial catch; up from 80% in 1988. Samples were collected randomly; all fish sampled were measured and aged.

Mean weights at age for 1989 (Table 8) were derived from commercial and research samples of spring spawning herring collected from January to June.

Commercial Fishery Catch at Age

Commercial catch-at-age data (Tables 9-13 and Figs. 2 and 3) were calculated for spring and autumn spawners for each stock area by applying age compositions and mean fish weights from the appropriate commercial samples to the landings. As in the past, catch-at-age data were generated using research samples collected from commercial mesh size gillnets for those areas where no commercial samples were available.

The 1982 year-class of spring spawners continued to dominate the fishery (by number) in all stock areas, accounting for 33% to 66% of the catch. These percentages were lower than 1988 when this year-class accounted for 41% to 70% of the catch. The 1985 year-class continued to account for approximately 20% of the commercial catch in Bonavista Bay-Trinity Bay. The 1987 year-class which accounted for 10% of the 1988 catch in White Bay-Notre Dame Bay did not contribute significantly to the 1989 catch in that area. However, there were still reports of small fish (1987 year-class) in this area during the fall purse seine fishery. In the Conception Bay-Southern Shore stock complex, the 1985, 1986, and 1987 year-classes accounted for approximately 60% of the landings. These year-classes were evident in both the spring (April) and fall (October) purse seine landings. As in 1988, there was a general absence of year-classes, other than the 1982 year-class, in the commercial catch in the two southern areas (Fig. 3). In Fortune Bay, this may be partially explained by the fact that there was no purse seine fishery, fixed gear only, which would be more selective to the larger fish. However, in St. Mary's Bay-Placentia Bay, 62% of the landings were by purse seine.

The percentage of spring spawners in the catch remained high in all areas (>80%) except for St. Mary's Bay-Placentia Bay where autumn spawners accounted for 42% of the catch. Although this is a higher percentage for the area than in 1988, it is not unusual as in 1986, 49% of the commercial catch was autumn spawners.

The actual age distribution of the 1989 commercial catch in the two northern areas (Fig. 4) closely approximated that predicted from the 1988 acoustic survey (Wheeler et al. 1989). As expected, the 1982 year-class dominated in both areas, followed by the 1983 year-class in White Bay-Notre Dame Bay and by the 1985 year-class in Bonavista Bay-Trinity Bay. It was expected that fish aged 11+ would contribute more than they did to the catch in White Bay-Notre Dame Bay.

Research Gillnet Program

i) Program Description

The program was continued for the tenth consecutive year during the fall in the three northern areas and for the eighth year during the spring in the two southern areas. The spring program for the three northern areas, which began in 1985, was expanded from ten fishermen in 1988 to seventeen in 1989 and included six fishermen in White Bay-Notre Dame Bay, eight in Bonavista Bay-Trinity Bay and three in Conception Bay-Southern Shore. These were in addition to the five fishermen already in place in St. Mary's Bay-Placentia Bay and the three in Fortune Bay. The fourteen fishermen involved in the fall gillnet program along the northeast coast continued to fish in 1989 until a decision is made to continue or terminate the fall program.

Each of the research gillnet fishermen was contracted to fish five gillnets (mesh sizes 2"-3") for one month, to maintain an accurate daily log record of catches, and to collect samples of his catch.

The research gillnet data base has also been expanded this year to include data collected during the spring, in some areas only, in 1970, 1971, 1973, 1980, 1981, and 1982 by research personnel (Table 14). These data were collected during field surveys from a fleet of five research gillnets set in the same manner as by the present contract fishermen. The research gillnets used during the field surveys were "shallow" nets, identical to those fished by contract fishermen from 1980-82. The same conversion factor, derived from comparisons of catches from deep and shallow nets (Wheeler et al. 1986), which has been used to adjust shallow net catches of contract fishermen, was used to adjust the shallow net catches for the 1970-82 research data.

ii) Research Gillnet Catch at Age

Catches at age for each stock area were calculated by applying age distributions of samples taken during the month, normally at four-day intervals, to catches during that interval and then combining these interval age distributions into one for the entire month.

The 1982 year-class again dominated (by number) in the spring program in all areas, ranging from 33% of the catch in White Bay-Notre Dame Bay to 65% of the catch in Fortune Bay (Figs. 5 and 6). The 1985 year-class, which was evident in the research gillnet catches during the fall of 1988 in both Bonavista Bay-Trinity Bay and Conception Bay-Southern Shore accounted for 20% and 10% of the respective catches during the spring program in 1989. However, it didn't dominate the catches as did the 1982 year-class as four-year-olds in 1986 (40-70%). Fish aged 11+ continued to account for approximately 10% of the catch in White Bay-Notre Dame Bay, Conception Bay-Southern Shore, and Fortune Bay. Although, the 1982 year-class continued to totally dominate the catches in the two southern areas, the 1986 year-class of spring spawners accounted for 16% of the catch in St. Mary's Bay-Placentia Bay. In Fortune Bay, year-classes subsequent to the 1982 year-class have been totally absent from research gillnet catches. The percentage of spring-spawners remained consistent in all areas, ranging from 83% in St. Mary's Bay-Placentia Bay to 93% in Conception Bay-Southern Shore.

Research gillnet catches at age were available for the fall for the three northern stock areas (Fig. 7). Although the 1982 year-class dominated the catch in White Bay-Notre Dame Bay and Bonavista Bay-Trinity Bay, the 1987 year-class, as two-year-olds, accounted for 54% of the catch in Conception Bay-Southern Shore. It also represented 17% of the fall catch in Bonavista Bay-Trinity Bay and 2% in White Bay-Notre Dame Bay. In comparison, the 1982 year-class as two-year-olds, accounted for approximately 10% of the 1984 fall catch in Conception Bay-Southern Shore and Bonavista Bay-Trinity Bay and 5% in White Bay-Notre Dame Bay (Wheeler et al. 1988). The increased catch of two-year-old fish from north to south is not unexpected as fish growth rates, and hence selection rates to the research gillnets, increase from north to south. Further evidence of the strength of the 1987 year-class will be available from the 1990 spring research gillnet catches. As in the 1989 spring catches, the 1985 year-class represented approximately 15-20% of the fall catch in both Bonavista Bay-Trinity Bay and Conception Bay-Southern Shore. The percentage of spring spawners was slightly higher than during the spring, and ranged from 93% for Bonavista Bay-Trinity Bay to 98% for Conception Bay-Southern Shore.

The fall research gillnet program provides important information on recruiting year-classes. Fish at age two are too small to be recruited to the research gillnets during the spring but by the fall are partially recruited to the two inch mesh size nets.

iii) Research Gillnet Catch Rates

This year, for the first time, detailed examination of research gillnet catch rates was conducted for each stock area using the multiplicative model (Gavaris 1980). Separate analyses were conducted where data were available from both the spring (April to June) and fall (October to December) for a stock area. Catch rates were calculated as the number of fish caught (spring and autumn spawners combined) per day fished. There were three categories evaluated in the model: fisherman, week, and year. Certain data groupings or deletions (Table 15) were necessary to run the model. In addition, catches of 0 fish are adjusted by 1.1.

Regression coefficients by area and season from the multiplicative model analyses are as follows:

	R^2	
Stock area	Spring	Fall
WB-NDB	0.351	0.247
BB-TB	0.499	0.237
CB-SS	0.491	0.583
SMB-PB	0.332	-
FB	0.341	-

For two of the three areas for which data are available for both spring and fall, the model provides a better relationship for the spring data. This is consistent with the hypothesis that catch rates during the spring should better reflect stock abundance as the nets are fished on overwintering or prespawning concentrations of fish. For all areas and seasons, there was a pattern exhibited by the residuals. It was determined that most of the pattern was caused by small catch values and that the pattern could be removed by deleting catches equal to 0 from the data sets. However, this was not done because it was felt that this could bias the results as there was a trend over time in the occurrence of 0 catches (Table 16). As expected, there were differences between fishermen in all stock areas. There were also some temporal trends within seasons, in particular in the spring for both Bonavista Bay-Trinity Bay and Conception Bay-Southern Shore where catch rates during May were higher than during June.

Unstandardized catch rates and those derived from the multiplicative model, for spring spawners only are presented in Figures 8-11. Although, the magnitudes of the two series differ, trends over time are consistent. With the exception of the spring data for White Bay-Notre Dame Bay and Fortune Bay, catch rates have declined in recent years. For Bonavista Bay-Trinity Bay and St. Mary's Bay-Placentia Bay for which there are data from both the 1970's and 1980's, catch rates during the 1980's are substantially lower than during the 1970's. Both the spring and fall data for

Bonavista Bay-Trinity Bay and Conception Bay-Southern Shore both exhibit the same trends with increasing catch rates through the mid 1980's and declining catch rates in the late 1980's.

Catch rates at age have been calculated by stock age, season, and spawning component from unstandardized catch rates and multiplicative model catch rates (Tables 17-24). The unstandardized catch rates at age were calculated from the research gillnet catch at age and effort data. The multiplicative model catch rates for spring and autumn spawners combined were partitioned by spawning type and age using the same distributions calculated for the unstandardized catch rate data.

The multiplicative model analysis of catch rates is still considered preliminary. Further investigation is required of the potential leverage of the data collected by research personnel between 1970 and 1982 as they include few observations in some areas and years. Investigation is also required on how occurrences of 0 catch should be treated in the model. However, initial analyses suggest that both spring and fall research gillnet catch rates exhibit similar trends. The fall research gillnet program in the three northern areas will therefore be continued until this can be investigated further through detailed analysis within the next year.

ESTIMATION OF STOCK SIZE AND ASSESSMENT RESULTS

The following biomass (t) estimates were derived for the two southern stock areas from the 1990 acoustic survey (Wheeler 1990) using Foote's (1987) relationship between target strength and fish length:

Stock area	Mean	C.V.
FB	37,000	0.69
SMB-PB	97,500	0.88

The coefficients of variation, based upon survey design only, are large as 93% of the Fortune Bay estimate is derived from a single concentration of herring and 99% of the St. Mary's Bay-Placentia Bay estimate is derived from two concentrations of herring.

For the northern areas, the most recent biomass estimate was derived from the 1988 acoustic survey (Wheeler et al. 1989). There was no acoustic survey of these stocks within the past year.

As described in detail by Wheeler (1990), biomass estimates derived using Foote's relationship between target strength and fish length may be overestimated by a factor of 2.8 if further planned research confirms preliminary experimental target strength results obtained in Trinity Bay in October 1989.

PROGNOSIS

Given the implications of projecting catch levels from the acoustic survey using Foote's (1987) relationship versus the experimental results (Wheeler 1990), CAFSAC recommended that provision of advice for 1991 be deferred until the results of further experimental target strength research, planned for May 1990, are available for review.

Acknowledgments

We would like to thank M. F. Dawson for administering the research gillnet program, P. J. Williams for administering the sampling program, and all other Pelagic Section technical staff who were in any way associated with the collection of data used in this assessment. Special thanks are also extended to our typist, M. Y. Hynes.

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Table 1. White Bay (W.B.)-Notre Dame Bay (N.D.B.) herring landings (t), by gear, 1974-89.

Year	Area	Gear						Total
		Purse seine	Ringnet	Midwater trawl	Bar seine	Gillnet	Trap	
1974	W.B.	-	8	11	53	738	632	1442
	N.D.B.	-	6	-	85	2191	312	2594
	Combined	-	14	11	138	2929	944	4036
1975	W.B.	828	-	-	46	1209	329	2412
	N.D.B.	1183	108	-	12	1631	209	3143
	Combined	2011	108	-	58	2840	538	5555
1976	W.B.	1724	487	-	18	509	246	2984
	N.D.B.	2908	3412	-	589	2242	353	9504
	Combined	4632	3899	-	607	2751	599	12488
1977	W.B.	-	1228	-	39	268	240	1775
	N.D.B.	-	4961	-	2096	2438	355	9850
	Combined	-	6189	-	2135	2706	595	11625
1978	W.B.	-	1254	-	240	1133	331	2958
	N.D.B.	-	3980	-	306	5859	311	10456
	Combined	-	5234	-	546	6992	642	13414
1979	W.B.	-	832	-	9	978	64	1883
	N.D.B.	-	1968	-	2274	8971	598	13811
	Combined	-	2800	-	2283	9949	662	15694
1980	W.B.	-	747	-	-	1269	83	2099
	N.D.B.	-	913	-	727	2778	13	4431
	Combined	-	1660	-	727	4047	96	6530
1981	W.B.	-	220	-	14	646	23	903
	N.D.B.	-	1065	-	400	2209	107	3781
	Combined	-	1285	-	414	2855	130	4684
1982	W.B.	-	-	-	7	402	52	461
	N.D.B.	-	-	-	136	1425	1	1562
	Combined	-	-	-	143	1827	53	2023
1983	W.B.	-	15	-	-	76	7	98
	N.D.B.	-	-	-	-	329	-	329
	Combined	-	15	-	-	406	7	427
1984	W.B.	-	-	-	4	342	4	350
	N.D.B.	-	-	-	3	1115	-	1118
	Combined	-	-	-	7	1457	4	1468
1985	W.B.	-	-	-	2	564	-	566
	N.D.B.	1	-	-	9	1248	-	1258
	Combined	1	-	-	11	1812	-	1824
1986	W.B.	112	-	-	1	196	7	316
	N.D.B.	1152	-	-	86	1119	83	2440
	Combined	1264	-	-	87	1315	90	2756
1987	W.B.	4283	-	-	37	396	-	4716
	N.D.B.	6570	-	-	530	1030	650	8780
	Combined	10,853	-	-	567	1426	650	13,496
1988*	W.B.	1809	-	-	19	67	-	1895
	N.D.B.	4223	-	-	360	707	113	5403
	Combined	6032	-	-	379	774	113	7298
1989*	W.B.	648	-	-	1	113	10	772
	N.D.B.	1580	-	-	45	758	206	2589
	Combined	2228	-	-	46	871	216	3361

* provisional

Table 2. Bonavista Bay (B.B.) - Trinity Bay (T.B.) herring landings (t), by gear, 1974-89.

Year	Area	Gear						Total
		Purse seine	Ringnet	Midwater trawl	Bar seine	Gillnet	Trap	
1974	B.B.	-	-	-	21	611	10	642
	T.B.	-	428	-	154	976	93	1651
	Combined	-	428	-	175	1587	103	2293
1975	B.B.	1559	-	-	34	414	2	2009
	T.B.	1370	1790	-	242	411	90	3903
	Combined	2929	1790	-	276	825	92	5912
1976	B.B.	2812	3052	-	24	328	139	6355
	T.B.	1614	1054	-	465	419	30	3582
	Combined	4426	4106	-	489	747	169	9937
1977	B.B.	-	6223	236	2495	309	-	9263
	T.B.	-	1548	-	927	174	45	2694
	Combined	-	7771	236	3422	483	45	11,957
1978	B.B.	-	4239	-	150	1320	3	5712
	T.B.	-	1055	-	966	308	8	2337
	Combined	-	5294	-	1116	1628	11	8049
1979	B.B.	-	3490	-	377	2374	4	6245
	T.B.	-	1181	-	1615	680	55	3531
	Combined	-	4671	-	1992	3054	59	9776
1980	B.B.	-	1714	-	652	1321	-	3687
	T.B.	-	964	-	405	336	13	1718
	Combined	-	2678	-	1057	1657	13	5405
1981	B.B.	-	1100	-	713	1399	7	3219
	T.B.	-	78	-	361	367	19	825
	Combined	-	1178	-	1074	1766	26	4044
1982	B.B.	-	-	-	-	386	4	390
	T.B.	-	-	-	25	76	6	107
	Combined	-	-	-	25	462	10	497
1983	B.B.	-	-	-	-	52	-	52
	T.B.	-	-	-	27	17	-	44
	Combined	-	-	-	27	69	-	96
1984	B.B.	-	-	-	-	135	-	135
	T.B.	-	-	-	-	41	-	41
	Combined	-	-	-	-	176	-	176
1985	B.B.	-	-	-	4	290	2	296
	T.B.	-	-	-	2	312	6	320
	Combined	-	-	-	6	602	8	616
1986	B.B	767	-	-	7	362	5	1141
	T.B.	356	-	-	30	233	5	624
	Combined	1123	-	-	37	595	10	1765
1987	B.B	4762	-	-	72	218	-	5052
	T.B.	838	-	-	15	175	1	1029
	Combined	5600	-	-	87	393	1	6081
1988*	B.B.	5951	-	-	280	172	-	6403
	T.B.	3207	-	-	273	94	85	3659
	Combined	9158	-	-	553	266	85	10062
1989*	B.B.	610	-	-	11	85	-	706
	T.B.	2151	-	-	141	54	6	2352
	Combined	2761	-	-	152	139	6	3058

* provisional

Table 3. Conception Bay (C.B.)- Southern Shore (S.S.) herring landings (t), by gear, 1974-89.

Year	Area	Gear						Total
		Purse seine	Ringnet	Midwater trawl	Bar seine	Gillnet	Trap	
1974	C.B.	48	2107	-	67	131	134	2487
	S.S.	-	32	-	14	72	86	204
	Combined	48	2139	-	81	203	220	2691
1975	C.B.	13	2281	-	388	166	24	2872
	S.S.	315	-	-	23	160	169	667
	Combined	328	2281	-	411	326	193	3539
1976	C.B.	-	1704	258	76	153	92	2283
	S.S.	-	44	-	-	8	149	201
	Combined	-	1748	258	76	161	241	2484
1977	C.B.	-	1248	-	58	174	12	1492
	S.S.	-	442	-	-	18	200	660
	Combined	-	1690	-	58	192	212	2152
1978	C.B.	-	1098	-	11	415	3	1527
	S.S.	-	133	-	14	78	193	418
	Combined	-	1231	-	25	493	196	1945
1979	C.B.	-	432	-	-	210	63	705
	S.S.	-	10	-	18	49	111	188
	Combined	-	442	-	18	259	174	893
1980	C.B.	-	319	-	16	107	1	443
	S.S.	-	-	-	-	2	32	34
	Combined	-	319	-	16	109	33	477
1981	C.B.	-	-	-	-	160	2	162
	S.S.	-	-	-	-	53	8	61
	Combined	-	-	-	-	213	10	223
1982	C.B.	-	-	-	-	84	1	85
	S.S.	-	-	-	-	7	5	12
	Combined	-	-	-	-	91	6	97
1983	C.B.	-	-	-	-	17	-	17
	S.S.	-	-	-	-	-	-	-
	Combined	-	-	-	-	17	-	17
1984	C.B.	-	-	-	-	49	-	49
	S.S.	-	-	-	-	-	-	-
	Combined	-	-	-	-	49	-	49
1985	C.B.	-	-	-	-	81	-	81
	S.S.	-	-	-	-	16	-	16
	Combined	-	-	-	-	97	-	97
1986	C.B.	76	-	-	-	102	1	179
	S.S.	-	-	-	1	23	1	25
	Combined	76	-	-	1	125	2	204
1987	C.B.	580	-	-	187	185	10	962
	S.S.	-	-	-	-	15	3	18
	Combined	580	-	-	187	200	13	980
1988*	C.B.	414	-	-	1	35	2	452
	S.S.	1	-	-	-	8	72	81
	Combined	415	-	-	1	45	74	533
1989*	C.B.	1007	-	-	-	61	-	1068
	S.S.	1	-	-	-	9	1	11
	Combined	1008	-	-	-	70	1	1079

* provisional

Table 4. St. Mary's Bay (SMB)-Placentia Bay (PB) herring landings (t), by gear, 1974-89.

Year	Area	Gear					Total
		Purse seine	Ringnet	Bar seine	Gillnet	Trap	
1974	S.M.B.	1710	51	271	470	37	2539
	P.B.	3200	-	212	510	11	3933
	Combined	4910	51	483	980	48	6472
1975	S.M.B.	1032	711	554	674	243	3214
	P.B.	2638	-	225	450	188	3501
	Combined	3670	711	779	1124	431	6715
1976	S.M.B.	-	920	158	352	25	1455
	P.B.	2056	172	242	177	-	2647
	Combined	2056	1092	400	529	25	4102
1977	S.M.B.	-	1131	221	531	29	1912
	P.B.	740	524	14	78	-	1356
	Combined	740	1655	235	609	29	3268
1978	S.M.B.	-	1523	66	490	3	2082
	P.B.	557	612	29	214	33	1445
	Combined	557	2135	95	704	36	3527
1979	S.M.B.	-	1570	131	332	9	2042
	P.B.	359	891	17	307	1	1575
	Combined	359	2461	148	639	10	3617
1980	S.M.B.	-	645	16	352	12	1025
	P.B.	182	892	9	339	30	1452
	Combined	182	1537	25	691	42	2477
1981	S.M.B.	-	44	8	122	-	174
	P.B.	-	311	-	149	1	461
	Combined	-	355	8	271	1	635
1982	S.M.B.	-	-	-	10	-	10
	P.B.	-	-	4	31	-	35
	Combined	-	-	4	41	-	45
1983	S.M.B.	-	-	-	13	-	13
	P.B.	-	-	-	27	-	27
	Combined	-	-	-	40	-	40
1984	S.M.B.	-	-	-	11	-	11
	P.B.	-	-	1	95	-	96
	Combined	-	-	1	106	-	107
1985	S.M.B.	-	-	1	31	-	32
	P.B.	3	-	-	113	-	116
	Combined	3	-	1	144	-	148
1986	S.M.B.	4	-	-	17	-	21
	P.B.	-	-	2	107	-	109
	Combined	4	-	2	124	-	130
1987	S.M.B.	33	-	5	47	5	90
	P.B.	-	-	1	161	-	162
	Combined	33	-	6	208	5	252
1988*	S.M.B.	-	-	-	25	-	25
	P.B.	1020	-	8	177	-	1205
	Combined	1020	-	8	202	-	1230
1989*	S.M.B.	-	-	-	8	-	8
	P.B.	213	-	2	127	2	344
	Combined	213	-	2	135	2	352

* provisional

Table 5. Fortune Bay herring landings (t), by gear, 1974-89.

Year	Gear				Total
	Purse seine	Bar seine	Gillnet	Trap	
1974	1928	268	72	-	2268
1975	809	81	19	-	909
1976	109	310	43	-	462
1977	188	364	22	5	579
1978	104	854	41	-	999
1979	285	829	81	-	1195
1980	97	265	89	-	451
1981	-	30	37	-	67
1982	-	-	20	2	22
1983	-	-	15	-	15
1984	-	-	21	-	21
1985	-	-	52	-	52
1986	1	1	92	-	94
1987	-	2	144	-	146
1988*	2	2	86	-	90
1989*	-	3	104	2	109

* provisional

Table 6. Number of fish sampled from the Newfoundland herring fishery, by area and gear, 1984-89 (research samples in parenthesis).

Year	Area	Gear type: Trap	Bar seine	Gillnet	Ringnet	Total sampled	Comm. catch (t)
1984	WB	121	-	825 (1207)	-	946 (1207)	350
	NDB	-	50	2116 (1150)	(664)	2166 (1814)	1118
	BB	-	-	550 (1860)	(844)	550 (2704)	135
	TB	150	(100)	200 (800)	(700)	350 (1600)	41
	CB	(100)	-	50 (400)	(464)	50 (964)	49
	SS	-	-	-	-	-	-
	SMB	-	-	(1110)	223	223 (1110)	11
	PB	98	-	488 (653)	(136)	586 (789)	96
	FB	-	-	4666 (612)	(182)	466 (794)	21
	Total	369 (100)	50 (100)	4695 (7792)	223 (2990)	5337 (10982)	1821
1985	WB	175	-	580 (1047)	-	755 (1047)	566
	NDB	-	100	994 (1200)	(237)	1094 (1437)	1258
	BB	-	-	1048 (2036)	(350)	1048 (2386)	296
	TB	-	-	536 (1000)	(317)	536 (1317)	320
	CB	26	-	450 (800)	(150)	476 (950)	81
	SS	-	-	100 (500)	-	100 (500)	16
	SMB	-	-	50 (598)	50	100 (598)	32
	PB	-	-	92 (697)	50	142 (697)	116
	FB	-	-	500 (900)	(250)	500 (1150)	52
	Total	201	100	4350 (8778)	100 (1304)	4751 (10082)	2737
1986	WB	-	-	(1150)	100	100 (1150)	316
	NDB	77	50	600 (1222)	50 (400)	777 (1622)	2440
	BB	150	-	400 (1949)	389 (150)	939 (2099)	1141
	TB	150	100	400 (800)	150 (700)	800 (1500)	624
	CB	150 (236)	-	344 (1010)	(100)	494 (1346)	179
	SS	-	-	(579)	-	(579)	25
	SMB	50	-	100 (850)	150	300 (850)	21
	PB	50	-	582 (558)	(350)	632 (908)	109
	FB	-	-	286 (1338)	(100)	286 (1438)	94
	Total	627 (236)	150	2712 (9456)	839 (1800)	4328 (11492)	4949
1987	WB	-	-	350 (850)	246	596 (850)	4716
	NDB	250	-	300 (1174)	583 (313)	1133 (1487)	8780
	BB	50	-	265 (1592)	546 (169)	861 (1761)	5052
	TB	-	100	196 (1100)	386 (50)	682 (1150)	1029
	CB	50 (200)	-	150 (500)	200	400 (700)	962
	SS	50	-	95 (250)	-	145 (250)	18
	SMB	-	50 (200)	50 (800)	50	150 (1000)	90
	PB	-	-	200 (786)	-	200 (786)	162
	FB	-	-	191 (1300)	-	191 (1300)	146
	Total	400 (200)	150 (200)	1797 (8352)	2011 (532)	4358 (9284)	20955
1988	WB	-	-	50 (1229)	200	250 (1229)	1895
	NDB	46	-	349 (1817)	300 (600)	695 (2417)	5403
	BB	-	-	297 (2320)	400	697 (2320)	6403
	TB	100	100	200 (1100)	300	700 (1100)	3659
	CB	50	-	178 (1213)	141	369 (1213)	452
	SS	94	-	- (377)	-	94 (377)	81
	SMB	-	-	98 (731)	48	146 (731)	26
	PB	-	-	134 (846)	136	270 (846)	1204
	FB	-	-	194 (1246)	-	194 (1246	90
	Total	290	100	1500 (10879)	1525 (600)	3415 (11479)	19213
1989	WB	-	-	133 (1742)	100	233 (1742)	772
	NDB	50	-	196 (2562)	300	546 (2562)	2589
	BB	-	-	148 (1995)	150	298 (1995)	706
	TB	100 (100)	50	200 (1817)	200 (100)	550 (2017)	2352
	CB	-	-	204 (1044)	150	354 (1044)	1068
	SS	-	-	99 (342)	-	99 (342)	11
	SMB	-	-	100 (687)	-	100 (687)	8
	PB	-	-	100 (794)	200	300 (794)	344
	FB	-	-	237 (1226)	-	237 (1226)	109
	Total	150 (100)	50	1417 (12209)	1100 (100)	2717 (12409)	7959

Table 7. Commercial catch (t) and sampling (number of fish) for 1989, by stock area, month, and gear type.

		WB–NDB		BB–TB		CB–SS		SMB–PB		FB	
Month	Gear	Catch	No. sampled	Catch	No. sampled	Catch	No. sampled	Catch	No. sampled	Catch	No. sampled
January	Gillnet	–	–	–	–	–	–	–	–	1	50
	Purse seine	–	–	–	–	–	–	82	100	–	–
February	Gillnet	1	–	–	–	–	–	–	–	2	–
	Purse seine	–	–	–	–	–	–	131	100	–	–
March	Gillnet	5	–	1	50	–	–	1	–	6	50
	Purse seine	–	–	18	–	–	–	–	–	–	–
April	Gillnet	66	50	24	100	18	50	66	50	38	48
	Bar seine	–	–	–	–	–	–	–	–	1	–
	Purse seine	–	–	544	150	491	50	–	–	–	–
May	Gillnet	581	146	56	100	32	100	47	100	41	70
	Trap	82	50	–	–	1	–	–	–	–	–
	Bar seine	23	–	109	50	–	–	1	–	1	–
	Purse seine	86	50	47	–	1	–	–	–	–	–
June	Gillnet	155	83	10	–	6	49	18	50	15	19
	Trap	125	–	–	–	–	–	2		2	–
	Bar seine	1	–	11	–	–	–	–	–	1	–
	Purse seine	3	–	33	–	–	–	–	–	–	–
July	Gillnet	15	–	2	–	2	–	–	–	–	–
	Trap	2	–	–	–	–	–	–	–	–	–
August	Gillnet	2	–	1	–	2	–	–	–	1	–
	Trap	1	–	–	–	–	–	–	–	–	–
	Purse seine	3	–	7	–	19	–	–	–	–	–
September	Gillnet	9	50	11	–	4	50	–	–	–	–
	Trap	1	–	6	–	–	–	–	–	–	–
	Bar seine	9	–	22	–	–	–	–	–	–	–
	Purse seine	156	50	465	50	63	50	–	–	–	–
October	Gillnet	20	–	23	98	3	54	–	–	–	–
	Trap	1	–	–	–	–	–	–	–	–	–
	Bar seine	13	–	1	–	–	–	–	–	–	–
	Purse seine	813	150	919	100	434	50	–	–	–	–
November	Gillnet	13	–	9	–	2	–	–	–	–	–
	Bar seine	–	–	11	–	–	–	–	–	–	–
	Purse seine	895	100	74	–	–	–	–	–	–	–
December	Gillnet	4	–	3	–	2	–	3		1	–
	Trap	4	–	–	–	–	–	–	–	–	–
	Purse seine	272	50	654	50	–	–	–	–	–	–
Combined	Gillnet	871	329	140	348	71	303	135	200	105	237
	Trap	216	50	6	–	1	–	2	–	2	–
	Bar seine	46	–	154	50	–	–	1	–	3	–
	Purse seine	2228	400	2761	350	1008	150	213	200	–	–

Table 8. Mean weight at age (g) of Newfoundland spring spawning herring from samples collected January-June, 1989. Sample sizes in parenthesis.

	Stock area				
Age	WB-NDB	BB-TB	CB-SS	SMB-PB	FB
0	-	-	-	-	-
1	-	-	-	30 (1)	-
2	-	82 (17)	125 (24)	97 (14)	112 (1)
3	124 (65)	147 (94)	188 (61)	163 (222)	144 (42)
4	195 (198)	212 (429)	220 (176)	221 (70)	180 (6)
5	227 (54)	248 (27)	274 (25)	266 (17)	209 (2)
6	249 (579)	265 (172)	282 (48)	271 (57)	252 (29)
7	273 (915)	280 (1423)	293 (517)	309 (908)	296 (1028)
8	296 (52)	293 (22)	294 (14)	328 (37)	329 (18)
9	311 (71)	323 (26)	342 (31)	343 (126)	348 (64)
10	332 (121)	347 (27)	375 (10)	347 (32)	378 (46)
11+	412 (364)	411 (240)	416 (98)	430 (41)	463 (58)

Table 9. Commercial catch at age of spring and autumn spawning herring for White Bay–Notre Dame Bay, 1970–89.

	Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Spring	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	10	1	5	1	1	2	56	50	1	1	115
	3	1	129	290	727	4	128	24	1671	55	60	46
	4	12	88	2396	1411	123	215	506	107	2034	50	1240
	5	24	161	353	2825	3142	453	237	468	317	2928	92
	6	24	64	69	761	5446	5438	868	184	1034	323	1080
	7	972	425	122	719	1193	7069	10893	793	517	1410	17
	8	11	10184	403	654	697	1123	17145	7363	2509	767	496
	9	83	233	1363	416	1506	838	1328	12675	10807	2222	179
	10	159	254	205	1685	858	810	3364	1055	11756	14413	1450
	11+	275	3105	808	794	2378	3999	8535	15707	14379	27508	14653
Total SS		1572	14645	6015	9995	15349	20076	42957	40074	43410	49683	19369
Autumn	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	53	1	1	6	1	1	1	1	71
	4	1	1	17	7	11	64	31	45	6	1	13
	5	26	6	74	22	124	3	35	35	24	10	13
	6	10	14	79	25	10	25	51	85	155	267	23
	7	39	11	67	60	48	16	20	54	171	172	272
	8	60	26	1	25	2	21	40	1	24	160	4
	9	20	17	164	13	46	3	46	94	2	133	19
	10	11	19	81	97	7	2	4	1	130	1	1
	11+	172	291	562	298	346	302	329	182	238	298	450
Total AS		342	388	1100	550	597	444	559	500	753	1045	868
Total AS & SS		1914	15033	7115	10545	15946	20520	43516	40572	44163	50728	20237
% SS		82.1	97.4	84.5	94.8	96.3	97.8	98.7	98.8	98.3	97.9	95.7
% AS		17.9	2.6	15.5	5.2	3.7	2.2	1.3	1.2	1.7	2.1	4.3

	Age	1981	1982	1983	1984	1985	1986	1987	1988*	1989*
Spring	1	1	1	1	1	1	195	26	2848	–
spawners	2	445	76	1	6	3	29	1105	401	12
	3	152	371	38	12	187	975	324	1074	115
	4	41	332	46	124	350	2945	7201	299	311
	5	1231	59	23	1218	240	308	25843	2939	61
	6	63	268	14	73	1486	667	1651	11655	1775
	7	805	34	93	114	108	1258	1067	1012	5731
	8	64	258	1	157	275	198	2088	1128	173
	9	344	19	26	37	94	162	399	1422	566
	10	194	192	4	122	81	179	442	315	532
	11+	10908	4059	805	1938	2110	1973	4566	2840	1143
Total SS		14248	5669	1052	3802	4935	8888	44712**	25933***	10419
Autumn	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1
	3	1	72	1	1	1	10	2	1	1
	4	13	26	74	60	29	67	297	97	64
	5	86	62	25	409	94	69	469	111	12
	6	11	16	23	66	333	79	156	44	5
	7	1	12	1	30	137	373	112	20	199
	8	100	9	1	8	32	68	630	7	18
	9	1	42	6	7	23	6	152	578	–
	10	4	1	1	3	10	1	10	6	203
	11+	65	23	1	24	74	42	108	303	17
Total AS		284	265	135	610	735	713	1935	1169	521
Total AS & SS		14532	5934	1187	4412	5670	9601	46647	27102	10940
% SS		98.0	95.5	88.6	86.2	87.0	92.6	95.9	95.7	95.2
% AS		2.0	4.5	11.4	13.8	13.0	7.4	4.1	4.3	4.8

* preliminary
** 4475 age 0's in 1987 SS not included
*** 10 age 0's in 1988 SS not included

Table 10. Commercial catch at age of spring and autumn spawning herring for Bonavista Bay–Trinity Bay, 1970–89.

	Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Spring	1	1	1	1	1	1	1	5	10	1	1	1
spawners	2	1	1	1	1	1	1	14	16	22	6	15
	3	1	690	10	1	1	392	77	248	26	286	13
	4	1	311	1347	60	2	134	493	135	357	167	195
	5	9	102	389	4887	235	163	123	759	122	765	43
	6	55	64	91	126	4795	2564	166	227	251	19	293
	7	808	361	75	96	424	14330	4897	50	112	436	52
	8	35	1373	88	1	151	455	20697	6209	598	101	264
	9	126	151	480	48	294	995	909	23206	4412	530	75
	10	69	126	14	271	69	727	854	774	13394	5575	967
	11+	212	522	213	1	1849	1679	4306	5890	5956	19994	12259
Total SS		1318	3702	2709	5488	7822	21441	32539	37524	25251	27880	14177
Autumn	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	1	1	1	1	10	1	1	1	14
	4	9	1	1	1	1	26	22	55	16	1	11
	5	1	10	1	1	1	30	77	16	14	27	17
	6	1	1	1	1	1	1	23	176	61	114	83
	7	4	4	2	1	16	22	66	86	58	30	188
	8	17	23	2	48	2	41	34	112	28	175	45
	9	18	3	5	1	1	6	62	30	23	13	112
	10	17	21	1	1	1	19	8	73	82	16	3
	11+	738	406	33	1	1216	259	1069	1069	417	800	463
Total AS		808	472	49	58	1242	407	1373	1620	702	1179	938
Total AS & SS		2126	4174	2758	5546	9064	21848	33912	39114	25953	29059	15115
% SS		62.0	88.7	98.2	99.0	86.3	98.1	96.0	95.9	97.3	95.9	93.8
% AS		38.0	11.3	1.8	1.0	13.7	1.9	4.0	4.1	2.7	4.1	6.2

	Age	1981	1982	1983	1984	1985	1986	1987	1988*	1989*
Spring	1	1	1	1	1	1	151	296	267	1
spawners	2	136	1	1	4	13	207	1352	2923	368
	3	246	8	4	22	175	443	413	8190	510
	4	53	11	34	35	70	4445	2845	185	2035
	5	256	2	7	210	87	261	16208	3037	188
	6	26	30	2	9	351	161	334	20858	836
	7	288	5	15	5	37	262	359	853	5571
	8	23	35	1	12	27	38	126	811	12
	9	321	5	8	2	13	10	33	8	106
	10	88	65	2	2	22	31	6	27	79
	11+	11762	1186	159	154	797	657	956	802	372
Total SS		13200	1349	234	456	1593**	6665	22928***	37961	10078
Autumn	1	1	1	1	1	1	1	19	1	1
spawners	2	1	1	1	1	1	1	1	97	1
	3	6	3	1	1	1	1	1	26	1
	4	115	1	10	3	5	51	2	15	50
	5	106	8	2	84	18	80	391	73	108
	6	33	10	5	14	203	59	237	398	76
	7	83	3	2	17	96	292	87	177	129
	8	283	8	1	3	54	149	360	156	17
	9	36	25	1	5	22	24	138	673	39
	10	4	1	1	1	10	1	2	2	366
	11+	230	37	3	9	29	30	156	192	116
Total AS		898	98	28	139	440	686	1391	1810	904
Total AS & SS		14098	1447	262	595	2033	7351	24319	39771	10982
% SS		93.6	93.2	89.3	76.6	78.4	90.7	94.3	95.4	91.8
% AS		6.4	6.8	10.7	23.4	21.6	9.3	5.7	4.6	8.2

* preliminary
** 10 age 0's in 1985 SS not included
*** 3124 age 0's in 1987 SS not included

Table 11. Commercial catch at age of spring and autumn spawning herring for Conception Bay-Southern Shore, 1970-89.

	Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Spring	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	67	4	9	1177	7	1	1	1
	3	1	36	7	2	1	418	28	127	1	4	1
	4	15	31	1625	34	5	30	97	5	99	9	3
	5	17	19	134	4521	122	16	23	101	32	34	1
	6	21	11	55	242	9655	2057	31	45	65	7	19
	7	255	43	29	329	153	8592	2330	13	14	38	1
	8	12	272	79	142	83	120	4771	950	3	4	12
	9	13	26	361	44	39	517	89	4241	734	31	1
	10	11	11	67	175	13	238	252	49	3080	270	49
	11+	46	65	122	28	658	891	714	959	1358	1640	1101
Total SS		393	516	2481	5585	10734	12889	9513	6498	5388	2039	1190
Autumn	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	1	1	2	7	1	1	1	1	1
	4	1	1	1	2	3	162	1	7	4	2	1
	5	1	1	1	2	8	40	49	29	50	17	1
	6	8	1	1	1	6	81	27	150	30	80	1
	7	20	1	1	38	17	18	23	87	69	15	32
	8	36	6	1	35	1	49	23	72	9	57	3
	9	5	34	1	1	6	11	31	13	10	17	6
	10	6	11	1	1	1	14	12	7	34	6	1
	11+	114	89	1	94	45	318	193	373	282	245	32
Total AS		194	147	11	177	91	702	362	741	491	442	80
Total AS & SS		587	663	2492	5762	10825	13591	9875	7239	5879	2481	1270
% SS		67.0	77.8	99.6	96.9	99.2	94.8	93.6	89.8	91.6	82.2	93.7
% AS		33.0	22.2	0.4	3.1	0.8	5.2	3.7	10.2	8.4	17.8	6.3

	Age	1981	1982	1983	1984	1985	1986	1987	1988*	1989*
Spring	1	1	1	1	1	1	1	714	22	1
spawners	2	1	1	1	1	1	6	1	2	581
	3	25	2	1	3	58	1	36	175	689
	4	4	5	1	27	11	389	73	47	1130
	5	26	1	1	47	11	7	3486	518	14
	6	9	2	1	5	17	13	17	966	107
	7	28	1	1	1	2	16	26	99	1497
	8	3	5	1	2	2	3	10	48	10
	9	14	1	1	1	1	1	2	4	36
	10	13	1	1	1	1	3	1	1	2
	11+	504	176	13	7	97	81	65	89	108
Total SS		628	196	23	96	202	518	4431	1971	4175
Autumn	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1
	3	1	9	1	1	1	23	1	1	289
	4	14	5	1	4	3	7	7	1	1
	5	8	14	2	60	6	18	37	49	1
	6	3	1	3	6	52	21	27	141	3
	7	7	1	1	6	24	94	32	112	52
	8	14	2	2	3	13	29	32	61	13
	9	2	2	5	1	3	10	21	42	6
	10	1	1	1	1	1	3	13	1	32
	11+	9	5	12	1	15	10	8	1	16
Total AS		61	42	30	85	120	214	175	411	415
Total AS & SS		689	238	53	181	322	732	6114	2382	4590
% SS		91.1	82.4	43.4	53.0	62.7	70.8	96.2	82.7	91.0
% AS		8.9	17.6	56.6	47.0	37.3	29.2	3.8	17.1	9.0

* preliminary

Table 12. Commercial catch at age of spring and autumn spawning herring for St. Mary's Bay-Placentia Bay, 1970-89.

	Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Spring	1	3	1	1	1	3	1	1	1	1	1	1
spawners	2	476	1	1	76	995	74	365	52	30	87	133
	3	109	557	207	326	280	2234	391	1423	175	663	332
	4	4434	116	20375	77	234	471	1906	140	1817	279	133
	5	59	2111	725	15470	126	147	208	736	123	2263	153
	6	76	80	5154	566	14328	1591	267	87	596	96	1270
	7	645	251	365	6757	436	13858	862	50	64	614	57
	8	66	45	650	93	6049	146	5622	1039	106	85	470
	9	72	13	352	224	138	3391	201	3830	512	66	38
	10	37	22	73	193	238	350	2256	134	3827	501	237
	11+	107	96	403	315	624	1323	1361	2448	2185	4785	2971
Total SS		6084	3293	28306	24098	23451	23586	13440	9940	9436	9440	5795
Autumn	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	24	5	2	1	11	1	1	1	1
	4	1	9	61	150	2	7	4	47	23	11	96
	5	2	2	175	52	96	68	214	52	435	143	35
	6	1	53	15	71	146	182	67	209	92	598	52
	7	71	31	61	10	80	89	32	81	244	73	419
	8	112	43	37	54	95	206	17	69	122	216	79
	9	19	84	101	17	93	6	94	26	38	21	126
	10	28	35	71	68	51	37	11	22	52	2	25
	11+	202	314	539	737	970	677	329	526	561	348	492
Total AS		439	574	1086	1166	1537	1275	781	1035	1570	1415	1327
Total AS & SS		6523	3867	29392	25264	24988	24861	14221	10975	11006	10855	7122
% SS		93.3	85.2	96.3	95.4	93.8	94.9	94.5	90.6	85.7	87.0	81.4
% AS		6.7	14.8	3.7	4.6	6.2	5.1	5.5	9.4	14.3	13.0	18.6

	Age	1981	1982	1983	1984	1985	1986	1987	1988*	1989*
Spring	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	8	1	1	34	1	22
	3	193	1	5	9	7	1	19	1	45
	4	42	2	2	24	18	143	2	30	7
	5	111	3	3	36	27	19	502	205	1
	6	51	8	2	6	21	28	29	2723	21
	7	338	3	4	3	15	9	47	139	388
	8	28	14	1	24	3	4	9	282	30
	9	80	4	9	1	25	1	3	16	85
	10	6	4	1	10	5	5	1	53	4
	11+	466	69	39	44	125	30	11	167	28
Total SS		1317	110	68	166	248	238	656	3618	632
Autumn	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	2	1	1
	3	1	1	1	1	1	1	4	1	5
	4	139	1	18	17	9	16	12	28	5
	5	116	7	6	101	20	24	32	25	18
	6	10	1	12	32	86	15	80	236	5
	7	11	1	4	21	46	97	30	74	48
	8	50	1	1	5	36	28	82	29	40
	9	7	1	1	3	10	16	24	295	56
	10	1	1	1	1	3	4	3	5	148
	11+	29	2	4	8	24	15	12	70	142
Total AS		366	18	50	191	237	215	281	765	469
Total AS & SS		1683	128	118	357	485	453	937	4383	1101
% SS		78.3	85.9	57.6	46.5	51.1	52.5	70.0	82.5	57.4
% AS		21.7	14.1	42.4	53.5	48.9	47.5	30.0	17.5	42.6

* preliminary

Table 13. Commercial catch at age of spring and autumn spawning herring for Fortune Bay, 1970-89.

	Age	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Spring	1	1	1	617	23	1	1	1	1	1	1	1
spawners	2	29475	167	1515	2210	389	2	82	27	1	1	25
	3	5988	23223	256	925	1314	277	15	2103	42	1	16
	4	11953	6086	19690	67	552	581	318	25	2677	183	3
	5	133	23525	2896	5694	130	112	228	327	62	3833	69
	6	281	1165	10767	475	4435	87	129	166	237	15	1122
	7	7894	5747	351	1712	250	1490	11	26	43	165	7
	8	233	3514	4432	73	1094	16	338	43	139	5	183
	9	16	132	991	282	36	142	36	188	52	24	1
	10	225	148	34	558	117	22	188	4	326	1	11
	11+	257	537	366	173	255	201	140	244	302	167	50
Total SS		56456	64245	41915	12192	8573	2931	1486	3154	3882	4396	1488
Autumn	1	1	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1	1	1
	3	1	1	1	1	7	1	7	1	1	1	1
	4	1	598	1	48	9	22	9	23	1	7	4
	5	334	1	84	50	87	12	38	19	36	5	3
	6	1	136	25	79	65	39	26	19	6	50	3
	7	443	175	185	8	12	19	13	1	25	1	3
	8	816	769	44	32	27	20	1	1	12	17	1
	9	412	626	310	15	5	11	27	1	6	12	1
	10	1	470	125	27	1	7	1	1	1	1	1
	11+	2201	1956	793	97	85	45	9	2	18	12	1
Total AS		4212	4734	1570	359	300	178	133	70	108	108	20
Total AS & SS		60668	68979	43485	12551	8873	3109	1619	3224	3990	4504	1508
% SS		93.1	93.1	96.4	97.1	96.6	94.3	91.8	97.8	97.3	97.6	98.7
% AS		6.9	6.9	3.6	2.9	3.4	5.7	8.2	2.2	2.7	2.4	1.3

	Age	1981	1982	1983	1984	1985	1986	1987	1988*	1989*
Spring	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	2	1	1	1	1	1
	3	144	1	2	1	54	1	1	1	1
	4	16	3	2	4	3	145	1	1	1
	5	4	3	1	3	39	4	304	1	1
	6	3	1	1	2	12	69	11	225	18
	7	21	2	1	1	2	20	49	7	283
	8	2	36	1	2	1	6	18	27	31
	9	23	1	10	1	1	1	4	6	21
	10	1	5	1	2	1	2	1	1	28
	11+	12	5	18	23	15	14	38	10	29
Total SS		228	59	39	42	130	264	429	281	415
Autumn	1	1	1	1	1	1	1	1	1	1
spawners	2	1	1	1	1	1	1	1	1	1
	3	5	1	1	1	1	1	1	1	1
	4	64	1	1	1	17	3	1	2	3
	5	16	7	1	9	4	8	4	1	6
	6	1	2	2	4	26	16	7	5	1
	7	1	1	1	6	12	38	11	5	6
	8	1	1	1	1	7	12	25	1	31
	9	1	1	1	1	4	5	10	13	3
	10	1	1	1	1	1	1	5	1	17
	11+	1	1	1	1	2	5	14	11	5
Total AS		93	18	12	27	76	91	80	42	75
Total AS & SS		321	77	51	69	206	355	509	323	490
% SS		71.0	76.6	76.5	60.9	63.1	74.4	84.3	87.0	84.7
% AS		29.0	23.4	23.5	39.1	36.9	25.6	15.7	13.0	15.3

* preliminary

Table 14. Sampling information for research gillnet data collected by scientific staff within the Newfoundland Region for the period 1970-82.

Year	Area	Month	# Days fished
1970	SMB	April	6
		May	14
	PB	May	2
	FB	March	2
1971	WB	June	4
	NDB	May	6
	BB	May	10
	TB	May	4
	SMB	May	13
		June	3
	PB	March	6
	FB	March	4
1972	BB	May	1
		June	5
	TB	May	4
1973	SMB	April	6
	PB	April	12
1980	TB	May	3
	CB	June	3
1981	TB	May	8
1982	BB	April	4
	TB	April	4

Table 15. Data reductions and deletions required for multiplicative model analysis of research gillnet data.

Area	Season	Data modification	Comments
WB-NDB	Spring	Fisher 990 and 991 grouped with 839	Fisher 990 and 991 fished in 1971 only
WB-NDB	Fall	Fisher 822 deleted	Fisher 822 fished in July-August only
BB-TB	Spring	Fisher 990 and 991 grouped with 825	Fisher 990 and 991 fished in 1971 and 1972 only
BB-TB	Fall	Fisher 999 deleted	Fisher 999 fished in August only
CB-SS	Spring	Fisher 826, 832, and 990 grouped with 824	Fisher 826 and 832 fished in 1985 only - Fisher 990 fished in 1980 only
CB-SS	Fall	No modifications	
SMB-PB	Spring	Fisher 990 and 991 grouped with 814 - Weeks 1, 2, and 3 deleted	Fisher 990 and 991 fished in 1970, 1971, and 1973 only - Weeks 1, 2, and 3 occurred one year only
FB	Spring	Years 1970 and 1971 deleted	Only six records for 1970 and 1971 combined

Table 16. Number of occurrences of 0 catches in research gillnet data used for multiplicative analysis.

	WB-NDB		BB-TB		CB-SS		SMB-PB	FB
Year	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
1970	-	-	-	-	-	-	1	0
1971	0	-	0	-	-	-	0	0
1972	-	-	0	-	-	-	-	-
1973	-	-	-	-	-	-	1	-
1980	-	16	0	12	0	-	-	-
1981	-	17	3	35	-	-	-	-
1982	-	20	2	3	-	-	52	19
1983	-	11	-	9	-	2	24	20
1984	-	0	0	2	-	1	18	13
1985	-	3	0	4	2	19	7	11
1986	-	2	0	5	8	5	7	8
1987	-	3	0	7	10	-	1	3
1988	12	9	14	16	0	4	9	12
1989	4	8	32	23	16	4	11	2

Table 17. Unstandardized research gillnet catch rates at age (numbers per days fished) and multiplicative model catch rates at age, by spawning type, for White Bay - Notre Dame Bay, spring progras.

Stock: WBNDB Season: SPRING UNSTANDARDIZED CATCH RATES

AUTUMN SPAWNERS

Age	1971	1988	1989
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.1
4	0.0	0.0	0.0
5	0.0	0.8	7.4
6	2.2	1.4	2.0
7	0.0	0.8	4.8
8	3.9	0.7	4.8
9	1.9	4.8	6.9
10	0.0	0.1	21.7
11	41.8	1.5	18.6
Total	49.8	10.1	66.4

SPRING SPAWNERS

Age	1971	1988	1989
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	5.0	17.5
4	24.9	2.0	47.1
5	3.9	23.9	12.2
6	22.3	63.9	138.3
7	27.5	6.0	199.2
8	1010.9	5.0	10.6
9	14.4	12.9	17.5
10	28.8	1.9	26.5
11	176.8	36.6	61.4
Total	1309.5	157.0	529.7

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1971	1988	1989
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	5.0	17.5
4	24.9	2.0	47.1
5	3.9	24.7	19.6
6	24.5	65.3	140.2
7	27.5	6.8	203.9
8	1014.8	5.7	15.4
9	16.3	17.7	24.4
10	28.8	2.0	48.2
11	218.6	38.1	80.0
Total	1359.3	167.1	596.1

Stock: WBNDB Season: SPRING MULTIPLICATIVE CATCH RATES

AUTUMN SPAWNERS

Age	1971	1988	1989
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.7
4	0.0	0.0	0.0
5	0.0	5.0	81.8
6	2.4	8.8	21.9
7	0.0	5.0	52.6
8	4.2	4.4	52.6
9	2.0	30.7	76.0
10	0.0	0.6	238.8
11	44.8	9.4	204.5
Total	53.5	64.1	730.4

SPRING SPAWNERS

Age	1971	1988	1989
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	31.9	192.3
4	26.7	12.9	518.6
5	4.2	151.4	134.0
6	23.9	405.3	1520.8
7	29.5	37.8	2190.8
8	1085.2	31.9	116.5
9	15.5	81.7	192.3
10	30.9	11.9	291.3
11	189.8	232.0	675.9
Total	1405.6	995.7	5826.7

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1971	1988	1989
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	31.9	193.0
4	26.7	12.9	518.6
5	4.2	156.3	215.8
6	26.2	414.0	1542.7
7	29.5	42.8	2243.4
8	1089.3	36.3	169.1
9	17.5	112.4	268.2
10	30.9	12.6	530.2
11	234.6	241.4	880.4
Total	1459.1	1059.8	6557.1

Table 18. Unstandardized research gillnet catch rates at age (numbers per days fished) and multiplicative model catch rates at age, by spawning type, for White Bay - Notre Dame Bay, fall program.

Stock: WBNDB Season: FALL UNSTANDARDIZED CATCH RATES

AUTUMN SPAWNERS

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
3	3.3	0.3	7.0	0.0	14.0	0.0	0.0	0.0	0.1	0.0
4	0.4	1.0	3.4	14.2	2.1	1.5	2.9	15.7	2.2	0.7
5	1.5	0.0	3.8	1.6	40.9	1.5	3.9	20.3	3.2	0.4
6	1.8	0.4	3.3	4.2	10.2	13.9	3.3	15.1	1.5	0.1
7	1.8	0.0	0.0	1.4	1.3	7.6	10.2	2.8	0.8	2.6
8	0.1	0.3	0.0	0.2	1.1	0.0	2.6	8.5	0.4	0.7
9	0.2	0.0	1.5	0.3	0.3	0.0	0.4	2.9	1.7	0.0
10	0.0	0.0	0.0	0.9	0.2	0.0	0.0	2.1	0.4	2.2
11	4.3	0.3	0.4	1.9	3.3	2.3	1.3	1.1	1.0	1.7
Total	13.3	2.2	19.5	24.7	73.4	26.8	24.6	68.6	11.6	8.4

SPRING SPAWNERS

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
2	9.8	4.5	8.5	0.5	23.3	2.6	0.2	1.2	5.7	5.2
3	8.1	5.2	29.1	50.1	6.4	134.5	9.0	0.6	3.9	10.8
4	204.1	1.2	5.6	81.4	19.1	19.0	107.3	38.8	3.6	20.1
5	7.2	25.2	3.5	7.3	84.0	11.6	12.5	352.0	18.0	7.6
6	92.2	1.0	1.9	14.1	4.2	60.1	9.0	35.1	90.4	39.2
7	2.7	5.3	0.8	19.8	8.5	7.1	38.2	16.0	7.8	123.8
8	29.5	0.5	9.3	2.6	14.0	6.7	3.8	57.3	6.6	4.1
9	4.5	1.9	0.0	22.4	0.8	7.5	2.6	8.6	13.3	12.2
10	34.0	0.8	15.5	5.2	8.5	5.2	3.1	5.5	1.2	25.6
11	503.9	83.7	192.6	318.7	254.8	119.5	50.2	102.3	27.0	41.9
Total	895.0	129.4	266.8	521.6	424.0	373.5	235.9	616.4	177.9	290.7

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
2	9.8	4.5	8.5	0.5	23.3	2.6	0.2	1.2	5.9	5.2
3	11.3	5.4	36.1	50.1	20.4	134.5	9.0	0.6	4.0	10.8
4	204.5	2.2	9.0	95.5	21.2	20.5	110.2	54.5	5.8	20.8
5	8.6	25.2	7.3	8.9	124.8	13.1	16.4	372.3	21.2	8.0
6	94.0	1.4	5.2	18.3	14.4	74.0	12.3	50.2	91.9	39.3
7	4.5	5.3	0.8	21.2	9.8	14.7	48.4	18.8	8.6	126.4
8	29.6	0.8	9.3	2.8	15.1	6.7	6.4	65.8	7.0	4.8
9	4.7	1.9	1.5	22.7	1.1	7.5	3.0	11.5	15.1	12.2
10	34.0	0.8	15.5	6.1	8.7	5.2	3.1	7.7	1.7	27.8
11	508.2	84.0	193.0	320.6	258.1	121.9	51.6	103.4	28.0	43.6
Total	908.3	131.6	286.3	546.3	497.4	400.3	260.5	685.0	189.5	299.1

Stock: WBNDB Season: FALL MULTIPLICATIVE CATCH RATES

AUTUMN SPAWNERS

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0
3	4.9	1.1	9.5	0.0	32.0	0.0	0.0	0.0	0.2	0.0
4	0.6	4.5	4.7	37.1	4.9	3.8	10.9	31.4	4.4	1.6
5	2.2	0.0	5.2	4.2	93.3	3.8	14.6	40.6	6.4	1.0
6	2.6	1.7	4.5	11.1	23.3	35.3	12.3	30.2	3.0	0.2
7	2.6	0.0	0.0	3.7	3.0	19.2	38.2	5.6	1.6	6.2
8	0.2	1.1	0.0	0.5	2.5	0.0	9.8	17.0	0.8	1.6
9	0.3	0.0	2.1	0.8	0.7	0.0	1.5	5.8	3.4	0.0
10	0.0	0.0	0.0	2.4	0.5	0.0	0.0	4.3	0.8	5.2
11	6.3	1.1	0.6	5.0	7.5	5.9	4.9	2.2	2.0	4.0
Total	19.7	9.6	26.5	64.8	167.5	68.0	92.0	137.3	22.9	19.8

SPRING SPAWNERS

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0
2	14.6	19.8	11.6	1.4	53.2	6.6	0.9	2.5	11.2	12.4
3	11.9	22.6	39.5	131.5	14.5	341.2	33.5	1.2	7.7	25.4
4	302.7	5.1	7.6	213.6	43.5	48.3	401.6	77.7	7.0	47.4
5	10.6	110.2	4.7	19.2	191.6	29.4	46.8	704.2	35.5	17.9
6	136.7	4.5	2.5	37.0	9.7	152.6	33.5	70.3	178.5	92.8
7	4.0	23.2	1.1	52.0	19.3	18.0	143.0	32.1	15.5	292.7
8	43.8	2.3	12.7	6.8	31.9	17.1	14.1	114.7	13.0	9.6
9	6.6	8.5	0.0	58.9	1.9	19.0	9.7	17.3	26.4	28.9
10	50.4	3.4	21.0	13.7	19.3	13.3	11.5	11.1	2.5	60.5
11	747.4	365.6	261.7	836.7	581.4	303.3	188.0	204.7	53.4	98.9
Total	1327.6	565.1	362.5	1369.4	967.4	947.9	882.7	1233.2	351.4	687.1

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0
2	14.6	19.8	11.6	1.4	53.2	6.6	0.9	2.5	11.6	12.4
3	16.8	23.7	49.0	131.5	46.5	341.2	33.5	1.2	7.9	25.4
4	303.3	9.6	12.3	250.8	48.4	52.2	412.5	109.1	11.4	49.1
5	12.8	110.2	9.9	23.4	284.8	33.2	61.4	744.8	41.9	18.8
6	139.4	6.2	7.1	48.1	33.0	187.9	45.9	100.5	181.5	93.0
7	6.6	23.2	1.1	55.7	22.4	37.2	181.2	37.7	17.1	298.8
8	44.0	3.4	12.7	7.4	34.4	17.1	23.9	131.7	13.8	11.3
9	6.9	8.5	2.1	59.7	2.6	19.0	11.2	23.0	29.7	28.9
10	50.4	3.4	21.0	16.1	19.9	13.3	11.5	15.4	3.3	65.7
11	753.8	366.8	262.3	841.7	589.0	309.2	192.9	206.9	55.4	102.9
Total	1347.3	574.7	389.0	1434.2	1134.9	1015.9	974.7	1370.5	374.3	706.9

Table 19. Unstandardized research gillnet catch rates at age (numbers per days fished) and multiplicative model catch rates at age, by spawning type, for Bonavista Bay - Trinity Bay, spring program.

Stock: BBTB Season: SPRING UNSTANDARDIZED CATCH RATES

AUTUMN SPAWNERS

Age	1971	1972	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	2.1	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	10.2	13.0	0.0	6.6	0.0	0.0	0.0	0.3	0.0	0.1
5	0.2	0.0	0.0	4.8	0.7	0.6	39.0	0.5	0.0	0.0	0.3	0.3
6	0.0	0.0	10.2	2.1	3.1	0.6	6.3	10.9	0.6	0.3	0.2	0.3
7	0.0	0.0	29.4	2.4	0.0	0.0	0.0	1.9	0.8	0.4	0.2	1.9
8	0.0	0.0	4.7	2.1	0.0	0.6	0.0	1.3	0.2	1.3	0.0	1.3
9	0.0	0.0	35.8	0.7	0.7	0.0	0.4	0.0	0.0	0.7	0.5	0.5
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	3.3
11	0.6	10.2	71.5	1.7	1.4	2.8	2.1	0.7	0.0	0.0	0.3	2.4
Total	0.8	10.2	161.4	28.8	5.9	12.1	47.8	15.5	1.6	3.1	1.5	10.1

SPRING SPAWNERS

Age	1971	1972	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.1	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.6	0.3	0.1	0.1
3	1.6	2.6	0.0	19.9	3.1	4.4	20.2	18.3	0.9	1.2	5.8	2.3
4	15.5	483.5	17.3	4.6	1.4	35.8	8.2	7.6	151.6	1.2	0.3	21.8
5	2.5	220.8	0.0	1.7	0.3	1.2	37.7	4.3	2.4	104.5	2.3	0.9
6	2.6	14.4	53.1	1.5	1.0	0.0	3.5	11.2	2.6	1.5	30.0	5.5
7	13.9	44.4	0.0	5.2	0.0	0.7	0.7	1.0	3.1	0.0	0.5	57.7
8	80.2	56.2	3.5	0.0	0.7	0.0	2.2	1.0	0.9	0.0	0.4	0.9
9	4.1	331.9	0.0	4.2	0.3	9.8	0.0	1.0	0.3	0.3	0.6	0.6
10	10.6	5.2	41.4	5.9	0.3	1.6	2.2	1.1	0.2	0.7	0.0	0.7
11	13.9	147.7	575.0	166.7	56.3	181.0	146.4	39.3	10.8	6.4	12.5	5.5
Total	145.1	1306.8	690.2	209.4	63.5	233.8	221.8	84.8	174.2	116.0	52.6	96.0

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1971	1972	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.1	0.0	0.0	0.0	0.0	0.0	1.1	0.0	1.6	0.3	0.1	0.1
3	1.6	2.6	0.0	22.0	3.1	5.5	20.2	18.3	0.9	1.2	5.8	2.3
4	15.5	483.5	27.4	17.6	1.4	42.4	8.2	7.6	151.6	1.5	0.3	21.9
5	2.7	220.8	0.0	6.5	1.0	1.8	76.7	4.8	2.4	104.5	2.6	1.2
6	2.6	14.4	63.3	3.5	4.1	0.6	9.9	22.1	3.2	1.8	30.2	5.8
7	13.9	44.4	29.4	7.6	0.0	0.7	0.7	2.9	4.0	0.4	0.7	59.6
8	80.2	56.2	8.1	2.1	0.7	0.6	2.2	2.3	1.1	1.3	0.4	2.2
9	4.1	331.9	35.8	4.9	1.0	9.8	0.4	1.0	0.3	1.1	1.1	1.1
10	10.6	5.2	41.4	5.9	0.3	1.6	2.2	1.2	0.2	0.7	0.0	4.0
11	14.5	157.9	646.5	168.4	57.7	183.8	148.5	40.0	10.8	6.4	12.8	7.9
Total	145.9	1317	851.6	238.2	69.4	245.9	269.6	100.3	175.8	119.1	54.1	106.1

Stock: BBTB Season: SPRING MULTIPLICATIVE CATCH RATES

AUTUMN SPAWNERS

Age	1971	1972	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.7	0.0		0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	32.7	4.5	0.0		0.0	0.0	0.0	1.6	0.0	0.3
5	0.5	0.0	0.0	1.7	0.2		60.1	0.9	0.0	0.0	3.5	0.9
6	0.0	0.0	32.7	0.7	0.9		9.7	19.8	1.2	1.6	2.3	0.9
7	0.0	0.0	94.6	0.8	0.0		0.0	3.5	1.8	2.1	2.3	5.9
8	0.0	0.0	15.1	0.7	0.0		0.0	2.4	0.4	6.9	0.0	4.0
9	0.0	0.0	115.4	0.2	0.2		0.6	0.0	0.0	3.7	5.8	1.6
10	0.0	0.0	0.0	0.0	0.0		0.0	0.2	0.0	0.0	0.0	10.2
11	1.4	38.0	230.2	0.6	0.4		3.2	1.3	0.0	0.0	3.5	7.5
Total	1.9	38.0	519.7	10.0	1.8		73.7	28.0	3.4	16.0	17.4	31.3

SPRING SPAWNERS

Age	1971	1972	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
2	0.3	0.0	0.0	0.0	0.0		1.7	0.0	3.3	1.8	1.2	0.3
3	3.8	9.7	0.0	6.9	0.9		31.1	33.1	1.8	6.0	67.1	7.2
4	36.5	1800.4	55.6	1.6	0.4		12.7	13.8	320.1	6.0	3.7	67.6
5	5.8	822.4	0.0	0.6	0.1		58.1	7.8	5.2	539.6	26.8	2.7
6	6.1	53.5	171.2	0.5	0.3		5.5	20.3	5.5	7.8	347.8	17.0
7	32.7	165.4	0.0	1.8	0.0		1.0	1.8	6.6	0.0	6.1	179.1
8	188.5	209.2	11.1	0.0	0.2		3.4	1.8	1.8	0.0	4.9	2.7
9	9.5	1236.0	0.0	1.4	0.1		0.0	1.8	0.7	1.8	6.7	1.8
10	24.9	19.5	133.4	2.0	0.1		3.4	2.0	0.4	3.6	0.0	2.1
11	32.7	549.9	1851.7	57.6	16.8		225.7	71.0	22.8	32.9	145.2	17.0
Total	340.9204	4866.0	2222.9	72.3	18.9		342.0	153.5	367.9	598.9	610.2	298.0

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1971	1972	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0
2	0.3	0.0	0.0	0.0	0.0		1.7	0.0	3.3	1.8	1.2	0.3
3	3.8	9.7	0.0	7.6	0.9		31.1	33.1	1.8	6.0	67.1	7.2
4	36.5	1800.4	88.3	6.1	0.4		12.7	13.8	320.1	7.6	3.7	68.0
5	6.3	822.4	0.0	2.2	0.3		118.3	8.8	5.2	539.6	30.3	3.6
6	6.1	53.5	203.9	1.2	1.2		15.2	40.1	6.7	9.4	350.1	17.9
7	32.7	165.4	94.6	2.6	0.0		1.0	5.3	8.4	2.1	8.4	185.0
8	188.5	209.2	26.2	0.7	0.2		3.4	4.2	2.2	6.9	4.9	6.7
9	9.5	1236.0	115.4	1.7	0.3		0.6	1.8	0.7	5.5	12.5	3.4
10	24.9	19.5	133.4	2.0	0.1		3.4	2.2	0.4	3.6	0.0	12.3
11	34.1	587.8	2081.9	58.2	17.2		229.0	72.3	22.8	32.9	148.7	24.4
Total	342.8	4904.0	2742.6	82.3	20.7		415.7	181.5	371.3	614.9	627.6	329.3

Table 20. Unstandardized research gillnet catch rates at age (numbers per days fished) and multiplicative model catch rates at age, by spawning type, for Bonavista Bay - Trinity Bay, fall program.

Stock: BBTB Season: FALL UNSTANDARDIZED CATCH RATES

AUTUMN SPAWNERS

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
3	0.8	0.0	20.3	0.2	0.4	0.4	0.2	0.0	0.1	0.2
4	1.2	1.3	3.3	33.6	1.2	0.9	0.7	0.3	0.5	0.2
5	0.5	0.2	10.9	8.5	23.3	0.8	2.4	0.7	0.9	0.4
6	1.2	0.2	0.4	10.0	5.0	8.8	2.8	0.7	1.1	0.9
7	2.5	0.2	1.8	2.3	4.9	3.8	7.7	0.5	0.6	0.8
8	0.6	2.4	0.1	1.5	0.5	0.8	2.0	2.8	0.1	0.5
9	0.3	0.0	5.3	0.6	1.9	0.3	1.3	0.7	1.3	0.1
10	0.0	0.0	0.0	4.4	0.0	0.0	0.1	0.1	0.4	0.8
11	2.0	1.2	5.6	4.5	4.4	1.2	1.0	0.6	1.7	0.5
Total	9.0	5.5	47.7	65.5	41.6	17.0	18.1	6.5	6.8	4.2

SPRING SPAWNERS

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.1
2	20.6	1.3	4.6	1.0	18.3	2.2	2.4	3.7	4.9	9.7
3	1.3	1.9	73.0	8.1	7.6	50.3	5.8	0.3	14.7	3.0
4	12.8	0.2	19.8	101.9	7.4	4.0	109.9	4.4	1.5	10.3
5	0.9	0.8	5.0	11.0	57.3	1.8	2.1	43.9	6.3	1.1
6	4.3	0.2	14.6	4.3	2.3	8.0	2.2	1.9	50.9	4.2
7	0.3	1.6	0.1	11.5	1.3	5.1	4.6	1.7	1.9	20.8
8	0.9	0.0	3.0	0.2	2.0	0.1	0.6	1.6	1.6	0.5
9	0.1	1.2	0.0	4.5	0.0	0.6	0.1	0.5	1.1	1.0
10	1.9	0.1	0.6	1.0	1.9	0.0	0.8	0.2	0.2	1.0
11	101.2	61.8	64.8	95.9	44.6	17.6	10.4	6.3	3.9	2.4
Total	144.1	69.0	185.2	239.2	142.6	85.1	138.7	64.4	87.6	54.0

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.1
2	20.6	1.3	4.6	1.0	18.3	2.2	2.4	3.7	5.1	9.7
3	2.1	1.9	93.3	8.3	8.0	50.7	6.0	0.3	14.8	3.2
4	14.0	1.5	23.1	135.5	8.6	4.9	110.6	4.7	2.0	10.5
5	1.4	1.0	15.9	19.5	80.6	2.6	4.5	44.6	7.2	1.5
6	5.5	0.4	15.0	14.3	7.3	16.8	5.0	2.7	52.0	5.1
7	2.8	1.8	1.9	13.8	6.2	8.9	12.3	2.2	2.5	21.6
8	1.5	2.4	3.1	1.7	2.5	0.9	2.6	4.4	1.7	1.0
9	0.4	1.2	5.3	5.1	1.9	0.9	1.4	1.2	2.4	1.1
10	1.9	0.1	0.6	5.3	1.9	0.0	0.9	0.3	0.6	1.7
11	103.1	63.0	70.4	100.4	49.0	18.8	11.4	6.9	5.6	2.9
Total	153.1	74.5	232.9	304.7	184.2	102.1	156.8	70.9	94.4	58.2

Stock: BBTB Season: FALL MULTIPLICATIVE CATCH RATES

AUTUMN SPAWNERS

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0
3	0.9	0.0	13.7	0.2	0.9	0.9	0.4	0.0	0.3	0.4
4	1.4	0.6	2.2	37.1	2.6	1.9	1.5	0.9	1.4	0.4
5	0.6	0.1	7.4	9.4	51.1	1.7	5.2	2.1	2.5	0.8
6	1.4	0.1	0.3	11.1	11.0	18.4	6.0	2.1	3.0	1.8
7	2.9	0.1	1.2	2.5	10.8	8.0	16.5	1.5	1.7	1.6
8	0.7	1.2	0.1	1.7	1.1	1.7	4.3	8.2	0.3	1.0
9	0.3	0.0	3.6	0.7	4.2	0.6	2.8	2.1	3.6	0.2
10	0.0	0.0	0.0	4.8	0.0	0.0	0.2	0.3	1.1	1.6
11	2.3	0.6	3.8	5.0	9.7	2.5	2.1	1.8	4.7	1.0
Total	10.4	2.7	32.3	72.3	91.3	35.6	38.9	19.0	18.4	8.9

SPRING SPAWNERS

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.2
2	23.7	0.6	3.1	1.1	40.0	4.6	5.1	10.7	13.3	20.5
3	1.5	0.9	49.3	9.0	16.6	105.3	12.5	0.9	39.8	6.3
4	14.8	0.1	13.4	112.5	16.3	8.4	235.8	12.8	4.0	21.8
5	1.0	0.4	3.4	12.1	125.8	3.7	4.5	128.4	17.0	2.3
6	5.0	0.1	9.9	4.8	5.0	16.7	4.8	5.7	137.5	9.0
7	0.3	0.8	0.1	12.7	2.8	10.7	9.8	4.9	5.2	44.3
8	1.0	0.0	2.0	0.2	4.4	0.2	1.2	4.7	4.3	1.0
9	0.2	0.6	0.0	5.0	0.0	1.2	0.3	1.5	2.8	2.2
10	2.2	0.0	0.4	1.1	4.1	0.0	1.8	0.6	0.5	2.1
11	116.5	29.8	43.8	105.9	97.9	36.9	22.3	18.5	10.4	5.1
Total	165.9	33.2	125.2	264.1	312.8	178.1	297.7	188.6	236.6	114.8

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.9	0.2
2	23.7	0.6	3.1	1.1	40.0	4.6	5.1	10.7	13.8	20.5
3	2.4	0.9	63.1	9.2	17.5	106.1	12.9	0.9	40.0	6.7
4	16.1	0.7	15.6	149.6	18.9	10.3	237.3	13.7	5.4	22.2
5	1.6	0.5	10.8	21.5	176.9	5.4	9.6	130.5	19.5	3.1
6	6.3	0.2	10.2	15.8	16.0	35.2	10.8	7.8	140.5	10.8
7	3.2	0.9	1.3	15.2	13.6	18.7	26.3	6.4	6.9	45.9
8	1.7	1.2	2.1	1.9	5.5	1.9	5.5	12.9	4.5	2.0
9	0.5	0.6	3.6	5.7	4.2	1.9	3.1	3.6	6.4	2.4
10	2.2	0.0	0.4	5.9	4.1	0.0	2.0	0.9	1.6	3.7
11	118.8	30.3	47.6	110.9	107.6	39.4	24.5	20.3	15.1	6.1
Total	176.3	35.9	157.5	336.4	404.1	213.7	336.6	207.6	255.0	123.7

Table 21. Unstandardized research gillnet catch rates at age (numbers per days fished) and multiplicative model catch rates at age, by spawning type, for Conception Bay - Southern Shore, spring program.

Stock: CBSS Season: SPRING UNSTANDARDIZED CATCH RATES

AUTUMN SPAWNERS

Age	1980	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	1.2	0.0	0.0
4	0.0	0.9	0.3	1.2	0.0	0.1
5	0.0	1.3	4.7	1.4	6.5	0.4
6	0.0	26.6	10.3	3.9	12.1	1.5
7	0.0	20.8	66.9	6.8	20.3	3.2
8	0.0	16.7	20.2	9.3	9.9	5.2
9	0.0	3.4	12.5	1.3	20.1	0.6
10	0.0	1.9	0.7	2.4	0.1	4.8
11	0.0	27.1	29.8	4.3	3.7	1.9
Total	0.0	98.9	145.5	31.5	72.7	17.8

SPRING SPAWNERS

Age	1980	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.3	0.0
3	0.0	8.4	0.0	19.1	5.9	16.2
4	0.0	1.5	121.9	2.5	26.4	25.3
5	0.0	6.5	3.3	180.2	22.5	13.9
6	0.0	18.6	22.8	8.3	725.2	20.4
7	0.9	2.6	5.6	13.7	32.3	110.0
8	0.0	2.2	4.3	4.5	69.5	7.4
9	0.0	0.5	1.3	3.2	9.8	6.5
10	0.9	0.0	1.3	1.3	2.0	1.4
11	42.2	130.6	57.6	85.5	84.2	31.1
Total	44.0	171.0	217.3	317.9	978.7	232.0

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1980	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.3	0.0
3	0.0	8.4	0.0	20.2	5.9	16.2
4	0.0	2.4	122.2	3.7	26.4	25.4
5	0.0	7.8	7.9	181.6	29.0	14.3
6	0.0	45.2	33.1	12.1	737.3	21.9
7	0.9	23.3	72.6	20.4	52.6	113.2
8	0.0	18.9	24.6	13.7	79.4	12.7
9	0.0	3.9	13.8	4.4	29.9	7.1
10	0.9	1.9	2.0	3.7	2.0	6.2
11	42.2	157.7	87.4	89.8	87.9	33.0
Total	44.0	269.9	362.8	349.4	1051.4	249.8

Stock: CBSS Season: SPRING MULTIPLICATIVE CATCH RATES

AUTUMN SPAWNERS

Age	1980	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.1	0.0	0.0
4	0.0	2.3	0.1	0.1	0.0	0.0
5	0.0	3.3	1.7	0.2	1.7	0.0
6	0.0	67.9	3.8	0.5	3.2	0.1
7	0.0	53.0	24.8	0.8	5.3	0.2
8	0.0	42.7	7.5	1.2	2.6	0.3
9	0.0	8.6	4.6	0.2	5.3	0.0
10	0.0	4.8	0.3	0.3	0.0	0.3
11	0.0	69.2	11.0	0.5	1.0	0.1
Total	0.0	252.4	53.9	3.9	19.0	1.1

SPRING SPAWNERS

Age	1980	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.1	0.0
3	0.0	21.4	0.0	2.4	1.5	1.0
4	0.0	3.9	45.2	0.3	6.9	1.5
5	0.0	16.6	1.2	22.6	5.9	0.9
6	0.0	47.6	8.5	1.0	189.5	1.3
7	6.8	6.5	2.1	1.7	8.4	6.7
8	0.0	5.7	1.6	0.6	18.2	0.5
9	0.0	1.3	0.5	0.4	2.6	0.4
10	6.8	0.0	0.5	0.2	0.5	0.1
11	326.6	333.5	21.3	10.7	22.0	1.9
Total	340.6	436.5	80.5	39.9	255.8	14.2

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1980	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.1	0.0
3	0.0	21.4	0.0	2.5	1.5	1.0
4	0.0	6.2	45.3	0.5	6.9	1.6
5	0.0	19.9	2.9	22.8	7.6	0.9
6	0.0	115.5	12.3	1.5	192.7	1.3
7	6.8	59.6	26.9	2.6	13.7	6.9
8	0.0	48.3	9.1	1.7	20.7	0.8
9	0.0	9.9	5.1	0.6	7.8	0.4
10	6.8	4.8	0.8	0.5	0.5	0.4
11	326.6	402.6	32.4	11.3	23.0	2.0
Total	340.6	688.9	134.4	43.8	274.8	15.3

Table 22. Unstandardized research gillnet catch rates at age (numbers per days fished) and multiplicative model catch rates at age, by spawning type, for Conception Bay - Trinity Bay, fall program.

Stock: CBSS Season: FALL *UNSTANDARDIZED CATCH RATES*

AUTUMN SPAWNERS

Age	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0		0.0	0.0
2	1.9	0.0	0.0	0.0		0.0	0.4
3	0.2	7.3	4.4	0.1		0.1	0.3
4	4.6	6.2	12.8	2.4		0.0	0.0
5	0.8	213.5	7.5	4.0		0.3	0.3
6	1.3	39.5	53.6	2.6		0.2	0.0
7	0.1	10.4	16.6	9.2		0.7	0.2
8	0.1	1.1	11.0	4.1		0.6	0.1
9	1.1	1.7	0.0	2.1		5.4	0.0
10	0.0	1.1	0.1	1.1		1.1	0.3
11	0.7	1.4	6.4	0.5		0.4	0.2
Total	10.7	282.0	112.4	26.1		8.8	2.0

SPRING SPAWNERS

Age	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	1.5		0.0	0.0
2	2.3	80.0	1.1	0.9		14.3	41.7
3	1.2	18.7	461.0	0.4		118.2	6.3
4	2.1	68.0	26.0	34.9		4.2	12.2
5	0.2	130.2	14.7	2.3		6.5	0.6
6	0.3	8.7	18.1	2.4		295.6	0.7
7	0.3	7.0	0.1	1.6		8.8	11.8
8	0.0	13.3	1.1	0.2		10.6	0.4
9	0.3	0.0	1.1	0.5		0.9	0.3
10	0.3	0.0	0.0	0.6		0.0	0.7
11	7.3	88.7	41.8	3.0		2.8	0.9
Total	14.3	414.5	565.0	48.3		461.8	75.6

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	1.5		0.0	0.0
2	4.2	80.0	1.1	0.9		14.3	42.2
3	1.4	26.0	465.4	0.5		118.3	6.7
4	6.7	74.2	38.8	37.3		4.2	12.2
5	1.0	343.6	22.2	6.3		6.8	0.9
6	1.6	48.2	71.7	5.0		295.8	0.7
7	0.4	17.5	16.7	10.8		9.5	12.0
8	0.1	14.4	12.1	4.3		11.2	0.5
9	1.4	1.7	1.1	2.6		6.3	0.3
10	0.3	1.1	0.1	1.7		1.1	1.0
11	8.0	90.1	48.2	3.5		3.2	1.1
Total	25.0	696.5	677.4	74.4		470.6	77.6

Stock: CB-SS Season: FALL *MULTIPLICATIVE CATCH RATES*

AUTUMN SPAWNERS

Age	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0		0.0	0.0
2	1.8	0.0	0.0	0.0		0.0	1.5
3	0.2	3.3	2.4	0.9		0.1	1.1
4	4.3	2.8	7.0	21.4		0.0	0.0
5	0.8	97.3	4.1	35.5		0.3	1.1
6	1.2	18.0	29.5	23.2		0.2	0.0
7	0.1	4.8	9.1	81.8		0.7	0.7
8	0.1	0.5	6.1	36.5		0.6	0.4
9	1.0	0.8	0.0	18.8		5.3	0.0
10	0.0	0.5	0.1	9.8		1.1	1.1
11	0.7	0.6	3.5	4.4		0.4	0.7
Total	10.2	128.5	61.7	232.3		8.6	6.7

SPRING SPAWNERS

Age	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	13.3		0.0	0.0
2	2.2	36.5	0.6	8.2		14.1	138.9
3	1.1	8.5	253.3	3.4		116.0	21.1
4	2.0	31.0	14.3	310.4		4.1	40.5
5	0.2	59.3	8.1	20.6		6.3	2.0
6	0.3	4.0	9.9	21.5		290.1	2.3
7	0.3	3.2	0.1	14.2		8.6	39.3
8	0.0	6.0	0.6	1.7		10.4	1.3
9	0.3	0.0	0.6	4.3		0.9	1.0
10	0.3	0.0	0.0	5.2		0.0	2.3
11	6.9	40.4	23.0	26.7		2.7	3.0
Total	13.6	188.9	310.4	429.9		453.3	251.6

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	13.3		0.0	0.0
2	4.0	36.5	0.6	8.2		14.1	140.4
3	1.3	11.8	255.7	4.4		116.1	22.3
4	6.3	33.8	21.3	331.8		4.1	40.5
5	0.9	156.6	12.2	56.2		6.6	3.1
6	1.5	22.0	39.4	44.7		290.3	2.3
7	0.4	8.0	9.2	96.0		9.3	40.0
8	0.1	6.6	6.7	38.2		11.0	1.6
9	1.3	0.8	0.6	23.1		6.2	1.0
10	0.3	0.5	0.1	14.9		1.1	3.4
11	7.6	41.1	26.5	31.1		3.1	3.8
Total	23.8	317.4	372.1	662.2		461.9	258.3

Table 23. Unstandardized research gillnet catch rates at age (numbers per days fished) and multiplicative model catch rates at age, by spawning type, for St. Mary's Bay - Placentia Bay, spring program.

Stock: SMBPB Season: SPRING UNSTANDARDIZED CATCH RATES

AUTUMN SPAWNERS

Age	1970	1971	1973	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.6	0.5	6.2	0.9	0.7	2.0	0.0	0.1
4	0.9	8.4	0.2	0.6	10.3	10.8	36.8	8.0	4.6	1.1	1.8
5	23.0	0.6	0.0	2.0	1.9	53.2	14.2	16.6	8.2	1.2	3.8
6	1.3	28.3	1.2	0.2	5.3	15.9	39.0	10.2	14.9	2.9	1.5
7	29.4	10.9	1.4	0.0	1.0	22.8	14.4	42.2	8.5	5.2	3.8
8	58.7	9.5	4.8	0.2	0.5	1.5	12.2	10.4	20.6	5.0	2.8
9	20.3	17.4	0.0	0.1	0.8	4.1	1.5	3.6	7.5	8.3	2.0
10	9.1	6.9	0.3	0.0	0.4	0.8	2.5	1.5	0.7	1.2	5.0
11	40.0	43.2	21.9	0.5	2.6	13.5	10.9	4.5	4.6	4.4	4.3
Total	182.7	125.2	29.9	4.1	23.2	128.6	132.5	97.8	71.5	29.2	24.9

SPRING SPAWNERS

Age	1970	1971	1973	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.2	1.8	0.7	0.0	0.0	0.0	0.4	0.2
3	6.7	230.3	0.6	0.2	11.3	18.5	59.2	0.3	13.7	2.3	23.5
4	627.5	35.0	0.0	0.6	2.0	21.7	5.9	125.6	1.7	4.2	6.0
5	71.5	420.5	243.1	0.4	1.0	6.9	9.9	8.5	151.9	2.7	1.8
6	56.7	37.0	4.8	1.4	1.1	2.7	6.9	17.4	11.6	100.3	3.5
7	278.0	178.9	39.9	0.2	3.5	0.9	2.4	3.5	17.7	6.2	64.3
8	87.7	33.9	0.3	1.7	0.4	7.3	2.1	2.6	4.0	14.4	3.3
9	18.9	13.4	1.2	0.4	5.2	0.2	8.6	0.1	2.1	3.0	12.6
10	62.1	15.4	8.2	0.4	0.6	10.1	2.7	2.4	0.6	0.1	3.1
11	139.0	64.8	4.8	6.5	21.5	46.7	45.4	12.1	7.4	7.2	4.9
Total	1349.4	1028.1	302.4	11.9	48.4	115.6	143.1	172.5	210.4	140.9	123.3

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1970	1971	1973	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.2	1.8	0.7	0.0	0.0	0.0	0.4	0.2
3	6.7	230.3	0.6	0.8	11.8	24.7	60.2	1.0	15.7	2.3	23.6
4	628.4	43.3	0.2	1.2	12.3	32.5	42.7	133.6	6.3	5.3	7.8
5	94.5	421.1	243.1	2.3	2.9	60.2	24.1	25.1	160.1	3.9	5.6
6	58.0	65.3	6.1	1.6	6.4	18.6	45.8	27.6	26.4	103.2	4.9
7	307.4	189.8	41.4	0.2	4.5	23.7	16.9	45.7	26.2	11.4	68.1
8	146.4	43.4	5.1	1.9	0.9	8.8	14.3	13.0	24.6	19.4	6.1
9	39.2	30.8	1.2	0.5	6.0	4.3	10.0	3.7	9.6	11.2	14.6
10	71.2	22.3	8.5	0.4	1.0	10.8	5.2	3.9	1.3	1.3	8.0
11	179.0	108.0	26.8	7.0	24.1	60.2	56.2	16.6	11.9	11.6	9.2
Total	1532.1	1153.3	332.3	16.0	71.6	244.2	275.6	270.3	281.9	170.1	148.2

Stock: SMBPB Season: SPRING MULTIPLICATIVE CATCH RATES

AUTUMN SPAWNERS

Age	1970	1971	1973	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	1.2	1.3	5.4	1.2	1.7	7.5	0.0	0.2
4	1.2	18.0	0.5	1.2	28.3	9.5	46.1	19.4	17.2	4.2	3.1
5	29.5	1.3	0.0	4.0	5.3	47.0	17.8	40.3	30.9	4.6	6.4
6	1.6	60.8	2.8	0.4	14.5	14.1	48.8	24.7	55.8	11.0	2.5
7	37.7	23.4	3.3	0.0	2.7	20.1	18.1	102.4	31.9	19.7	6.4
8	75.2	20.5	11.1	0.4	1.3	1.4	15.3	25.1	77.3	19.1	4.8
9	26.0	37.4	0.0	0.2	2.1	3.6	1.8	8.8	28.2	31.5	3.4
10	11.7	14.8	0.7	0.0	1.1	0.7	3.2	3.6	2.7	4.6	8.5
11	51.3	92.9	51.0	1.0	7.1	11.9	13.6	10.9	17.2	16.7	7.3
Total	234.4	269.1	69.5	8.5	63.7	113.5	166.0	237.1	268.3	111.4	42.5

SPRING SPAWNERS

Age	1970	1971	1973	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.4	4.9	0.6	0.0	0.0	0.0	1.6	0.4
3	8.7	495.1	1.4	0.4	31.1	16.3	74.2	0.8	51.3	8.6	40.1
4	804.9	75.1	0.0	1.2	5.4	19.2	7.3	304.4	6.3	16.1	10.3
5	91.7	903.9	564.9	0.8	2.8	6.1	12.4	20.5	570.0	10.2	3.1
6	72.7	79.6	11.2	2.9	3.1	2.3	8.6	42.2	43.4	382.8	5.9
7	356.6	384.6	92.7	0.4	9.6	0.8	3.0	8.4	66.3	23.7	109.6
8	112.5	72.9	0.7	3.5	1.1	6.4	2.7	6.3	15.0	54.8	5.7
9	24.2	28.7	2.8	0.8	14.4	0.2	10.8	0.3	7.9	11.3	21.4
10	79.6	33.2	19.0	0.8	1.6	8.9	3.4	5.9	2.4	0.5	5.2
11	178.3	139.2	11.2	13.5	59.0	41.2	56.8	29.3	27.6	27.4	8.4
Total	1730.9	2210.1	702.6	24.7	132.9	102.1	179.2	418.2	789.5	537.7	209.9

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1970	1971	1973	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.4	4.9	0.6	0.0	0.0	0.0	1.6	0.4
3	8.7	495.1	1.4	1.6	32.4	21.8	75.4	2.5	58.8	8.6	40.3
4	806.0	93.2	0.5	2.5	33.7	28.7	53.5	323.9	23.5	20.4	13.3
5	121.3	905.3	564.9	4.9	8.1	53.1	30.1	60.8	600.9	14.8	9.6
6	74.3	140.4	14.1	3.3	17.6	16.4	57.4	66.9	99.2	393.9	8.4
7	394.3	408.0	96.1	0.4	12.2	20.9	21.1	110.8	98.2	43.4	116.0
8	187.7	93.4	11.8	3.9	2.4	7.8	18.0	31.4	92.3	73.9	10.4
9	50.2	66.1	2.8	1.0	16.5	3.8	12.6	9.0	36.1	42.8	24.8
10	91.3	48.0	19.7	0.8	2.7	9.6	6.6	9.4	5.1	5.1	13.7
11	229.6	232.1	62.2	14.5	66.1	53.2	70.4	40.2	44.8	44.1	15.7
Total	1965.3	2479.2	772.1	33.2	196.6	215.6	345.2	655.3	1057.8	649.1	252.4

Table 24. Unstandardized catch rates at age (numbers per days fished) and multiplicative model catch rates at age, by spawning type, for Fortune Bay, spring program.

Stock: FB Season: SPRING UNSTANDARDIZED CATCH RATES

AUTUMN SPAWNERS

Age	1970	1971	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	7.5
4	0.0	0.0	0.3	18.0	0.0	13.9	8.5	0.1	0.2	0.2
5	0.0	0.0	1.4	6.0	27.5	7.9	5.0	3.3	0.1	3.7
6	0.0	2.1	0.2	20.6	10.5	74.2	9.3	4.0	3.0	1.4
7	0.0	4.2	0.0	2.0	17.3	38.7	28.3	4.5	3.8	11.2
8	8.2	1.4	0.0	1.1	3.6	17.5	9.0	25.6	3.0	8.9
9	2.8	14.1	0.0	0.5	0.9	13.9	2.0	10.0	12.1	3.1
10	0.0	2.1	0.0	0.0	0.2	3.3	1.0	5.2	1.1	20.8
11	6.8	12.7	0.1	0.7	3.1	6.0	1.7	17.3	13.8	24.8
Total	17.8	36.7	2.0	48.9	63.0	175.3	64.9	69.9	37.2	81.4

SPRING SPAWNERS

Age	1970	1971	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	10.4	0.6	8.4	0.0	14.4	0.0	0.0	0.0	12.2
4	122.4	13.8	0.8	6.0	19.6	2.8	224.5	0.0	0.0	0.9
5	5.6	168.3	0.6	3.9	13.2	205.4	8.8	532.1	3.1	0.9
6	16.7	15.2	0.1	3.1	5.4	69.5	70.0	11.7	419.7	15.9
7	236.5	31.5	0.2	2.4	1.2	15.8	48.4	48.3	9.8	664.7
8	2.8	86.4	6.0	2.7	3.6	4.6	10.0	20.7	50.5	15.0
9	5.6	0.0	0.3	44.0	0.3	8.8	0.8	4.8	11.3	65.4
10	0.0	6.2	0.8	4.6	3.9	6.5	2.0	1.4	2.1	33.7
11	8.3	13.8	0.8	53.7	90.6	135.8	36.0	71.8	19.6	125.3
Total	397.5	345.6	10.3	128.7	137.9	463.6	400.1	690.2	515.6	934.9

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1970	1971	1982	1983	1984	1985	1986	1987	1988	1989
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	10.4	0.6	8.4	0.0	14.5	0.0	0.0	0.0	19.6
4	122.4	13.8	1.1	24.0	19.6	16.6	233.0	0.1	0.2	1.1
5	5.6	168.3	2.0	9.9	40.7	213.2	13.8	535.4	3.2	4.6
6	16.7	17.3	0.3	23.7	15.8	143.7	79.3	15.7	422.7	17.3
7	236.5	35.6	0.2	4.5	18.5	54.5	76.7	52.8	13.6	675.9
8	11.0	87.8	6.0	3.8	7.2	22.2	19.0	46.3	53.5	23.8
9	8.3	14.1	0.3	44.5	1.2	22.7	2.8	14.8	23.5	68.5
10	0.0	8.3	0.8	4.6	4.1	9.8	3.0	6.6	3.2	54.4
11	15.2	26.5	0.9	54.4	93.7	141.8	37.7	89.1	33.4	150.1
Total	415.3	382.3	12.3	177.6	200.9	638.9	465.0	760.1	552.8	1016.3

Stock: FB Season: SPRING MULTIPLICATIVE CATCH RATES

AUTUMN SPAWNERS

Age	1970	1971	1982	1983	1984	1985	1986	1987	1988	1989
1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3			0.0	0.0	0.0	0.2	0.0	0.0	0.0	69.5
4			1.6	23.0	0.0	20.3	47.9	1.5	0.9	1.5
5			7.1	7.7	32.6	11.6	28.1	35.6	0.5	34.0
6			1.1	26.3	12.4	108.7	52.3	43.1	14.3	12.8
7			0.0	2.6	20.5	56.8	159.3	48.4	18.1	103.5
8			0.0	1.4	4.3	25.7	50.8	276.9	14.3	82.3
9			0.0	0.6	1.0	20.3	11.3	108.2	57.7	28.7
10			0.0	0.0	0.2	4.9	5.8	56.0	5.3	192.6
11			0.5	0.9	3.7	8.7	9.5	187.6	65.8	230.4
Total			10.3	62.4	74.7	256.9	365.4	756.5	177.0	755.3

SPRING SPAWNERS

Age	1970	1971	1982	1983	1984	1985	1986	1987	1988	1989
1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2			0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3			3.1	10.7	0.0	21.1	0.0	0.0	0.0	112.8
4			4.1	7.7	23.2	4.1	1263.7	0.0	0.0	8.7
5			3.1	4.9	15.7	300.9	49.6	5758.9	14.7	8.7
6			0.5	3.9	6.4	101.9	394.2	127.0	1996.9	147.5
7			1.0	3.1	1.5	23.1	272.6	522.9	46.6	6167.7
8			31.0	3.4	4.3	6.8	56.3	224.1	240.4	138.8
9			1.5	56.2	0.3	12.9	4.5	52.3	54.0	607.2
10			4.1	5.9	4.6	9.5	11.3	14.9	9.8	312.3
11			4.1	68.5	107.4	199.0	202.7	776.8	93.2	1162.4
Total			53.1	164.3	163.5	679.1	2252.6	7469.3	2453.2	8674.7

SPRING AND AUTUMN SPAWNERS COMBINED

Age	1970	1971	1982	1983	1984	1985	1986	1987	1988	1989
1			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2			0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3			3.1	10.7	0.0	21.2	0.0	0.0	0.0	182.3
4			5.8	30.7	23.2	24.4	1311.6	1.5	0.9	10.2
5			10.1	12.6	48.3	312.4	77.7	5794.4	15.3	42.7
6			1.6	30.2	18.8	210.5	446.5	170.1	2011.2	160.3
7			1.0	5.7	21.9	79.9	431.9	571.3	64.7	6271.2
8			31.0	4.9	8.5	32.5	107.1	500.9	254.8	221.1
9			1.5	56.8	1.4	33.2	15.8	160.5	111.7	635.9
10			4.1	5.9	4.8	14.4	17.1	70.9	15.1	504.9
11			4.7	69.4	111.1	207.7	212.2	964.4	159.1	1392.8
Total			63.4	226.7	238.2	936.0	2618.0	8225.8	2630.2	9430.0

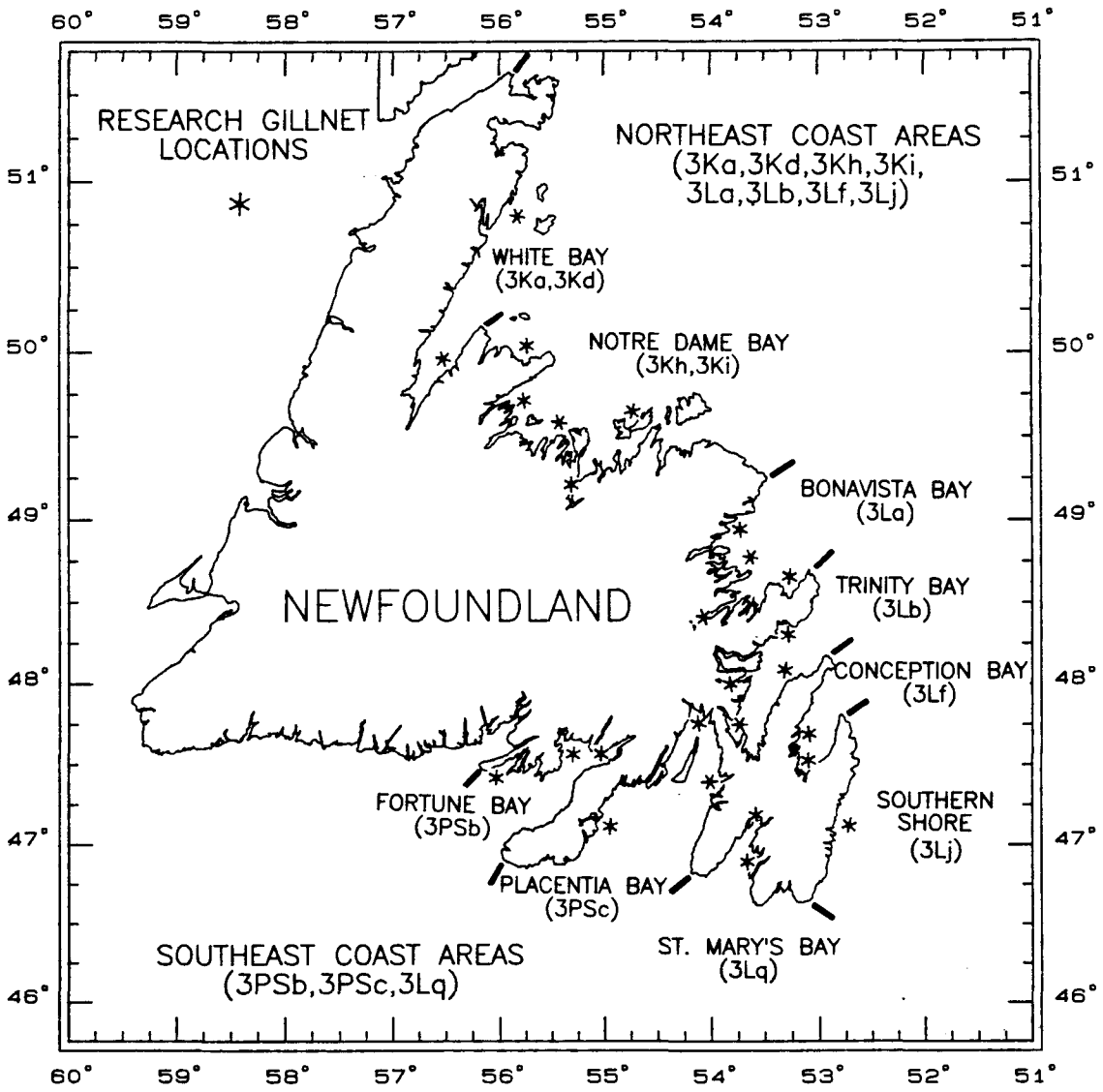


Fig. 1. Area map indicating herring stock complexes and research gillnet locations within the Newfoundland region.

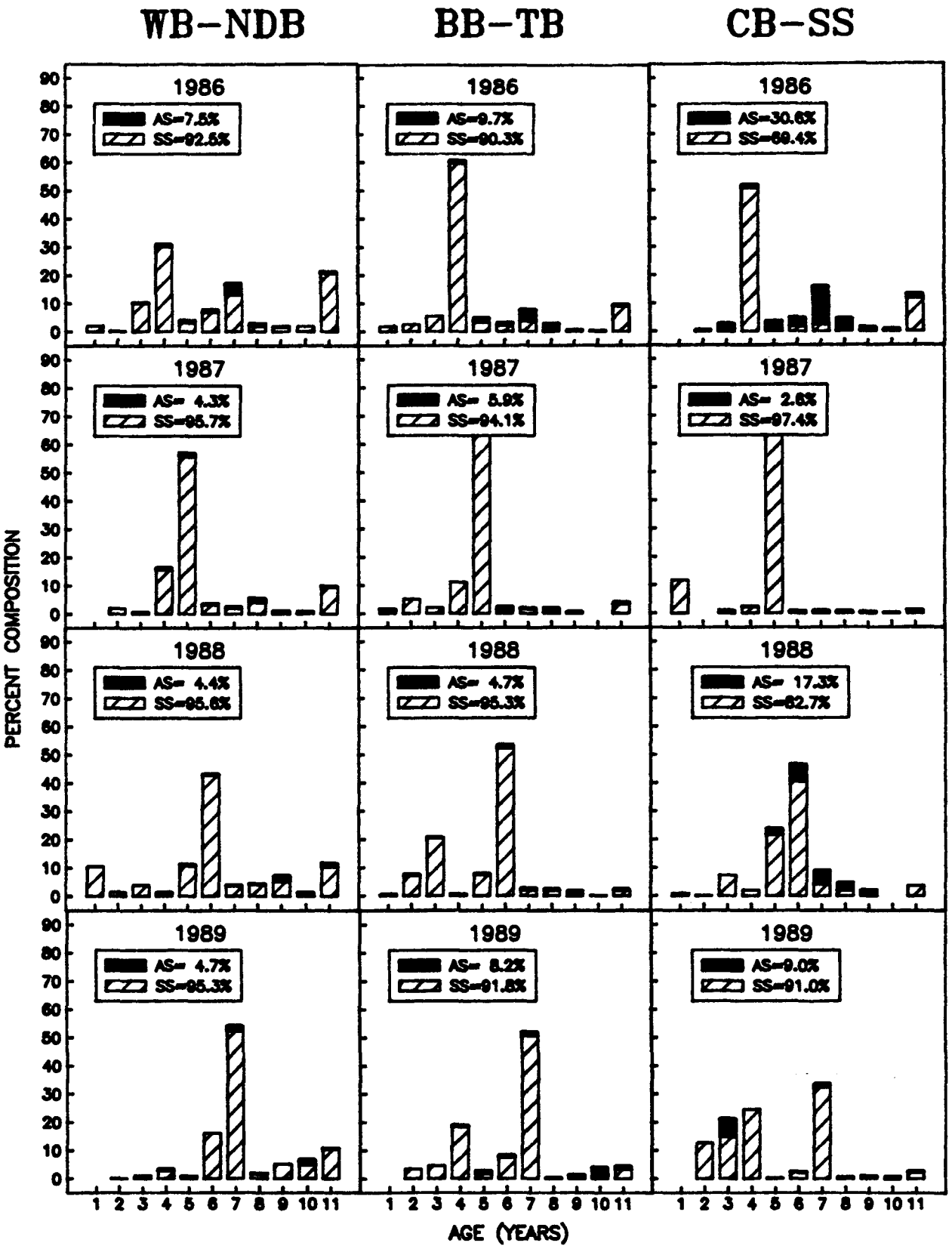


Fig.2. Age composition of herring from the commercial fishery, White Bay – Notre Dame Bay (WB–NDB), Bonavista Bay – Trinity Bay (BB–TB), and Conception Bay – Southern Shore (CB–SS), 1986–89.

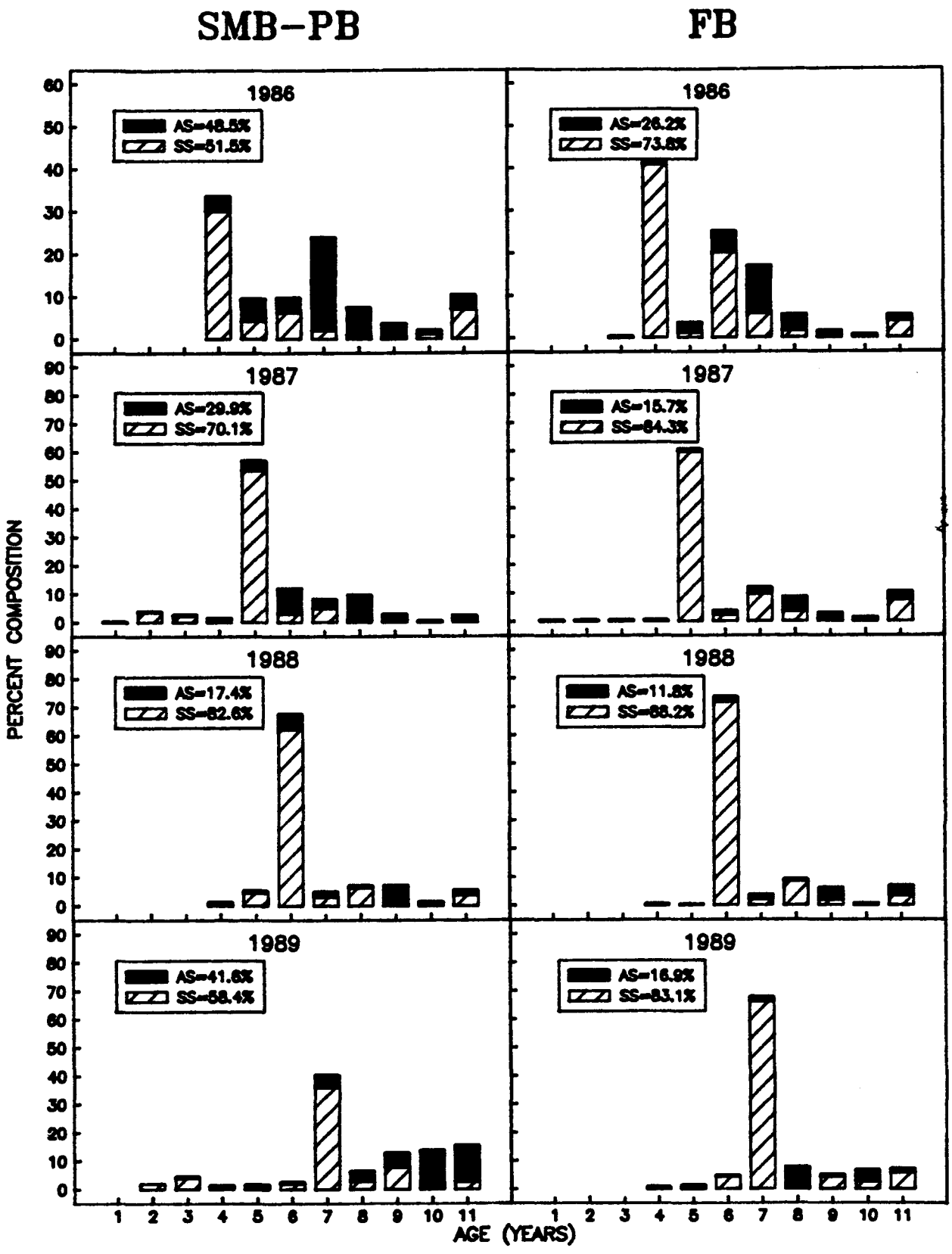
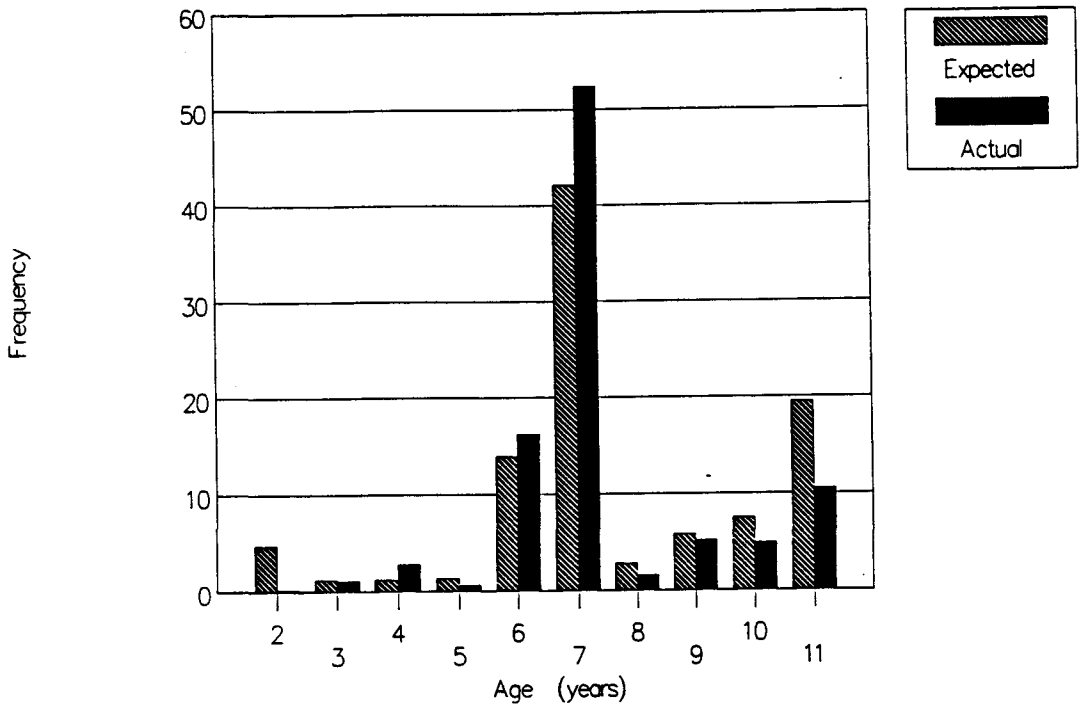


Fig.3. Age composition of herring from commercial fishery, St. Mary's Bay – Placentia Bay (SMB–PB), and Fortune Bay (FB), 1986–89.

White Bay – Notre Dame Bay



Bonavista Bay – Trinity Bay

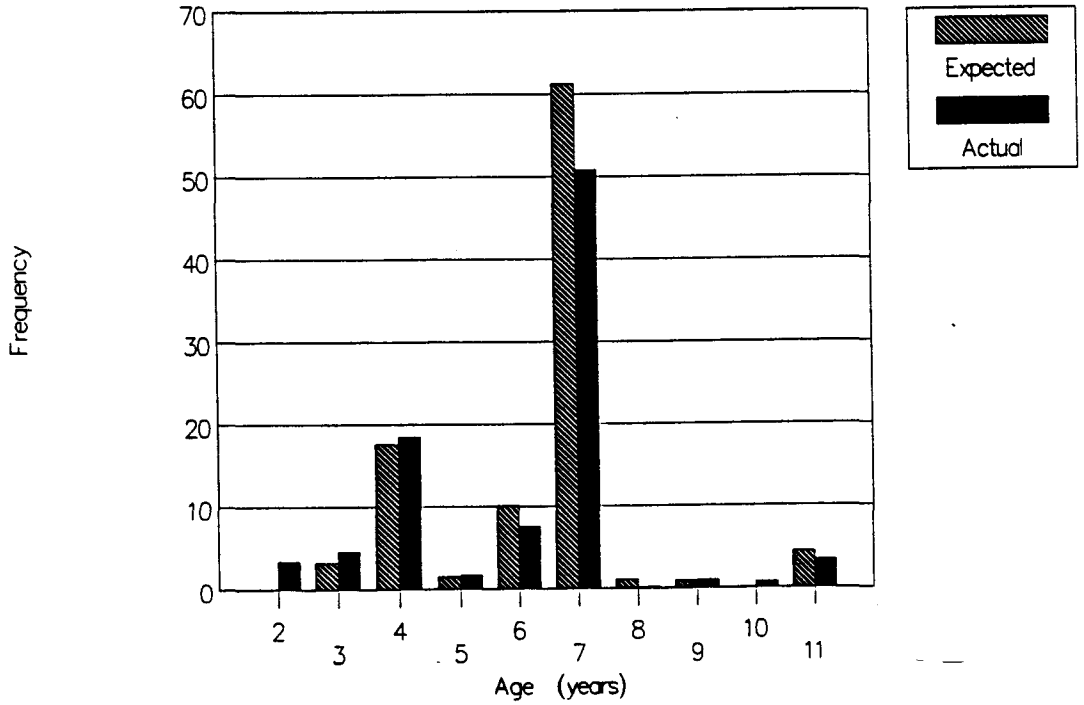


Fig. 4. Actual age distribution of the 1989 commercial catch vs. predicted age distribution from the 1988 acoustic survey, for White Bay-Notre Dame Bay and Bonavista Bay-Trinity Bay.

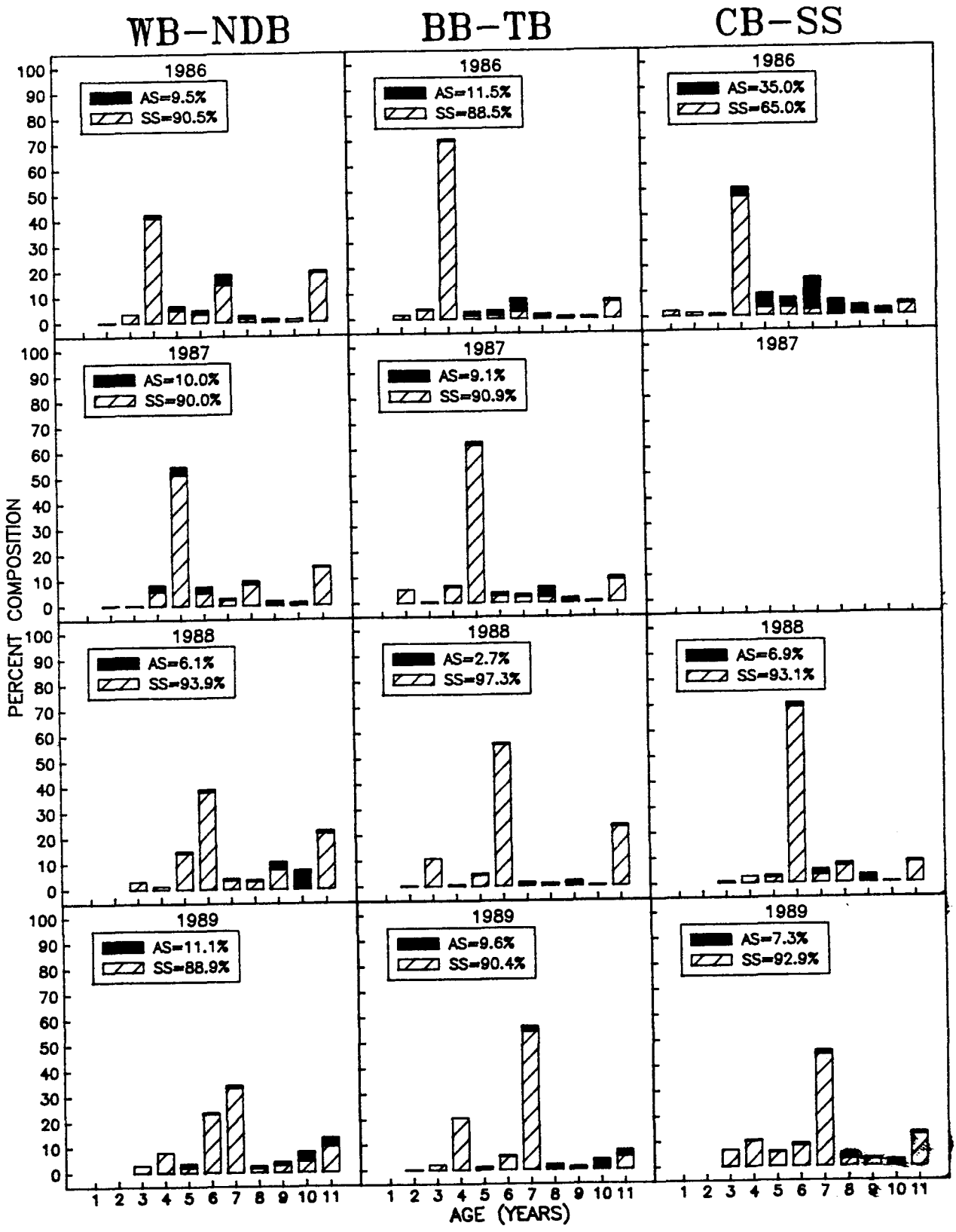


Fig.5. Age composition of herring from research gillnets, White Bay – Notre Dame Bay, Bonavista Bay – Trinity Bay, and Conception Bay – Southern Shore, 1986–89 (fall program from 1986–87 and spring program in 1988–89).

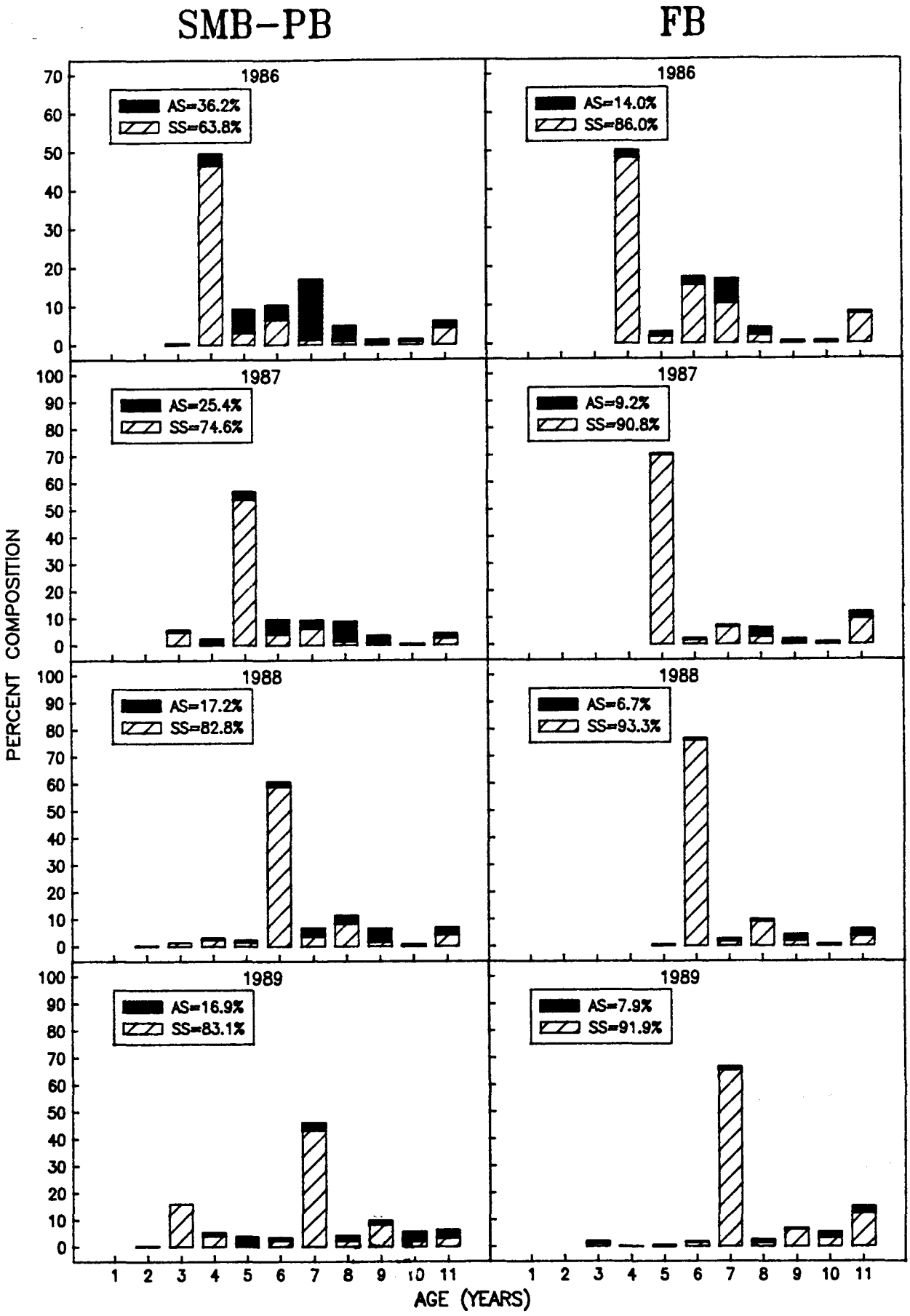


Fig.6. Age composition of herring from research gillnets, (spring program) St. Mary's Bay – Placentia Bay and Fortune Bay, 1986–89.

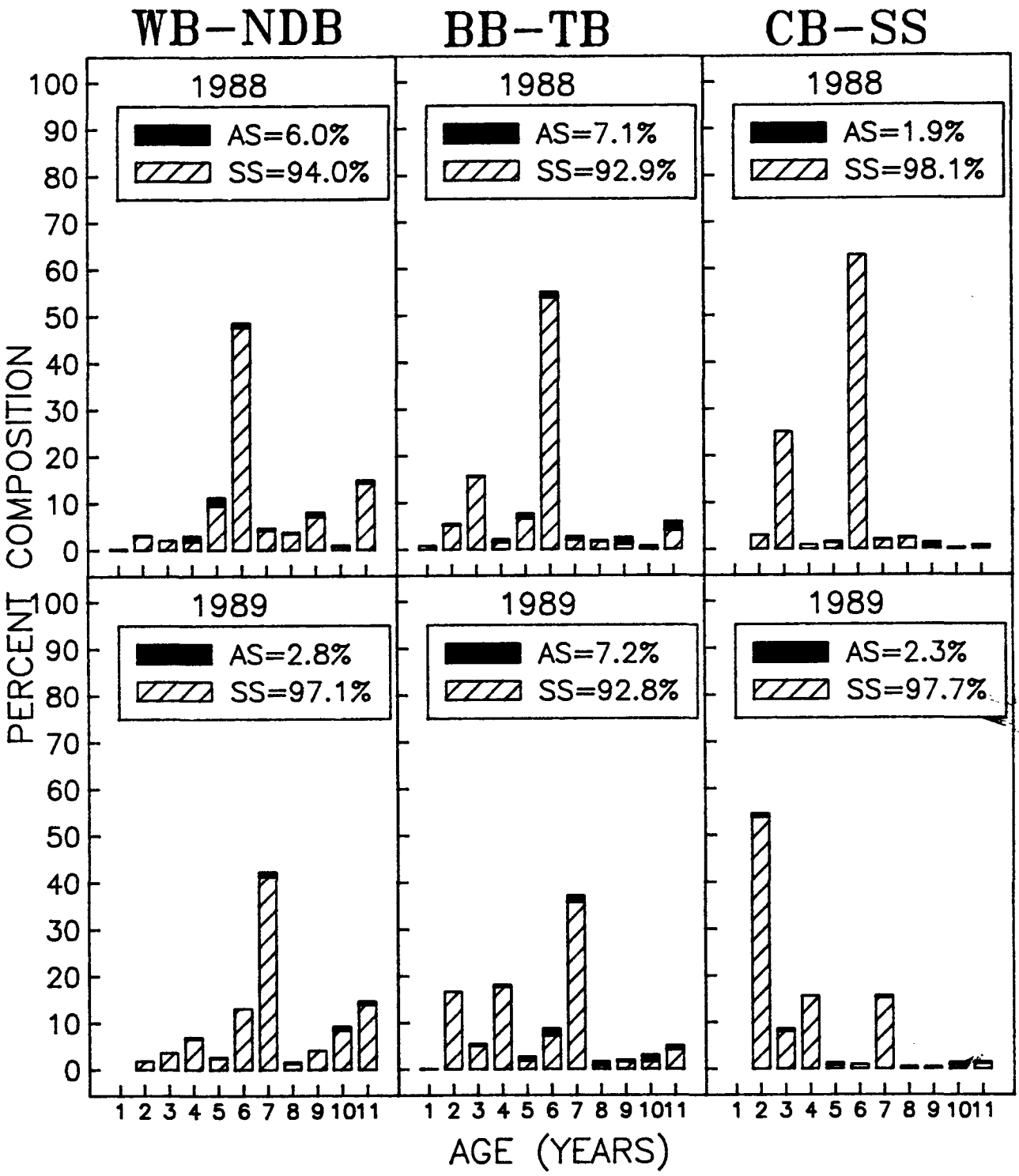
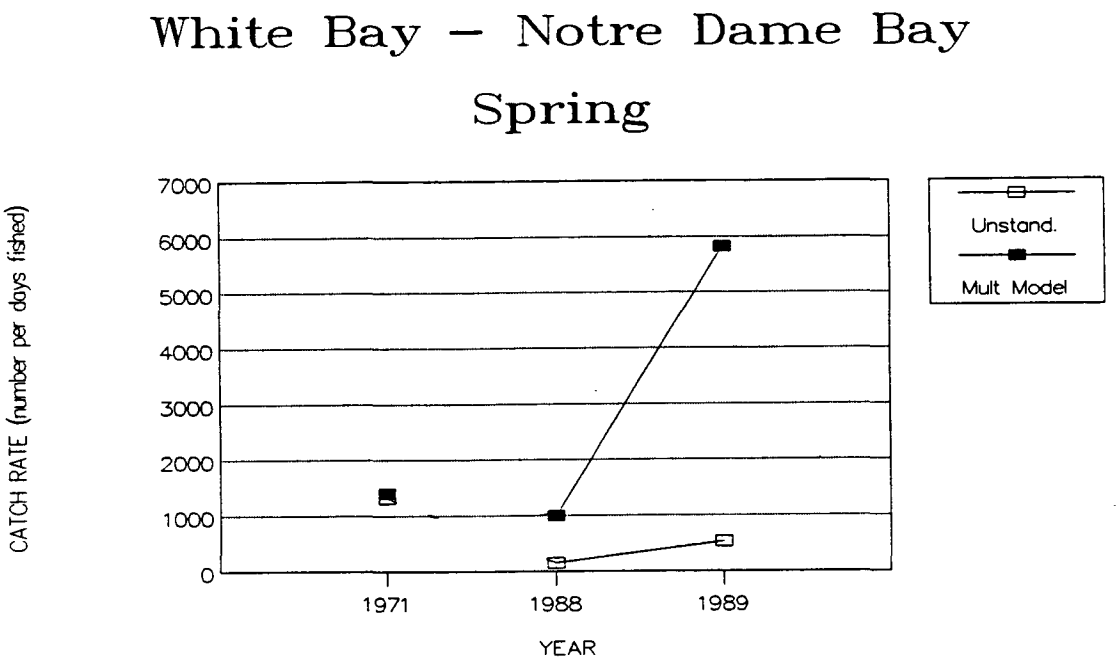


Fig.7. Age composition of herring from research gillnets, White Bay – Notre Dame Bay, Bonavista Bay – Trinity Bay, and Conception Bay – Southern Shore, 1988–89 (fall program only).



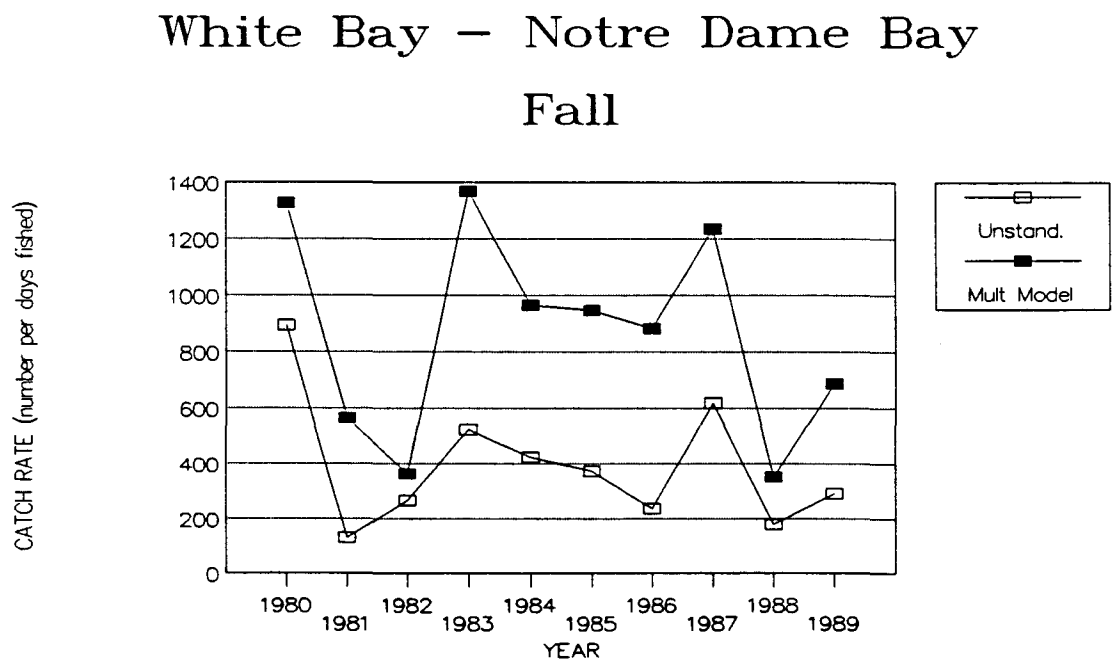
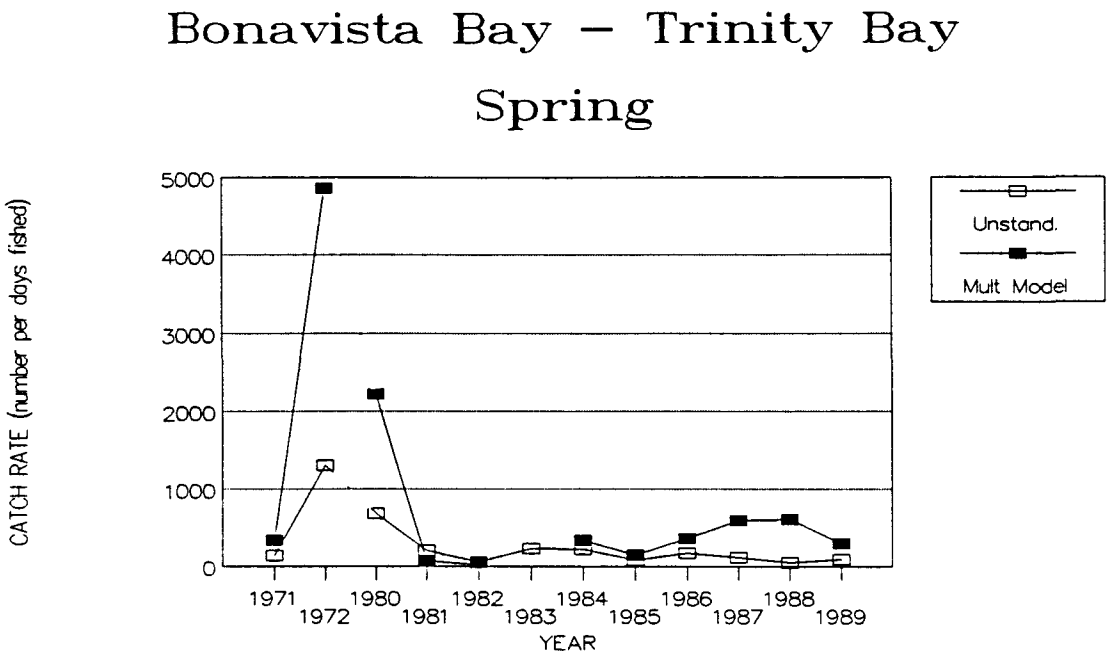


Fig. 8. Unstandardized research gillnet catch rates and multiplicative model catch rates, for spring spawners only, White Bay-Notre Dame Bay, spring and fall research gillnet programs.



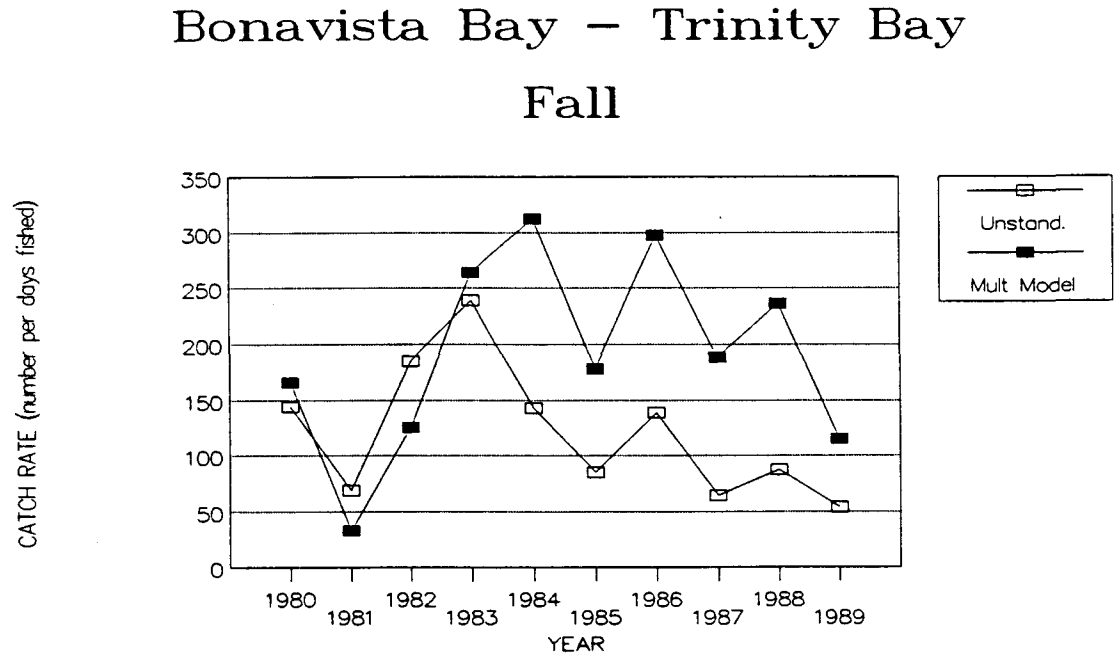
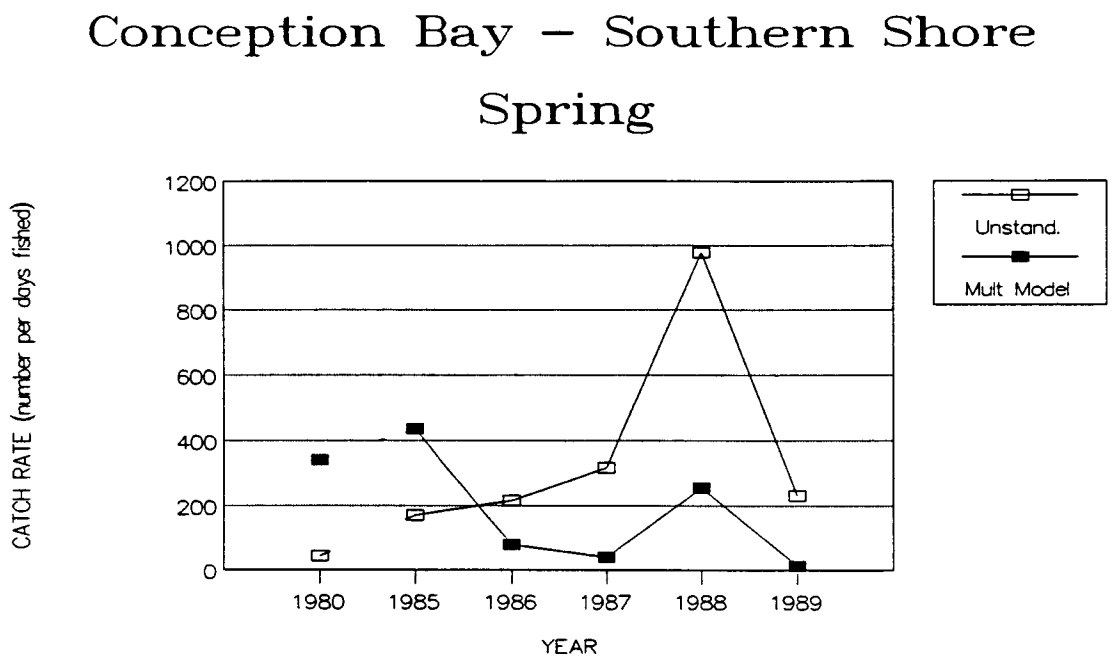


Fig. 9. Unstandardized research gillnet catch rates and multiplicative model catch rates, for spring spawners only, Bonavista Bay-Trinity Bay, spring and fall research gillnet programs.



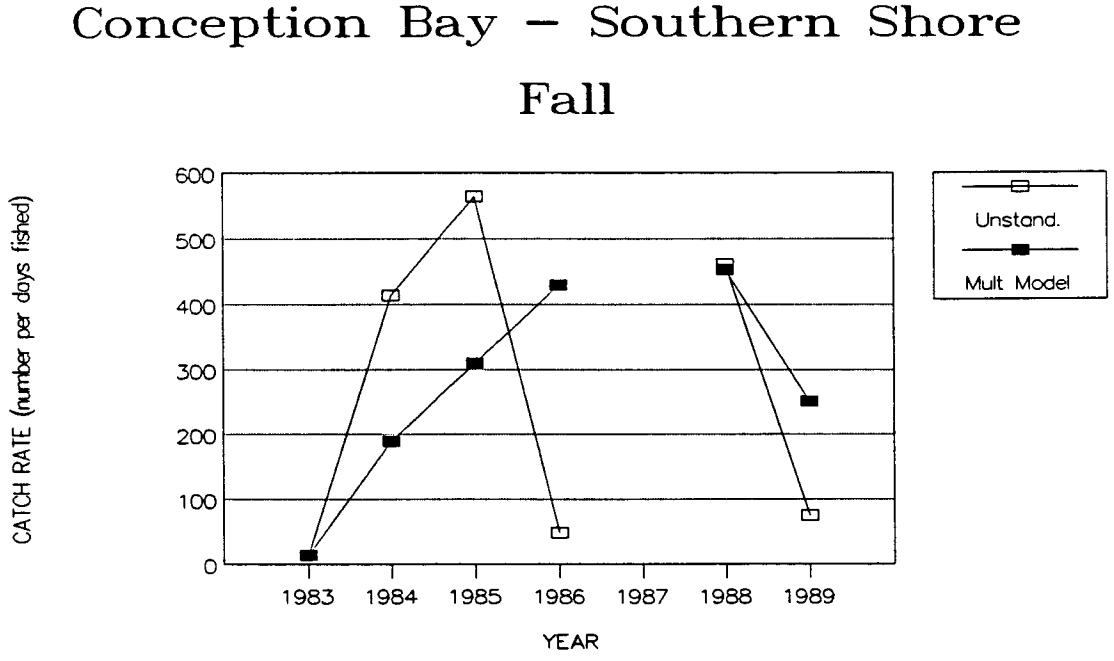
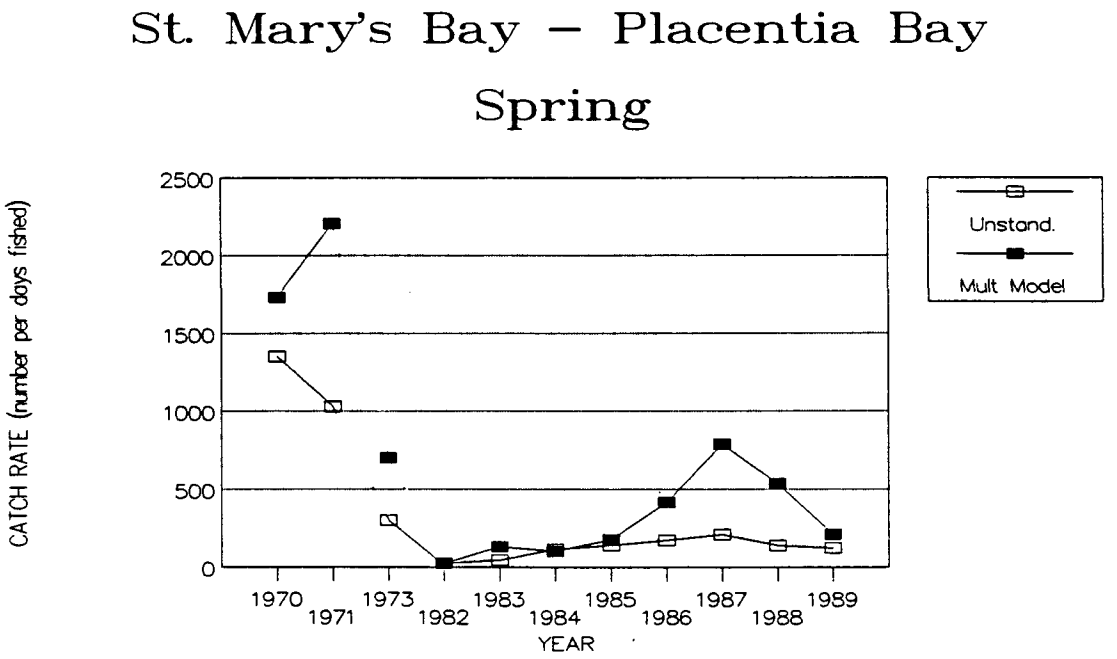


Fig. 10. Unstandardized research gillnet catch rates and multiplicative model catch rates, for spring spawners only, Conception Bay-Southern Shore, spring and fall research gillnet programs.



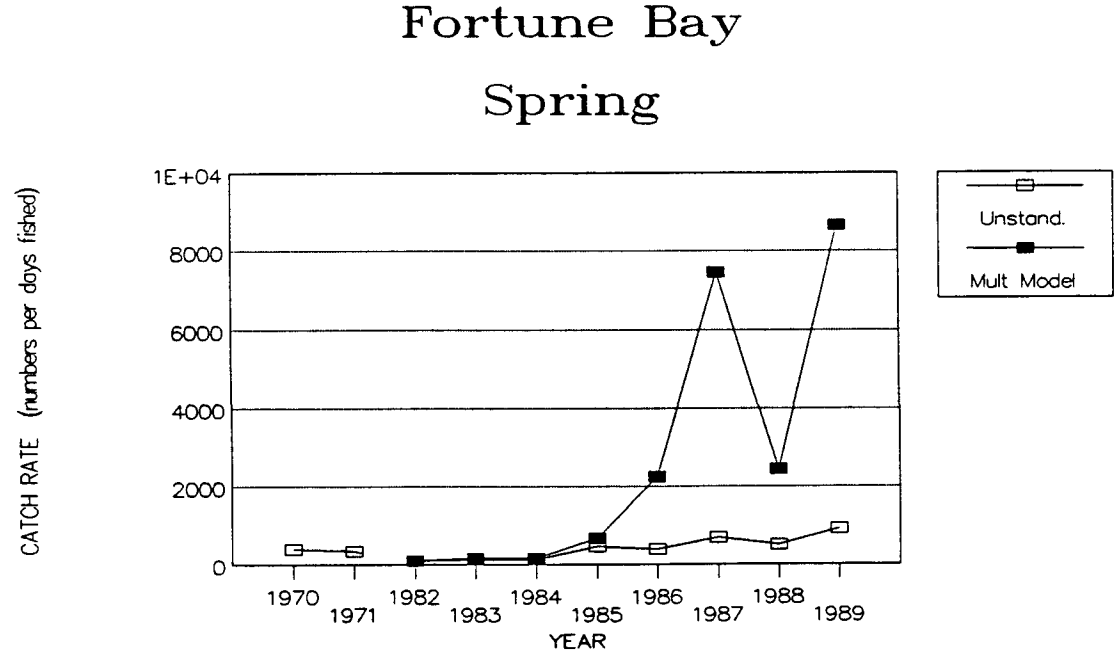


Fig. 11. Unstandardized research gillnet catch rates and multiplicative model catch rates, for spring spawners only, St. Mary's Bay-Placentia Bay and Fortune Bay, spring research gillnet program.