Department of Fisheries and Oceans
Canadian Stock Assessment Secretariat
Research Document 97/30

Not to be cited without
permission of the authors[1]

Ministère des pêches et océans
Secrétariat canadien pour l'évaluation des stocks
Document de recherche 97/30

Ne pas citer sans
autorisation des auteurs[1]

ASSESSMENT OF THE NAFO DIVISION 4T SOUTHERN GULF OF ST. LAWRENCE HERRING STOCK, 1996

by R. Claytor, C. LeBlanc, A. Sinclair, G. Poirier, and L. Paulin

Department of Fisheries and Oceans
P.O. Box 5030
Moncton, New Brunswick E1C 9B6

Abstract

The updated fall spawner $F_{0.1}$ fishing level for 1997 based on this assessment of the 1996 fishery is 49,186 tonnes. There is little change in the advice from last year's analysis of the 1995 fishery when the $F_{0.1}$ fishing level for 1997 was 48,540 tonnes. The 4+ biomass for fall spawners declined from 287,000 t in 1995 to 232,000 t in 1996, and 5+ biomass declined from 269,000 t in 1995 to 194,000 t in 1996. Fishing mortality on the fully recruited age (5 year olds) was 0.39 in 1996 exceeding the target of 0.30, weighted 4+ fishing mortality was 0.27, just below the expected weighted 4+ fishing mortality for 1996 of 0.28. Two below average year-classes are predominant in the fishery at this time, age 5s from the 1991 year-class and age 7 from the 1989 year-class. The incoming four year olds from the 1992 year-class appear to be average.

The updated spring spawner $F_{0.1}$ fishing level for 1997 based on this assessment of the 1996 fishery is 16,573 tonnes. This level is about 1,000 t higher than the F0.1 fishing level for 1997, 15,477 t, determined from last year's analysis of the 1995 fishery. The 4+ biomass for spring spawners declined from 112,000 tonnes in 1995 to 80,000 tonnes in 1996, while the 5+ biomass increased from 74,000 tonnes in 1995 to 77,000 tonnes in 1996. Fishing mortalities in 1996 were 0.44 for the fully recruited age (5 year olds) and 0.34 for weighted 4+. These levels were similar to the target of 0.44 for fully recruited ages and above the 0.3 target for weighted 4+. The 1990 and 1992 year-classes in the fishery at the present time are below average but the incoming four year olds appear to be above average.

Résumé

Le niveau de pêche $F_{0,1}$ des géniteurs d'automne mis à jour pour 1997 et fondé sur l'évaluation de la pêche de 1996 est de 49 186 tonnes. Il y a peu de modification par rapport à l'avis de l'an dernier fondé sur la pêche de 1995 et qui donnait une valeur de 48 540 tonnes pour 1997. La biomasse des géniteurs d'automne 4+ a diminué pour passer de 287 000 t en 1995 à 232 000 t en 1996 et celle des 5+, de 269 000 t en 1995 à 194 000 t en 1996. La mortalité par pêche des poissons totalement recrutés (âge 5) était de 0,39 en 1996, et donc supérieure à la valeur cible de 0,30, et la mortalité par pêche pondérée des 4+ était 0,27, soit tout juste en deçà de la valeur pondérée prévue de 0,28 pour 1996. Deux classes d'âge inférieures à la moyenne prédominent dans la pêche, ce sont celle des 5 ans de 1991 et celle des 7 ans de 1989. La classe à venir des quatre ans de 1992 semble d'importance moyenne.

Le niveau de pêche $F_{0,1}$ des géniteurs de printemps mis à jour pour 1997 et qui repose sur l'évaluation de la pêche de 1996 est de 16 573 tonnes. Cette valeur est de 1 000 t environ supérieure au niveau $F_{0,1}$ pour 1997, de 15 477 t, déterminé à partir de l'analyse de l'an dernier de la pêche de 1995. La biomasse des géniteurs de printemps 4+ a diminué pour passer de 112 000 t en 1995 à 80 000 t en 1996 et celle des 5+ a augmenté pour passer de 74 000 t en 1995 à 77 000 t en 1996. La mortalité par pêche en 1996 des poissons totalement recrutés (âge 5) était de 0,44 et la valeur pondérée pour les 4+ était de 0,34. Ces valeurs sont respectivement semblables à la cible de 0,44 pour les âges pleinement recrutées et supérieures à celle de 0,34 pour les 4+. Les classes de 1990 et 1992 sont actuellement inférieures à la moyenne mais celles des quatre ans à venir semble supérieure à la moyenne.

Introduction

This document provides an assessment of population biomass and fishing mortalities for spring and fall spawning herring in the southern Gulf of St. Lawrence for 1996. $F_{0.1}$ fishing levels are provided for spring and fall spawners for 1997 and 1998.

An ADAPT-VPA model is used to assess fall spawners using gillnetter catch rates as the abundance index. Supplementary abundance indices are available from an acoustic survey, bottom trawl survey, spawning bed survey, and phone survey of active gillnetters.

Issues and new analyses for the assessment of fall spawners are: the effects on the catch rate abundance index from shortened seasons, increased effort, and lower nightly boat limits in one area. New analyses also includes a risk analysis of the 1997 projection.

Spring spawners are assessed using a simple VPA with a range of Terminal Fs. A range of possible biomasses is then selected based on the proportion of spring and fall spawners observed in the acoustic survey.

Issues and new analyses for the assessment of spring spawners are the use of Escuminac and Southeast New Brunswick index gillnetters from 1988 to 1996 as an abundance index in an ADAPT-VPA model. A risk analysis of the 1997 projection is provided from the ADAPT results.

Information not directly related to estimating stock abundance and making projections, but important for providing background on analyses is provided in an appendix.

Description of the Fishery

Southern Gulf of St. Lawrence (Fig. 1) herring are harvested by an inshore, primarily gillnet fleet, fishing in 4T and a purse seine fleet (>65') in 4T and 4Vn. Five small seiners (<65' also participate in the inshore fishery. Unless specifically stated as small seiners, the terms purse seiners or seiners refers to the large seiners. Two stocks of herring are harvested in these fisheries. The spring spawning stock spawns before July 1 and the fall spawning stock after July 1. During the spring and fall fishing seasons large seiners are prohibited from fishing in several areas set aside for exclusive fishing by the inshore fleet (Figs. 2-5).

Prior to 1967, southern Gulf of St. Lawrence herring were exploited mainly by gillnets and average landings from 1935 to 1966 were 34,000 tonnes. In the mid 60s, a purse seine fishery was introduced and average landings were 166,000 tonnes from 1967 to 1972. Quotas were introduced in 1972 at 166,000 tonnes and reduced to 40,000 tonnes in 1973 (Fig. 6). Catches have been below the TAC since 1988 (Fig. 6).

The catch of spring spawners has exceeded the TAC for the last three years (Fig. 7), while the catch of fall spawners has been below the TAC since 1987 (Fig. 8).

Since 1981, the inshore has had the largest part of the 4T TAC and catch by spawning group and by fishing season (Figs. 9-12).

In the spring season, most of the inshore catch occurs in Areas 16C and 16E (Fig. 1, Table 1). Each of these areas had higher catches in 1996 compared to 1995, in spite of a reduction in the TAC (Fig. 7, Table 1).

Inshore catches exceeded their allocation of the spring TAC in 1996 by 3,000 t while large seiner catches were slightly below their spring season allocation (Table 2).

Inshore catches were about 1,500 t above their fall season allocation, while large seiner catches were slightly below their allocation during the fall season (Table 2). Combined, these catches were slightly under the fall season TAC (Table 2).

Fall Abundance Indices

The fall abundance index consists of weight of catch and trip information from purchase slips and dockside monitoring. Effort information for the index uses the number of nets per trip in each area and is estimated from a phone survey of active gillnetters.

The effort index is nets x number of trips. Each purchase slip or dockside monitor record was considered a trip. The number of nets per trip used in the principal landing areas has been estimated by statistical district since 1986 (Table 3) and was used to form the effort index for these years. Prior to 1986, an average index for the gulf was used (Table 4). Methods from deriving these estimates are in LeBlanc and LeBlanc (1996).

A multiplicative model with year, district, and 10 day periods was used to estimate an abundance index for each fall since 1978. This model was identical to those used in past assessments. The model was significant ($p<0.0001$, r-squared 0.59) (Table 5). Residual and DFFITS plots indicated there were on residual patterns no data points heavily influencing the model (Fig. 13).

The results indicate a decline in catch rates from 1995 to 1996, but confidence intervals overlap between the two years (Fig. 14). These catch rates are similar to those from 1985 to 1987 but are lower than those from 1989 to 1995. Catch rates in 1996 are significantly higher than those prior to 1984 (Fig. 14).

The second part of the abundance index is the catch-at-age matrix. Catch and weight-at-age matrices were derived from commercial sampling as in previous years. The combined 4TVn matrices were used in the estimation of stock parameters. These matrices were constructed by dividing catches into NAFO Divisions 4Vn, 4Tmno, 4Tl, and 4Tfghjk (Fig. 1).

Separate catch at age matrices were developed for fall inshore fishing areas corresponding to management areas, 16B, 16CE, 16D, 16F, and 16G (Fig. 1). The purse seine catches in 4Tmno were divided into time periods before and after Sept. 15. Separate catch at age matrices were also developed for the experimental mid-water trawl fishery. Purse seine and mid-water trawl catch-at-age matrices were combined into single mobile gear matrices (Appendix, Tables 1-24). Large purse seine catches for 4Vn were divided into six time periods corresponding to test fisheries and fisheries in different locations of 4Vn. These results are presented in Anon (1997).

Age 6 herring from the 1990 year-class were dominant in the inshore catch but age 4 herring from the 1992 year-class were dominant in the purse seine catch (Fig. 15). The above average 1987 and 1988 year-classes are no longer dominant in the fishery but still contribute as much as the 1989 and 1991 below average year-classes (Fig. 15).

The contrast between the size of the 1987 and 1988 year-classes and the 1989-1991 year-classes can be seen in comparing 5 year old numbers from 1992 to 1996 (Fig. 16). In 1992 and 1993, inshore catches were about half the level from 1994 to 1996. In spite of lower overall catches in 1987 and 1988, five year olds from the 1987 and 1988 year-classes were equal to or more numerous in the catch, than five year-olds from 1989-1991 year classes (Fig. 16). This difference indicates that there are no year-classes of comparable size entering the fishery at the present time and abundance in 1996 would be expected to be lower than it was in 1992 and 1993.

The below average strength of the 1989 and 1991 year-classes is evident upon examination of the catch-at-age matrices from the major fishing areas, the purse seine catch and the acoustic survey (Table 6).

The abundance index used to tune the ADAPT-VPA is in units of numbers/net-trip and is estimated by age for all years (Table 7). It is derived as follows:

Effort = Catch biomass inshore gear/ CPUE fixed gear

Abundance = Catch numbers inshore gear/ Effort.

This age-disaggregated index indicates the strength of the 1987 year-class compared to all others in the series. Other strong year-classes were 1988, 1983, and 1980 (Fig. 17).

Issues related to the development of the fall abundance index are: the shortened season, possible gear interference from increased effort on the fishing grounds, possible lower catch rates because of increased effort from inexperienced fishers, and a lower boat limit in one area (16F). Industry has argued that each of these will have acted to artificially lower catch rates in the fall and cause an under-estimation of stock abundance

Boat limits came into effect in 1985 and remained unchanged for all areas until 1994 when adjustments began to be made in some areas. Usually these were increases, but in 1996, the limit in management zone 16F (Gulf NS) was lowered from 20,000 pounds (9 tonnes) to 15,000 pounds (7 tonnes) (Table 8).

The effect of lowering this limit on the overall catch rate used in the ADAPT-VPA was first examined by determining the proportion of catches in each area that were at or near the nightly limits in each area (Fig. 18). These distributions indicated that in 16F about 45% to 55% of the catches were at or above the 15,000 pound nightly limit (Fig. 18). Proportions were similar in areas 16G and 16CE.

When all of 4T was combined the trend in the proportion of catches at or above 15,000 pounds (7 tonnes) in the catch declined from 1994 to 1996 (Fig. 19). Nightly boat limits in all areas were 15,000 pounds or more (Table 8). This trend matches the catch rate trend from the multiplicative model for these years (compare to Fig. 14).

An additional test of the influence of lowering the nightly limit on the overall catch rate used in the ADAPT-VPA was tested by setting all 1995 catches in 16F that were above 15,000 pounds to 15,000 pounds and recalculating the abundance index for 1995. This analysis indicates a very small drop in the CUE for 1995 (Fig. 20) and would have no influence on assessment results.

Area 16F accounted for about 18% of the inshore catch in 4T in 1995 and 1996. The proportion of the catch that was above 7 tonnes in 1995 was 36% (Fig. 18, Table 1). As a result, it is a relatively small proportion of the 4T inshore catch which is affected by this change.

The relationship between effort and catch rates is examined to determine if lower catch rates correspond to incidences of higher effort. Plots of catch rates against effort at high, medium, and low abundance levels indicate no relationship between effort and catch rates (Fig. 21). These plots indicate that effort levels are not influencing catch rates as used in the assessment. This contrast in ranges of effort levels at all abundance levels reduces uncertainty in estimating abundance of the 4T stock.

The season in 16B, CE, and D was shortened relative to times when about 87.5% of the catch occurs in these areas (Fig. 22). The reason for the shorter seasons was that the allocation had been caught. In other areas, the season was much shorter than gillnetters expected. To test the effect of these earlier closures on the catch rates, as used in the assessment, the catch rates were re-calculated from 1978-1996 using only data up to the dates of closure in each area. This re-calculation indicates that there was little effect on catch rates (Fig. 23).

Catch rates from index gillnetters, who are generally more experienced, are compared with catch rates from purchase slip and dockside monitoring data. This comparison was made to determine if index gillnetters have higher catch rates than all participants. This comparison indicates that for trends from 1994 to 1996, both indices are in general agreement in all areas (Fig. 24).

Supplementary indices provide mixed signals for stock abundance trends from 1995 to 1996. The bottom trawl survey in September indicates a decline from 1995 to 1996 (Fig. 25). Day and night tows provide the same relative abundance trends from this survey (Fig. 26). The acoustic survey for Chaleur Bay indicates an increase from 1995 to 1996 for the strata consistently surveyed from 1994 to 1996 (Fig. 27). An estimate of egg deposition has not been completed for the Fisherman's Bank egg survey but the principal bed observed was larger than those seen in 1995 and the depositions will probably be higher than 1995

but lower than 1994 (Fig. 28). The phone survey indicates that gillnetters in all areas felt abundance was up overall in 1996 compared to 1995 (Fig. 29).

Fall - Estimation of Stock Parameters

Fall biomass was estimated using the ADAPT formulation in past assessments (Claytor et al. 1996) (Table 9). Parameter estimates were significant (t>2.0) and correlations and bias percentages were low (Table 10). Residuals were generally well distributed and close to observed values. There were some indications of trends for age 4 and 6, but the majority of residuals were between ± 1 (Fig. 30). These patterns are similar to those seen in previous years (Claytor et al. 1996).

Retrospective values for 1994 and 1995 were similar to values estimated for 5+ and 7+ biomass in 1995 (Fig. 31). There has been no annual retrospective pattern and over- and under-estimates have alternated each year since 1990 (Fig. 31).Age by age retrospective plots indicate that the 1983 year-class was consistently over-estimated (Fig. 32).

The relationship between fishing mortality and effort is linearly significant (Fig. 33). The most recent year, 1996, has the highest positive residual (Fig. 33).

Fall 4+ biomass is about 232,000 tonnes and 7+ biomass is about 133,000 tonnes (Table 12).

Fall - Assessment Results

ADAPT results indicate that weighted 4+ fishing mortalities since 1981 have been below the weighted 4+ target of 0.21, each year except 1990, 1995, and 1996 (Table 13). Fishing mortality on age 5 fall spawning herring was the highest since 1980 (Table 13).

The 1989 and 1991 year-classes are well below average and the lowest since 1981 when the stock was at a very low abundance level (Fig. 34). These year-classes are low in the catches in all areas (Table 6) and the acoustic survey sampling from Chaleur-Miscou strata (Fig. 35). At the same time the, 1990 and 1992 year-classes are only average or slightly above average in strength (Fig. 35). The population has continued to decline from its peak in 1992 (Fig. 35).

Fall - Future Prospects

Projections for 1997 and 1998 were made by taking the beginning of the year biomass by age and subtracting losses from natural mortality and fishing to determine expected beginning of the year numbers for each of these years as in previous assessments (Claytor et al. 1996). The target fishing mortality of $F_{0.1}$=0.3 (fully recruited) was applied to these numbers to determine the $F_{0.1}$ fishing level.

Input parameters were partial recruitment by age, average weights-at-age, and recruitments at ages 2 and 3. Partial recruitment values were derived from average fishing mortalities from 1994 to 1996. Age 2 and age 3 recruitment were the geometric mean for 1978 to 1993 for age 2 and to 1994 for age 3. The extremely large 1987 year-class was omitted to remove the effects of this recruitment outlier on average year-class strength.

The $F_{0.1}$ fishing level for 1997 is 49,186 t and for 1998 is 45,494 tonnes (Table 14). The major cause for the decline from 1997 to 1998 in the $F_{0.1}$ level is the much lower than average recruitment of the 1991 year-class and only average recruitment for the 1992 year-class.

The probability that the fishing mortality in 1997 will exceed 0.3 for a range of TACs from 30,000 tonnes to 80,000 tonnes was determined. These results indicate that at a TAC of 56,000 tonnes there is an 80% chance that the target will be exceeded, but at 42,000 tonnes only a 15% chance it will be exceeded (Fig. 36). The biomass has a higher than 50% probability of declining at any TAC above 30,000 tonnes (Fig. 36).

Spring Abundance Indices

Spring abundance indices were derived using volunteer index gillnetters and daily catches monitored by the New Brunswick provincial government in Escuminac and Southeast New Brunswick. Index gillnetters kept daily records of total catch, and the amounts dumped, kept for private use, local sale, or transfers to other boats. Catch rates using these data were catch(kg)/net/trip. The New Brunswick provincial government hires a dockside co-ordinator to record catch and effort in Escuminac (Statistical Districts 73-75) and Southeast New Brunswick (Statistical Districts 76-80) (Fig. 1) during the spring season. From 1990 to 1996, catches and numbers of fishers have been recorded daily. Catch rates using these data are catch(kg)/fisher-day.

The index gillnetter and provincial co-ordinator catch rate models were both significant (Tables 15, 16). Residual and DFFITS analyses for these models indicated no outstanding outliers or influential points (Figs. 37, 38). The first year of the index gillnetter program was dropped from the data set because of few participants in that year. Index gillnetter and provincial co-ordinator both indicate peaks in catch rates in 1994 (Fig. 39). These two catch rate series are significantly correlated (Fig. 39).

Abundance indices by age from the index gillnetters indicate that the 1988 year-class was the largest in recent years (Fig. 40).

Spring - Estimation of Stock Parameters

Two methods were used to estimate population size. The first used the same approach as for the assessments of the 1994 and 1995 fisheries and the second used an ADAPT-VPA formulation identical to the fall model, but with the shorter time series of the spring index gillnetters.

The first method consisted of applying a simple VPA to the catch at age matrix using a range of terminal Fs from 0.2 to 0.7 as was done last year (Claytor et al. 1996). A partial recruitment vector was estimated from gillnet and acoustic survey matrices (Table 17). This analysis produced 4+ biomass estimates ranging from 50,000 to 140,000 tonnes (Fig. 41). All terminal Fs indicate a decline from 1995 to 1996 (Fig. 41).

As was done previously (Claytor et al. 1996), an attempt was made to narrow the bounds of these estimates to a more likely range using the percentage of spring and fall spawners observed in the acoustic survey since 1990. These data indicate that on average 21% to 26% of the southern Gulf of St. Lawrence 4+ biomass is spring spawners (Table 18), with the most recent years averaging 24% to 26% (Table 18). Percentages for the most recent years correspond to the 4+ biomass estimate using a Terminal F of 0.4 (Table 19). There is no retrospective pattern for the last three years of this analysis (Fig. 42). There is some tendency to over-estimate age 11 in the last three years (Fig. 43). The view of the stock from 1994 to 1995 is different from the analysis completed last year. For example, there was a general decline for 4+ ages from 1994 to 1995 in last years assessment (Claytor et al. 1996), while this analysis indicates a stable or increasing trend from 1994 to 1995 (Figs. 41 and 44).

An ADAPT formulation identical to the one used for the fall spawner was found to be significant using the index gillnetter catch rate series to derive the abundance index (1988-1996) (Table 20). The highest percent bias was 10% and the highest parameter correlation was 0.36 (Table 20).

Residual values were within +/- 1 but showed some trends for ages 4 and 10 (Fig. 45). There has been a slight tendency to over-estimate stock size with this model (Fig. 46). In the last two years this has been most noticeable for ages 7 and 9-11 (Fig. 47).

Spring - Assessment Results

Each of these models gives similar results for 1996 but some differences in fishing mortality levels are apparent for 1988-1996. The simple VPA indicates that target fishing mortalities have been exceeded from 1994 to 1996 and in 1988, while the ADAPT model indicates that the target fishing mortality has only been exceeded in 1996 (Tables 21-26).

Each of the models produces similar population trends (Fig. 48). The ADAPT-VPA model has a higher estimate of 9 year olds in 1997, which have a relatively larger biomass than other ages (Fig. 49).

Spring - Future Prospects

As with the fall spawners the spring spawner stock is very dependent on strong year-classes. The 1982 and 1988 year-classes were the strongest in the spring stock and dominated the fishery for about 4 years. While the 1990 and 1992 year-classes seem to be below average, the 1991 year-class appears to be stronger than estimated last year and is the main reason for the reversal of the downward trend from 1994 to 1995 observed in last years assessment (Fig. 50).

Projections for the spring stock were done in the same manner as for fall spawners. The $F_{0.1}$ fishing level using the simple VPA is about 17,000 compared to 16,500 t for the ADAPT-VPA model (Tables 27,28). These are both higher than the 15,500 t projected last year for 1997 in the assessment of the 1995 fishery.

A risk analysis of the ADAPT projection indicates that at any TAC above 10,000 tonnes the biomass in 1998 can be expected to be less than in 1997 (Fig. 51). At a TAC of 19,000 tonnes there is an 80% chance of the fishing mortality target being exceeded and a 20% chance of this target being exceeded at a TAC of 14,200 tonnes (Fig. 51).

Mean Weight - Spring and Fall

Mean weight-at-age for spring and fall spawners is below average in recent years (Figs. 52,53). The steady declines seen in the first half of the 1990s seems to have stopped and slightly reversed itself from 1995 to 1996 (Figs. 52, 53).

Acknowledgements

We would like to thank Clarence Bourque and Colin MacDougall for assistance in the field and in processing laboratory samples.

Reference

Anon. 1997. Decision rules for managing overwintering fisheries. DFO Maritimes Regional Fisheries Status Report 97/1 E.

Cairns, D.K., D. LeBlanc, and C. MacDougall. 1996. Herring spawn volume and progenitor biomass at Fisherman's Bank, Prince Edward Island. DFO Atlantic Fisheries Research Docuement 96/121.

Claytor, R., C. LeBlanc, J. Dale, G. Nielsen, L. Paulin, C. MacDougall, C. Bourque. 1996. Assessment of the NAFO Division 4T southern Gulf of St. Lawrence herring stock, 1995. DFO Atlantic Fisheries Research Docuement 96/79.

LeBlanc, C. and L. LeBlanc. 1996. The 1995 NAFO Division 4T herring Gillnet Telephone Survey. DFO Atlantic Fisheries Research Docuement 96/77.

Table 1. Catch (tonnes) by season in fixed gear for 4T Southern Gulf of St. Lawrence herring. Catches compiled using ZIFF raw data files for 1986, and 1988-1996. For 1987, purchase slip files were used.

SPRING SEASON - FIXED GEAR

	Area							
Year	16A	16B	16C	16D	16E	16F	16G	Total
86	234	1439	2282	328	3731	66	266	8347
87	206	4089	3082	106	3841	134	38	11496
88	78	6616	3560	108	2041	158	122	12682
89	88	3827	1556	74	5080	134	62	10822
90	62	1715	2232	167	4285	141	17	8618
91	26	2139	5159	193	5018	127	16	12678
92	26	2856	4348	243	4699	146	54	12372
93	34	2377	4533	885	6893	200	124	15047
94	129	1550	6187	218	10499	154	71	18809
95	13	1029	4799	1039	6993	95	27	13995
96	123	460	5380	1628	8428	37	40	16096
Mean 91-95	46	1990	5005	516	6820	144	58	14580

FALL SEASON - FIXED GEAR

	Area							
Year	16A	16B	16C	16D	16E	16F	16G	Total
86	124	25959	93	0	1570	5816	6638	40199
87	208	31653	902	1	1090	9495	8660	52009
88	68	22111	1254	9	2591	9141	6102	41276
89	95	26431	1015	0	517	3160	2905	34123
90	110	31926	753	2	2405	10343	10957	56496
91	34	17181	1559	1	3242	1906	3122	27044
92	35	23559	1789	18	2540	1919	3160	33019
93	87	14597	3062	618	1977	935	1786	23062
94	74	34473	4086	1460	2118	8095	3483	53789
95	77	29448	5164	1901	4216	10113	3816	54735
96	86	21381	2817	1448	4688	7754	7608	45782
Mean 91-95	61	23852	3132	800	2819	4594	3073	38330

Table 2. Catch (tonnes) by season in fixed gear for 4T Southern Gulf of St. Lawrence herring. Catches are from ZIFF files except for Fall bait, small seiner catches, and large seiner catches outside Chaleur Bay which are from quota monitoring. All seiner catches include mid-water trawl catches.

SOUTHERN GULF OF ST. LAWRENCE TACs and QUOTA ALLOCATIONS

Fishing Area	TAC (t)	Sharing TAC		Inshore		Large Seiners	
		Inshore	Seiners	Allocation	Catch	Allocation	Catch
Spring 4T	15,114	86%	14%	12,954	16,096	2,160	1,907
Fall 4T	52,326	84%	16%	44,158	45,782	8,168	8,023
Winter 4Vn	6,423		100%			6,423	4,267
Total Fall	58,749	75%	25%	44,158	45,782	14,591	12,290
Total (Spring + Fall)	73,863	77%	23%	57,112	61,878	16,751	14,197

SPRING FISHERY

Area/Zone	Season/Saison	TAC (t)/ TPA (t))	Catch (t)/ Prises (t)
INSHORE			
Escuminac 16C	Jan 1-May 31	4,550	5,252
Remainder of 4T	Jan 1-May 31	6,663	10,646
Bait and Roe Fisheries all 4T	June 1-June 30	1,541	198
Quebec Small Seiners	Jan. 1 - June 30	200	0
Total Inshore		12,954	16,096
LARGE SEINERS			
All 4T	Ap 1 - June 30	2,160	1,907
Grand Total		15,114	18,003

FALL FISHERY

Area/Zone	Season/Saison	Consistent Weekend Closure	Vessel Limit/ Limite par bateau (lb)	TAC (t)/ TPA (t)	Catch (t)/ Prises (t)
INSHORE					
Isle Verte 16A	July 1-Dec 31	none	20,000	407	86
Baie des Chaleurs 16B	Aug 1-Dec 31	2 days	20,000	19,635	20,753
Baie des Chaleurs 16B	Jul 1-Dec 31 Bait Fishery			376	307
Escuminac 16C & West PEI 16E	Aug 1-Dec 31	1 day	20,000	6,950	7,505
Magdalen 16D	Aug 1-Dec 31	1 day	20,000	1,450	1,448
Pictou 16F	Jul 1-Dec 31	2 days	15,000	7,245	7,754
Fisherman's Bank 16G	Aug 1-Dec 31	2 days	20,000	7,245	7,608
Quebec Small Seiners	Aug 1-Dec 31			550	321
Roe-on-Kelp				300	0
Total Inshore				44,158	45,782
LARGE SEINERS					
Within Chaleur Bay	Sept - Dec			6,422	6,670
Outside Chaleur Bay	Sept - Dec			1,746	1,353
All 4T				8,168	8,023
4Vn	Nov - Mar			6,423	4,267
Total L. Seiners				14,591	12,990
Grand Total				58,749	58,072

Table 3. Average number of nets used during the fall inshore fishery in statistical districts accounting for most of the fall inshore catch.

	Statistical District						
Year	11	13	65	66	67	87	92
86	10	12	9	5	8	10	10
87	10	9	5	5	6	8	8
88	9	8	9	6	7	10	10
89	6	7	6	6	7	8	11
90	7	8	6	6	6	10	7
91	10	5	5	5	6	12	7
92	9	4	7	5	7	7	9
93	5	8	7	6	6	7	9
94	6	6	10	5	5	7	12
95	7	6	7	5	5	8	8
96	6	6	5	5	5	8	8

Table 4. Average number of nets used in 4T during fall and spring gillnet fisheries.

Year	Fall	Spring
78	11.4	29.4
79	11.9	34.4
80	10.4	20.2
81	9.6	18.6
82	9.0	20.4
83	7.3	22.5
84	5.3	26.5
85	5.2	37.2
86	5.2	26.6
87	4.7	23.9
88	5.0	19.9
89	5.3	26.6
90	5.2	29.4
91	5.0	27.6
92	5.0	22.7
93	5.4	24.0
94	5.4	22.9
95	5.5	21.7
96	4.8	20.7

Table 5. Analysis of variance multiplicative model for 4T herring fall fixed gear catch rates.

Model: MODEL1
Dependent Variable: CPUE

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	29	3555.77075	122.61278	151.813	0.0001
Error	2957	2388.24655	0.80766		
C Total	2986	5944.01730			

Root MSE	0.89870	R-square	0.5982
Dep Mean	5.84291	Adj R-sq	0.5943
C.V.	15.38101		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	7.234665	0.08424380	85.878	0.0001
YY78	1	-1.111814	0.14432343	-7.704	0.0001
YY79	1	-1.863587	0.11267350	-16.540	0.0001
YY80	1	-1.966735	0.11058438	-17.785	0.0001
YY81	1	-1.306029	0.09268995	-14.090	0.0001
YY82	1	-1.313056	0.09442745	-13.905	0.0001
YY83	1	-0.936553	0.09403414	-9.960	0.0001
YY84	1	-0.397856	0.09832843	-4.046	0.0001
YY85	1	0.214693	0.10178452	2.109	0.0350
YY86	1	-0.164277	0.10330635	-1.590	0.1119
YY88	1	-0.147606	0.10367520	-1.424	0.1546
YY89	1	0.245024	0.10860144	2.256	0.0241
YY90	1	0.244949	0.09875720	2.480	0.0132
YY91	1	0.357930	0.10626156	3.368	0.0008
YY92	1	0.323834	0.10135746	3.195	0.0014
YY93	1	0.225697	0.10422384	2.166	0.0304
YY94	1	0.284130	0.09180613	3.095	0.0020
YY95	1	0.056383	0.09345068	0.603	0.5463
YY96	1	-0.062763	0.10659458	-0.589	0.5560
D11	1	-0.889005	0.05768195	-15.412	0.0001
D13	1	-1.180918	0.08875793	-13.305	0.0001
D65	1	-1.115789	0.05248767	-21.258	0.0001
D67	1	-0.217315	0.05880854	-3.695	0.0002
D87	1	-0.493099	0.05839885	-8.444	0.0001
D92	1	-1.117967	0.06469484	-17.281	0.0001
W1	1	-1.200360	0.05539618	-21.669	0.0001
W2	1	-0.303293	0.05630959	-5.386	0.0001
W3	1	-0.107565	0.05224406	-2.059	0.0396
W5	1	-0.068807	0.05704593	-1.206	0.2278
W6	1	-0.571178	0.07661867	-7.455	0.0001

Table 6. Inshore, purse seine (PS), and acoustic survey fall spawner catch-at-ages for 1996 by area. Units are numbers x 1000.

	Area and Gear					
AGE	16G	16F	16CE	16B	PS	Acoustic
1	0	0	0	0	0	0
2	0	0	0	0	311	59
3	4	0	0	0	2670	16977
4	1953	1313	3650	12726	13885	22111
5	723	975	2099	15703	5129	12927
6	5797	6743	11771	20819	11130	91421
7	2668	1153	1042	4510	4413	17178
8	6022	4021	2811	9205	3108	36164
9	5818	5028	2811	9575	2091	35111
10	1014	1889	808	1364	1083	4557
11	2042	5400	826	1621	843	956
TOTAL	26040	26521	25818	75523	44664	487

Table 7. Abundance index for fall spawners used to tune ADAPT-VPA, numbers/net/trip.

Age	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
1	0	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	10	0	3	16	0	0	0	0	12	1	0	0	1	0	4	0	0	0	0
3	431	23	367	294	94	42	85	139	77	328	53	23	174	17	28	9	0	2	0
4	666	488	241	1231	654	1189	2184	1096	1556	1562	931	1116	1060	4295	1114	278	472	156	852
5	418	251	281	322	736	563	1180	3038	781	1237	1910	1743	930	1114	4697	3380	632	1705	847
6	98	143	46	126	215	775	729	1847	1630	847	922	2343	1325	796	1056	4152	2497	648	1943
7	89	42	80	52	110	127	525	1181	911	1486	603	1110	2546	1174	636	687	3599	2115	434
8	470	52	17	30	46	96	117	559	389	635	650	564	798	1447	774	361	630	1882	1020
9	14	43	11	13	16	29	40	151	221	384	317	713	430	527	809	417	498	357	1049
10	19	14	14	12	5	7	18	90	16	187	125	263	468	262	394	222	497	252	227
11	229	27	4	5	3	9	8	20	33	77	74	205	254	494	580	317	728	628	477

Table 8. Nightly boat limits in 4T management units for fall inshore fishery. Limits are in pounds. Limits were provided by Area Offices.

	Management Unit					
Year	16A	16B	16CE	16D	16F	16G
96	20,000	20,000	20,000	20,000	15,000	20,000
95	20,000	20,000	20,000	20,000	20,000	20,000
94	20,000	25,000	20,000	20,000	20,000	15,000
93	20,000	20,000	20,000	15,000	20,000	15,000
92	20,000	20,000	20,000	15,000	20,000	15,000
91	20,000	20,000	20,000	15,000	20,000	15,000
90	20,000	20,000	20,000	15,000	20,000	15,000
89	20,000	20,000	20,000	15,000	20,000	15,000
88	20,000	20,000	20,000	15,000	20,000	15,000
87	20,000	20,000	20,000	15,000	20,000	15,000
86	20,000	20,000	20,000	15,000	80,000/wk	15,000
85	20,000	20,000	20,000	15,000	80,000/wk	12,000
Before 84	none	none	none	none	none	none

Table 9. ADAPT input summary for fall herring Division 4T, 1995.

Parameters:
- year-class estimates: N_i i=4-10
- calibration contants: K_i i=4-10

Strucuture:
- F for oldest age group (11+) assumed equal to F at age 10 (CALC-F-OLD)
- model did not include an intercept term (tested and found to be non-significant)

Input:
- $catch_{i,t}$ and $weight_{i,t}$ i=2-11+, t=1978-1996
- log $CPUE_{i,t}$ (kg/net-trip) i=2-11+, t=1978-1996
- natural mortality=0.2

Objective function:
- minimize $\sum\sum(\text{observed log CPUE}_{i,t}) - (\text{predicted log CPUE}_{i,t})$

Summary:
- number of parameters: 14
- number of observations: 133

Table 10. Diagnostics for ADAPT-VPA using ANOVA multiplicative model.

approximate statistics assuming linearity near solution

orthogonality offset 0.00074

mean square residuals 0.18305

	par est	std err	cv	t-stat	% bias
4	189612.573	86263.8367	0.454948	2.198054	10.345180
5	50241.5420	19225.0635	0.382653	2.613336	6.506561
6	112127.292	39553.7669	0.352758	2.834807	5.142878
7	30358.0515	10234.5131	0.337127	2.966243	4.452025
8	92834.2407	27748.8502	0.298907	3.345517	3.473719
9	115074.418	31967.5348	0.277799	3.599728	2.951407
10	19140.6189	5515.27744	0.288145	3.470473	2.990415
4	0.004134	0.000429	0.103667	9.646262	0.283890
5	0.007492	0.000765	0.102123	9.792067	0.376487
6	0.008365	0.000849	0.101541	9.848267	0.448781
7	0.010001	0.001012	0.101147	9.886564	0.511507
8	0.010886	0.001094	0.100496	9.950613	0.534293
9	0.010494	0.001048	0.099840	10.016030	0.542525
10	0.011542	0.001145	0.099198	10.080894	0.542902

parameter correltion matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1.00	0.04	0.03	0.02	0.02	0.02	0.01	-0.24	-0.02	-0.01	-0.01	-0.01	-0.00	-0.00
2	0.04	1.00	0.04	0.03	0.03	0.03	0.02	-0.15	-0.20	-0.02	-0.01	-0.01	-0.01	-0.00
3	0.03	0.04	1.00	0.04	0.04	0.03	0.03	-0.11	-0.14	-0.18	-0.02	-0.01	-0.01	-0.00
4	0.02	0.03	0.04	1.00	0.05	0.04	0.03	-0.09	-0.10	-0.13	-0.17	-0.01	-0.01	-0.00
5	0.02	0.03	0.04	0.05	1.00	0.05	0.04	-0.09	-0.09	-0.10	-0.13	-0.16	-0.01	-0.01
6	0.02	0.03	0.03	0.04	0.05	1.00	0.05	-0.08	-0.08	-0.09	-0.10	-0.13	-0.15	-0.01
7	0.01	0.02	0.03	0.03	0.04	0.05	1.00	-0.06	-0.07	-0.08	-0.08	-0.10	-0.12	-0.14
8	-0.24	-0.15	-0.11	-0.09	-0.09	-0.08	-0.06	1.00	0.06	0.05	0.04	0.03	0.02	0.01
9	-0.02	-0.20	-0.14	-0.10	-0.09	-0.08	-0.07	0.06	1.00	0.05	0.04	0.03	0.02	0.01
10	-0.01	-0.02	-0.18	-0.13	-0.10	-0.09	-0.08	0.05	0.05	1.00	0.05	0.03	0.02	0.01
11	-0.01	-0.01	-0.02	-0.17	-0.13	-0.10	-0.08	0.04	0.04	0.05	1.00	0.04	0.02	0.01
12	-0.01	-0.01	-0.01	-0.01	-0.16	-0.13	-0.10	0.03	0.03	0.03	0.04	1.00	0.03	0.01
13	-0.00	-0.01	-0.01	-0.01	-0.01	-0.15	-0.12	0.02	0.02	0.02	0.02	0.03	1.00	0.02
14	-0.00	-0.00	-0.00	-0.00	-0.01	-0.01	-0.14	0.01	0.01	0.01	0.01	0.01	0.02	1.00

Table 11. Beginning of year numbers for fall spawners from ADAPT-VPA model.

Age	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
2	143086	391355	336225	531139	810211	493104	531843	761708	540035	386412	403956	1476009	881380	236997	588362	167043	367864		
3	149308	115750	312666	272486	434157	661455	402382	434503	622657	441226	315572	326856	1207802	721556	194037	481608	136720	301168	
4	99567	99085	79948	212549	213309	346116	533668	325057	351089	505143	351712	254162	266121	981780	584783	158059	392366	111657	243834
5	79210	50219	52794	44644	142004	156019	257511	408328	250716	251009	373800	265825	191890	192504	747554	461985	124656	304664	84173
6	28125	39813	21159	25918	29649	97465	115284	193506	304879	182445	174491	262587	192561	132451	142789	548611	345906	87888	190682
7	22720	17853	14762	9247	18347	19205	66396	84711	139712	211152	122457	119407	182842	129048	100074	102013	406590	232199	51077
8	29550	13451	9551	3053	6355	12495	13400	48100	58464	89637	132222	79770	81754	96106	94137	72655	74746	259747	138359
9	4574	10799	6701	1797	1690	4130	8667	9615	33661	36972	53120	87901	52734	49376	64877	67395	54141	47887	164922
10	2515	1922	3271	1392	782	913	2844	6601	6114	22115	19676	33127	60071	30872	34429	43099	50054	34292	30240
11	29645	13099	1890	655	1216	1287	1475	3253	6523	8799	19240	24620	38886	61426	66648	66566	77457	79631	56783
4+	295906	246241	190076	299255	413352	637630	999245	1079171	1151158	1307272	1246718	1127399	1066859	1673563	1835291	1520383	1525916	1157965	960070
5+	196339	147156	110128	86706	200043	291514	465577	754114	800069	802129	895006	873237	800738	691783	1250508	1362324	1133550	1046308	716236
7+	89004	57124	36175	16144	28390	38030	92782	152280	244474	368675	346715	344825	416287	366828	360165	351728	662988	653756	441381

Table 12. Beginning of year biomass for fall spawners from ADAPT-VPA model.

Age/Age	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
2	9104	24900	21392	33794	51550	31374	33839	48464	34360	24586	25702	93912	56078	15079	37435	10628	23405	23082	4377
3	20042	14569	40771	39903	60794	96307	67538	70196	84519	69650	37850	41967	172041	111679	24412	46643	11575	31538	33715
4	17977	17396	14018	40545	47327	74140	113101	72284	78221	100783	83320	53818	54211	201029	103905	25382	63641	17637	37727
5	18625	11562	12228	10874	37413	41224	66651	107580	64543	64292	97985	71806	49915	47253	172861	100556	25350	59864	17322
6	7609	10399	5247	7838	9382	29554	33621	57594	91158	52874	51523	78827	58028	37330	36992	135858	82915	19913	43578
7	6598	5058	4037	2907	6662	6490	21777	27993	46394	68755	39814	39113	60250	41694	29142	27154	107319	60494	12674
8	9123	4185	2626	1038	2421	4599	4922	16982	20881	31354	45970	27281	28666	33209	30979	20979	21106	73395	39326
9	1500	3794	2102	573	660	1562	3331	3791	12643	13615	19936	31858	18666	17712	22307	22277	16766	14923	50032
10	878	673	1128	491	296	360	1070	2673	2342	8556	7661	12947	22608	11407	12035	13797	16988	11742	10096
11	10951	4757	698	246	515	522	654	1341	2718	3490	7753	9850	15324	23946	24646	22664	25974	28792	20968
4+	73261	57824	42083	64513	104675	158451	245126	290238	318900	343718	353962	325500	307668	413580	432867	368668	360060	286760	231724
5+	55284	40428	28065	23968	57348	84311	132025	217954	240679	242935	270641	271682	253457	212551	328962	343286	296419	269123	193997
7+	29050	18467	10590	5256	10554	13533	31753	52780	84978	125770	121133	121049	145514	127968	119109	106871	188154	189346	133096

Table 13. Fishing mortality estimates for fall spawnwers from ADAPT-VPA model.

Age/Âge	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
2	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00		
3	0.21	0.17	0.19	0.05	0.03	0.02	0.01	0.01	0.01	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.01	
4	0.48	0.43	0.38	0.20	0.11	0.10	0.07	0.06	0.14	0.10	0.08	0.08	0.12	0.07	0.04	0.04	0.05	0.08	0.17
5	0.49	0.66	0.51	0.21	0.18	0.10	0.09	0.09	0.12	0.16	0.15	0.12	0.17	0.10	0.11	0.09	0.15	0.27	0.39
6	0.25	0.79	0.63	0.15	0.23	0.18	0.11	0.13	0.17	0.20	0.18	0.16	0.20	0.08	0.14	0.10	0.20	0.34	0.39
7	0.32	0.43	1.38	0.18	0.18	0.16	0.12	0.17	0.24	0.27	0.23	0.18	0.44	0.12	0.12	0.11	0.25	0.32	0.37
8	0.81	0.50	1.47	0.39	0.23	0.17	0.13	0.16	0.26	0.32	0.21	0.21	0.30	0.19	0.13	0.09	0.25	0.25	0.24
9	0.67	0.99	1.37	0.63	0.42	0.17	0.07	0.25	0.22	0.43	0.27	0.18	0.34	0.16	0.21	0.10	0.26	0.26	0.20
10	0.71	1.90	1.90	0.33	0.25	0.21	0.09	0.22	0.17	0.28	0.26	0.20	0.28	0.13	0.22	0.15	0.28	0.26	0.26
11	0.71	1.90	1.90	0.33	0.25	0.21	0.09	0.22	0.17	0.28	0.26	0.20	0.28	0.13	0.22	0.15	0.28	0.26	0.26
Ave 5-9	0.51	0.67	1.07	0.31	0.25	0.16	0.10	0.16	0.20	0.28	0.21	0.17	0.29	0.13	0.14	0.10	0.22	0.29	0.32
Wt 4+	0.51	0.65	0.65	0.20	0.15	0.12	0.08	0.10	0.16	0.18	0.16	0.14	0.24	0.09	0.10	0.09	0.18	0.26	0.27

Table 14. Projection of fall spawners for 1997 and 1998 based on ADAPT-VPA model.

	Weights		Average	Numbers Beginning			Biomass Beginning			F = 0.3	F = 0.3
Age/Âge	Mid-Year	Catch	PR	1996	1997	1998	1996	1997	1998	1997	1998
2	0.0565	0.0910	0.03	455922	455922	455922	26524	25754	25754	384	384
3	0.1010	0.1361	0.03	329508	369933	369933	37404	37350	37350	465	465
4	0.1583	0.1887	0.56	243834	267094	299788	37727	42279	47454	7127	7999
5	0.2019	0.2211	1.00	84173	169269	184665	17322	34172	37281	8837	9641
6	0.2316	0.2446	1.00	190682	46613	102667	43578	10796	23778	2692	5929
7	0.2575	0.2716	1.00	51077	105489	28272	12674	27167	7281	6763	1813
8	0.2831	0.2962	1.00	138359	28770	63982	39326	8144	18111	2012	4475
9	0.3082	0.3256	1.00	164922	89108	17450	50032	27465	5378	6850	1341
10	0.3385	0.3493	1.00	30240	111105	54047	10096	37614	18297	9162	4457
11	0.3554	0.3785	1.00	56783	54772	100609	20968	19465	35755	4894	8990
2+				1745500	1698075	1677336	295652	270207	256441	49186	45494
Wt 4+										0.26	0.25

Table 15. Diagnostics for 4T spring spawning herring using index gillnetters.

Model: MODEL1
Dependent Variable: CPUE

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	14	343.00969	24.50069	14.082	0.0001
Error	836	1454.48432	1.73981		
C Total	850	1797.49402			

Root MSE	1.31902	R-square	0.1908
Dep Mean	4.22598	Adj R-sq	0.1773
C.V.	31.21215		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	4.575046	0.13942989	32.813	0.0001
YY89	1	0.123960	0.17007015	0.729	0.4663
YY90	1	0.303245	0.19811340	1.531	0.1262
YY91	1	0.236552	0.18135331	1.304	0.1925
YY92	1	0.223362	0.16764827	1.332	0.1831
YY93	1	0.796452	0.17513330	4.548	0.0001
YY94	1	1.038820	0.18415431	5.641	0.0001
YY95	1	0.517229	0.20565212	2.515	0.0121
YY96	1	0.295372	0.18554297	1.592	0.1118
L2	1	-0.985938	0.10063660	-9.797	0.0001
W2	1	-0.522069	0.22273388	-2.344	0.0193
W3	1	-0.502628	0.12430443	-4.044	0.0001
W5	1	-0.334726	0.12669970	-2.642	0.0084
W6	1	-0.092871	0.16656451	-0.558	0.5773
W7	1	0.109680	0.20948347	0.524	0.6007

Table 16. Diagnostics for 4T spring spawning herring using provincial co-ordiantor data.

Model: MODEL1
Dependent Variable: CPUE

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	12	186.22207	15.51851	13.934	0.0001
Error	326	363.06061	1.11368		
C Total	338	549.28267			

Root MSE	1.05531	R-square	0.3390
Dep Mean	4.51675	Adj R-sq	0.3147
C.V.	23.36442		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	5.665850	0.17401241	32.560	0.0001
YY90	1	-0.958471	0.26378500	-3.634	0.0003
YY91	1	-0.411851	0.20797232	-1.980	0.0485
YY92	1	-0.287498	0.20064713	-1.433	0.1529
YY93	1	-0.128720	0.19278686	-0.668	0.5048
YY95	1	-0.485896	0.20284146	-2.395	0.0172
YY96	1	-0.248140	0.20942958	-1.185	0.2369
A2	1	-1.303929	0.11644288	-11.198	0.0001
W2	1	-0.666455	0.28306565	-2.354	0.0191
W3	1	-0.452423	0.16970309	-2.666	0.0081
W5	1	-0.270315	0.15902808	-1.700	0.0901
W6	1	-0.137222	0.19635696	-0.699	0.4851
W7	1	0.923591	0.42621994	2.167	0.0310

Table 17. Partial recruitment vector for spring spawners using acoustic survey sampling and gillnet catch-at-age matrices.

Age/Âge	1990	1991	1992	1993	1994	1995	1996	90-96	PR
1			0.00					0.00	0.00
2	0.00	0.00	0.01	0.00				0.00	0.00
3	0.01	0.03	0.08	0.01	0.01	0.01	0.00	0.02	0.03
4	0.64	0.17	0.36	0.14	0.08	0.09	0.04	0.22	0.29
5	1.00	0.76	0.61	1.00	0.48	1.00	0.29	0.73	1.00
6	0.12	1.00	0.79		1.00	0.29	1.00	0.70	0.95
7		0.24	1.00		0.78	0.71	0.50	0.64	0.88
8		0.30	0.46		1.00	0.40	0.88	0.61	0.83
9	0.25	0.34	0.88		0.29	0.38		0.43	0.58
10		0.47	0.73		0.63			0.61	0.83
11+		0.12			0.80			0.46	0.62

Table 18. Numbers (x 1000) and biomass (t) of spring and fall spawners estimated during the acoustic survey from 1990 to 1996.

	Numbers				Biomass			
			Percent				Percent	
Year	Spring	Fall	Spring	Ave to 96	Spring	Fall	Spring	Ave to 96
90	39247	166696	19	19	9758	27005	27	22
91	13799	98536	12	19	3723	20249	16	21
92	120086	490348	20	21	25978	98181	21	22
93	70584	316221	18	21	13572	60950	18	23
94	163315	680437	19	22	33755	120486	22	24
95	62991	198802	24	23	12715	39713	24	26
96	115659	427866	21		34625	94209	27	

Table 19. Comparison of spring spawners as a percentage of the total spring + fall population estimate at various Terminal Fs and ADAPT-VPA model for spring spawners. Fall estimates are from the ADAPT-VPA model for fall spawners.

		Spring 4+ Biomass							Percentage Spring Spawners						
Year	Fall 4+	0.7	0.6	0.5	0.4	0.3	0.2	ADAPT	0.7	0.6	0.5	0.4	0.3	0.2	ADAPT
78	73261	44981	44983	44986	44990	44997	45011		38	38	38	38	38	38	
79	57824	30767	30769	30772	30776	30783	30797		35	35	35	35	35	35	
80	42083	19938	19940	19944	19949	19958	19976		32	32	32	32	32	32	
81	64513	10334	10340	10347	10359	10379	10418		14	14	14	14	14	14	
82	104675	8320	8326	8335	8347	8369	8411		7	7	7	7	7	7	
83	158451	23064	23084	23111	23154	23223	23362		13	13	13	13	13	13	
84	245126	40336	40399	40487	40619	40839	41280		14	14	14	14	14	14	
85	290238	64215	64373	64593	64925	65478	66585		18	18	18	18	18	19	
86	318900	86708	86990	87387	87983	88977	90967		21	21	22	22	22	22	
87	343718	81217	81627	82203	83069	84513	87402		19	19	19	19	20	20	
88	353962	72609	73194	74016	75250	77310	81433	76733	17	17	17	18	18	19	18
89	325500	65505	66273	67350	68970	71673	77084	70916	17	17	17	17	18	19	18
90	307668	65144	66145	67551	69667	73201	80280	72151	17	18	18	18	19	21	19
91	413580	70620	72315	74695	78275	84255	96232	80087	15	15	15	16	17	19	16
92	432867	100339	103136	107070	112993	122896	142747	124391	19	19	20	21	22	25	22
93	368668	98998	102789	108127	116169	129622	156602	126513	21	22	23	24	26	30	26
94	360060	79821	83896	89636	98288	112766	141807	107099	18	19	20	21	24	28	23
95	286760	76875	83372	92534	106357	129509	175982	111691	21	23	24	27	31	38	28
96	231724	50651	56911	65735	79045	101330	146052	79680	18	20	22	25	30	39	26

Table 20. Diagnostics for ADAPT-VPA for 4T spring herring using index gillnetter abundance index.
approximate statistics assuming linearity near solution

orthogonality offset 0.00491

mean square residuals 0.1538

	par est	std err	cv	t-stat	% bias
4	9983.71812	4743.90083	0.475164	2.104538	10.889880
5	100896.264	40552.0145	0.401918	2.488070	7.025572
6	23928.5974	8792.78691	0.367459	2.721389	5.548073
7	37273.7000	12678.3493	0.340142	2.939949	4.581065
8	50415.6633	15584.5687	0.309122	3.234973	3.839064
9	12676.7765	3877.13098	0.305845	3.269628	3.529970
10	4494.58143	1439.05072	0.320175	3.123296	3.690199
4	0.002223	0.000331	0.148932	6.714492	0.486996
5	0.004532	0.000652	0.143838	6.952272	0.639639
6	0.005099	0.000725	0.142087	7.037929	0.776970
7	0.004865	0.000685	0.140748	7.104890	0.891174
8	0.004903	0.000682	0.138983	7.195142	0.955714
9	0.005301	0.000726	0.136965	7.301144	1.003255
10	0.006082	0.000818	0.134460	7.437138	0.999323

parameter correltion matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	1.00	0.09	0.07	0.06	0.05	0.04	0.03	-0.36	-0.05	-0.04	-0.03	-0.02	-0.02	-0.01
2	0.09	1.00	0.11	0.09	0.07	0.06	0.05	-0.25	-0.30	-0.06	-0.05	-0.03	-0.02	-0.01
3	0.07	0.11	1.00	0.12	0.10	0.08	0.06	-0.21	-0.23	-0.29	-0.06	-0.04	-0.03	-0.01
4	0.06	0.09	0.12	1.00	0.12	0.10	0.07	-0.18	-0.19	-0.23	-0.27	-0.05	-0.04	-0.02
5	0.05	0.07	0.10	0.12	1.00	0.12	0.09	-0.15	-0.16	-0.19	-0.23	-0.26	-0.04	-0.02
6	0.04	0.06	0.08	0.10	0.12	1.00	0.11	-0.13	-0.14	-0.15	-0.18	-0.21	-0.24	-0.03
7	0.03	0.05	0.06	0.07	0.09	0.11	1.00	-0.09	-0.10	-0.11	-0.13	-0.16	-0.20	-0.23
8	-0.36	-0.25	-0.21	-0.18	-0.15	-0.13	-0.09	1.00	0.15	0.12	0.09	0.07	0.04	0.02
9	-0.05	-0.30	-0.23	-0.19	-0.16	-0.14	-0.10	0.15	1.00	0.13	0.10	0.07	0.05	0.02
10	-0.04	-0.06	-0.29	-0.23	-0.19	-0.15	-0.11	0.12	0.13	1.00	0.11	0.08	0.05	0.03
11	-0.03	-0.05	-0.06	-0.27	-0.23	-0.18	-0.13	0.09	0.10	0.11	1.00	0.10	0.06	0.03
12	-0.02	-0.03	-0.04	-0.05	-0.26	-0.21	-0.16	0.07	0.07	0.08	0.10	1.00	0.08	0.04
13	-0.02	-0.02	-0.03	-0.04	-0.04	-0.24	-0.20	0.04	0.05	0.05	0.06	0.08	1.00	0.05
14	-0.01	-0.01	-0.01	-0.02	-0.02	-0.03	-0.23	0.02	0.02	0.03	0.03	0.04	0.05	1.00

Table 21. Beginning of year population numbers for spring spawners at Terminal F = 0.4.

Age/ Age	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
2	92838	79071	59510	179251	245067	235289	286415	161413	117127	153116	184878	247323	542512	305088	140078	388942	55090	406942	250233
3	51284	62081	51848	38751	142165	197068	188686	232747	130079	93750	124745	146400	202133	440944	248485	113346	317763	45068	332275
4	125803	31534	29623	21040	17042	92382	142005	148577	182750	98527	74124	97132	114666	159685	351084	198496	92006	255727	35482
5	21152	65191	12017	6592	9544	9226	50793	102262	105417	128227	71604	51973	62755	78615	117545	255514	154873	68499	188908
6	17157	13764	26379	2630	2564	6513	5238	33570	69835	71951	80732	47034	36147	40157	49718	83499	171895	97618	41829
7	14635	7930	7407	8083	417	1648	4915	3930	22319	44403	45244	47558	30879	25450	23874	32169	50481	90536	59914
8	4853	6083	3766	1224	3367	45	1242	3972	1985	14970	25662	26068	28777	21854	17071	16044	19359	31337	45077
9	2986	2560	3220	617	210	2435	4	959	2622	776	7821	12484	15679	17417	13770	12100	10023	10128	19619
10	4386	839	1601	708	94	0	1993	0	628	1942	168	3447	6558	9541	9645	9155	6978	6542	6024
11	12589	5448	2197	1527	590	0	0	1630	1207	1168	2080	794	2030	5386	8599	11218	10842	11098	9780
4+	203561	133349	86210	42421	33828	112249	206190	294900	386763	361964	307435	286490	297491	358105	591306	618195	516457	571485	406633
5+	77758	101815	56587	21381	16786	19867	64185	146323	204013	263437	233311	189358	182825	198420	240222	419699	424451	315758	371151
7+	39449	22860	18191	12159	4678	4128	8154	10491	28761	63259	80975	90351	83923	79648	72959	80686	97683	149641	140414

Table 22. Fishing mortality (F) matrix for spring spawners using Terminal F = 0.4.

Age/ Age	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
2	0.20	0.22	0.23	0.03	0.02	0.02	0.01	0.02	0.02	0.01	0.03	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00
3	0.29	0.54	0.70	0.62	0.23	0.13	0.04	0.04	0.08	0.04	0.05	0.04	0.04	0.03	0.03	0.01	0.02	0.04	0.01
4	0.46	0.77	1.30	0.59	0.41	0.40	0.13	0.14	0.15	0.12	0.16	0.24	0.18	0.11	0.12	0.05	0.10	0.10	0.12
5	0.23	0.71	1.32	0.74	0.18	0.37	0.21	0.18	0.18	0.26	0.22	0.16	0.25	0.26	0.14	0.20	0.26	0.29	0.40
6	0.57	0.42	0.98	1.64	0.24	0.08	0.09	0.21	0.25	0.26	0.33	0.22	0.15	0.32	0.24	0.30	0.44	0.29	0.38
7	0.68	0.55	1.60	0.68	2.02	0.08	0.01	0.48	0.20	0.35	0.35	0.30	0.15	0.20	0.20	0.31	0.28	0.50	0.35
8	0.44	0.44	1.61	1.56	0.12	2.12	0.06	0.22	0.74	0.45	0.52	0.31	0.30	0.26	0.14	0.27	0.45	0.27	0.33
9	1.07	0.27	1.32	1.68	8.86	0.00	8.08	0.22	0.10	1.33	0.62	0.44	0.30	0.39	0.21	0.35	0.23	0.32	0.23
10	0.95	0.87	0.73	1.15	10.12	0.01	0.00	0.10	0.26	0.21	0.86	0.55	0.27	0.36	0.29	0.44	0.28	0.40	0.33
11	0.95	0.87	0.73	1.15	10.12	0.01	0.00	0.10	0.26	0.21	0.86	0.55	0.27	0.36	0.29	0.44	0.28	0.40	0.33
Ave 5-9	0.60	0.48	1.37	1.26	2.29	0.53	1.69	0.26	0.29	0.53	0.41	0.29	0.23	0.29	0.19	0.29	0.33	0.33	0.34
Wt 4+	0.32	0.47	1.28	1.01	1.20	0.34	0.22	0.22	0.23	0.34	0.35	0.24	0.20	0.25	0.16	0.25	0.32	0.31	0.32

Table 23. Beginning of year biomass for spring spawners using Terminal F = 0.4.

Age/ Âge	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96
2	10275	8751	6586	19838	27122	26040	31699	17864	12963	16946	20461	27372	60042	33765	15503	43046	6097	45038	27694
3	8060	8818	8196	6641	25269	32229	33228	41536	21792	14317	19682	20585	35663	72765	36207	14327	41963	6190	39309
4	23037	5510	5266	4142	3462	17904	25777	30236	36443	18205	14314	17929	21888	29166	58457	31004	13740	40581	5382
5	4811	14677	2536	1623	2410	2150	10890	22804	24651	27955	16203	11459	13810	16599	22962	46147	27017	11913	32855
6	4471	3383	6687	743	786	1751	1365	8345	17959	18737	20524	12169	9089	9591	11380	17397	33373	18954	8115
7	4139	2245	1954	2437	146	522	1399	1203	6705	12287	13009	13826	8471	6762	5975	7752	10993	19380	12665
8	1459	1893	1111	362	1198	13	424	1331	660	4643	7862	8003	8639	6171	4525	4208	4839	7424	10476
9	990	836	1070	208	72	813	1	421	873	238	2580	4101	4910	5222	4022	3488	2824	2716	4806
10	1503	264	577	250	37	0	762	0	255	578	56	1215	2178	2986	2939	2717	2135	1973	1721
11	4579	1969	749	594	235	0	0	586	436	424	702	268	683	1779	2733	3456	3366	3417	3023
4+	44990	30776	19949	10359	8347	23154	40619	64925	87983	83069	75250	68970	69667	78275	112993	116169	98288	106357	79045
5+	21953	25267	14683	6217	4885	5250	14842	34689	51540	64863	60936	51041	47779	49109	54537	85165	84548	65776	73662
7+	12671	7207	5460	3851	1689	1348	2587	3540	8930	18171	24209	27413	24880	22920	20195	21622	24158	34910	32692

Table 24. Beginning of year numbers for spring spawners from ADAPT-VPA model.

Age/ Âge	88	89	90	91	92	93	94	95	96
2	190502	244463	630858	307770	137344	365063	24037	487640	60166
3	128564	151004	199791	513275	250681	111107	298212	19645	398346
4	76658	100258	118435	157768	410304	200293	90173	239720	14667
5	73373	54048	65314	81701	115975	303999	156345	66999	175802
6	81877	48482	37845	42253	52245	82214	211592	98823	40600
7	45896	48495	32065	26841	25590	34238	49429	123036	60900
8	25943	26602	29545	22824	18210	17448	21053	30475	71686
9	7892	12714	16116	18045	14565	13032	11173	11515	18914
10	169	3505	6746	9898	10160	9806	7741	7484	7159
11	2095	807	2088	5588	9057	12015	12028	12695	9024
4+	313903	294911	308154	364918	656106	673045	559534	590747	398752
5+	237245	194653	189719	207150	245802	472752	469361	351027	384085
7+	81995	92123	86560	83196	77582	86539	101424	185205	167683

Table 25. Fishing mortality (F) matrix for spring spawners using ADAPT-VPA model.

Age/ Âge	88	89	90	91	92	93	94	95	96
2	0.03	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.01
3	0.05	0.04	0.04	0.02	0.02	0.01	0.02	0.09	0.01
4	0.15	0.23	0.17	0.11	0.10	0.05	0.10	0.11	0.31
5	0.21	0.16	0.24	0.25	0.14	0.16	0.26	0.30	0.44
6	0.32	0.21	0.14	0.30	0.22	0.31	0.34	0.28	0.39
7	0.35	0.30	0.14	0.19	0.18	0.29	0.28	0.34	0.35
8	0.51	0.30	0.29	0.25	0.14	0.25	0.40	0.28	0.20
9	0.61	0.43	0.29	0.37	0.20	0.32	0.20	0.28	0.24
10	0.85	0.54	0.26	0.34	0.28	0.40	0.25	0.34	0.27
11	0.85	0.54	0.26	0.34	0.28	0.40	0.25	0.34	0.27
Ave 5-9	0.40	0.28	0.22	0.27	0.18	0.26	0.30	0.30	0.32
Wt 4	0.28	0.24	0.19	0.18	0.12	0.15	0.26	0.22	0.34

Table 26. Beginning of year biomass for spring spawners using ADAPT-VPA model.

Age/ Âge	88	89	90	91	92	93	94	95	96
2	21084	27056	69819	34062	15200	40403	2660	53969	6659
3	20284	21232	35250	84701	36527	14044	39381	2698	47125
4	14803	18506	22607	28816	68317	31284	13467	38041	2225
5	16603	11917	14374	17250	22655	54903	27274	11652	30576
6	20815	12543	9516	10092	11959	17129	41080	19188	7877
7	13197	14098	8796	7131	6405	8251	10764	26336	12874
8	7948	8167	8869	6445	4827	4576	5262	7220	16661
9	2604	4177	5046	5411	4255	3757	3148	3088	4633
10	56	1235	2240	3098	3096	2910	2368	2258	2045
11	707	273	702	1845	2878	3701	3734	3909	2790
4+	76733	70916	72151	80087	124391	126513	107099	111691	79680
5+	61930	52410	49544	51272	56075	95228	93632	73650	77455
7+	24512	27950	25654	23930	21461	23196	25278	42810	39002

Table 27. Projection for spring spawners based on VPA using Terminal F = 0.4.

	Weights		Average	Beginning Numbers			Beginning Biomass			F = 0.43	F = 0.44
Age	Mid-Year	Catch	PR	1996	1997	1998	1996	1997	1998	1997	1998
2	0.0980	0.1159	0.00	169932	169932	169932	16535	16651	16651	20	20
3	0.1292	0.1459	0.03	130315	138989	138973	15417	17962	17960	236	241
4	0.1532	0.1688	0.29	35482	105420	112336	5382	16155	17215	1895	2063
5	0.1741	0.1829	1.00	188908	25868	76192	32855	4504	13265	1509	4529
6	0.1941	0.2039	0.95	41829	103675	13777	8115	20124	2674	6470	876
7	0.2144	0.2225	0.88	59914	23420	56416	12665	5021	12096	1497	3676
8	0.2398	0.2475	0.83	45077	34498	13134	10476	8271	3149	2337	907
9	0.2650	0.2727	0.58	19619	26480	19767	4806	7016	5237	1451	1105
10	0.2978	0.3001	0.83	6024	12737	16894	1721	3793	5031	1046	1415
11	0.3092	0.3168	0.83	9780	9284	14055	3023	2870	4345	805	1242
2+				706880	650303	631477	110997	102367	97623	17265	16074
Wt 4+ F										0.30	0.30

Table 28. Projection for spring spawners based on ADAPT-VPA model.

	Weights		Average	Beginning Numbers			Beginning Biomass			F = 0.43	F = 0.44
Age	Mid-Year	Catch	PR	1996	1997	1998	1996	1997	1998	1997	1998
2	0.0980	0.1159	0.01	169932	169932	169932	16535	16651	16651	93	88
3	0.1292	0.1459	0.02	131447	138371	138405	15551	17882	17887	175	167
4	0.1532	0.1688	0.70	14667	106542	112205	2225	16327	17194	4185	4224
5	0.1741	0.1829	1.00	175802	8815	64941	30576	1535	11306	505	3573
6	0.1941	0.2039	0.90	40600	92699	4742	7877	17993	920	5435	267
7	0.2144	0.2225	0.79	60900	22355	51971	12874	4793	11143	1279	2853
8	0.2398	0.2475	0.45	71686	35229	13138	16661	8446	3150	1361	485
9	0.2650	0.2727	0.55	18914	48180	23891	4633	12766	6330	2481	1178
10	0.2978	0.3001	0.62	7159	12137	31261	2045	3614	9309	763	1882
11	0.3092	0.3168	0.62	9024	4457	7651	2790	1378	2365	296	486
2+				700131	638717	618136	111766	101385	96255	16573	15203
Wt 4+ F										0.30	0.30

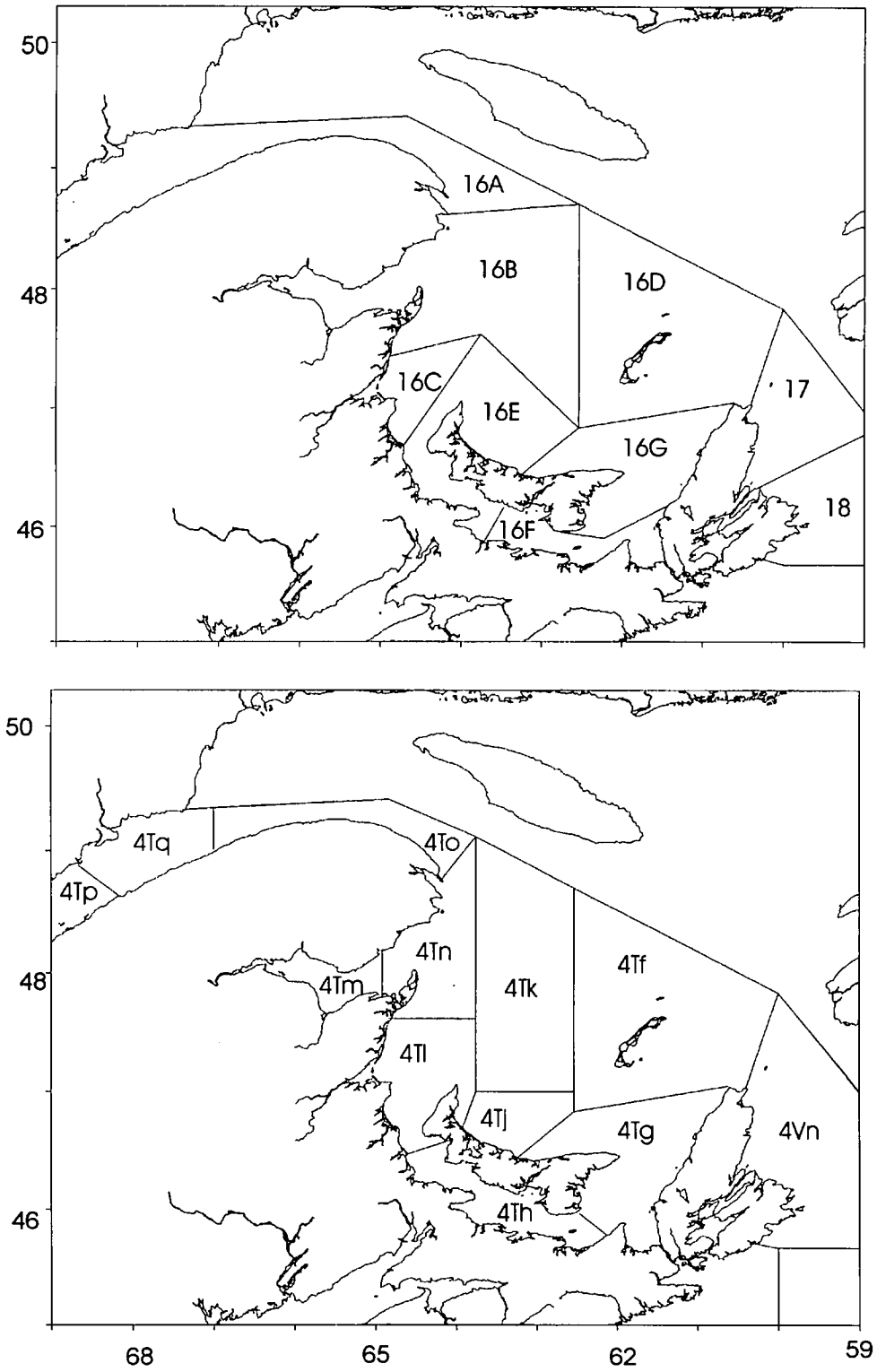


Fig. 1. Herring 4T managment zones (upper) and Northwest Atlantic Fisheries Organization (NAFO) unit areas in 4T (lower)

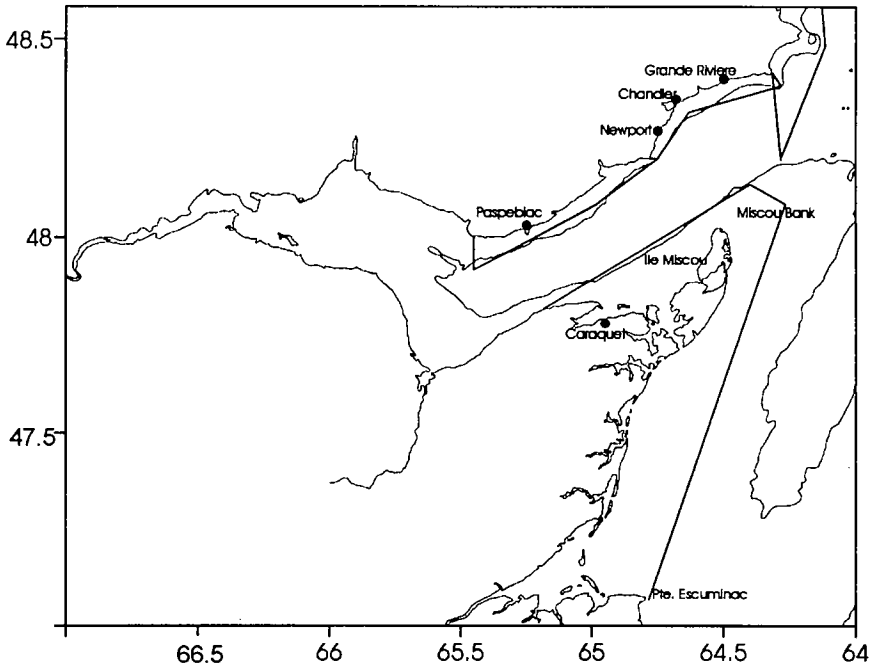


Fig. 2. Lines indicating areas where large seiners are prohibited from fishing from 15-April - 15 May. Offshore line is 50 m contours. Prohibited areas are from shore to the line.

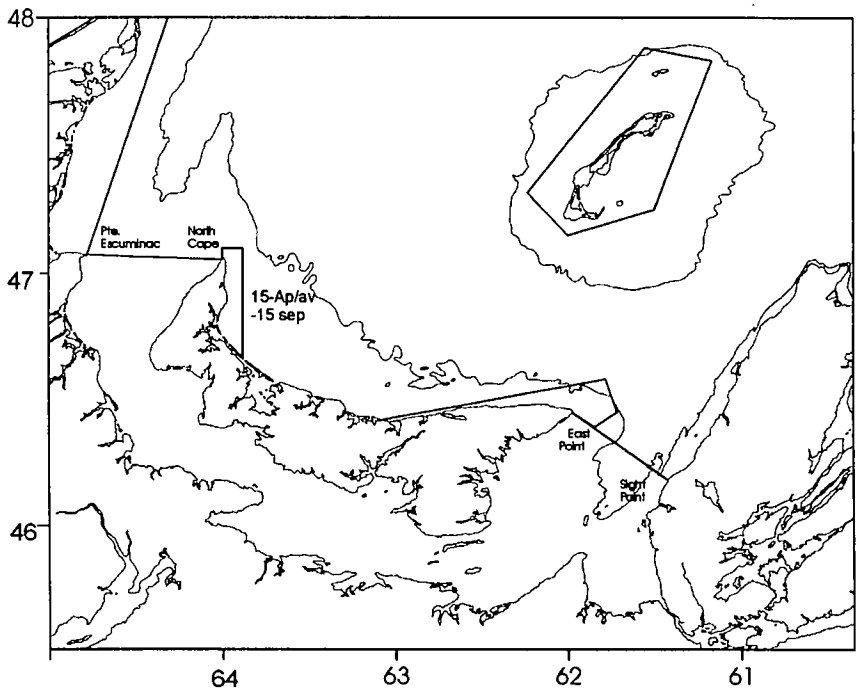


Fig. 3. Lines indicating where seiners are prohibited from fishing from Jan.1 - Dec. 31 except where indicated as 15-April - 15 Sept. Offshore line is 50 m contour. Prohibited areas are from shore to the line.

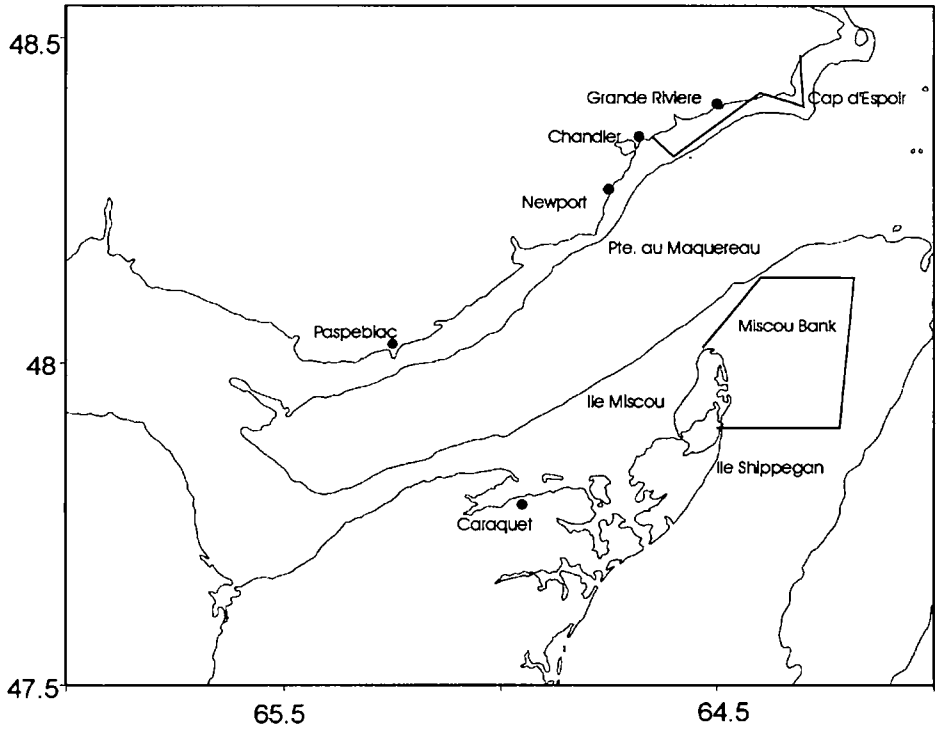


Fig. 4. Large seiners are prohibited from fishing in areas enclosed by sold lines during the fall inshore season in Chaleur Bay. Offshore line is 50 m contour. Prohibited areas are from shore to the line.

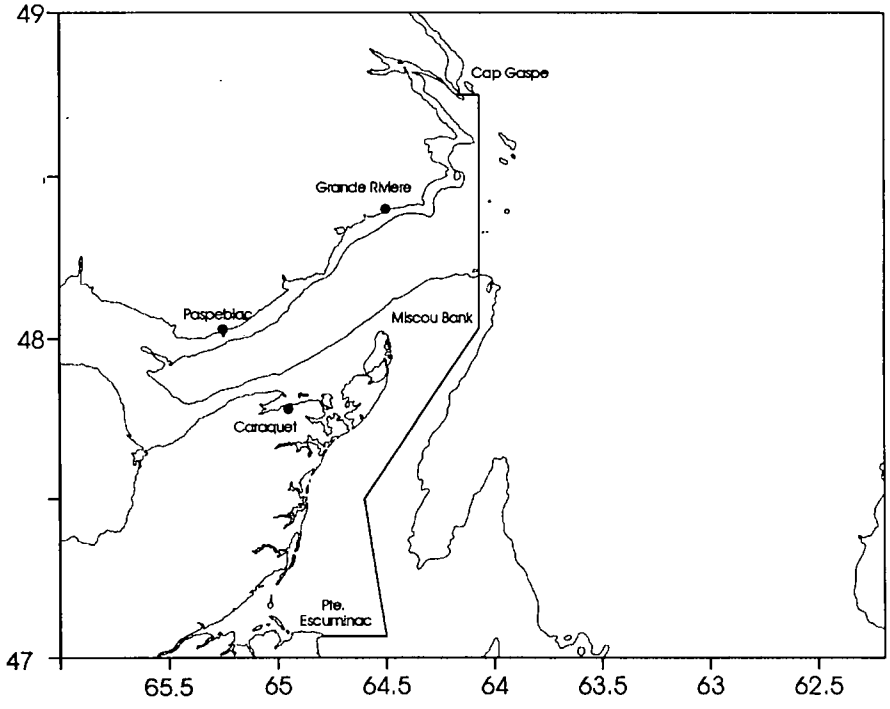


Fig. 5. Large seiners are prohibited from fishing with mid-water trawl west of solid line, from Jan. 1 to Dec. 31. Offshore line is 50 m contour. Prohibited areas are from shore to the line.

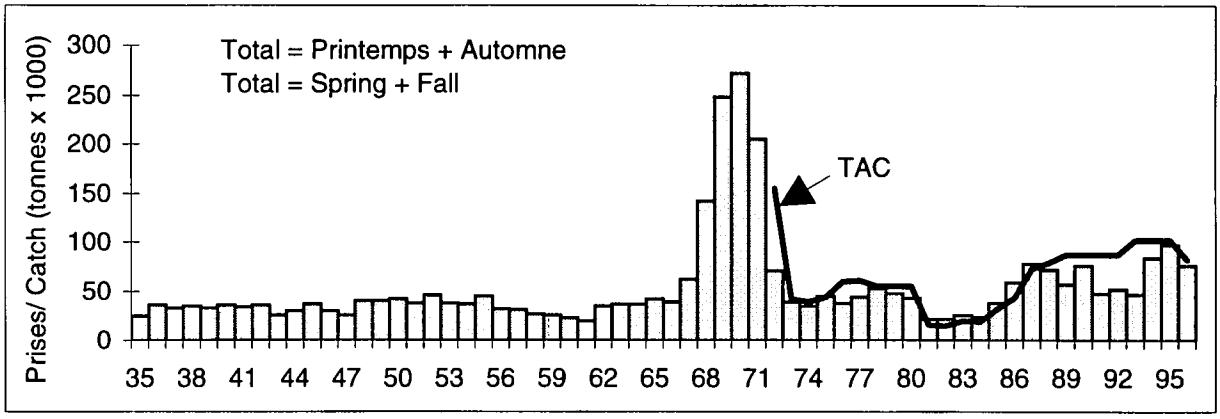


Fig.6. Historical catch and TAC's of combined spring and fall spawners from 4T herring population.

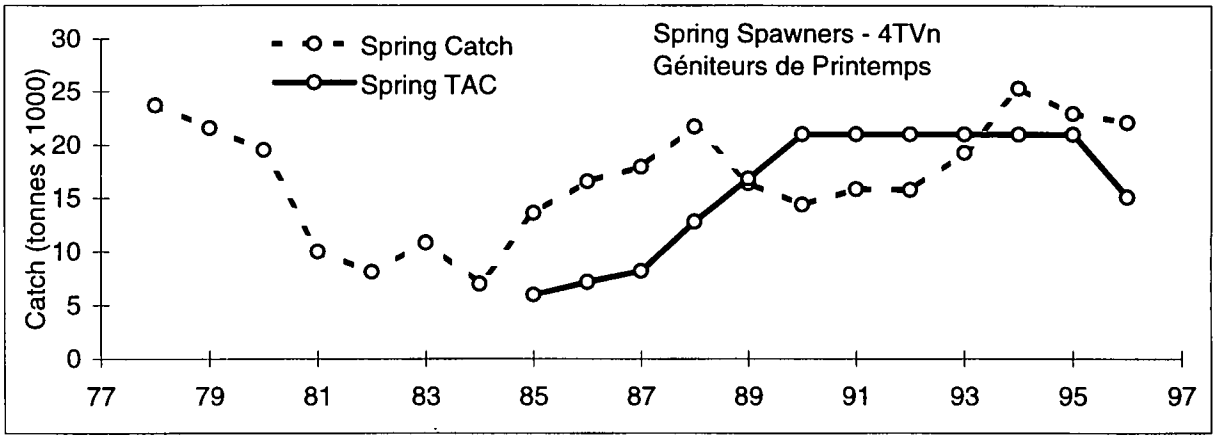


Fig.7. Spring spawning catch compared to spring spawner TAC.

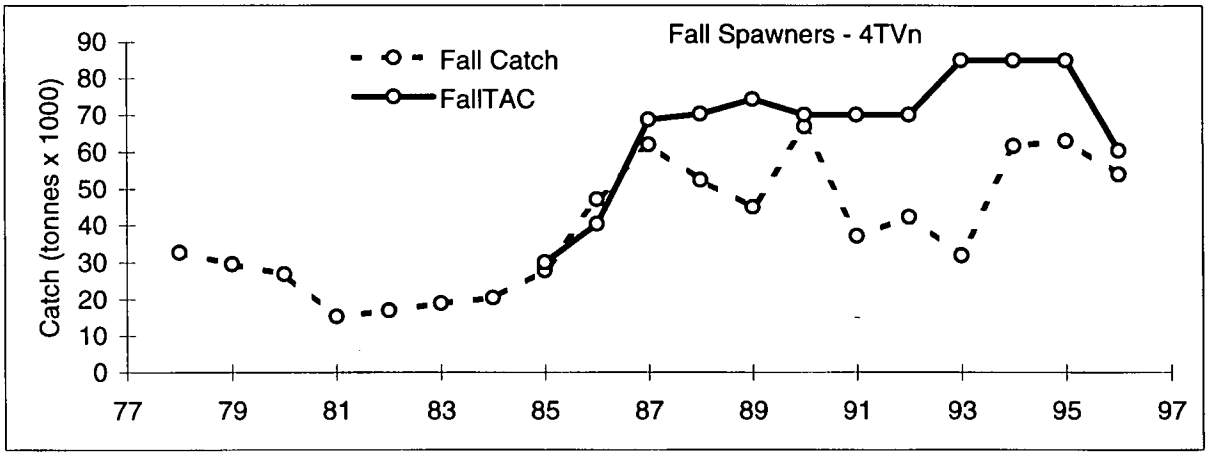


Fig.8. Comparison of fall spawner TAC and catch.

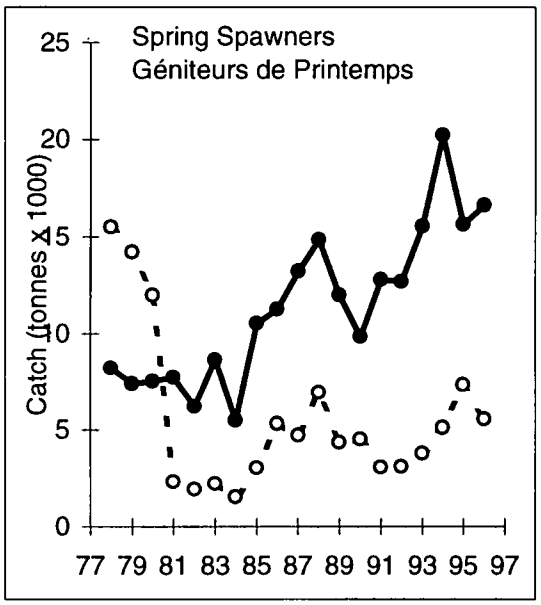


Fig.9. Spring spawning catch by gear type.

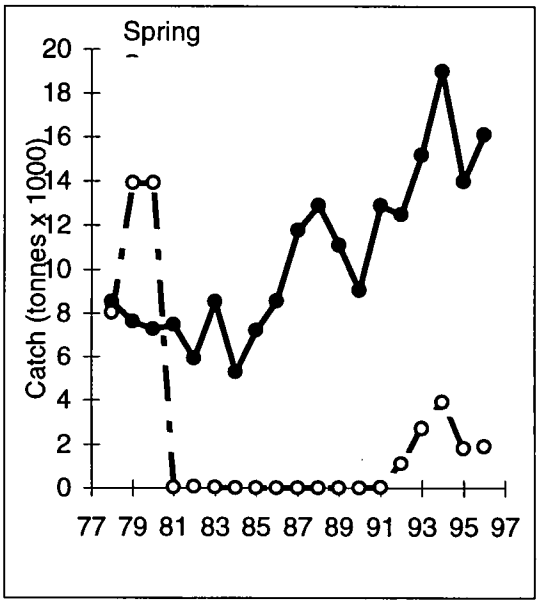


Fig.11. Catch in spring season by gear type.

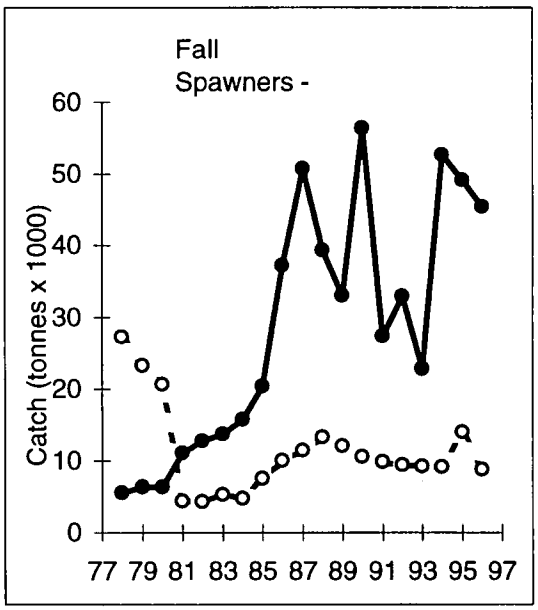


Fig.10. Fall spawning catch by gear type.

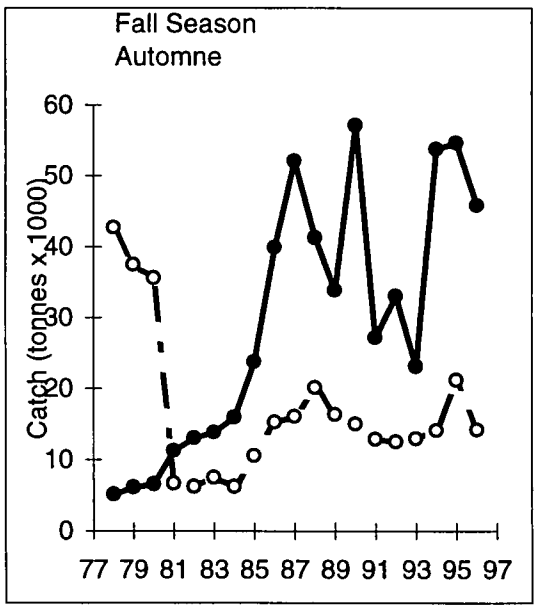


Fig.12. Catch in fall season by gear type.

Solid line and circle, Inshore - Dotted line and open circle, Large Seiners

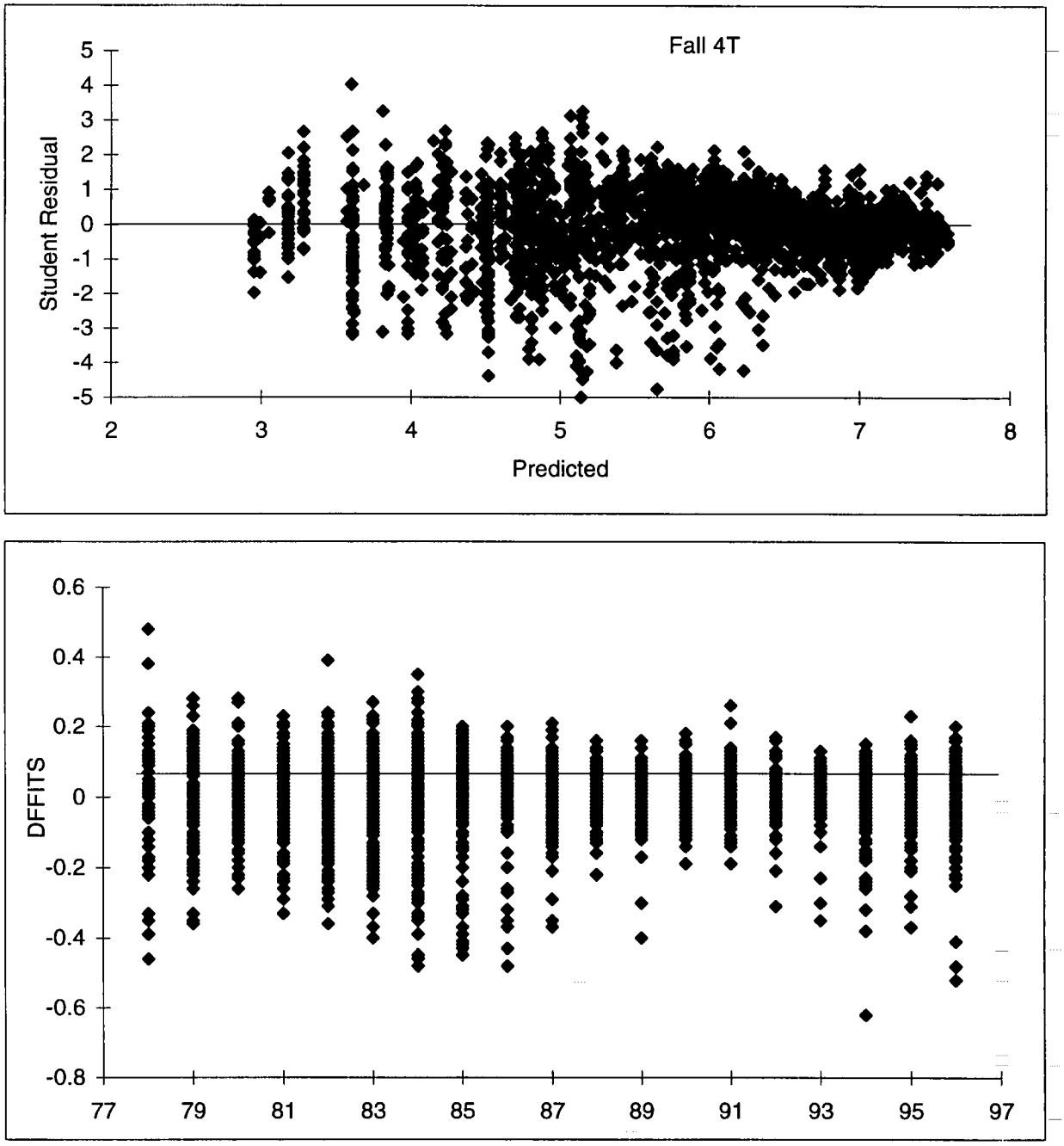


Fig.13. Diagnostics for fall catch rate multiplicative analysis.

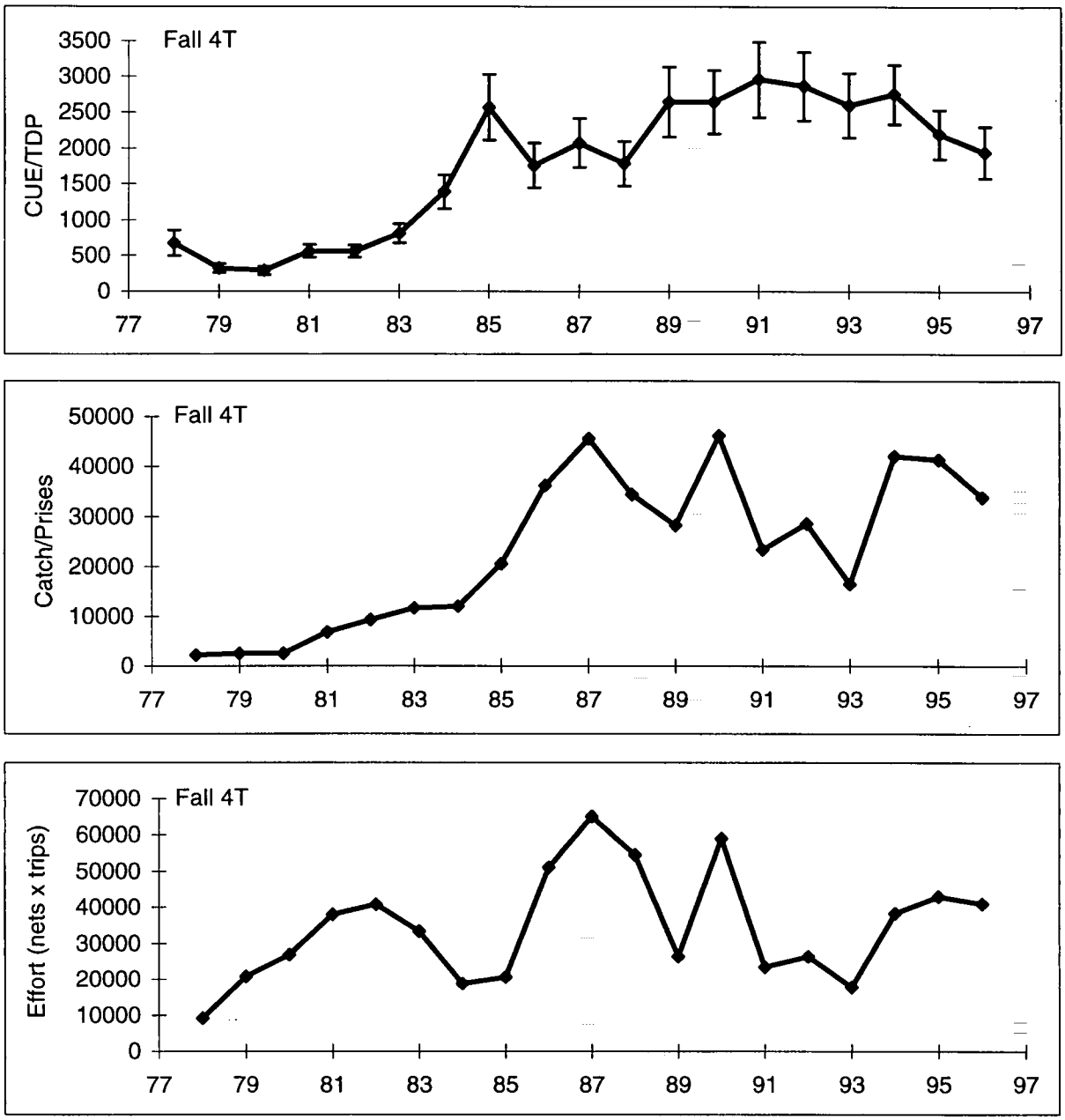


Fig.14. Catch rates, catch, and effort from multiplicative analysis from fall gillnets.

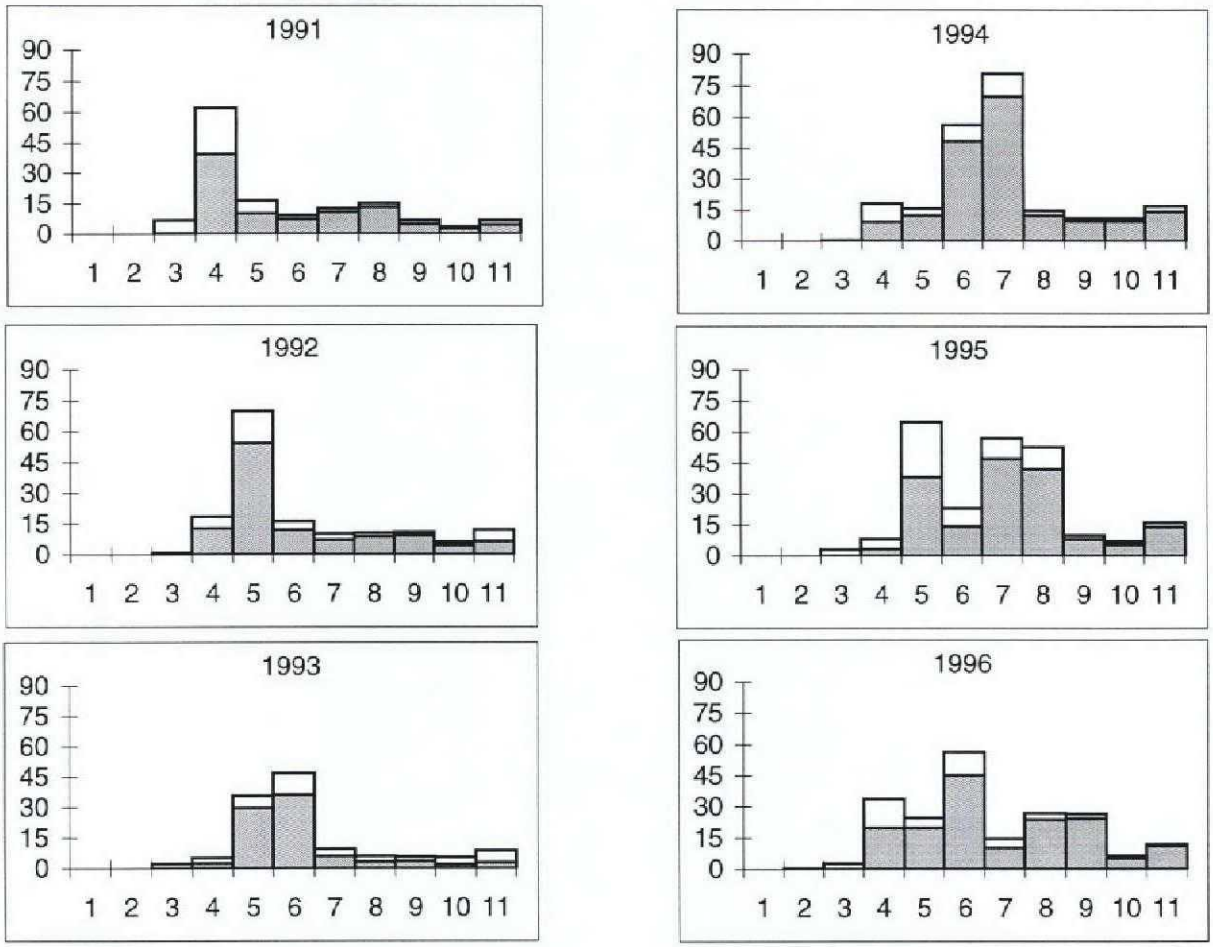


Fig.15. Fall spawners catch-at-age all gears. Open bars are mobile gear, gray bars are fixed gear.

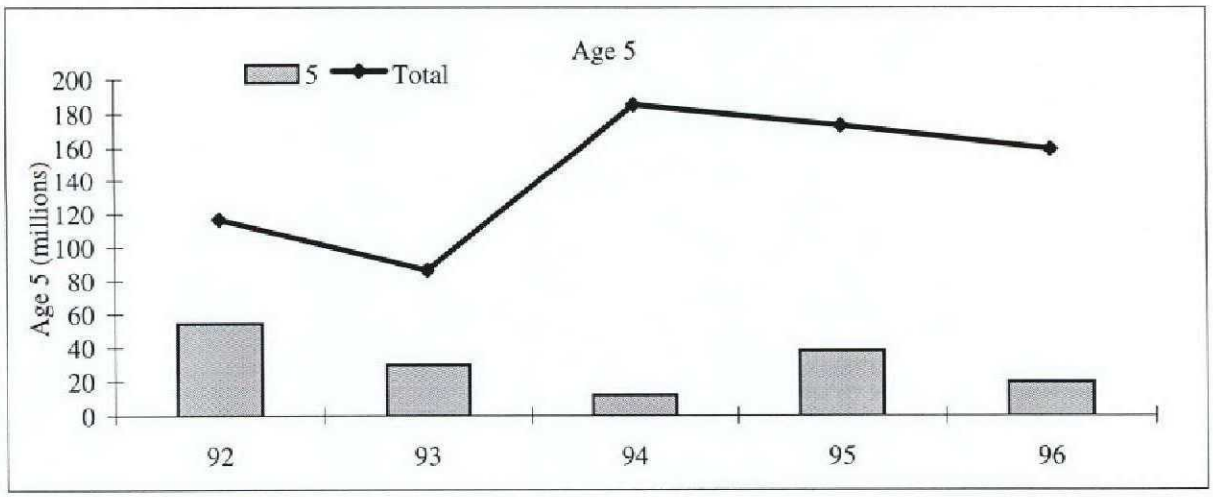


Fig.16. Total numbers in inshore catch (line) compared to numbers at age 5 (bars).

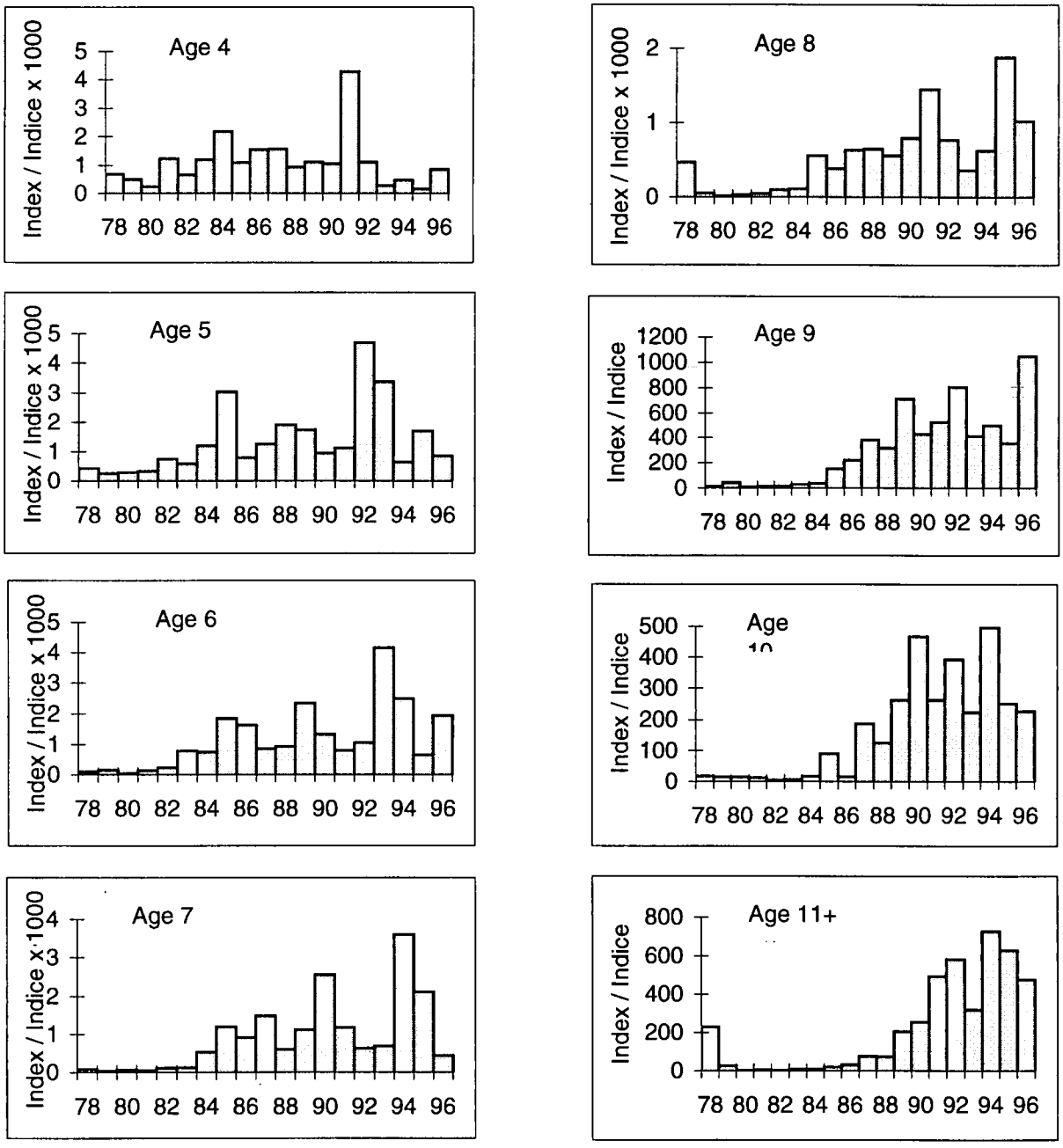


Fig.17. Abundance indices for fall spawners from multiplicative model. Units are numbers / net-trip.

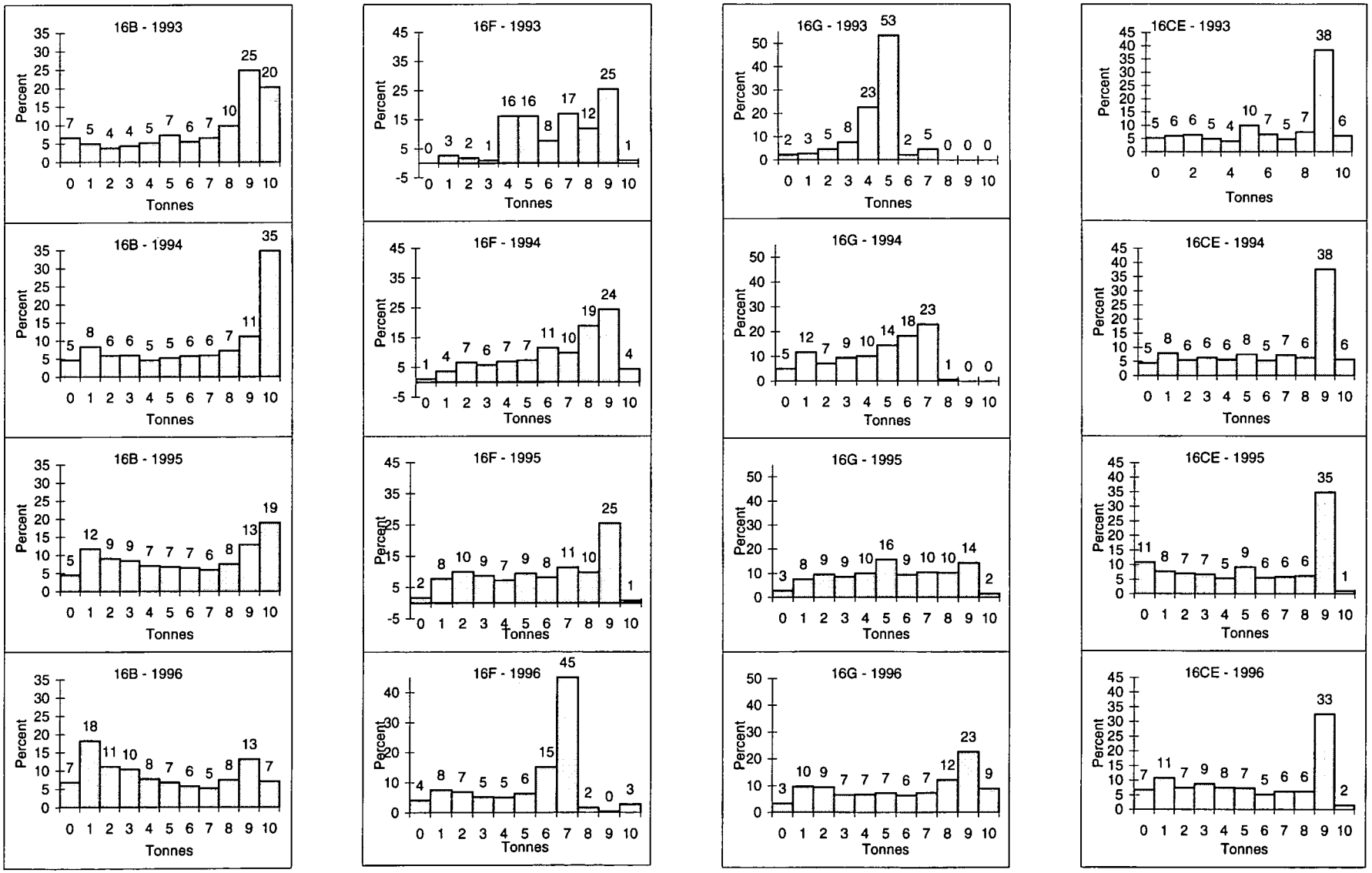


Fig.18. Percentage of catch at tonnage indicated for four main fall fishing areas in 4T. Numbers above each bar are percentages.

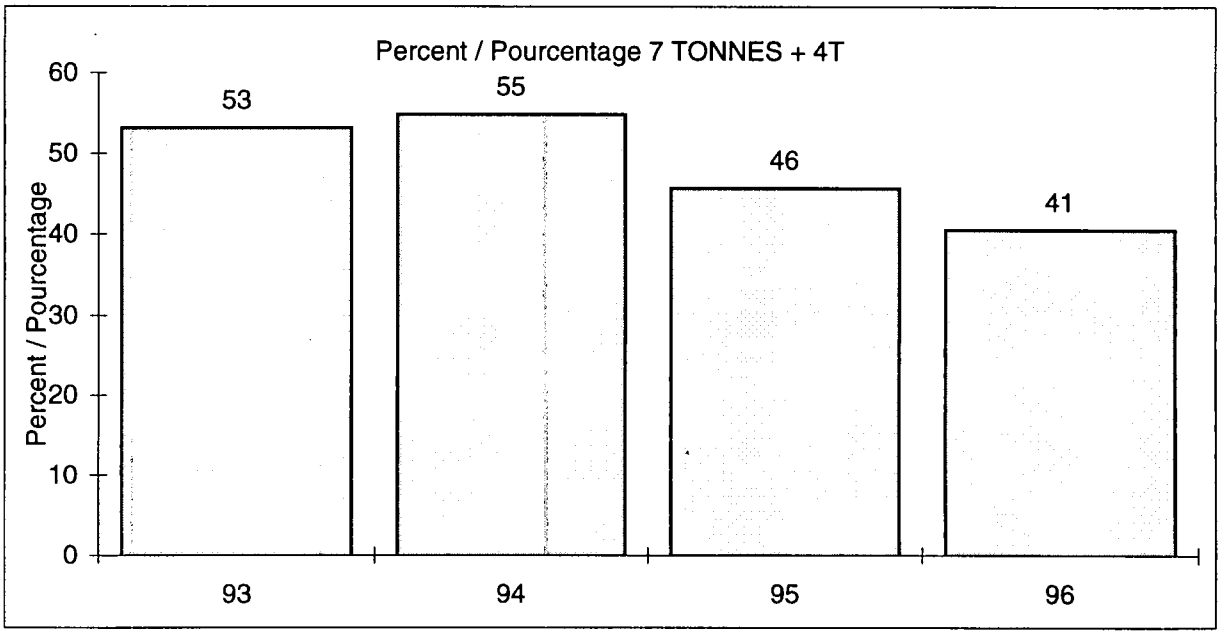


Fig.19. Percentage of catch, 7 tonnes or more in 4T inshore catch in four main fishing areas. Numbers above each bar are percentages.

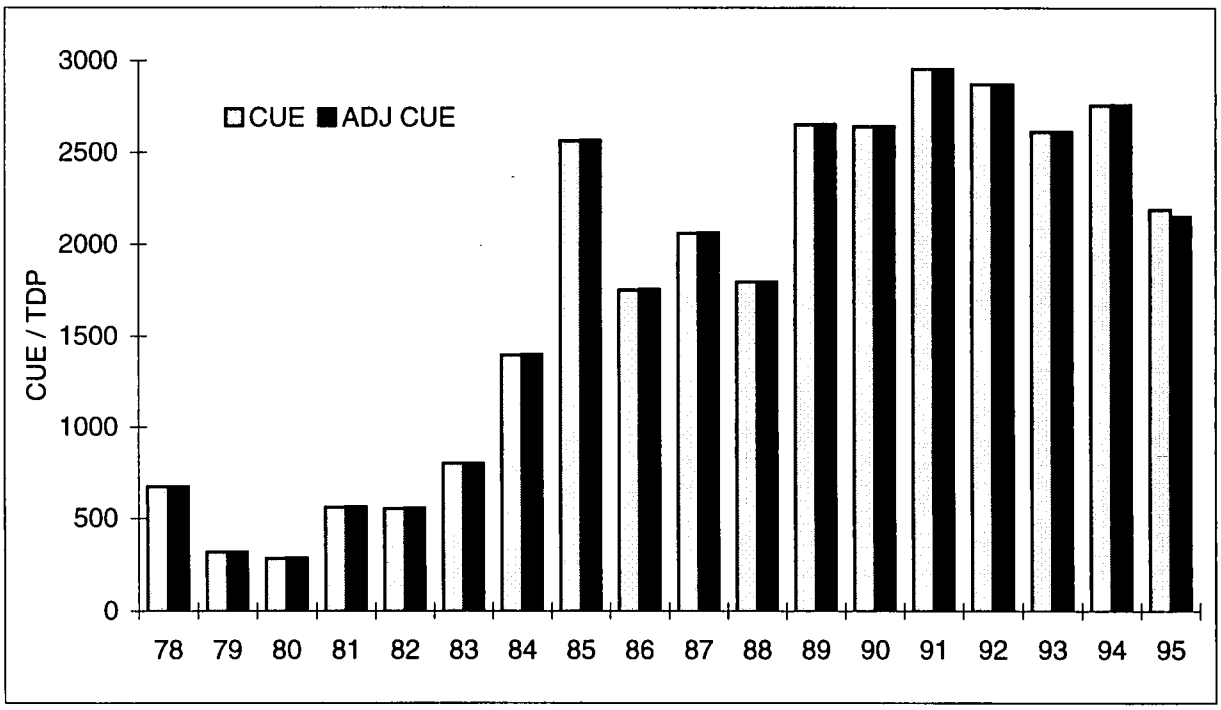


Fig. 20. Effect of reducing nightly limit in 16F (Pictou) in 1995.

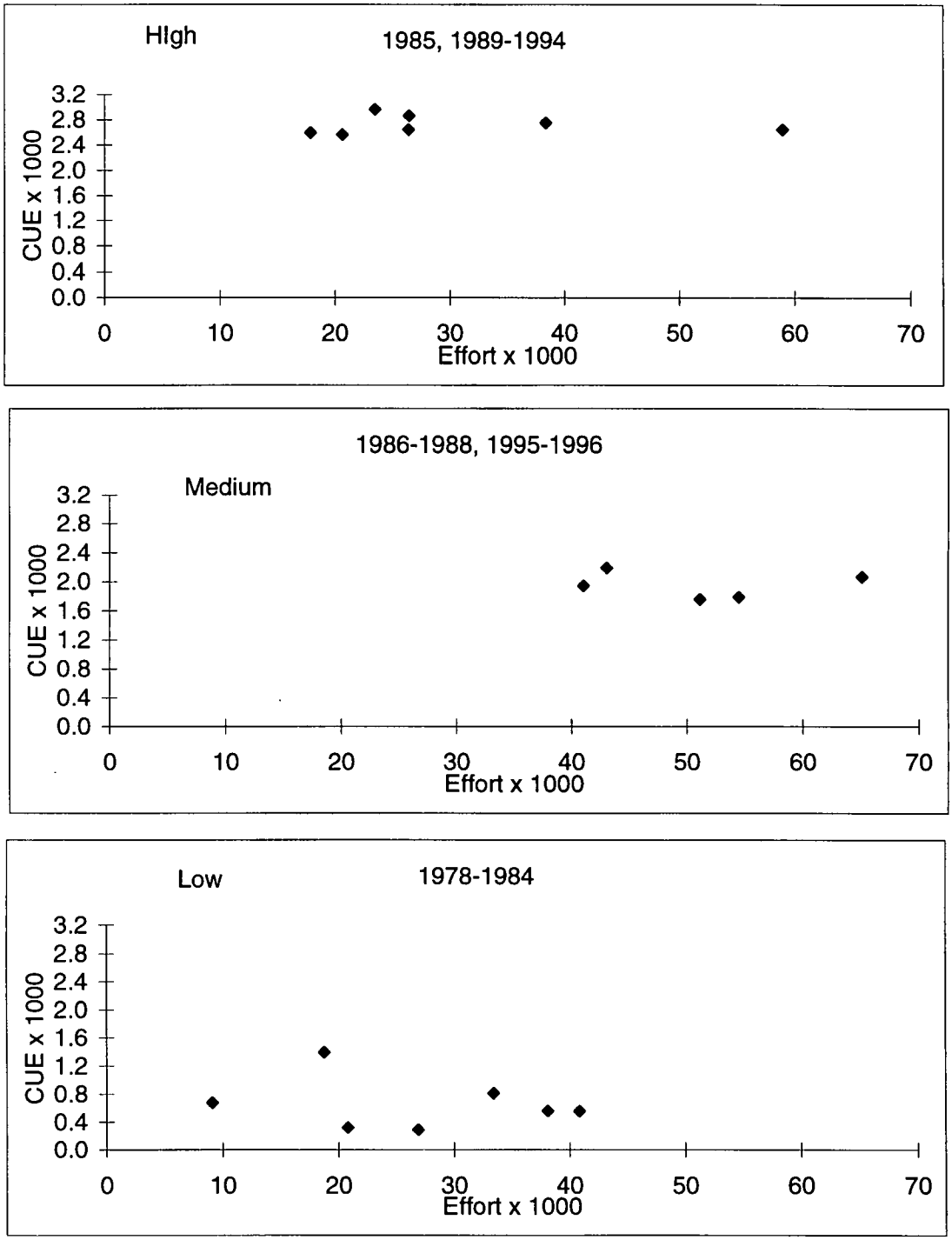


Fig. 21. Relationship between effort and fall abundance index at low, medium, and high population numbers for 4T fall spawners. Index units are kg/net-trip, effort is net-trips.

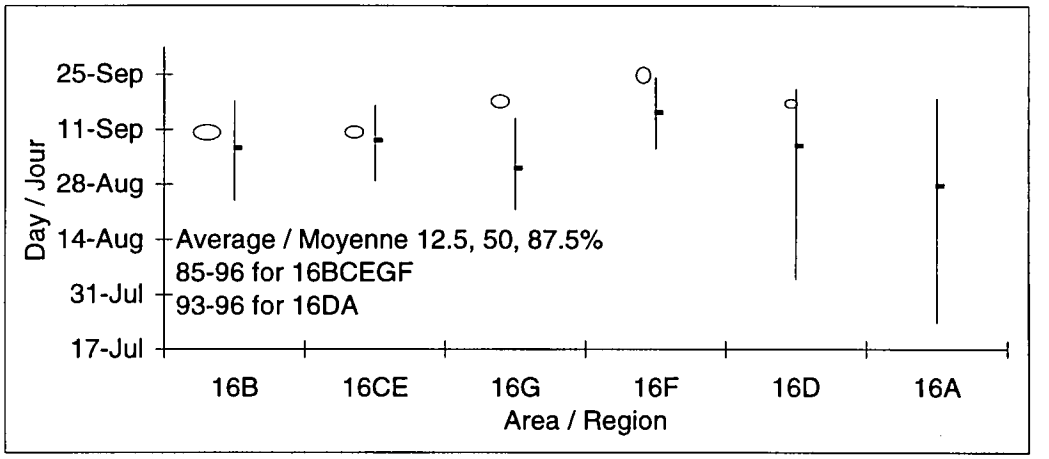


Fig. 22. Average timing of fall inshore fishery in 4T management units. Circle indicates date fishing stopped in each area in 1996. Fishing was not closed in 16A.

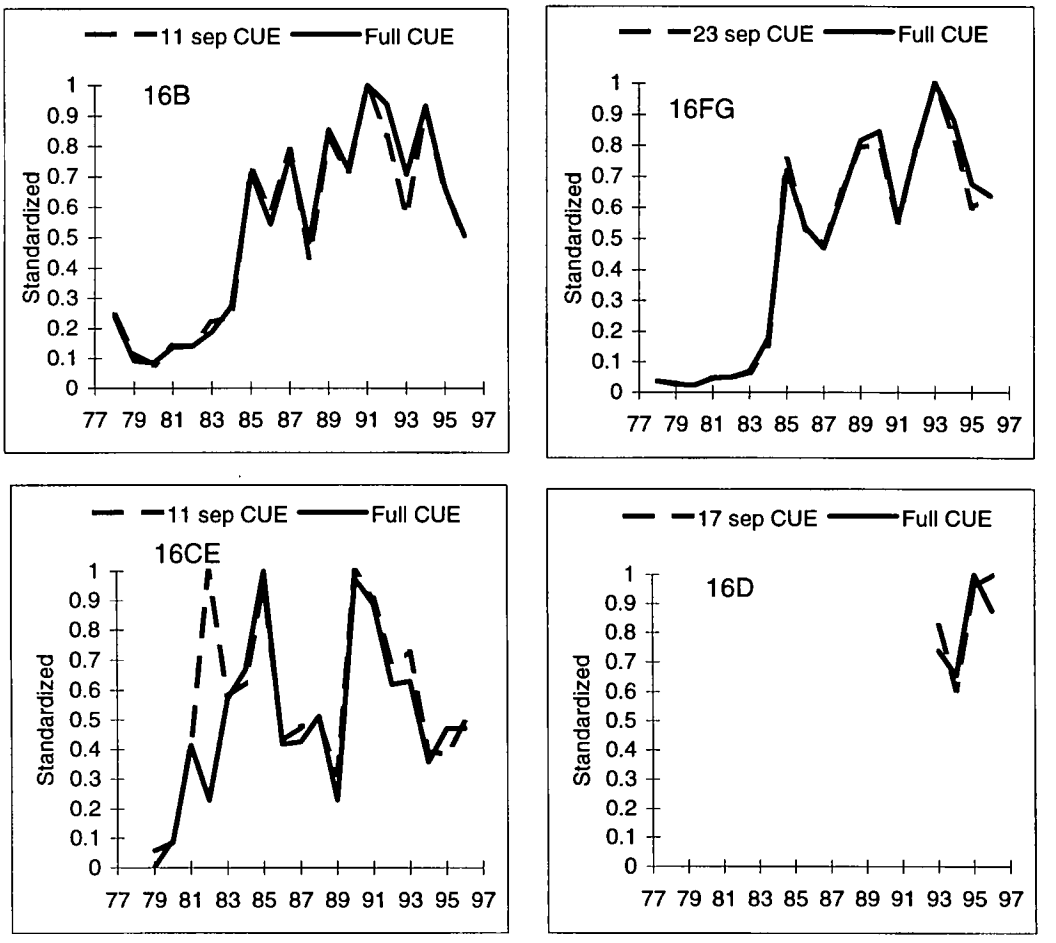


Fig. 23. Catch rate series for full year and each year shortened to date fisheries closed in 1996.

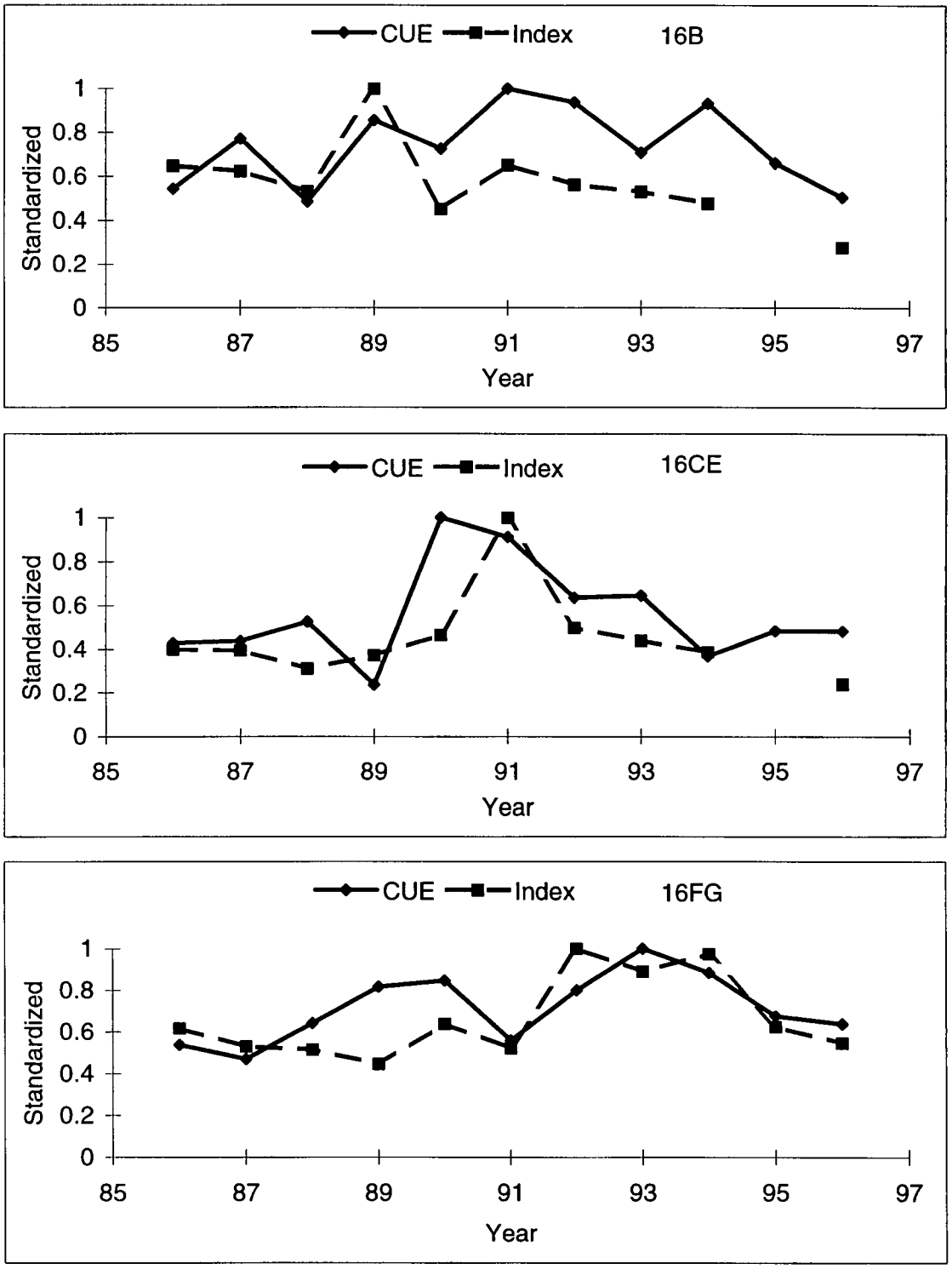


Fig. 24. Fall catch rates from multiplicative model and index gillnetter data.

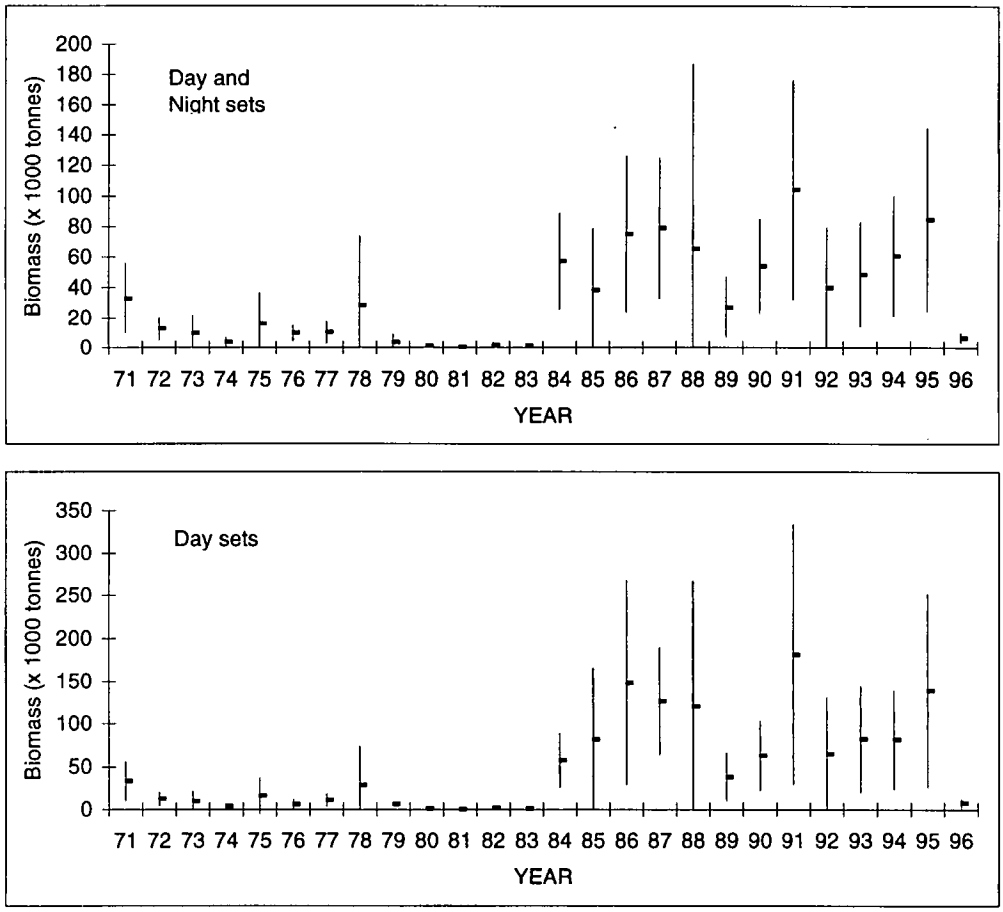


Fig. 25. Herring biomass in the southern Gulf of St. Lawrence fall groundfish surveys (mean with approximate 95% confidence intervals); strata 401, 403, 415-439.

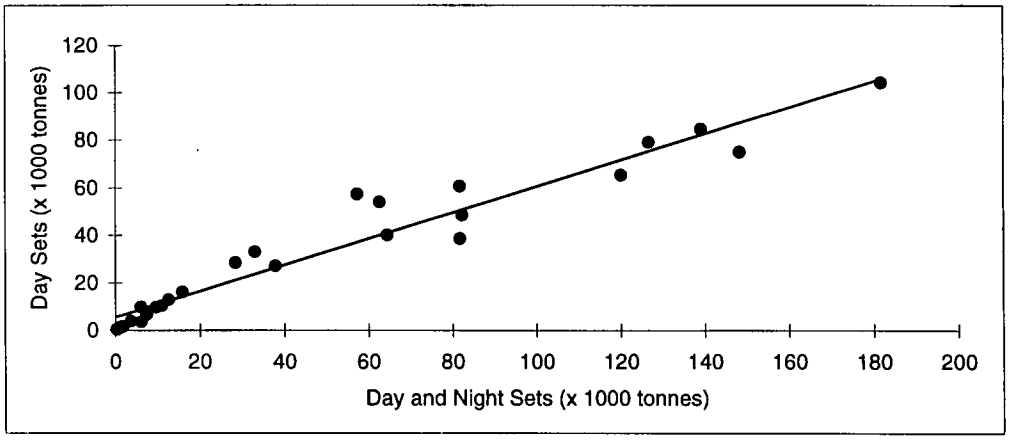


Fig. 26. Relationship between day and night sets, and day sets only for herring in September bottom trawl sruvey in 1996. Relationship is significant ($p<0.0001$, $r^2=.0.94$).

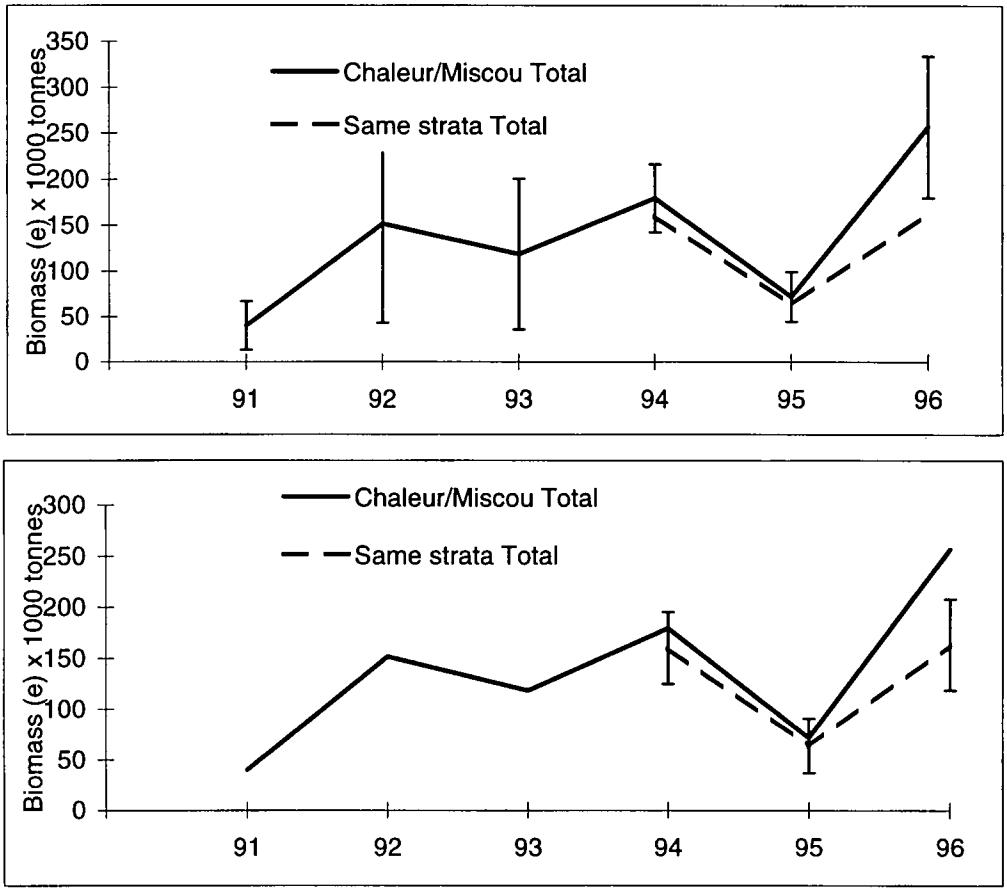


Fig. 27. Acoustic survey biomass index, spring + fall, for all strata surveyed in each year and strata consistently surveyedfrom 1994-1996.

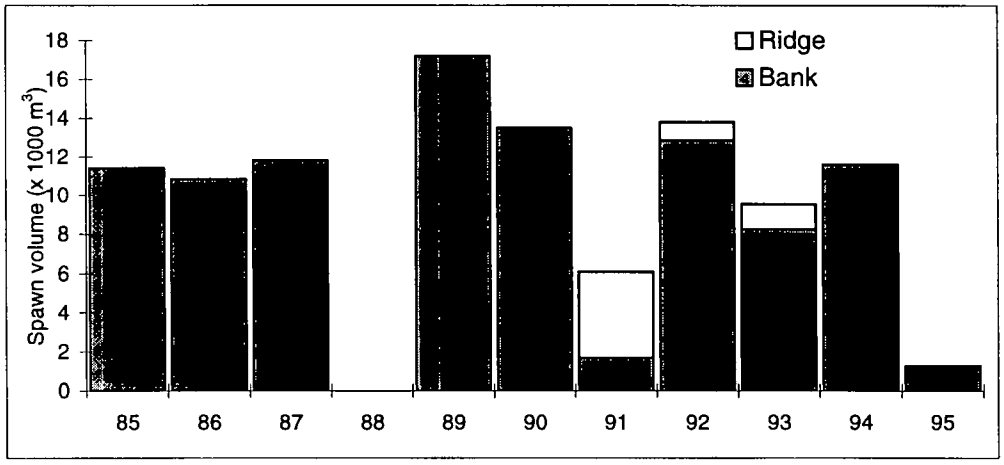


Fig. 28. Egg deposition volume at Fisherman's Bank and the Ridge as estimated by spawning bed survey (Cairns et al. 1996).

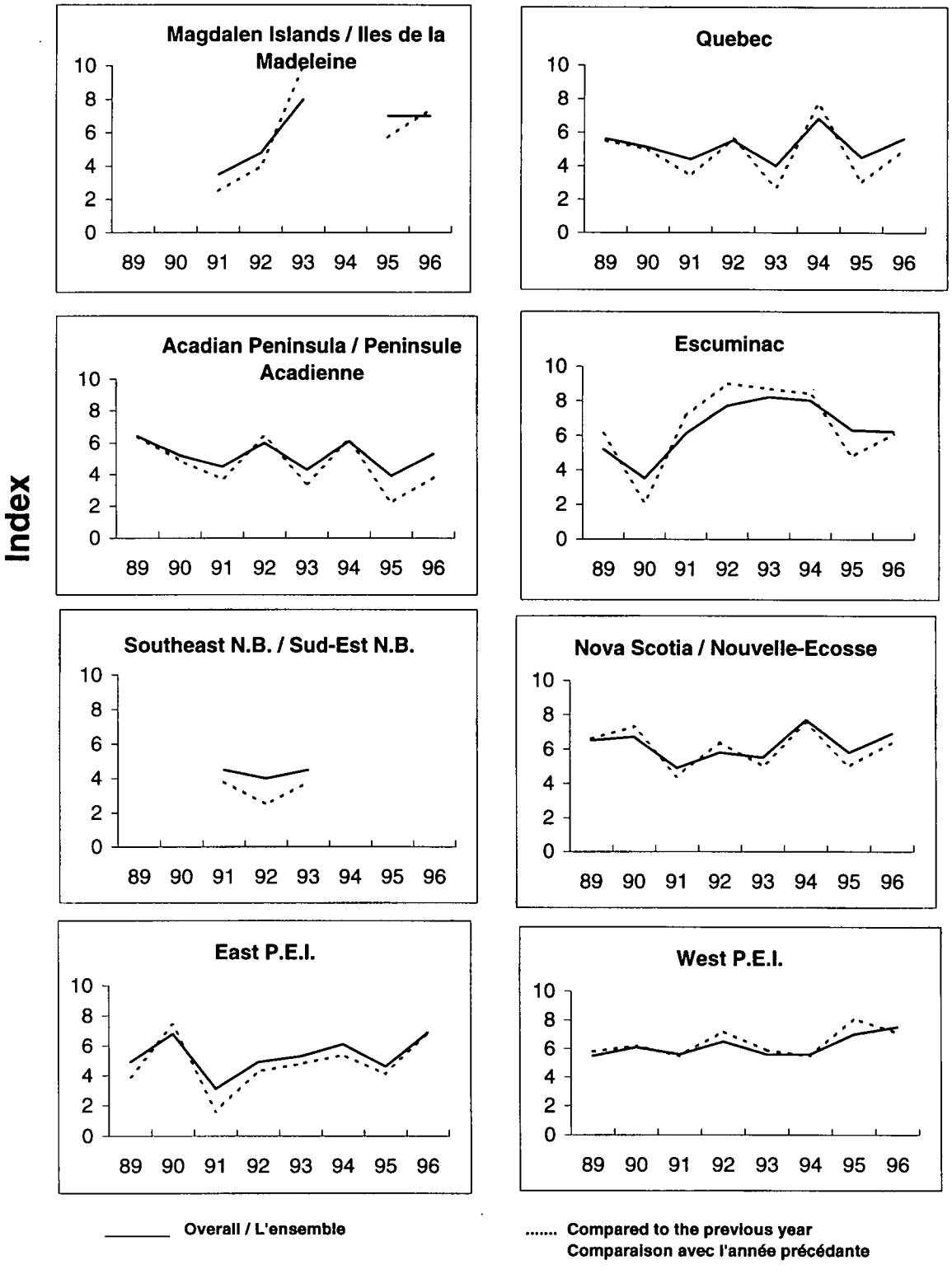


Fig. 29. Fall indices of abundance by area from phone survey
Fig. 29. Indices d'abondance de l'automne d'après le sondage

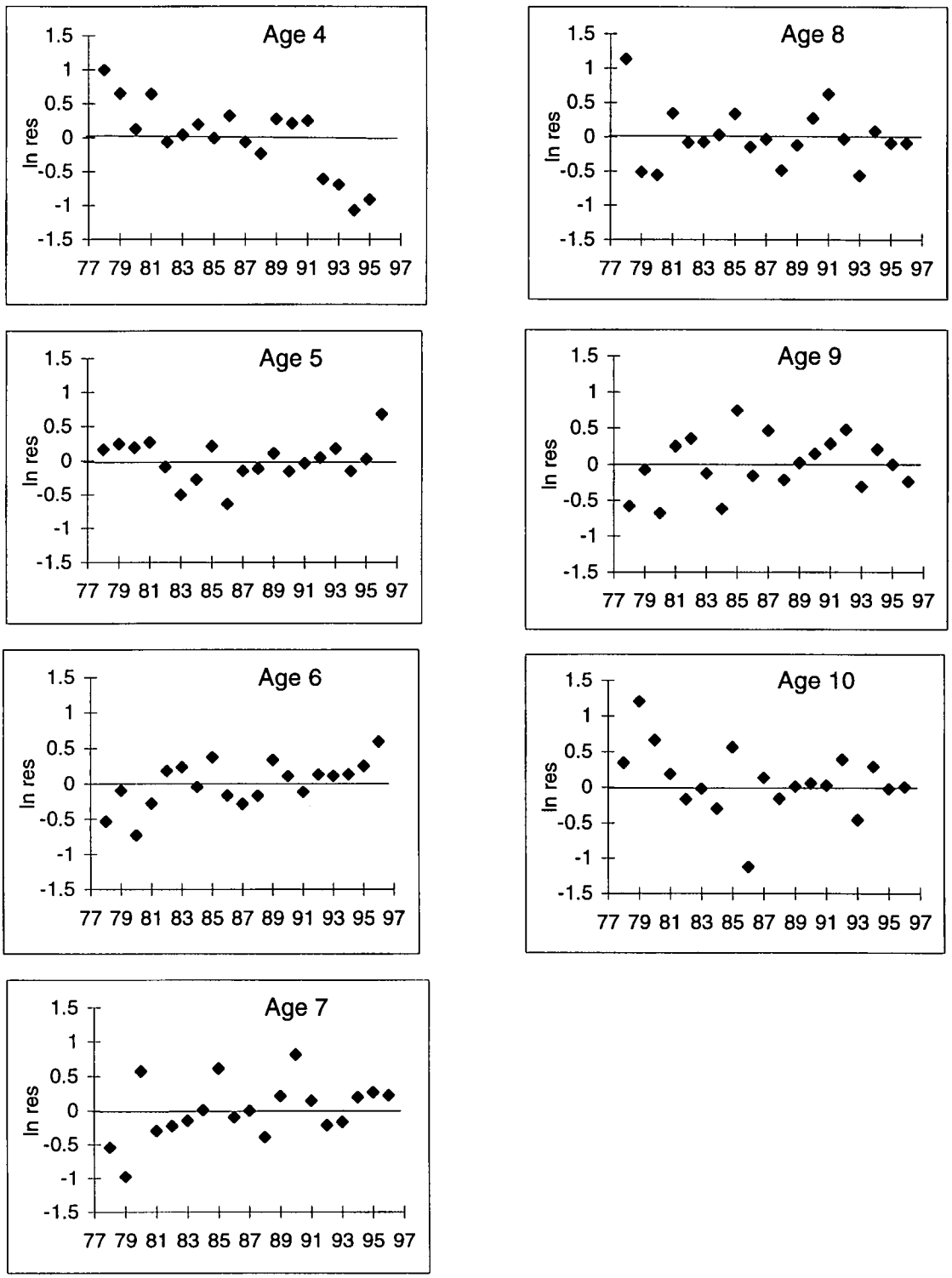


Fig. 30. Log residuals by age from ADAPT-VPA of fall spawners using ANOVA muliplicative model abundance index. Residual (ln(observed/predicted).

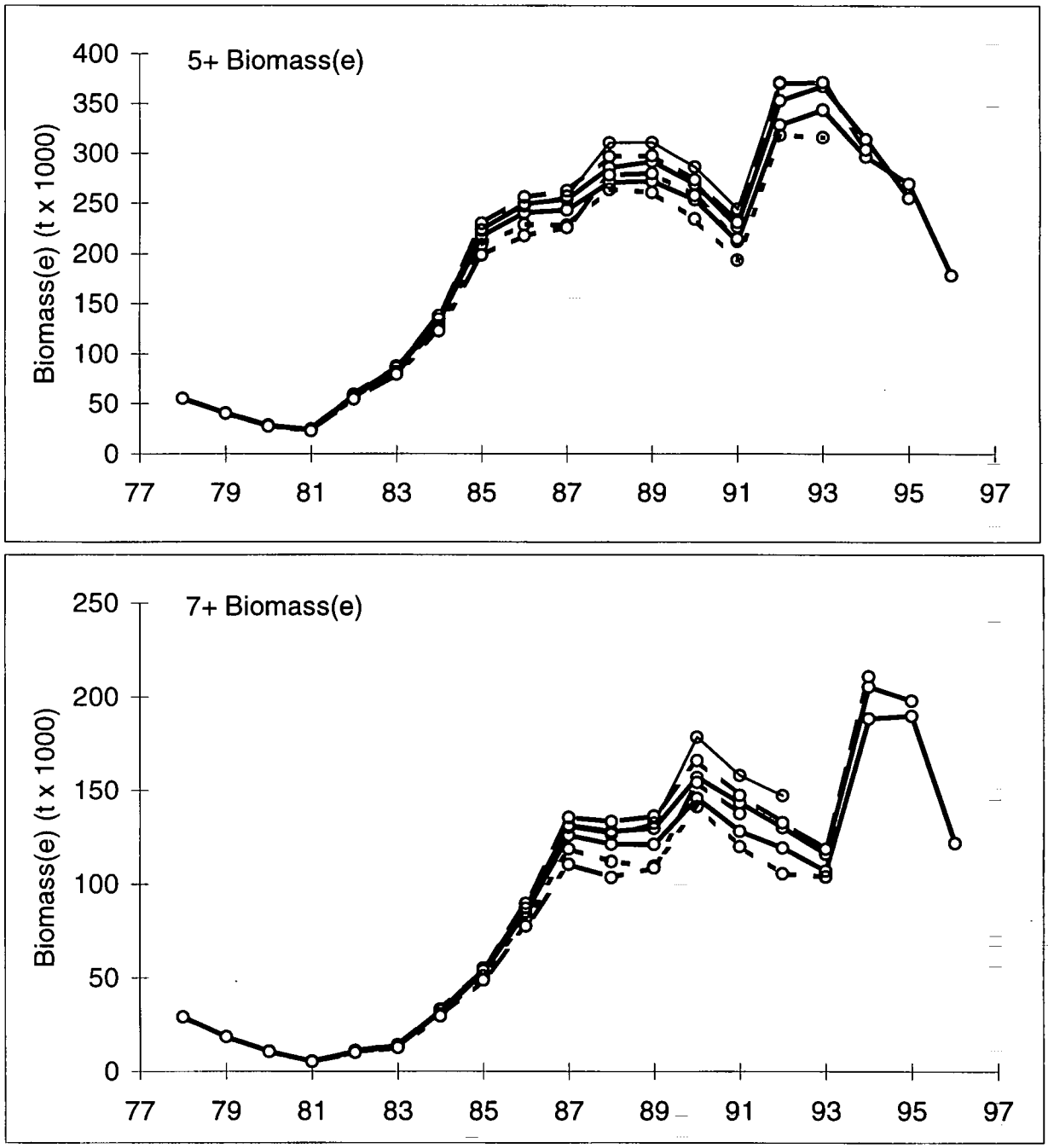


Fig. 31. Retrospective analysis of 5+ and 7+ 4T fall spawner herring biomass.

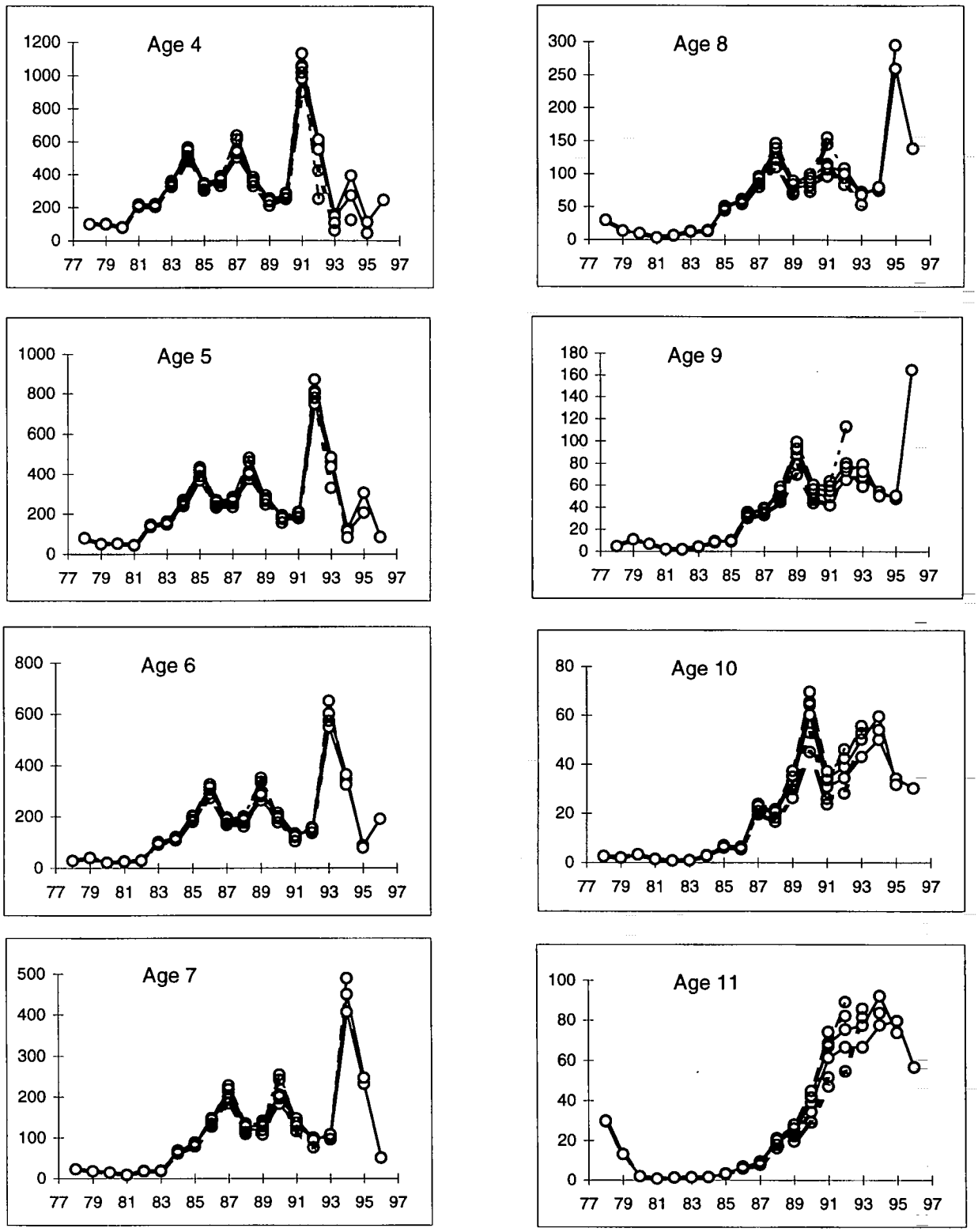
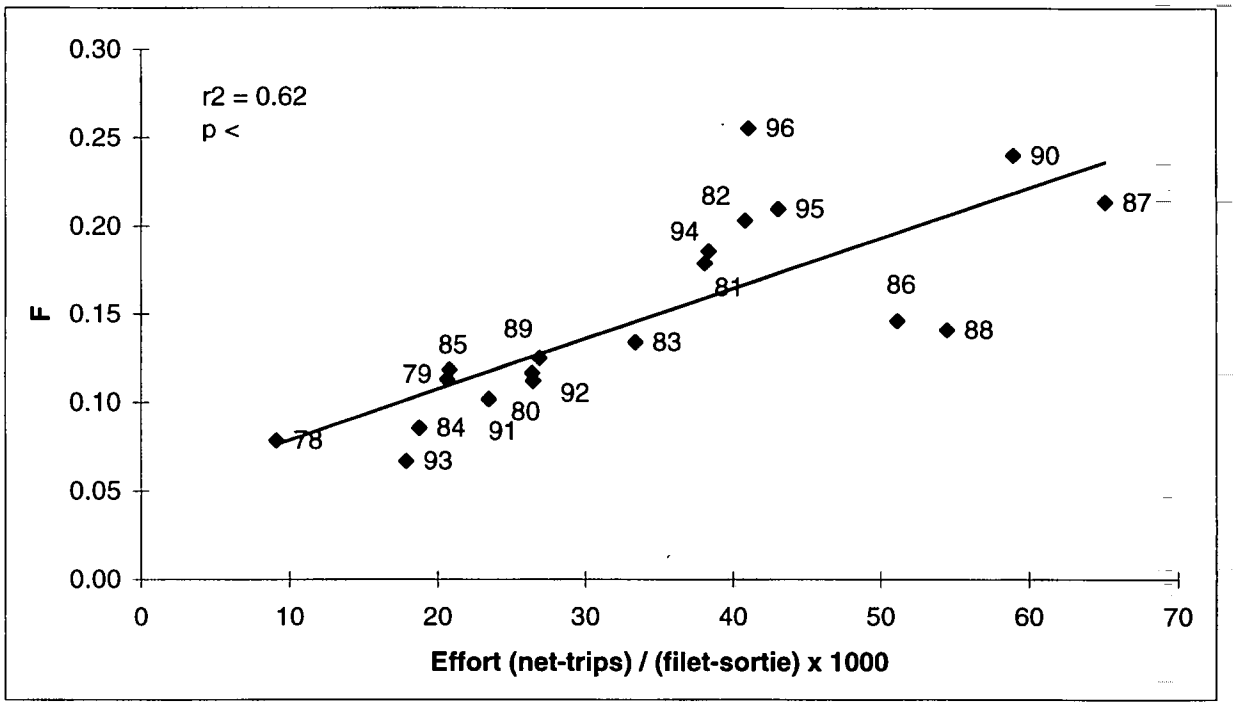


Fig. 32. Retrospective by age for ANOVA multiplicative model, 1978-1996.



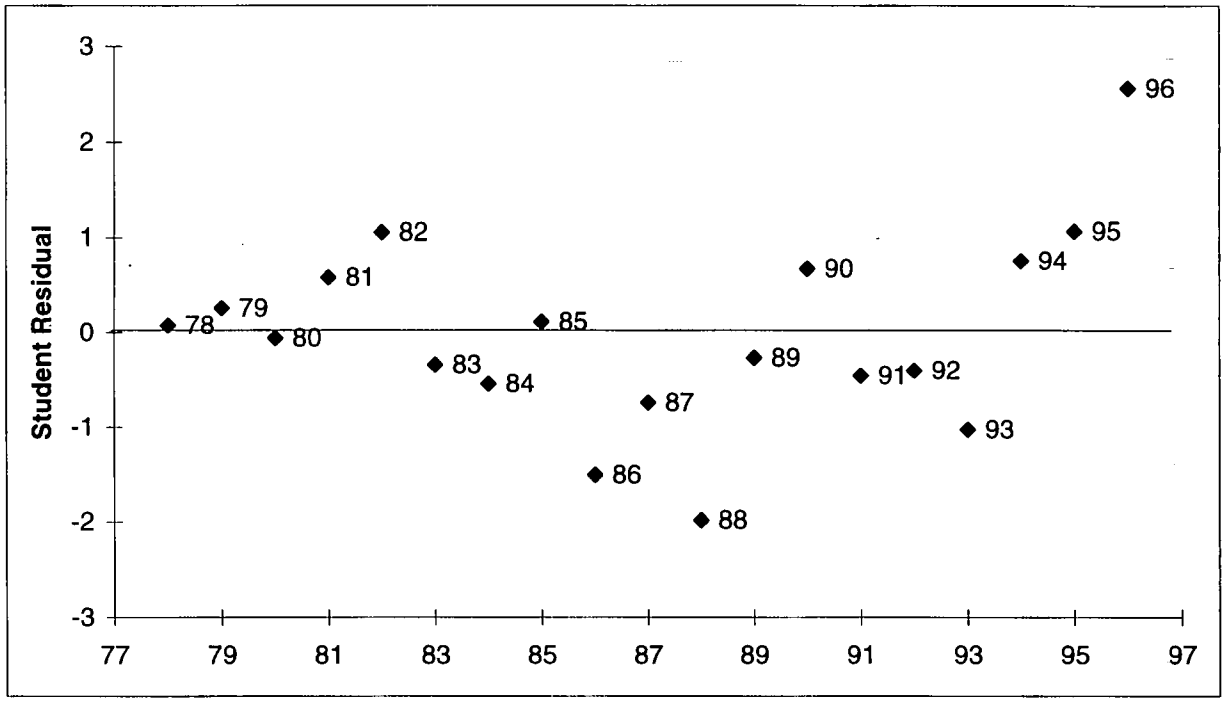


Fig. 33. Relationship between fixed gear inshore effort and fixed gear fishing mortality for fall spawners.

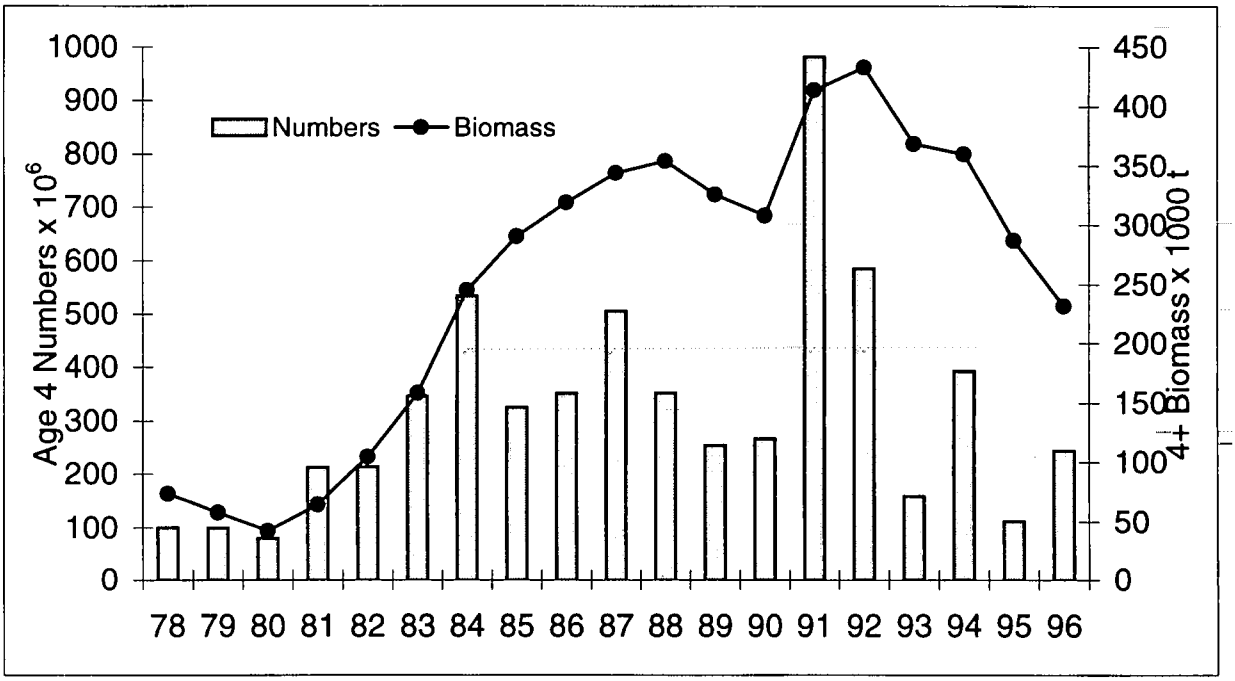


Fig. 34. Spawning stock biomass, 4+, compared to recruits as age 4 numbers for 4T fall spawners.

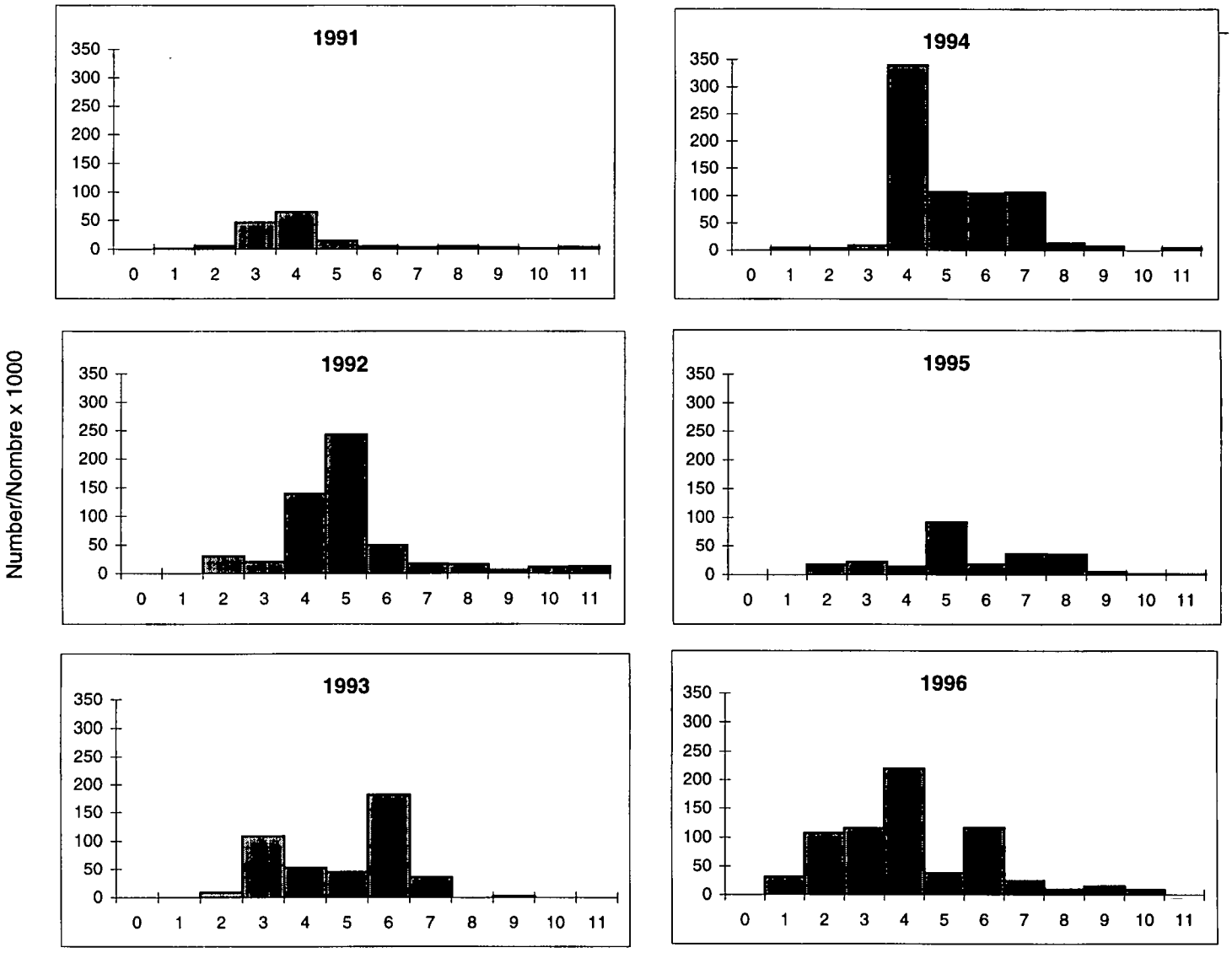
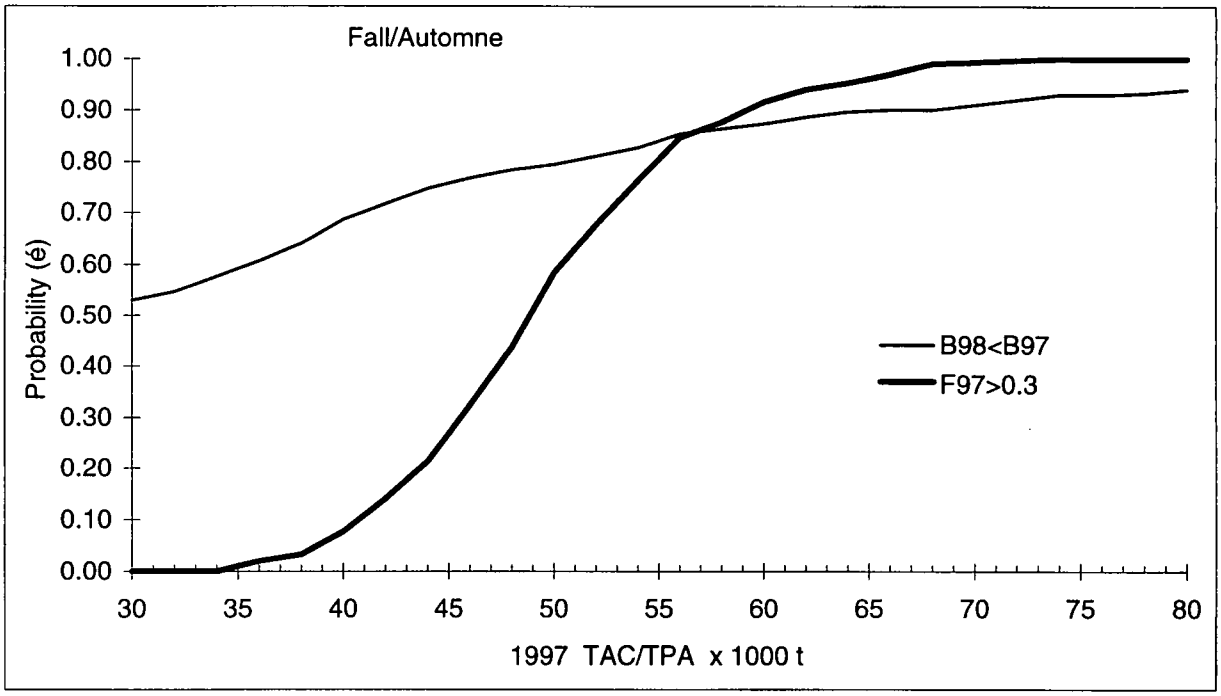


Fig. 35. Acoustic survey numbers-at-age of Chaleur-Miscou strata fall spawners.
Fig. 35. Nombres-à-l'âge des géniteurs d'automne, Chaleur-Miscou relevés acoustiques.



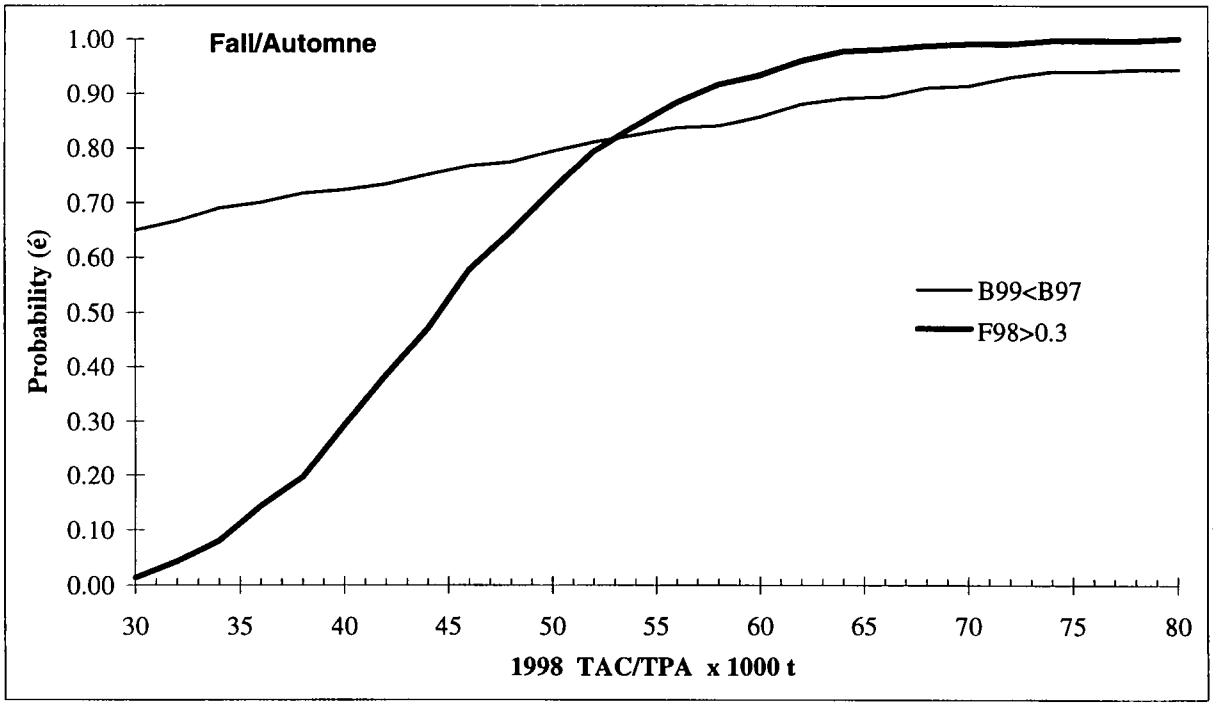


Fig. 36. Risk analysis for fall spawners for 1998 and 1999.

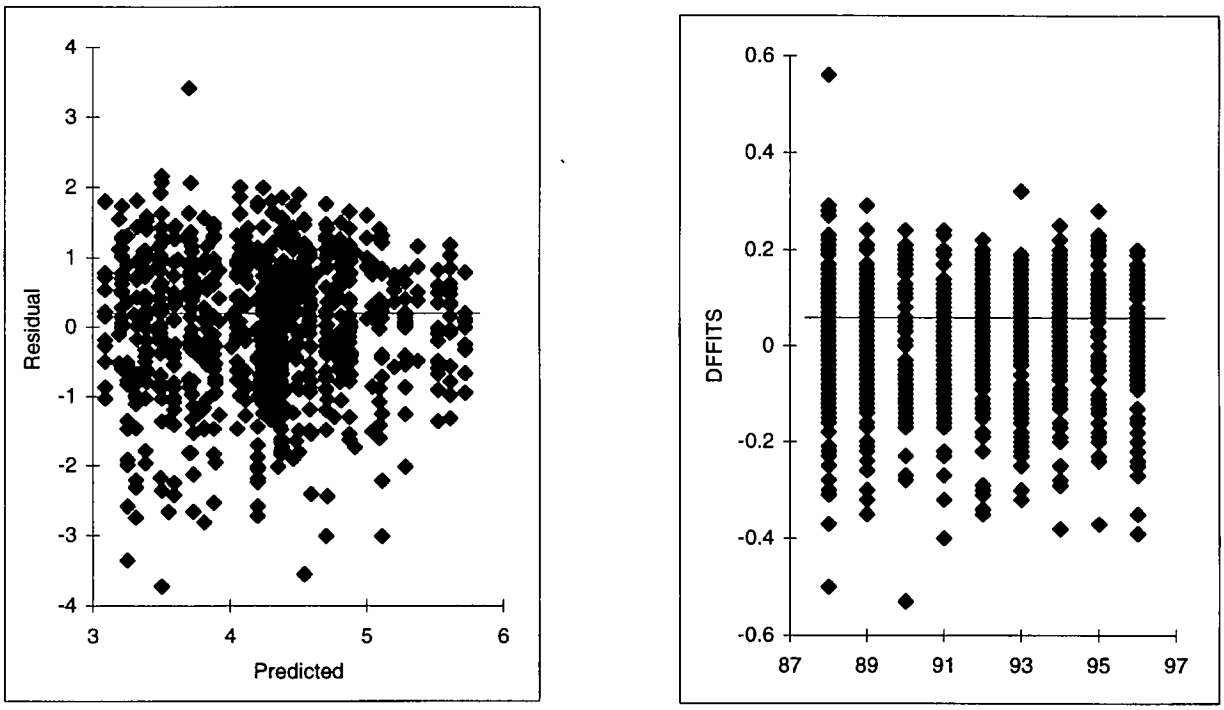


Fig. 37. Diagnostics for 4T spring spawners from index gillnetter data.

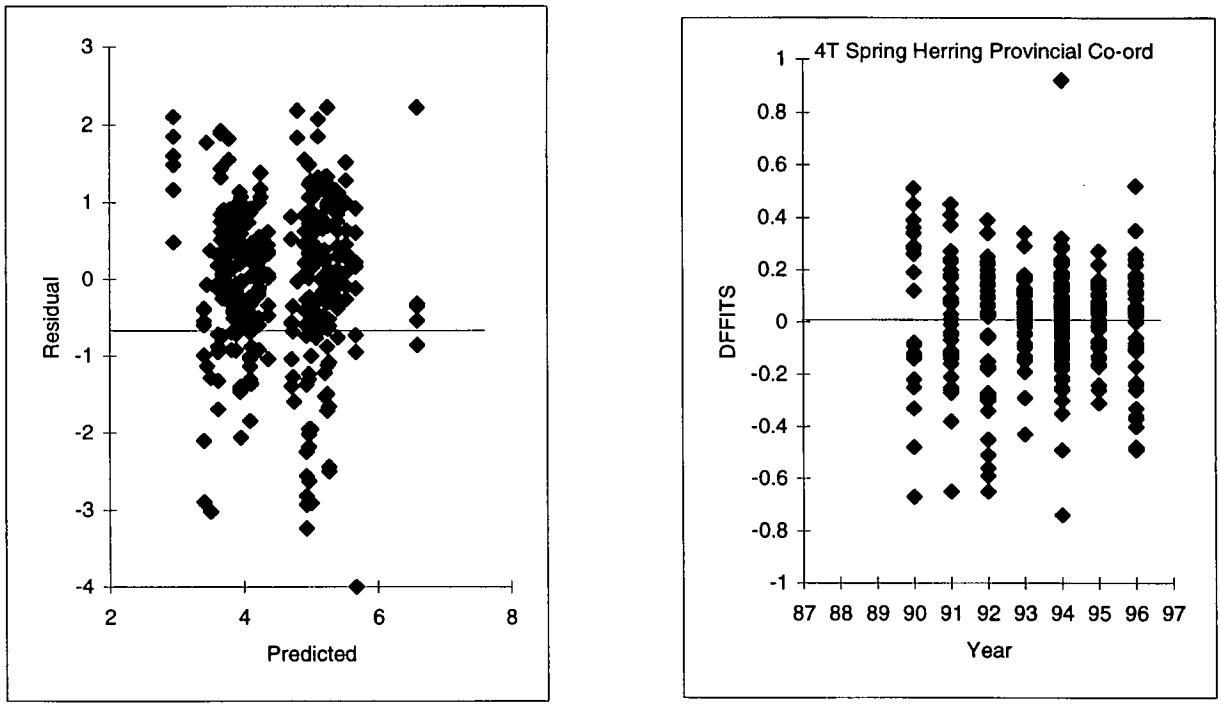


Fig. 38. Diagnostics for 4T spring spawners from provincial data.

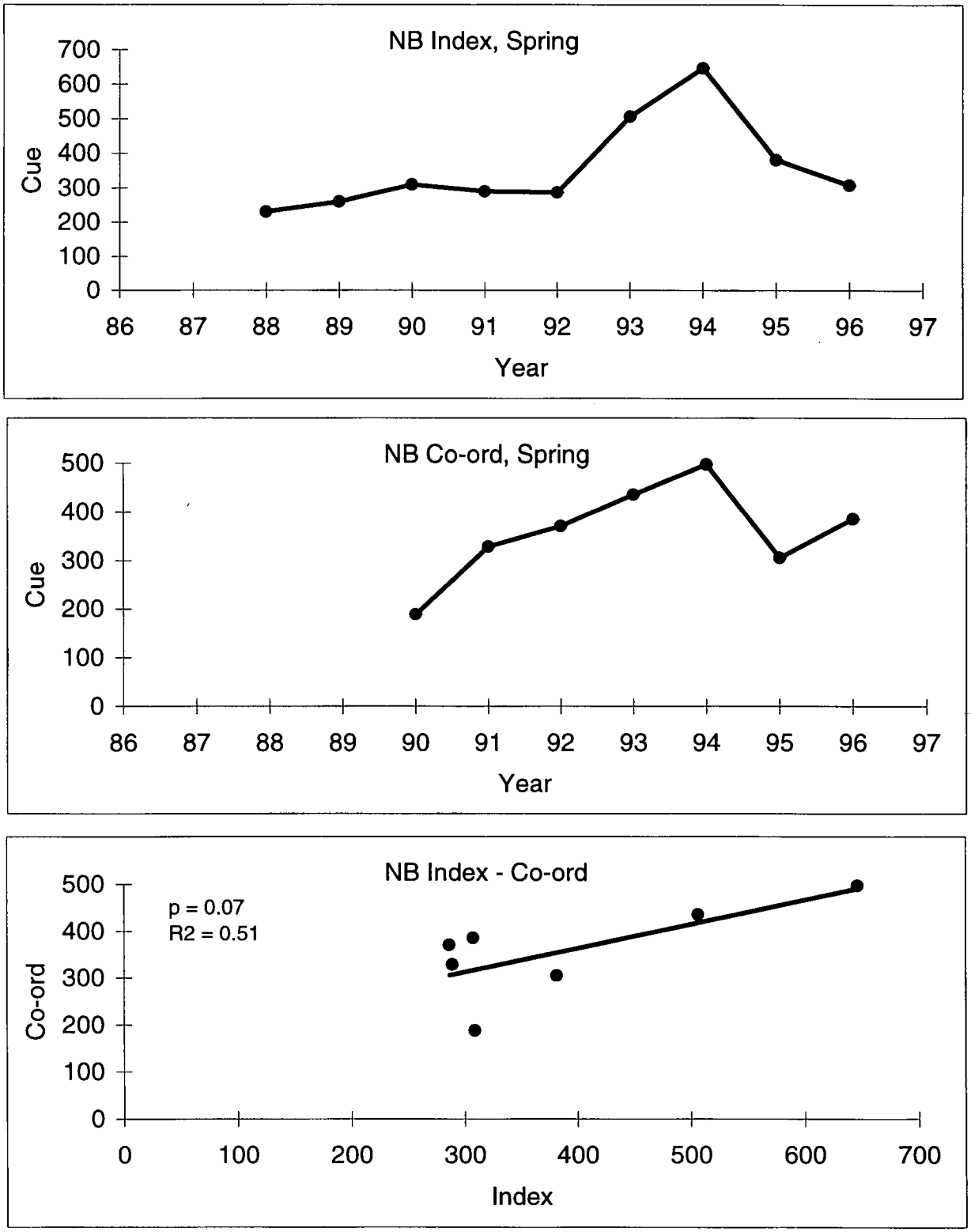


Fig. 39. Catch rate trends for spring index gillnetters (kg/net-trip) and provincial data (kg/fisher-net).

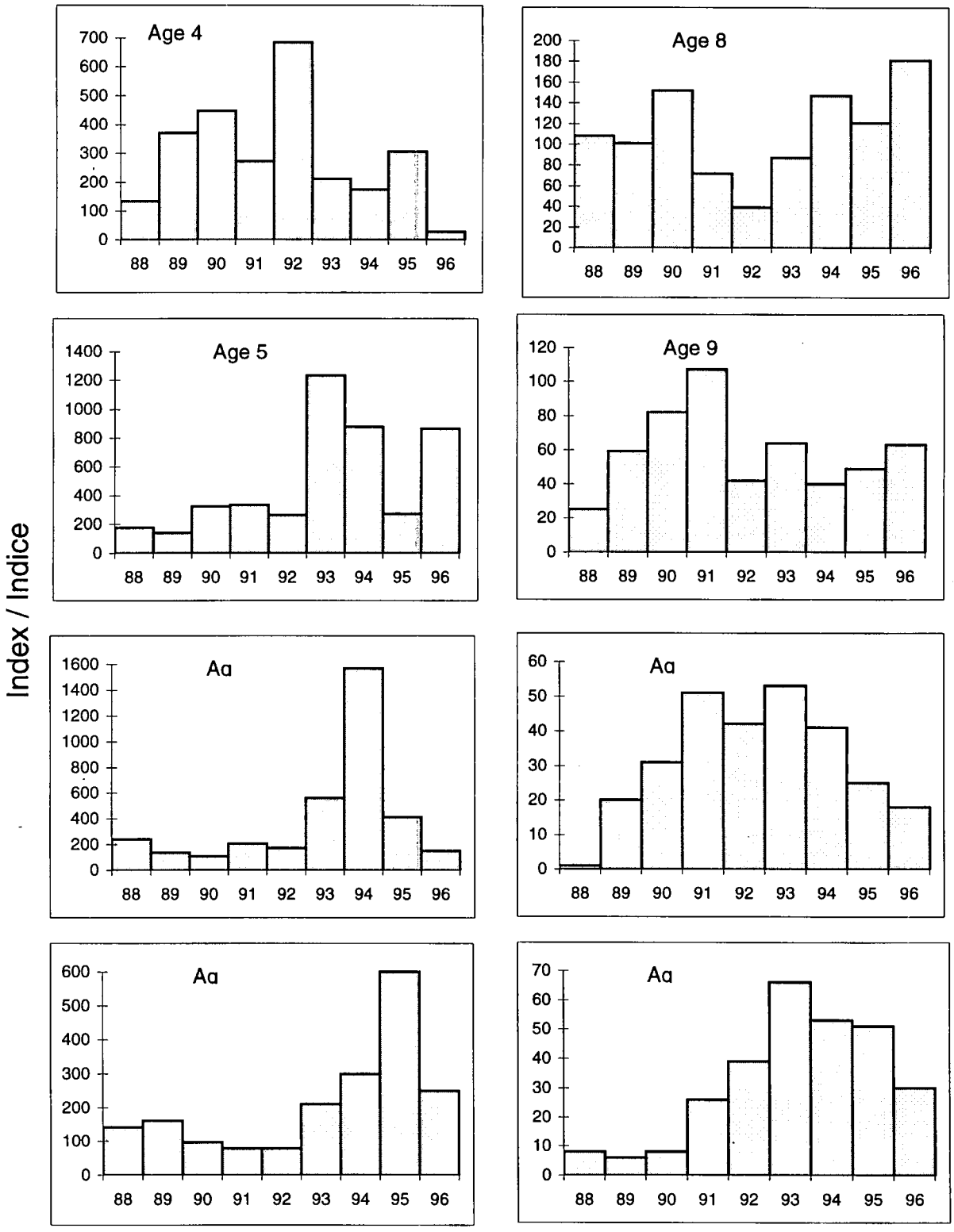


Fig. 40. Abundance indices for spring spawners using index gillnetters. Units for index are kg/net-trip.

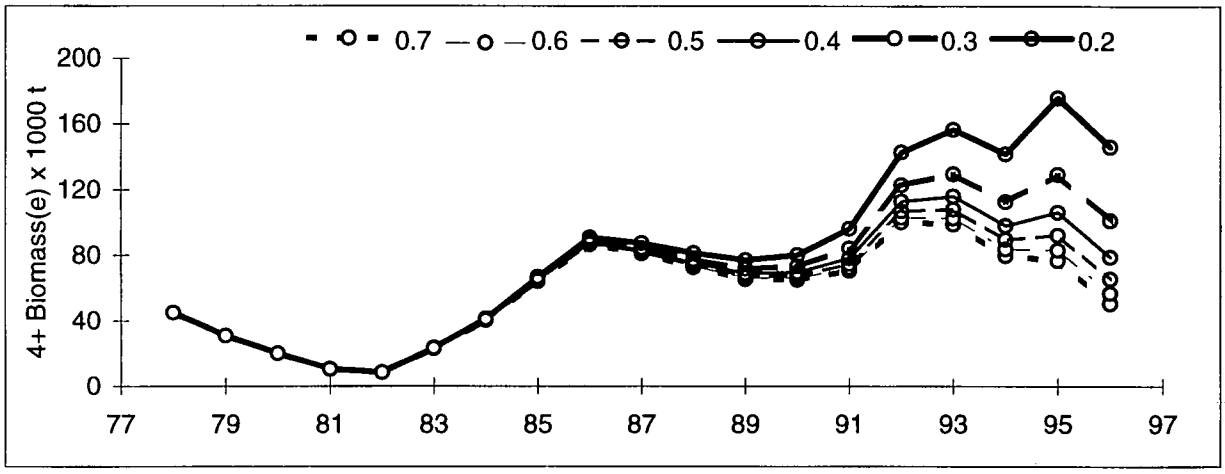


Fig. 41. Results of simple VPA at various terminal F's for spring spawners.

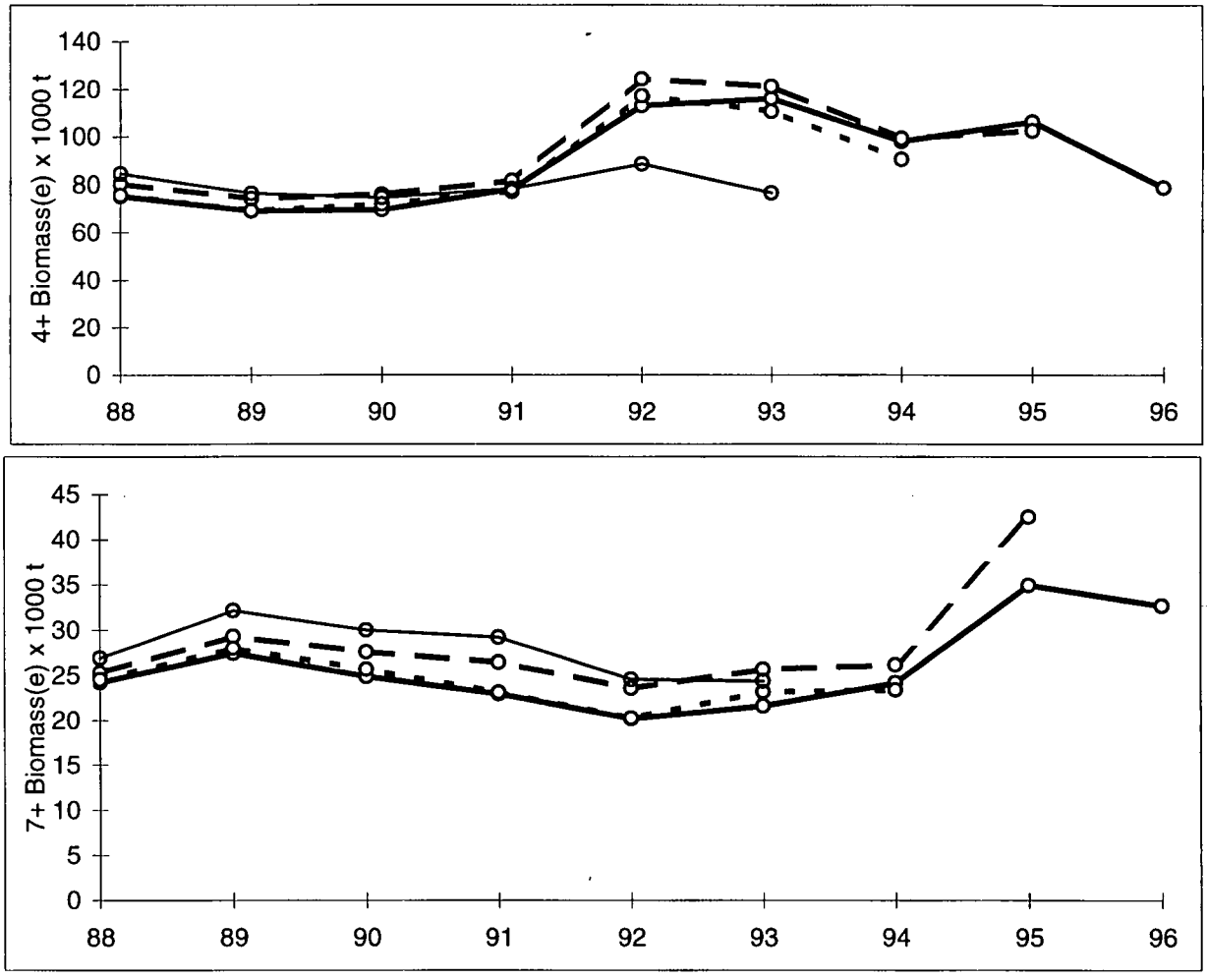


Fig. 42. Retrospective analysis for simple VPA at terminal F=0.4, for 4+ and 7+ biomass.

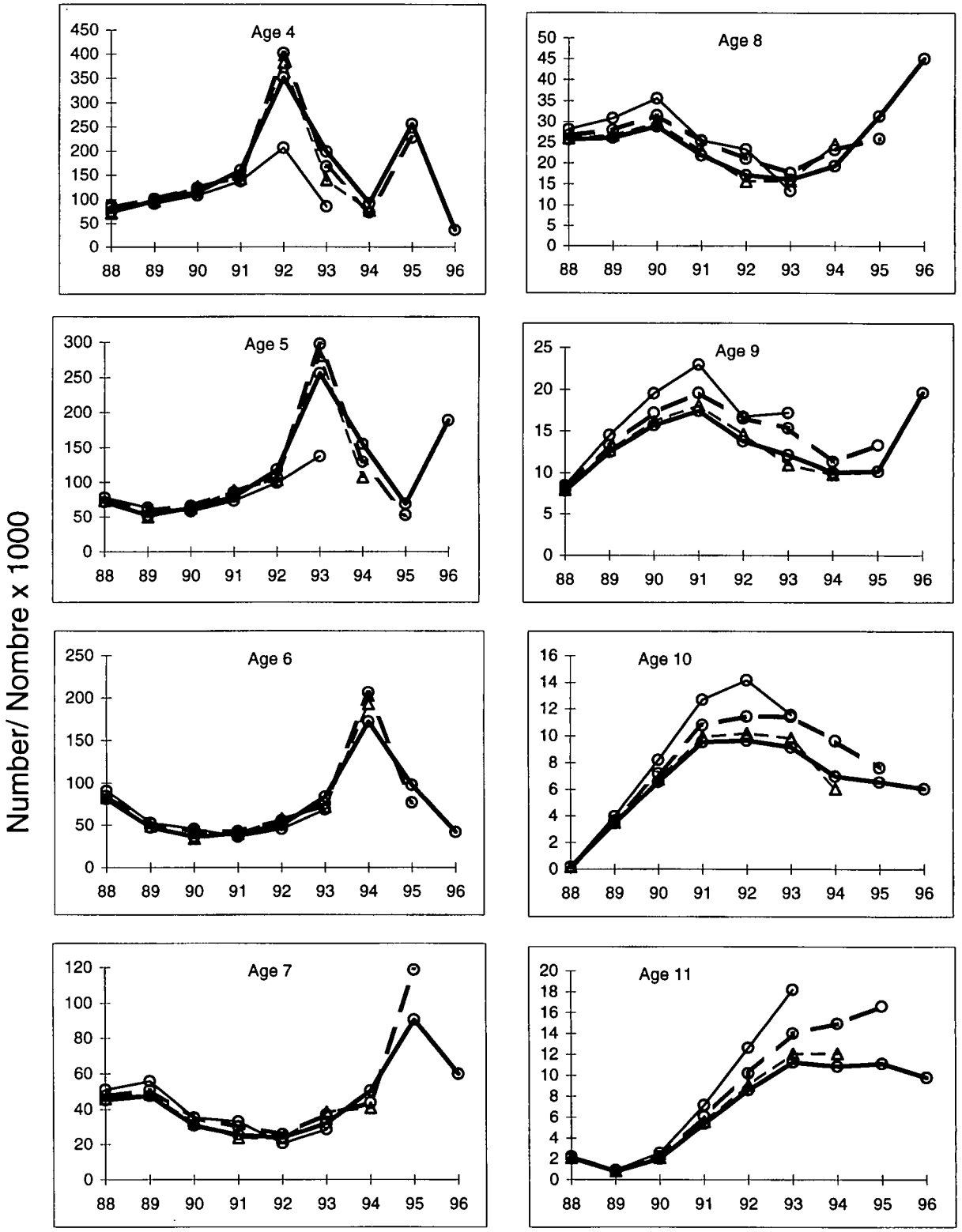
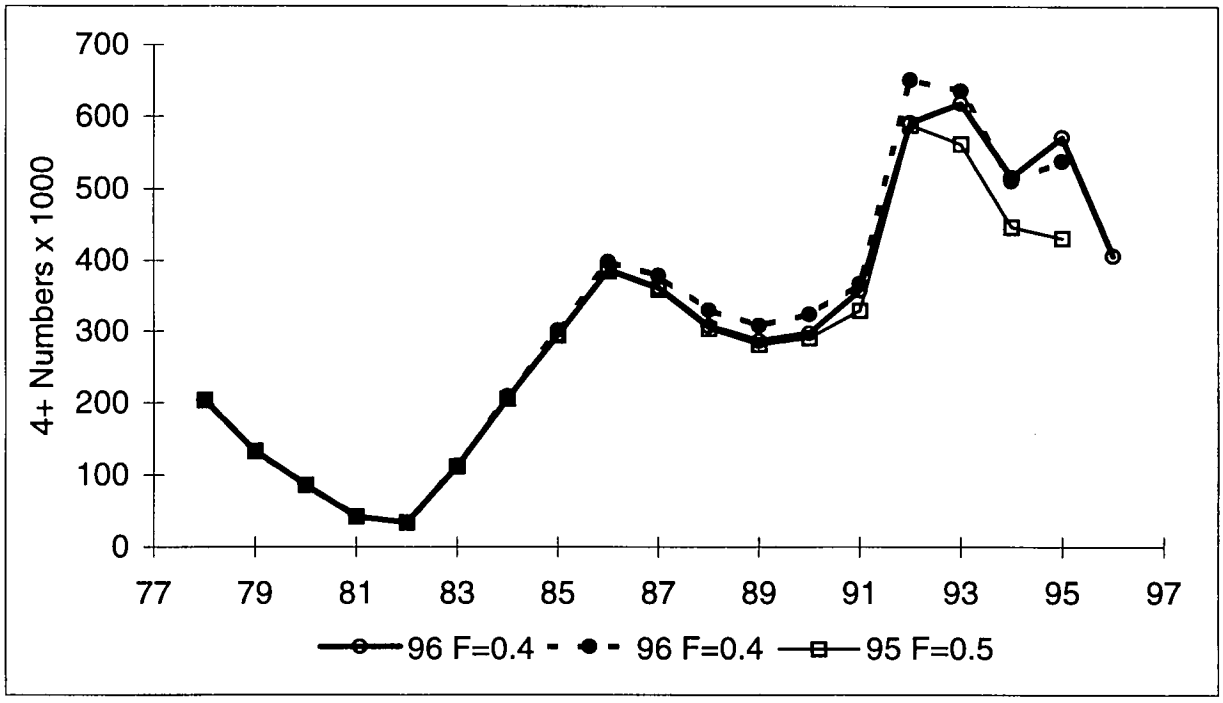


Fig. 43. Retrospective by age for simple VPA with Terminal F=0.4.



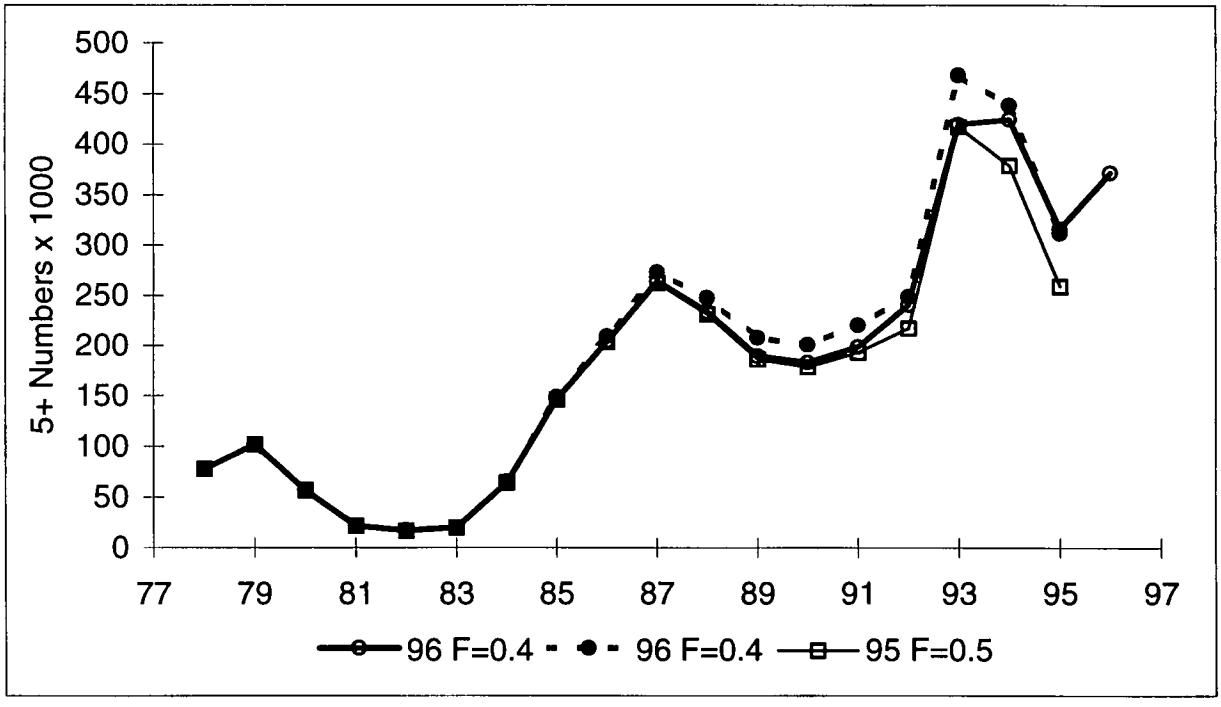


Fig. 44. Comparison of 4+ and 5+ numbers for 1995 and 1996 using the simple VPA model developed for this assessment of the 1996 fishery at F = 0.4 to the VPA developed in the assessment of the 1995 fishery (Claytor et al. 1996).

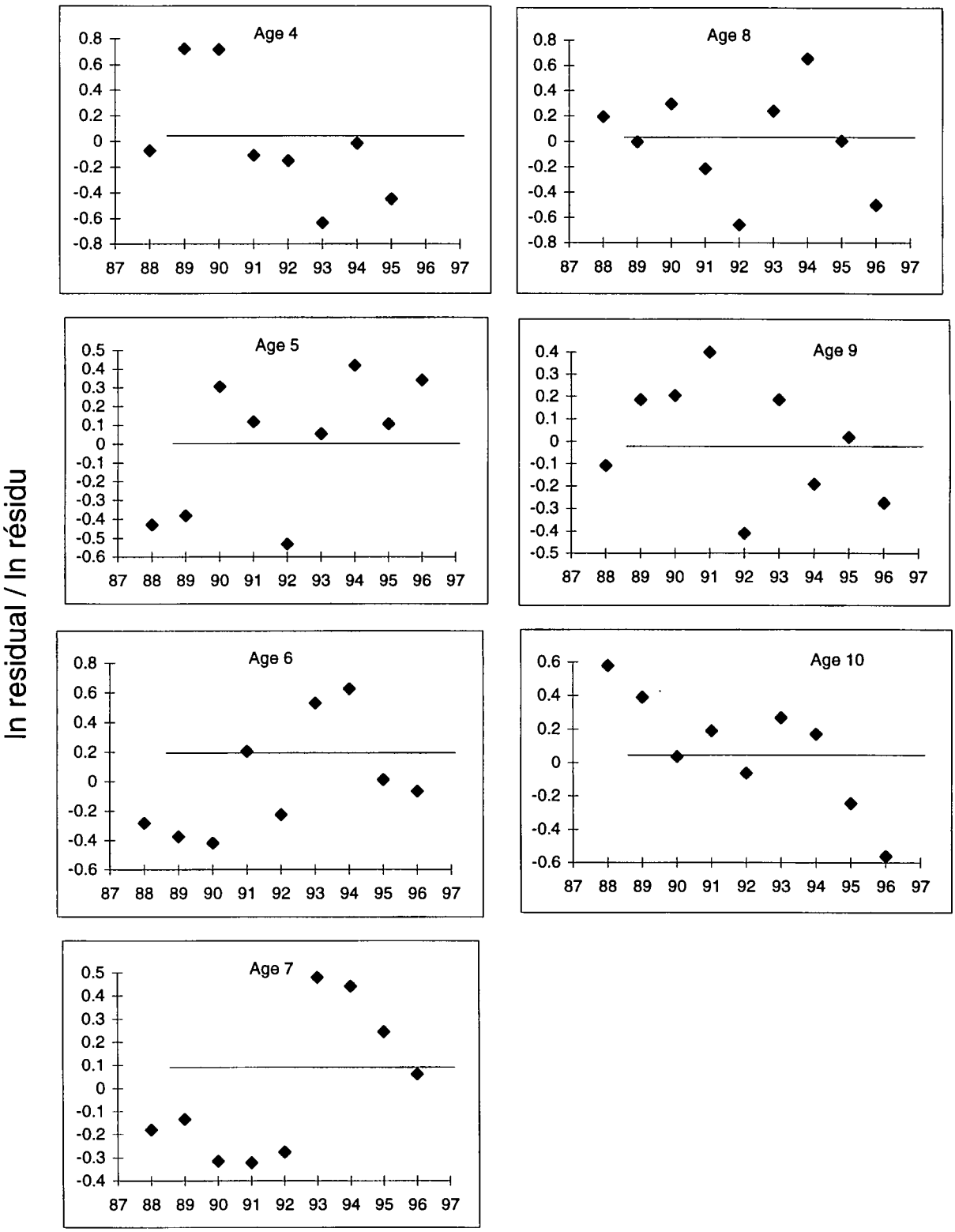


Fig. 45. Residuals for 4T spring herring ADAPT-VPA using index gillnetters abundance index.

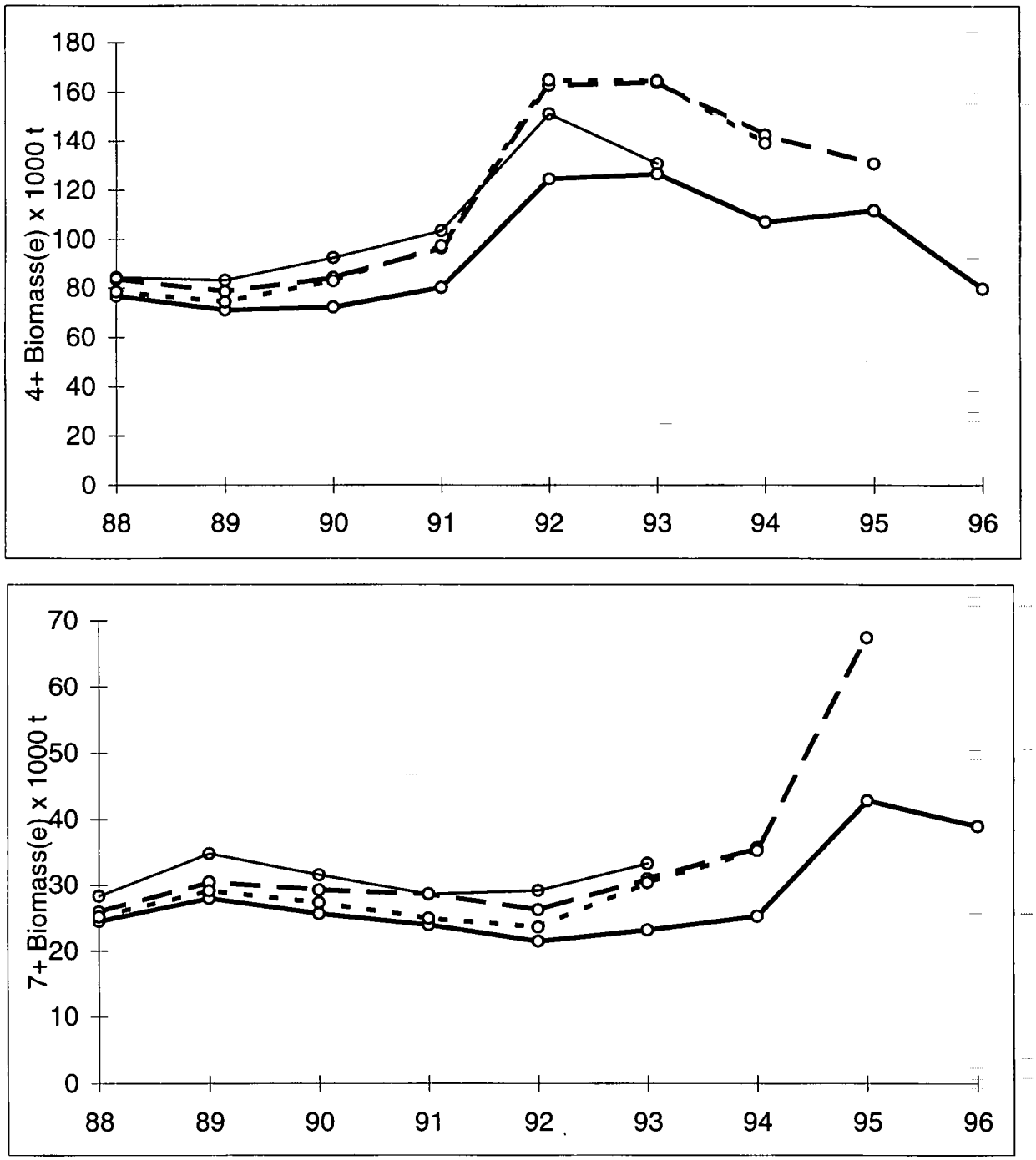


Fig. 46. Retrospecitive analysis of spring 1996 ADAPT-VPA model for 4+ and 7+ biomass.

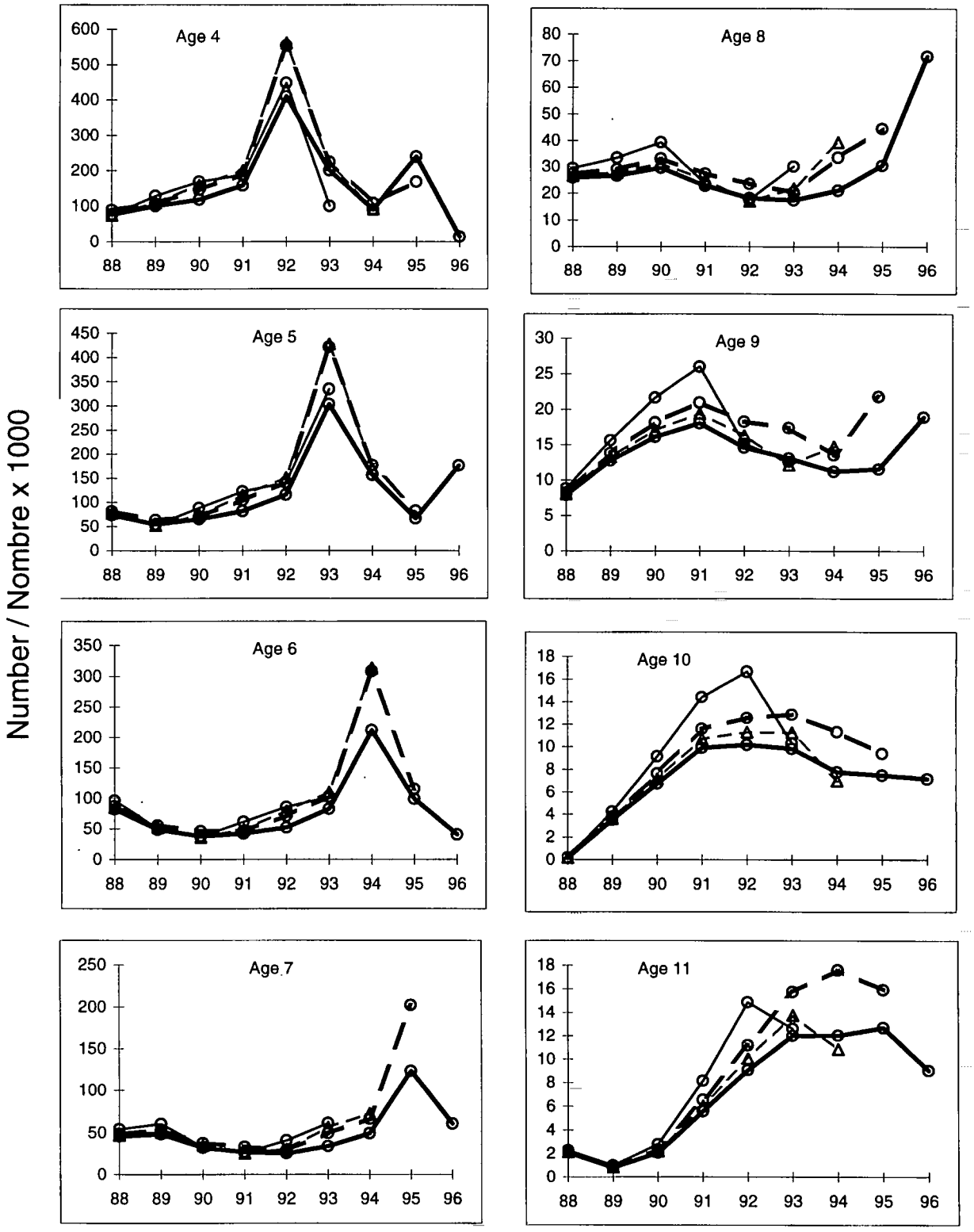


Fig. 47 Retrospective plots by age for 4T spring spawners, using index gillnetters.

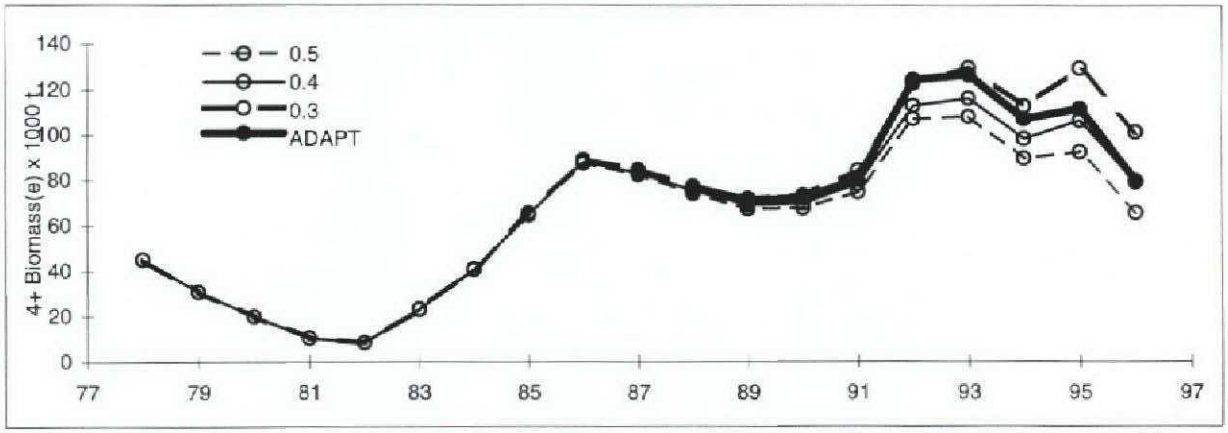


Fig. 48. Trends in 4+ biomass for simple VPA at three Terminal Fs compared to ADAPT-VPA.

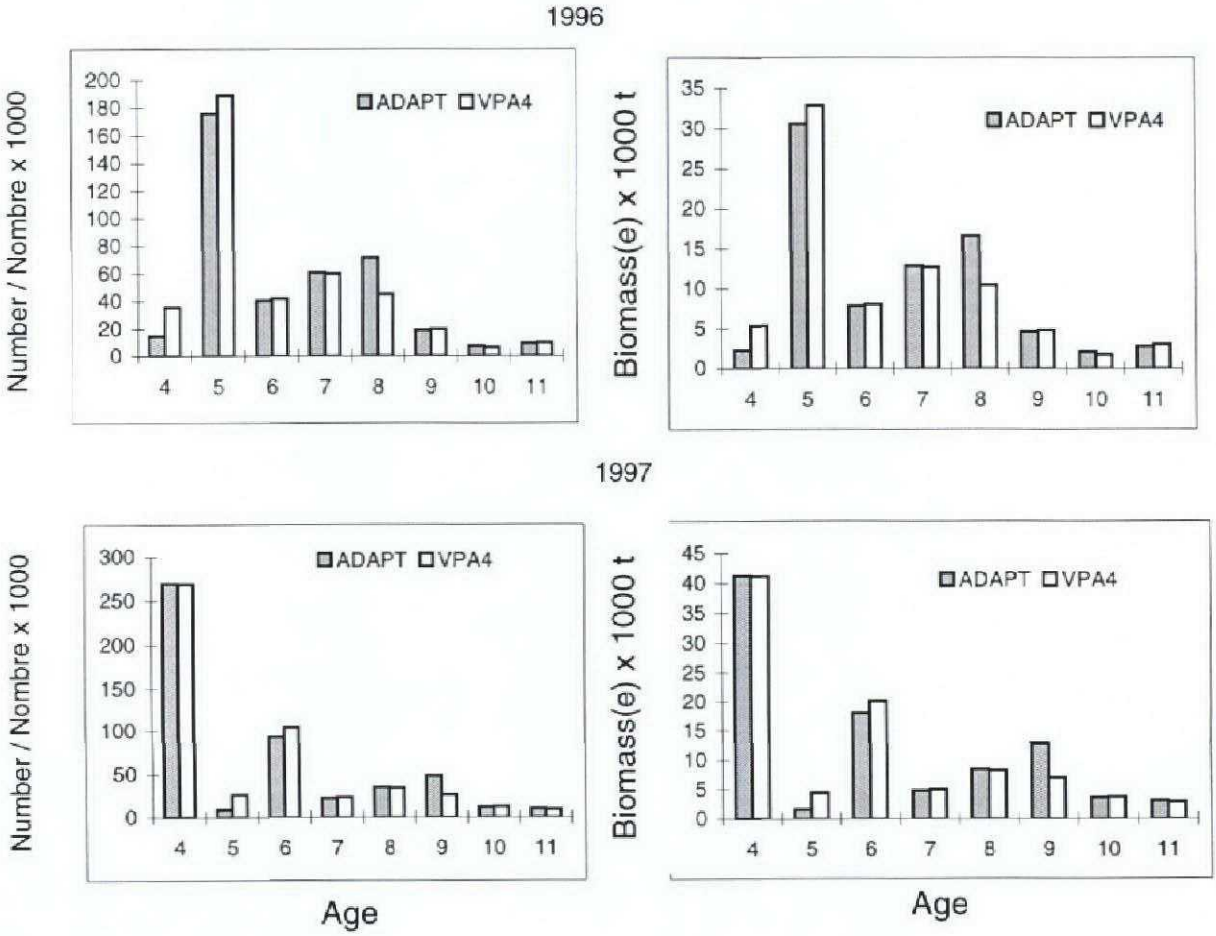


Fig. 49. Age by age comparison of numbers and biomass for simple VPA and ADAPT-VPA for spring spawners.

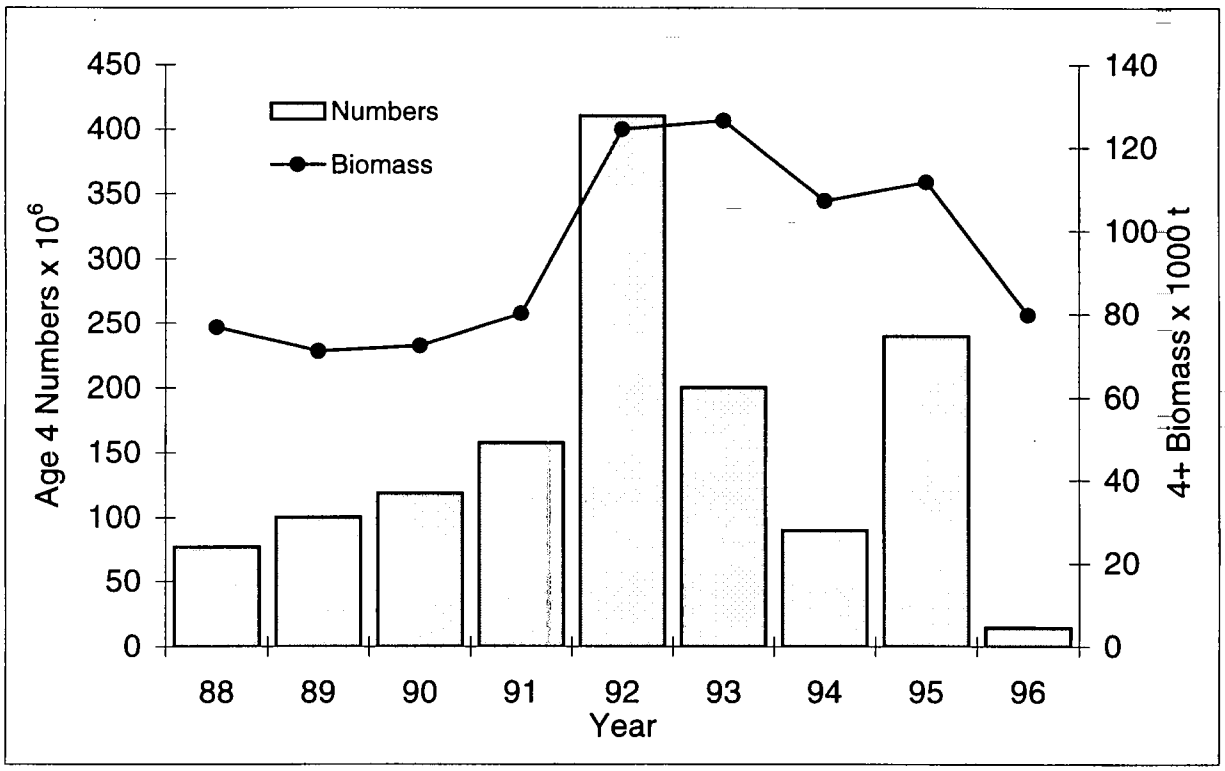
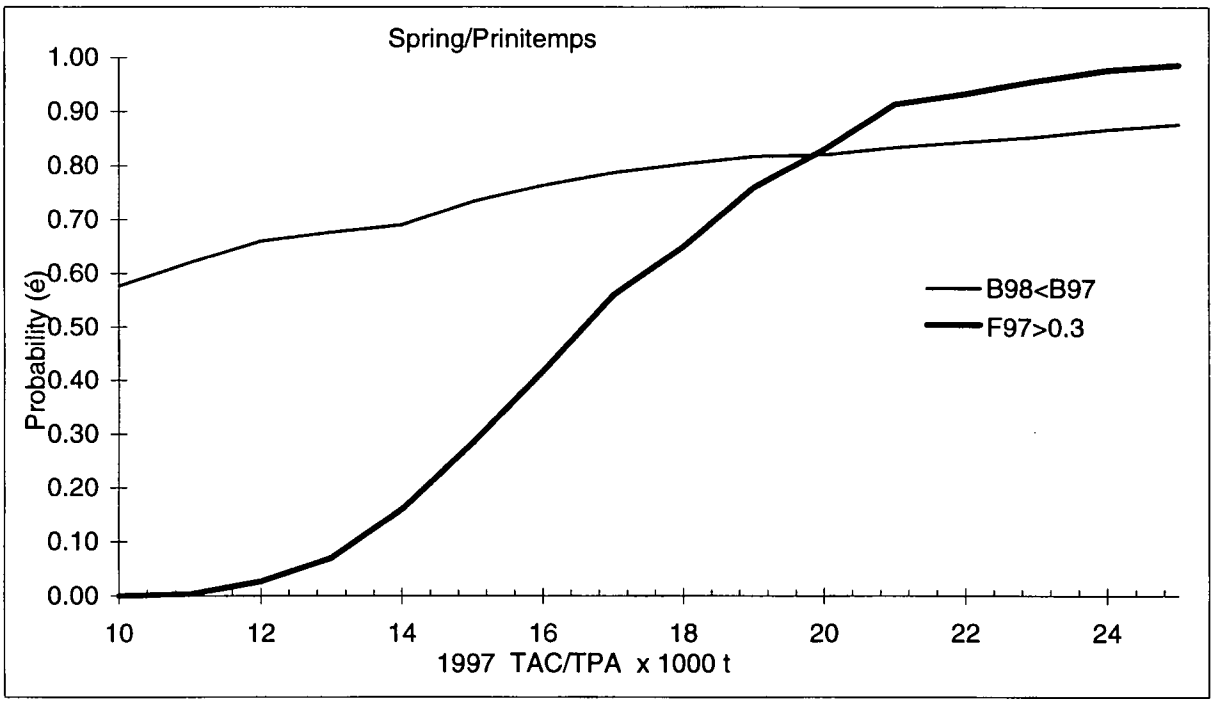


Fig. 50. Spring spawning stock biomass, 4+, compared to numbers of recruits to fishery as age 4 numbers.



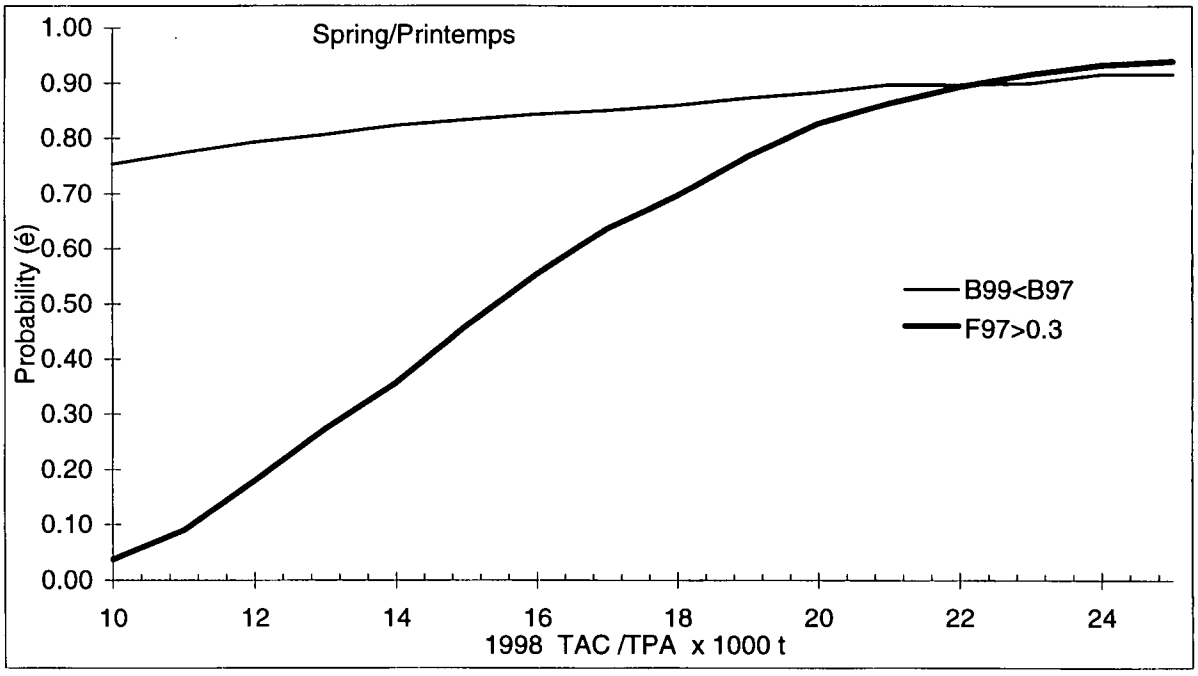


Fig. 51. Risk analysis for spring spawners 1998 and 1999.

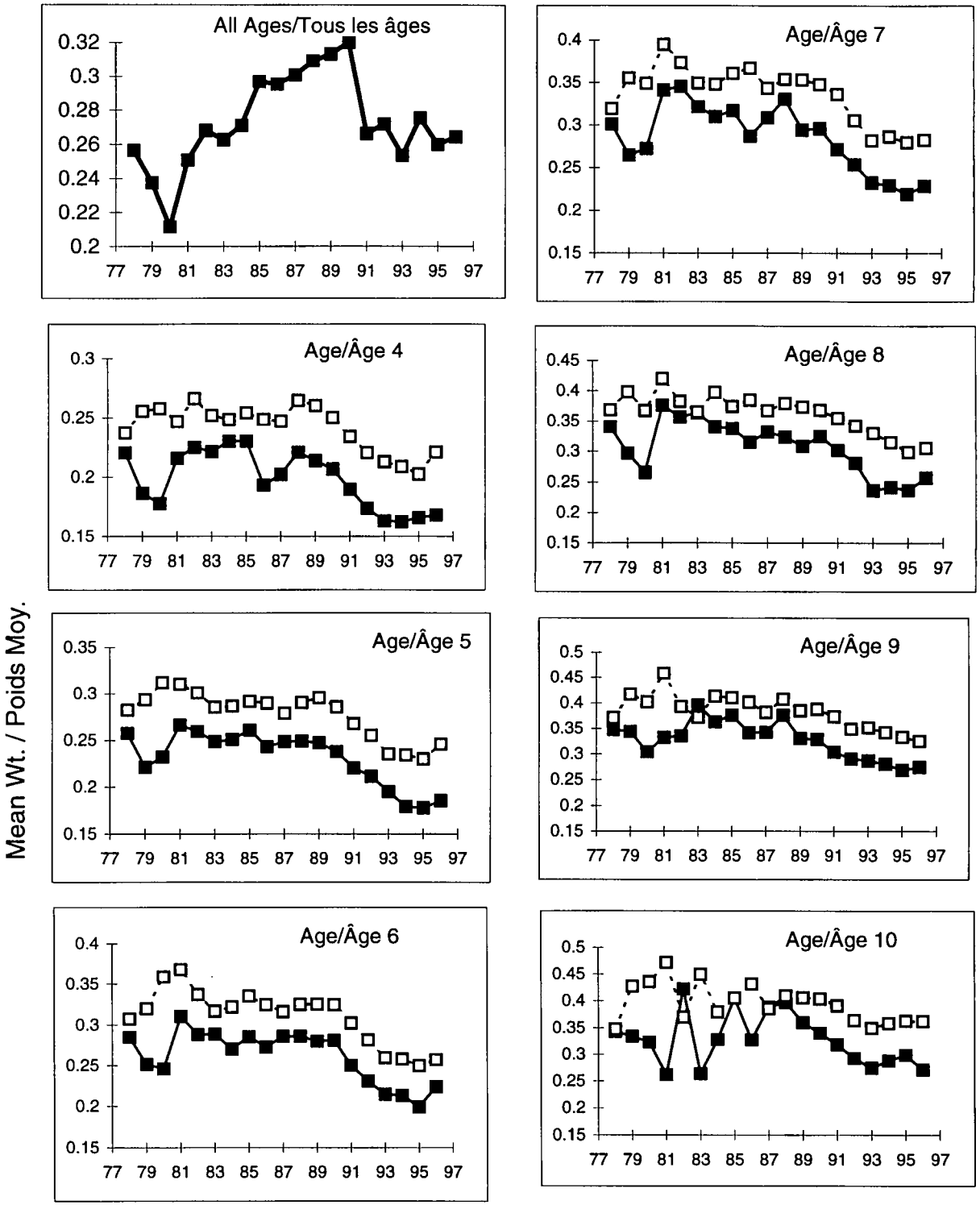


Fig. 52. Fall Spawners mean weight-at-age for all gears and for fixed and mobile gears,ages 4-10. Dotted line is fixed gear and solid line is mobile gear. Weight is in kilograms.

Fig. 52. Poids moyen selon l'âge des géniteurs d'automne pour tous les types d'engins et pour les engins fixes et mobiles, âges 4-10. La ligne pointillée représente les engins fixes et la ligne continue représente les engins mobiles. Le poids est en kilogrammes.

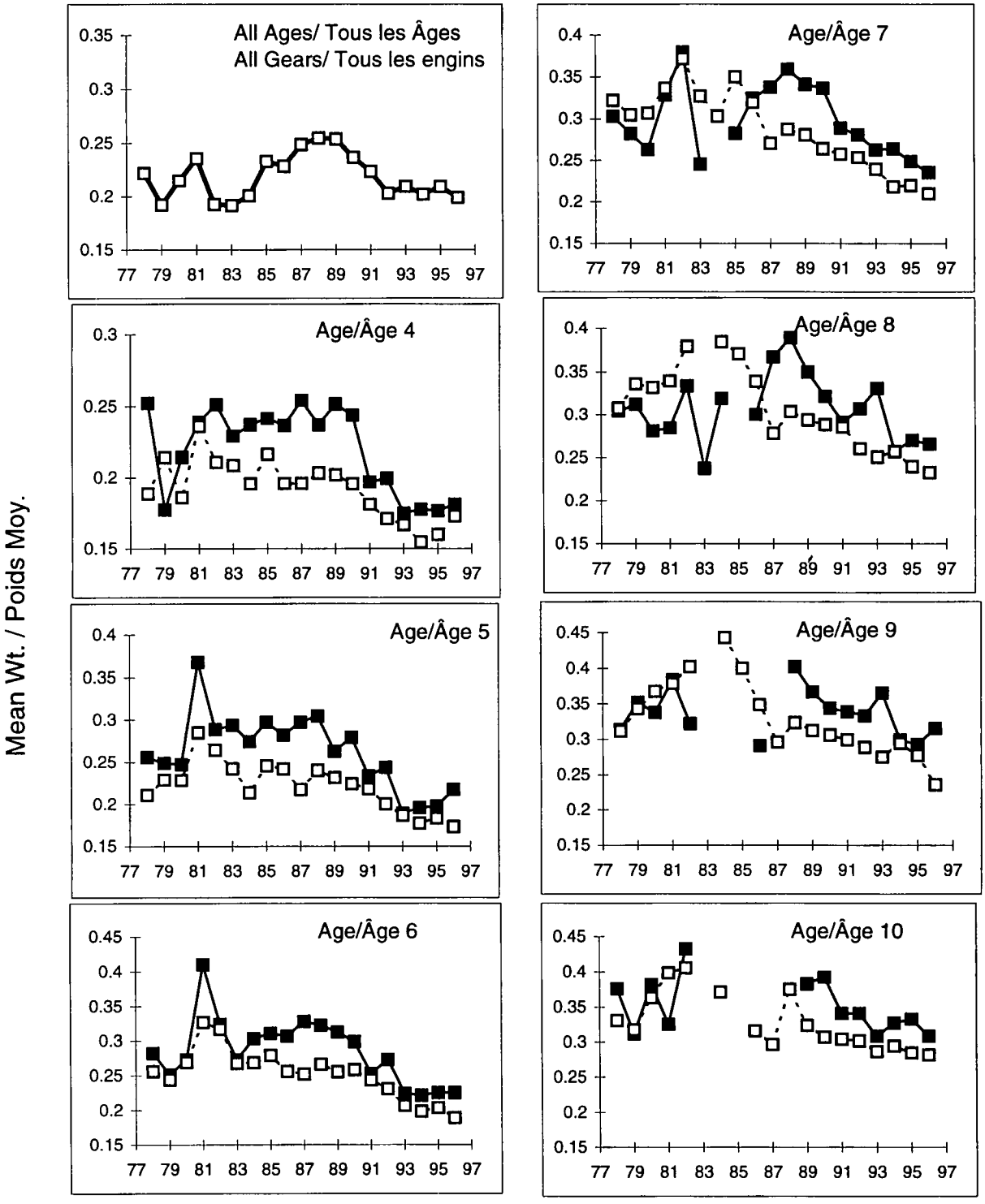


Fig. 53. Spring Spawners mean weight-at-age for all gears and for fixed and mobile gears, ages 4-10. Dotted line is fixed gear and solid line is mobile gear. Weight is in kilograms.

Fig. 53. Poids moyen selon l'âge des géniteurs de printemps pour tous les types d'engins et pour les engins fixes et mobiles, âges 4-10. La ligne pointillée représente les engins fixes et la ligne continue représente les engins mobiles. Le poids est en kilogrammes.

Appendix Table of Contents

Table 1. Catch-at-age for 4T herring fall spawners, including those caught by purse seines in 4Vn, 1978-1996. Numbers are in thousands of fish.
Tableau 1. Prises selon l'âge pour les géniteurs d'automne dans 4T, y compris ceux capturés à la senne coulissante dans 4Vn, 19781996. En milliers de poissons.

FIXED GEAR - FALL SPAWNERS 4TVn
ENGINS FIXES - GÉNITEURS D'AUTOMNE 4TVn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	904	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	82	8	64	322	0	0	0	0	253	15	0	0	19	0	52	0	0	0	0
3	3592	474	7965	5753	2154	720	963	1117	1627	8010	1165	294	3706	158	325	78	0	53	9
4	5548	9986	5224	24124	14985	20231	24882	8816	32871	38205	20432	14113	22572	39459	12879	2440	9158	3483	19846
5	3484	5132	6097	6313	16883	9570	13445	24441	16497	30249	41943	22056	19815	10235	54288	29704	12264	38155	19745
6	816	2924	994	2477	4922	13180	8306	14860	34428	20712	20253	29673	28214	7309	12201	36482	48412	14500	45273
7	745	865	1733	1027	2523	2168	5978	9498	19251	36337	13240	14057	54225	10784	7345	6034	69790	47315	10111
8	3911	1065	373	597	1050	1632	1335	4495	8212	15518	14266	7133	17002	13296	8943	3168	12224	42105	23761
9	117	879	232	258	371	486	456	1212	4666	9382	6953	9021	9163	4840	9347	3661	9658	7986	24446
10	157	278	304	239	117	124	200	727	341	4563	2738	3324	9958	2409	4554	1949	9640	5643	5291
11+	1903	545	96	102	62	160	91	159	692	1878	1623	2593	5404	4538	6705	2785	14115	14055	11126
	20355	23060	23082	41212	43067	48271	55656	65325	118838	164869	122613	102264	170079	93028	116639	86301	185262	173295	159607

MOBILE GEAR - FALL SPAWNERS 4TVn
ENGINS MOBILES - GÉNITEURS D'AUTOMNE 4TVn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	240	140	0	0	0	0	0	5	20	77	0	0	0	0	0	0	0	0
2	1464	8555	2970	455	2088	1479	1031	1080	761	863	4283	752	43	0	61	47	15	14	311
3	22001	15905	39638	5059	8169	7995	3883	4024	3507	2526	3483	1399	4123	6448	565	2066	310	2977	2670
4	29044	21322	17650	11260	5597	8339	6727	8223	7400	5754	4028	4592	5475	22717	5682	2810	9164	4524	13885
5	24187	16923	12979	1315	3891	4192	5704	8085	8729	4032	6081	6959	7433	6142	15818	6033	3398	26780	5129
6	4902	16786	7906	699	681	1629	2387	5824	8079	9035	5667	7497	3402	1939	4258	10570	7957	8576	11130
7	4947	4734	8118	317	268	400	941	2540	8102	8593	9403	4483	5003	1947	2909	3667	11043	9877	4413
8	10893	3702	6168	297	135	95	163	1826	3828	6883	8227	7390	2404	1964	1753	2738	2485	10657	3108
9	1898	5277	4233	503	149	108	91	731	1352	2326	4500	4737	4434	1788	1724	2002	1433	1924	2091
10	1017	1249	2259	116	38	30	14	449	510	364	1417	2407	3534	995	1708	3571	1389	1415	1083
11+	11937	10464	1389	64	178	57	20	420	217	82	2441	1658	3330	2235	5417	5739	2951	2335	843
	112290	105157	103450	20085	21194	24324	20961	33202	42490	40478	49607	41874	39181	46175	39895	39243	40145	69077	44664

ALL GEARS - FALL SPAWNERS 4TVn
TOUS LES ENGINS - GÉNITEURS D'AUTOMNE 4TVn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	1144	143	0	0	0	0	0	5	20	77	0	0	0	0	0	0	0	0
2	1546	8563	3085	777	2088	1478	1031	1080	1014	879	4283	752	63	0	113	48	15	14	311
3	25594	16379	48009	10813	10324	8715	4847	5141	5134	10536	4649	1693	7830	6605	890	2145	309	3030	2679
4	34592	31309	23000	35384	20582	28585	31610	17039	40271	43959	24460	18705	28047	62176	18561	5251	18322	8006	33730
5	27672	22055	19127	7629	20775	13764	19149	32527	25225	34280	48025	29015	27248	16378	70106	35736	15662	64935	24874
6	5718	19709	8926	3175	5603	14811	10693	20685	42507	29747	25921	37170	31616	9248	16459	47052	56369	23076	56404
7	5692	5598	9984	1344	2792	2568	6919	12037	27353	44930	22644	18540	59229	12730	10254	9698	80833	57192	14524
8	14803	4766	6656	894	1186	1727	1498	6321	12040	22400	22494	14523	19406	15260	10696	5906	14710	52762	26869
9	2015	6156	4524	762	520	594	547	1943	6017	11708	11454	13758	13597	6627	11071	5663	11091	9910	26538
10	1174	1527	2595	355	155	154	214	1175	852	4926	4155	5731	13492	3404	6262	5519	11029	7058	6374
11+	13840	10409	1499	167	241	217	111	579	909	1960	4063	4251	8734	6773	12122	8524	17067	16390	11969
	132646	127615	127548	61300	64266	72613	76619	98527	161327	205345	172225	144138	209261	139202	156534	125542	225408	242372	204272

Table 2. Weight-at-age (kg) for 4T herring fall spawners, including those caught by purse seines in 4Vn, 1978-1996.
Tableau 2. Poids selon l'âge (kg) pour les g"eniteurs d'automne dan 4T, y compris ceus captur"es à l'aide de sennes coulissantes dans 4Vn, 1978-1996/

FIXED GEAR - FALL SPAWNERS 4TVn
ENGINS FIXES - GÉNITEURS D'AUTOMNE 4TVn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.079	0.107	0.212	0.129	0.000	0.000	0.000	0.000	0.179	0.133	0.000	0.000	0.268	0.000	0.066	0.000	0.000	0.000	0.000
3	0.134	0.202	0.207	0.205	0.222	0.191	0.236	0.257	0.196	0.235	0.231	0.226	0.210	0.196	0.142	0.160	0.000	0.125	0.000
4	0.237	0.255	0.258	0.247	0.266	0.252	0.248	0.254	0.249	0.247	0.265	0.260	0.250	0.234	0.220	0.213	0.209	0.202	0.221
5	0.282	0.293	0.312	0.310	0.301	0.285	0.286	0.292	0.290	0.279	0.290	0.296	0.286	0.268	0.255	0.235	0.234	0.230	0.245
6	0.307	0.320	0.359	0.368	0.337	0.317	0.322	0.335	0.325	0.316	0.325	0.326	0.325	0.303	0.282	0.260	0.258	0.250	0.257
7	0.319	0.355	0.349	0.395	0.374	0.349	0.348	0.361	0.367	0.343	0.354	0.353	0.348	0.336	0.305	0.282	0.287	0.280	0.283
8	0.369	0.398	0.367	0.420	0.383	0.365	0.397	0.374	0.385	0.367	0.379	0.373	0.368	0.355	0.342	0.330	0.315	0.299	0.305
9	0.371	0.417	0.402	0.459	0.393	0.372	0.413	0.410	0.401	0.382	0.407	0.385	0.388	0.373	0.349	0.352	0.343	0.334	0.326
10	0.348	0.427	0.435	0.472	0.370	0.450	0.379	0.406	0.432	0.386	0.410	0.406	0.404	0.392	0.364	0.350	0.359	0.363	0.363
11+	0.432	0.437	0.431	0.521	0.467	0.430	0.490	0.497	0.434	0.426	0.438	0.407	0.432	0.411	0.399	0.383	0.384	0.380	0.395
	0.277	0.285	0.272	0.267	0.296	0.286	0.285	0.316	0.312	0.307	0.320	0.327	0.331	0.292	0.284	0.264	0.288	0.283	0.284

MOBILE GEAR - FALL SPAWNERS 4TVn
ENGINS MOBILES - GÉNITEURS D'AUTOMNE 4TVn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.069	0.031	0.000	0.000	0.000	0.000	0.000	0.038	0.039	0.069	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.102	0.111	0.109	0.086	0.115	0.138	0.125	0.112	0.093	0.079	0.096	0.105	0.108	0.000	0.066	0.052	0.091	0.085	0.096
3	0.150	0.155	0.143	0.180	0.180	0.183	0.196	0.195	0.151	0.166	0.164	0.161	0.177	0.151	0.128	0.141	0.137	0.120	0.151
4	0.220	0.187	0.178	0.216	0.225	0.221	0.230	0.230	0.193	0.202	0.221	0.213	0.206	0.190	0.174	0.163	0.162	0.166	0.168
5	0.257	0.221	0.232	0.266	0.259	0.248	0.251	0.261	0.243	0.248	0.249	0.247	0.238	0.220	0.211	0.195	0.179	0.178	0.185
6	0.285	0.252	0.246	0.311	0.288	0.289	0.270	0.285	0.273	0.286	0.286	0.280	0.281	0.250	0.231	0.215	0.213	0.199	0.224
7	0.301	0.265	0.272	0.341	0.345	0.321	0.310	0.317	0.287	0.308	0.330	0.294	0.296	0.272	0.254	0.233	0.230	0.219	0.229
8	0.341	0.297	0.266	0.376	0.357	0.364	0.341	0.338	0.315	0.332	0.324	0.308	0.324	0.302	0.280	0.237	0.242	0.237	0.257
9	0.348	0.344	0.304	0.333	0.336	0.395	0.363	0.376	0.342	0.343	0.376	0.331	0.329	0.304	0.291	0.287	0.280	0.269	0.274
10	0.343	0.334	0.323	0.262	0.422	0.264	0.328	0.406	0.328	0.389	0.398	0.360	0.340	0.319	0.293	0.275	0.289	0.299	0.271
11+	0.392	0.382	0.386	0.262	0.436	0.432	0.409	0.435	0.411	0.431	0.410	0.377	0.353	0.354	0.333	0.314	0.322	0.335	0.305
	0.253	0.228	0.198	0.218	0.211	0.216	0.234	0.260	0.250	0.275	0.283	0.281	0.273	0.214	0.236	0.231	0.217	0.203	0.195

ALL GEARS - FALL SPAWNERS 4TVn
TOUS LES ENGINS - GÉNITEURS D'AUTOMNE 4TVn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.033	0.031	0.000	0.000	0.000	0.000	0.000	0.038	0.039	0.069	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.101	0.111	0.111	0.104	0.115	0.138	0.125	0.112	0.114	0.080	0.096	0.105	0.158	0.000	0.066	0.052	0.091	0.085	0.096
3	0.148	0.157	0.154	0.193	0.189	0.184	0.204	0.208	0.165	0.218	0.181	0.172	0.193	0.152	0.139	0.142	0.137	0.120	0.151
4	0.223	0.208	0.196	0.237	0.255	0.243	0.245	0.242	0.238	0.241	0.257	0.248	0.241	0.218	0.208	0.186	0.185	0.182	0.199
5	0.261	0.238	0.257	0.302	0.293	0.274	0.276	0.284	0.273	0.275	0.285	0.284	0.272	0.250	0.246	0.228	0.222	0.208	0.233
6	0.288	0.262	0.259	0.355	0.331	0.314	0.310	0.321	0.315	0.307	0.317	0.316	0.320	0.292	0.269	0.250	0.252	0.231	0.251
7	0.303	0.279	0.286	0.382	0.371	0.345	0.343	0.352	0.343	0.337	0.344	0.339	0.343	0.326	0.291	0.264	0.279	0.269	0.266
8	0.348	0.319	0.271	0.405	0.380	0.365	0.391	0.364	0.363	0.356	0.359	0.340	0.363	0.348	0.332	0.287	0.303	0.286	0.300
9	0.349	0.354	0.308	0.375	0.376	0.377	0.405	0.397	0.388	0.374	0.395	0.366	0.369	0.355	0.340	0.329	0.335	0.321	0.321
10	0.344	0.351	0.336	0.403	0.383	0.414	0.376	0.406	0.369	0.386	0.405	0.387	0.387	0.370	0.345	0.301	0.350	0.350	0.347
11+	0.398	0.384	0.388	0.421	0.444	0.430	0.475	0.452	0.428	0.426	0.421	0.395	0.402	0.393	0.369	0.336	0.373	0.373	0.389
	0.256	0.237	0.211	0.251	0.268	0.263	0.271	0.297	0.295	0.301	0.309	0.313	0.320	0.266	0.272	0.254	0.275	0.260	0.264

Table 3. Catch-at-age for 4T herring fall spawners, 1978-1996. Numbers are in thousands of fish.
Tableau 3. Prises selon l'âge pour les géniteurs d'automne dans 4T, 19781996. En milliers de poissons.

FIXED GEAR - FALL SPAWNERS 4T
ENGINS FIXES - GÉNITEURS D'AUTOMNE 4T

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	904	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	82	8	64	322	0	0	0	0	253	15	0	0	19	0	52	0	0	0	0
3	3592	474	7965	5753	2154	720	963	1117	1627	8010	1165	280	3706	158	325	78	0	53	9
4	5548	9986	5224	24124	14985	20231	24882	8816	32871	38205	20432	13451	22572	39459	12879	2440	9158	3483	19846
5	3484	5132	6097	6313	16883	9570	13445	24441	16497	30249	41943	21013	19815	10235	54288	29704	12264	38155	19745
6	816	2924	994	2477	4922	13180	8306	14860	34428	20712	20253	28252	28214	7309	12201	36482	48412	14500	45273
7	745	865	1733	1027	2523	2168	5978	9498	19251	36337	13240	13385	54225	10784	7345	6034	69790	47315	10111
8	3911	1065	373	597	1050	1632	1335	4495	8212	15518	14266	6804	17002	13296	8943	3168	12224	42105	23761
9	117	879	232	258	371	486	456	1212	4666	9382	6953	8600	9163	4840	9347	3661	9658	7986	24446
10	157	278	304	239	117	124	200	727	341	4563	2738	3165	9958	2409	4554	1949	9640	5643	5291
11+	1903	545	96	102	62	160	91	159	692	1878	1623	2468	5404	4538	6705	2785	14115	14055	11126
	20355	23060	23082	41212	43067	48271	55656	65325	118838	164869	122613	97418	170079	93028	116639	86301	185262	173295	159607

MOBILE GEAR - FALL SPAWNERS 4T
ENGINS MOBILES - GÉNITEURS D'AUTOMNE 4T

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	240	140	0	0	0	0	0	0	0	65	0	0	0	0	0	0	0	0
2	1422	2728	2342	78	200	127	34	253	157	47	3842	726	43	0	61	22	0	0	74
3	21438	13283	36773	4518	5022	3343	332	2037	974	913	2650	840	3426	4343	545	1907	30	2841	1336
4	27443	20666	15048	4460	2494	4688	2456	4303	2238	1616	2925	3184	3211	17311	4586	2354	7200	3973	5919
5	23095	16756	12091	622	2463	2078	2914	5103	6335	2619	2753	5829	5909	3595	12545	4219	2676	22406	2568
6	4060	16686	7251	108	322	1045	1612	4897	6704	8300	3273	5054	2989	1189	2831	6213	5531	7310	7821
7	4319	4410	7455	317	110	182	564	1950	6332	7553	8828	4023	2287	1091	1435	1980	7850	6033	2756
8	10527	3702	5532	91	95	45	97	1760	2861	6263	7493	6706	1762	698	763	1265	1501	7363	1932
9	1449	5277	3328	267	102	25	33	601	1107	2161	4154	4308	3577	479	345	408	738	957	1204
10	737	1249	1621	116	38	30	14	449	435	289	1234	2284	1848	456	725	2007	560	506	505
11+	11781	10464	896	64	121	19	1	372	210	60	2362	1366	297	536	1100	3152	1262	603	255
	106271	95461	92477	10641	10967	11582	8057	21725	27353	29821	39579	34320	25349	29698	24936	23527	27348	51991	24370

ALL GEARS - FALL SPAWNERS 4T
TOUS LES ENGINS - GÉNITEURS D'AUTOMNE 4T

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	1144	140	0	0	0	0	0	0	0	65	0	0	0	0	0	0	0	0
2	1504	2736	2406	400	200	127	34	253	410	62	3842	726	62	0	113	22	0	0	74
3	25030	13757	44738	10271	7176	4063	1295	3154	2601	8923	3815	1120	7132	4501	870	1985	30	2592	1344
4	32991	30652	20272	28584	17479	24919	27338	13119	35109	39821	23357	16635	25783	56770	17465	4794	16358	7359	25765
5	26579	21888	18188	6935	19346	11648	16359	29544	22832	32868	44696	26842	25724	13830	66833	33923	14940	60020	22313
6	4876	19610	8245	2585	5244	14225	9918	19757	41132	29012	23526	33306	31203	8498	15032	42695	53943	20582	53095
7	5064	5275	9188	1344	2633	2350	6542	11448	25583	43890	22068	17408	56512	11875	8780	8014	77640	52957	12867
8	14438	4767	5905	688	1145	1677	1432	6255	11073	21781	21759	13510	18764	13994	9706	4433	13725	48960	25693
9	1566	6156	3560	525	473	511	489	1813	5773	11543	11107	12908	12740	5319	9692	4069	10396	8926	25651
10	894	1527	1925	355	155	154	214	1176	776	4852	3972	5449	11806	2865	5279	3956	10200	6169	5795
11+	13684	11009	992	166	183	179	92	531	902	1938	3985	3834	5701	5074	7805	5937	15377	15063	11380
	126626	118521	115559	51853	54034	59853	63713	87050	146191	194690	162192	131738	195427	122726	141575	109828	212609	222628	183978

Table 4. Weight-at-age (kg) for 4T herring fall spawners, 1978-1996.
Tableau 4. Poids selon l'âge (kg) pour les g"eniteurs d'automne dan 4T, 1978-1996.

FIXED GEAR - FALL SPAWNERS 4T
ENGINS FIXES - GÉNITEURS D'AUTOMNE 4T

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.079	0.107	0.212	0.129	0.000	0.000	0.000	0.000	0.179	0.133	0.000	0.000	0.268	0.000	0.066	0.000	0.000	0.000	0.000
3	0.134	0.202	0.207	0.205	0.222	0.191	0.236	0.257	0.196	0.235	0.231	0.226	0.210	0.196	0.142	0.160	0.000	0.125	0.000
4	0.237	0.255	0.258	0.247	0.266	0.252	0.248	0.254	0.249	0.247	0.265	0.260	0.250	0.234	0.220	0.213	0.209	0.202	0.221
5	0.282	0.293	0.312	0.310	0.301	0.285	0.286	0.292	0.290	0.279	0.290	0.296	0.286	0.268	0.255	0.235	0.234	0.230	0.245
6	0.307	0.320	0.359	0.368	0.337	0.317	0.322	0.335	0.325	0.316	0.325	0.326	0.325	0.303	0.282	0.260	0.258	0.250	0.257
7	0.319	0.355	0.349	0.395	0.374	0.349	0.348	0.361	0.367	0.343	0.354	0.353	0.348	0.336	0.305	0.282	0.287	0.280	0.283
8	0.369	0.398	0.367	0.420	0.383	0.365	0.397	0.374	0.385	0.367	0.379	0.373	0.368	0.355	0.342	0.330	0.315	0.299	0.305
9	0.371	0.417	0.402	0.459	0.393	0.372	0.413	0.410	0.401	0.382	0.407	0.385	0.388	0.373	0.349	0.352	0.343	0.334	0.326
10	0.348	0.427	0.435	0.472	0.370	0.450	0.379	0.406	0.432	0.386	0.410	0.406	0.404	0.392	0.364	0.350	0.359	0.363	0.363
11+	0.432	0.437	0.431	0.521	0.467	0.430	0.490	0.497	0.434	0.426	0.438	0.407	0.432	0.411	0.399	0.383	0.384	0.380	0.395
	0.277	0.285	0.272	0.267	0.296	0.286	0.285	0.316	0.312	0.307	0.320	0.327	0.331	0.292	0.284	0.264	0.288	0.283	0.284

MOBILE GEAR - FALL SPAWNERS 4T
ENGINS MOBILES - GÉNITEURS D'AUTOMNE 4T

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.069	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.100	0.119	0.103	0.114	0.096	0.108	0.111	0.102	0.107	0.142	0.096	0.105	0.108	0.000	0.066	0.080	0.000	0.000	0.134
3	0.149	0.151	0.141	0.179	0.171	0.173	0.162	0.189	0.158	0.203	0.165	0.159	0.177	0.154	0.128	0.143	0.118	0.120	0.181
4	0.219	0.185	0.168	0.226	0.211	0.208	0.212	0.214	0.214	0.243	0.225	0.216	0.209	0.189	0.172	0.165	0.163	0.167	0.198
5	0.255	0.220	0.226	0.250	0.261	0.234	0.237	0.256	0.251	0.268	0.260	0.249	0.241	0.218	0.212	0.202	0.179	0.175	0.205
6	0.275	0.251	0.238	0.287	0.282	0.285	0.259	0.283	0.277	0.289	0.305	0.283	0.283	0.252	0.227	0.222	0.214	0.197	0.240
7	0.293	0.259	0.264	0.341	0.375	0.319	0.303	0.317	0.294	0.315	0.333	0.295	0.300	0.278	0.261	0.238	0.230	0.219	0.243
8	0.340	0.297	0.251	0.257	0.355	0.368	0.331	0.337	0.322	0.335	0.324	0.308	0.328	0.309	0.286	0.226	0.238	0.231	0.274
9	0.335	0.344	0.278	0.261	0.308	0.365	0.370	0.375	0.345	0.344	0.380	0.330	0.327	0.296	0.310	0.359	0.278	0.270	0.301
10	0.322	0.334	0.288	0.262	0.422	0.264	0.328	0.406	0.329	0.407	0.404	0.361	0.339	0.317	0.303	0.269	0.274	0.316	0.281
11+	0.391	0.382	0.359	0.262	0.444	0.458	0.424	0.437	0.410	0.445	0.411	0.384	0.415	0.354	0.345	0.317	0.320	0.323	0.266
	0.250	0.236	0.189	0.212	0.211	0.212	0.237	0.267	0.274	0.304	0.293	0.286	0.266	0.203	0.219	0.227	0.211	0.192	0.212

ALL GEARS - FALL SPAWNERS 4T
TOUS LES ENGINS - GÉNITEURS D'AUTOMNE 4T

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.033	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.099	0.119	0.106	0.126	0.096	0.108	0.111	0.102	0.151	0.140	0.096	0.105	0.157	0.000	0.066	0.080	0.000	0.000	0.134
3	0.147	0.153	0.153	0.193	0.186	0.177	0.217	0.213	0.182	0.232	0.185	0.175	0.194	0.156	0.133	0.144	0.118	0.120	0.180
4	0.222	0.208	0.191	0.244	0.258	0.244	0.245	0.241	0.246	0.247	0.260	0.252	0.245	0.220	0.208	0.189	0.188	0.183	0.216
5	0.259	0.238	0.255	0.305	0.296	0.276	0.278	0.286	0.279	0.278	0.288	0.285	0.275	0.255	0.247	0.231	0.224	0.209	0.241
6	0.280	0.262	0.252	0.365	0.334	0.315	0.312	0.322	0.317	0.309	0.322	0.319	0.321	0.295	0.272	0.254	0.254	0.232	0.255
7	0.297	0.275	0.280	0.382	0.374	0.347	0.344	0.354	0.349	0.339	0.345	0.340	0.346	0.331	0.298	0.271	0.281	0.273	0.274
8	0.348	0.319	0.259	0.398	0.380	0.365	0.393	0.364	0.369	0.358	0.360	0.341	0.365	0.352	0.338	0.300	0.307	0.289	0.303
9	0.338	0.354	0.286	0.358	0.374	0.372	0.410	0.399	0.391	0.375	0.397	0.366	0.371	0.368	0.348	0.353	0.338	0.327	0.324
10	0.326	0.351	0.311	0.403	0.383	0.413	0.376	0.406	0.374	0.387	0.408	0.387	0.394	0.380	0.356	0.309	0.354	0.359	0.356
11+	0.397	0.385	0.366	0.421	0.452	0.433	0.489	0.455	0.428	0.426	0.422	0.398	0.431	0.405	0.391	0.348	0.379	0.377	0.392
	0.254	0.246	0.206	0.255	0.279	0.272	0.279	0.304	0.305	0.307	0.313	0.316	0.322	0.270	0.272	0.256	0.278	0.262	0.274

Table 5. Catch-at-age for 4Tm,n,o herring fall spawners, 1978-1996. Numbers are in thousands of fish.
Tableau 5. Prises selon l'âge pour les géniteurs d'automne dans 4Tm,n,o, 19781996. En milliers de poissons.

FIXED GEAR - FALL SPAWNERS 4Tm,n,o
ENGINS FIXES - GÉNITEURS D'AUTOMNE 4Tm,n,o

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	51	316	0	0	0	0	0	15	0	0	12	0	0	0	0	0	0
3	174	206	6356	4154	1773	7514	465	477	612	6652	144	266	2734	129	69	78	0	53	0
4	3421	3386	2151	12990	6040	11226	7388	3916	10839	25007	13441	11894	14849	28509	6044	2000	6671	2955	12726
5	2392	1368	2004	2735	11775	3995	6306	8758	10233	14716	22754	19054	12627	7159	37239	21146	10589	21690	15703
6	495	1605	3186	608	1643	8854	3264	7914	21638	13854	7813	20563	19767	5343	11045	24660	31682	10721	20865
7	414	281	852	285	283	920	3030	5641	15446	19049	7549	9916	20067	7945	6149	3741	47512	25709	4518
8	2627	635	159	146	186	382	615	2712	6322	8677	6330	5192	7888	7622	7191	1968	9532	25449	9213
9	57	541	185	73	71	103	78	693	3936	4922	3328	6244	5163	2398	5853	1730	7100	4317	9579
10	77	194	100	49	28	67	73	273	207	2471	1755	2673	5779	1123	3145	522	3194	2473	1366
11+	1205	230	0	37	53	73	56	108	496	639	1176	2232	3603	2177	5106	784	5264	2915	1630
	10862	8446	15044	21393	21852	33134	21275	30492	69729	96002	64290	78034	92489	62406	81841	56629	121546	96283	75601

MOBILE GEAR - FALL SPAWNERS 4Tm,n,o
ENGINS MOBILES - GÉNITEURS D'AUTOMNE 4Tm,n,o

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	239	0	0	0	0	0	0	0	0	64	0	0	0	0	0	0	0	0
2	96	2533	0	3	199	6	32	253	134	47	3790	726	43	0	61	16	0	0	71
3	3914	9020	0	157	5005	148	315	2037	860	906	2614	840	3426	4343	545	1899	30	2449	1323
4	16052	6394	0	155	2486	206	2333	4303	2155	1604	2885	3184	3211	17311	4424	2292	6396	3918	4989
5	20196	4508	0	21	2455	91	2762	5103	6324	2600	2716	5829	5909	3595	12412	3873	2368	22149	1898
6	3517	7102	0	3	321	46	1531	4897	6699	8242	3229	5054	2989	1189	2685	6129	4658	7189	7062
7	3936	1651	0	11	110	8	536	1950	6331	7500	8709	4023	2287	1091	1336	1870	6359	5599	1967
8	9137	1373	0	3	95	2	92	1760	2858	6219	7392	6706	1762	698	727	1152	1163	6579	1483
9	1294	1931	0	9	102	1	31	601	1106	2146	4098	4308	3577	479	306	293	584	957	1091
10	225	329	0	4	38	1	13	449	435	287	1217	2284	1848	456	676	1800	433	389	352
11+	10609	3296	0	2	121	1	1	372	210	60	2330	1366	297	536	1084	2678	928	537	160
	68976	38376	0	368	10932	510	7646	21725	27112	29611	39044	34320	25349	29696	24256	22002	22919	49767	20396

ALL GEARS - FALL SPAWNERS 4Tm,n,o
TOUS LES ENGINS - GÉNITEURS D'AUTOMNE 4Tm,n,o

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	239	0	0	0	0	0	0	0	0	64	0	0	0	0	0	0	0	0
2	96	2533	51	319	199	6	32	253	134	62	3790	726	55	0	61	16	0	0	71
3	4088	9226	6356	4311	6778	7662	780	2514	1472	7558	2758	1106	6160	4472	614	1977	30	2502	1323
4	19473	9780	2151	13145	8526	11432	9721	8219	12994	26611	16326	15078	18060	45820	10468	4292	13067	6873	17715
5	22588	5876	2004	2756	14230	4086	9068	13861	16557	17316	25470	24883	18536	10754	49651	25019	12957	43840	17601
6	4012	8707	3186	611	1964	8900	4795	12811	28337	22096	11042	25617	22756	6532	13730	30789	36340	17910	27926
7	4350	1932	852	296	393	928	3566	7591	21777	26549	16258	13939	22354	9036	7485	5611	53871	31309	6486
8	11764	2008	159	149	281	384	707	4472	9180	14896	13722	11898	9650	8320	7918	3120	10695	32028	10696
9	1351	2472	185	82	173	104	109	1294	5042	7068	7426	10552	8740	2877	6159	2023	7684	5274	10670
10	302	523	100	53	66	68	86	722	642	2758	2972	4957	7627	1579	3821	2322	3627	2862	1719
11+	11814	3526	0	39	174	74	57	480	706	699	3506	3598	3900	2713	6190	3462	6192	3452	1790
	79838	46822	15044	21761	32784	33644	28921	52217	96841	125613	103334	112354	117838	92103	106097	78631	144463	146050	95997

Table 6. Weight-at-age (kg) for 4Tm,n,0 herring fall spawners, 1978-1996.
Tableau 6. Poids selon l'âge (kg) pour les g"eniteurs d'automne dan 4Tm,n,o, 1978-1996.

FIXED GEAR - FALL SPAWNERS 4Tm,n,o
ENGINS FIXES - GÉNITEURS D'AUTOMNE 4Tm,n,o

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.000
2	0	0	0.1766	0.1305	0	0	0	0	0	0.1328	0	0	0.1492	0	0	0	0	0	0.000
3	0.2026	0.2065	0.1838	0.2047	0.2239	0.1355	0.2425	0.2799	0.2214	0.2354	0.2113	0.2257	0.2165	0.1991	0.2267	0.1596	0	0.1247	0.000
4	0.2598	0.264	0.2374	0.2565	0.2692	0.2486	0.2581	0.2551	0.2631	0.2512	0.2611	0.2609	0.254	0.233	0.2285	0.2122	0.208	0.2004	0.221
5	0.2954	0.3081	0.2908	0.3091	0.3	0.287	0.2983	0.3051	0.2939	0.2869	0.287	0.2973	0.2891	0.2667	0.2576	0.2332	0.2328	0.2254	0.244
6	0.3349	0.3277	0.2618	0.3622	0.3408	0.3222	0.3407	0.3479	0.3304	0.3217	0.3178	0.3277	0.3245	0.3021	0.2826	0.261	0.2554	0.2468	0.258
7	0.3446	0.3738	0.3279	0.4279	0.3748	0.3567	0.3553	0.3664	0.37	0.3553	0.3486	0.3539	0.3492	0.3325	0.3095	0.2884	0.2844	0.2821	0.283
8	0.3773	0.3969	0.323	0.4634	0.4133	0.3939	0.3961	0.3795	0.3903	0.3804	0.3762	0.3716	0.3657	0.3527	0.3435	0.3348	0.3111	0.3018	0.304
9	0.4221	0.4114	0.3694	0.4586	0.4194	0.3993	0.4537	0.421	0.4031	0.3929	0.4069	0.3848	0.3828	0.3713	0.3535	0.3552	0.347	0.3324	0.328
10	0.392	0.428	0.436	0.5027	0.4208	0.4965	0.3612	0.4377	0.4511	0.4085	0.4123	0.4062	0.401	0.3832	0.3619	0.3265	0.352	0.3709	0.377
11+	0.4447	0.4363	0	0.5208	0.4782	0.4527	0.4895	0.5081	0.4562	0.4387	0.4333	0.4042	0.4331	0.4078	0.4035	0.3687	0.3983	0.3882	0.416
	0.3241	0.3134	0.2358	0.2597	0.2913	0.2533	0.3019	0.3319	0.3332	0.3106	0.3135	0.3254	0.3263	0.2841	0.2902	0.2581	0.2806	0.2758	0.270

MOBILE GEAR - FALL SPAWNERS 4Tm,n,o
ENGINS MOBILES - GÉNITEURS D'AUTOMNE 4Tm,n,o

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	0.0692	0	0	0	0	0	0	0	0	0.0753	0	0	0	0	0	0	0.0000	0.000
2	0.1957	0.1257	0	0.1154	0.096	0.1079	0.1109	0.1023	0.1053	0.1422	0.0959	0.1049	0.1081	0	0.0661	0.0849	0	0.0000	0.139
3	0.1954	0.1853	0	0.1789	0.1709	0.1734	0.1621	0.1886	0.1609	0.2033	0.1651	0.1585	0.1773	0.1541	0.1277	0.1432	0.118	0.1275	0.182
4	0.2322	0.2455	0	0.2256	0.2109	0.2079	0.2116	0.2142	0.2161	0.2427	0.225	0.2159	0.2088	0.1893	0.1733	0.1639	0.1644	0.1673	0.208
5	0.2567	0.2854	0	0.2498	0.2607	0.2345	0.2369	0.2556	0.2515	0.2683	0.2603	0.249	0.241	0.2178	0.2119	0.1961	0.1809	0.1755	0.220
6	0.278	0.2799	0	0.2863	0.2817	0.2854	0.2594	0.2829	0.2767	0.289	0.305	0.2832	0.2834	0.252	0.2245	0.2214	0.218	0.1968	0.245
7	0.2936	0.2691	0	0.3408	0.3748	0.3185	0.3032	0.317	0.2943	0.3148	0.3328	0.2946	0.3	0.2784	0.2584	0.2318	0.2284	0.2181	0.264
8	0.3413	0.2974	0	0.2547	0.3549	0.3675	0.3313	0.337	0.3224	0.3352	0.324	0.3082	0.3278	0.3093	0.2841	0.2116	0.2432	0.2315	0.289
9	0.34	0.3621	0	0.2603	0.3079	0.3648	0.3701	0.3754	0.3451	0.3435	0.38	0.3297	0.3273	0.2955	0.3089	0.3457	0.2851	0.2699	0.303
10	0.3268	0.3477	0	0.262	0.4223	0.2639	0.3278	0.4055	0.3288	0.4071	0.4042	0.3609	0.3388	0.3166	0.303	0.2539	0.2565	0.3078	0.290
11+	0.3942	0.4044	0	0.2566	0.4439	0.4579	0.4236	0.4365	0.4098	0.4446	0.4108	0.3838	0.415	0.3539	0.3443	0.2972	0.3173	0.3257	0.235
	0.2848	0.2567	0	0.2117	0.2109	0.2117	0.2366	0.2671	0.2751	0.3035	0.293	0.2856	0.2658	0.2028	0.2184	0.218	0.2097	0.1922	0.216

ALL GEARS - FALL SPAWNERS 4Tm,n,o
TOUS LES ENGINS - GÉNITEURS D'AUTOMNE 4Tm,n,o

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	0.0692	0	0	0	0	0	0	0	0	0.0753	0	0	0	0	0	0	0.0000	0.000
2	0.1957	0.1257	0.1766	0.1304	0.096	0.1079	0.1109	0.1023	0.1053	0.1399	0.0959	0.1049	0.1171	0	0.0661	0.0849	0	0.0000	0.139
3	0.1957	0.1858	0.1838	0.2038	0.1848	0.1362	0.21	0.2059	0.1861	0.2316	0.1675	0.1747	0.1947	0.1554	0.1388	0.1438	0.118	0.1275	0.182
4	0.237	0.2519	0.2374	0.2561	0.2522	0.2479	0.2469	0.2337	0.2553	0.2507	0.2547	0.2514	0.246	0.2165	0.2052	0.1864	0.1867	0.1815	0.217
5	0.2608	0.2907	0.2908	0.3086	0.2932	0.2858	0.2796	0.2869	0.2777	0.2841	0.2842	0.286	0.2738	0.2504	0.2462	0.2275	0.2233	0.2002	0.241
6	0.285	0.2887	0.2618	0.3618	0.3311	0.322	0.3147	0.3231	0.3177	0.3095	0.3141	0.3189	0.3191	0.293	0.2712	0.2531	0.2506	0.2267	0.255
7	0.2985	0.2843	0.3279	0.4247	0.3748	0.3564	0.3475	0.3537	0.348	0.3439	0.3401	0.3368	0.3442	0.326	0.3004	0.2695	0.2778	0.2707	0.277
8	0.3493	0.3289	0.323	0.4592	0.3936	0.3938	0.3877	0.3628	0.3692	0.3615	0.3481	0.3359	0.3588	0.3491	0.338	0.2893	0.3037	0.2874	0.302
9	0.3435	0.3729	0.3694	0.4368	0.3537	0.399	0.4299	0.3998	0.3904	0.3779	0.3921	0.3623	0.3601	0.3587	0.3513	0.3538	0.3423	0.3211	0.325
10	0.3434	0.3775	0.436	0.4845	0.4217	0.4931	0.3562	0.4177	0.3682	0.4084	0.409	0.3853	0.3859	0.364	0.3515	0.2702	0.3406	0.3623	0.360
11+	0.3994	0.4065	0	0.5073	0.4543	0.4528	0.4883	0.4526	0.4424	0.4392	0.4183	0.3965	0.4317	0.3972	0.3931	0.3134	0.3862	0.3785	0.400
	0.2901	0.2669	0.2358	0.2589	0.2645	0.2527	0.2846	0.3049	0.3169	0.3089	0.3057	0.3133	0.3133	0.2579	0.2738	0.2469	0.2694	0.2473	0.259

Table 7. Catch-at-age for 4TI herring fall spawners, 1978-1996. Numbers are in thousands of fish.
Tableau 7. Prises selon l'âge pour les géniteurs d'automne dans 4TI, 19781996. En milliers de poissons.

FIXED GEAR - FALL SPAWNERS 4TI
ENGINS FIXES - GÉNITEURS D'AUTOMNE 4TI

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	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
3	29	70	288	1650	30	235	100	68	39	204	723	17	201	17	0	0	0	0	0
4	628	2212	1342	4362	1689	3406	1602	467	733	1184	2701	759	1899	5946	5026	325	931	158	3650
5	520	1553	2103	1752	1475	1173	1755	1231	676	1669	2923	1348	1377	1386	9319	6654	1369	8512	2099
6	156	604	635	839	211	1373	789	1098	1455	335	2832	1326	1766	751	0	8626	7000	1993	12052
7	253	306	350	286	120	344	638	781	1050	2511	1092	646	2787	1637	595	1459	8657	10465	1042
8	1165	151	148	183	120	0	126	385	430	148	1159	332	630	1743	260	556	920	6617	3013
9	10	186	71	52	0	0	16	99	268	399	582	386	372	1208	122	362	269	1138	3284
10	81	35	54	118	0	0	15	39	14	204	29	172	363	517	215	504	437	494	860
11+	694	266	81	52	0	0	15	15	34	55	0	142	58	1210	237	681	707	2795	826
	3536	5383	5072	9294	3645	6531	5056	4183	4699	6709	12041	5128	9452	14414	15774	19167	20290	32172	26825

MOBILE GEAR - FALL SPAWNERS 4TI
ENGINS MOBILES - GÉNITEURS D'AUTOMNE 4TI

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	1	118	2	0	0	0	0	0	0	0	0	0	0	0	0
3	1665	231	284	24	17	3114	16	0	0	1	0	0	0	0	0	0	0	0	5
4	6494	1267	702	24	8	4368	122	0	0	2	0	0	0	0	0	0	0	0	249
5	1963	1917	744	3	8	1937	146	0	0	3	0	0	0	0	0	0	0	0	58
6	256	3262	661	1	1	974	81	0	0	8	0	0	0	0	0	0	0	0	132
7	0	863	115	2	0	170	28	0	0	7	0	0	0	0	0	0	0	0	68
8	727	851	70	0	0	42	5	0	0	6	0	0	0	0	0	0	0	0	60
9	0	2396	144	1	0	23	2	0	0	2	0	0	0	0	0	0	0	0	26
10	315	580	59	1	0	28	1	0	0	0	0	0	0	0	0	0	0	0	8
11+	92	5667	0	0	0	18	0	0	0	0	0	0	0	0	0	0	0	0	5
	11512	17034	2779	56	35	10792	403	0	0	29	0	0	0	0	0	0	0	0	610

ALL GEARS - FALL SPAWNERS 4TI
TOUS LES ENGINS - GÉNITEURS D'AUTOMNE 4TI

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	1	118	2	0	0	0	0	0	0	0	0	0	0	0	0
3	1694	301	572	1674	47	3349	116	68	39	205	723	17	201	17	0	0	0	0	5
4	7122	3479	2044	4386	1697	7774	1724	467	733	1186	2701	759	1899	5946	5026	325	931	158	3898
5	2483	3470	2847	1755	1483	3110	1901	1231	676	1672	2923	1348	1377	1386	9319	6654	1369	8512	2157
6	412	3866	1296	840	212	2347	870	1098	1455	343	2832	1326	1766	751	0	8626	7000	1993	12184
7	253	1169	465	288	120	514	666	781	1050	2518	1092	646	2787	1637	595	1459	8657	10465	1110
8	1892	1002	218	183	120	42	131	385	430	154	1159	332	630	1743	260	556	920	6617	3073
9	10	2582	215	53	0	23	18	99	268	401	582	386	372	1208	122	362	269	1138	3310
10	396	615	113	119	0	28	16	39	14	204	29	172	363	517	215	504	437	494	868
11+	786	5933	81	52	0	18	15	15	34	55	0	142	58	1210	237	681	707	2795	831
	15048	22417	7851	9350	3680	17323	5459	4183	4699	6738	12041	5128	9453	14415	15774	19167	20290	32172	27436

Table 8. Weight-at-age (kg) for 4TI herring fall spawners, 1978-1996.
Tableau 8. Poids selon l'âge (kg) pour les g"eniteurs d'automne dan 4TI, 1978-1996.

FIXED GEAR - FALL SPAWNERS 4TI
ENGINS FIXES - GÉNITEURS D'AUTOMNE 4TI

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.203	0.240	0.222	0.223	0.245	0.181	0.242	0.281	0.225	0.248	0.233	0.226	0.192	0.186	0.000	0.000	0.000	0.000	0.000
4	0.257	0.260	0.280	0.250	0.272	0.224	0.256	0.274	0.264	0.233	0.277	0.259	0.238	0.236	0.218	0.216	0.208	0.215	0.225
5	0.297	0.297	0.338	0.313	0.307	0.279	0.273	0.307	0.296	0.262	0.305	0.292	0.288	0.278	0.249	0.241	0.244	0.244	0.251
6	0.315	0.295	0.377	0.362	0.371	0.310	0.325	0.352	0.331	0.311	0.357	0.327	0.325	0.312	0.000	0.260	0.269	0.266	0.261
7	0.294	0.331	0.385	0.397	0.446	0.369	0.352	0.370	0.370	0.334	0.392	0.352	0.343	0.354	0.281	0.266	0.302	0.285	0.304
8	0.359	0.396	0.409	0.414	0.446	0.000	0.395	0.380	0.390	0.333	0.396	0.374	0.369	0.360	0.340	0.327	0.335	0.294	0.314
9	0.422	0.424	0.466	0.498	0.000	0.000	0.451	0.421	0.403	0.365	0.457	0.389	0.375	0.374	0.324	0.341	0.369	0.365	0.328
10	0.306	0.399	0.445	0.462	0.000	0.000	0.360	0.438	0.451	0.248	0.401	0.411	0.399	0.412	0.389	0.360	0.393	0.368	0.392
11+	0.411	0.433	0.443	0.542	0.000	0.000	0.495	0.508	0.456	0.406	0.000	0.405	0.415	0.416	0.398	0.385	0.428	0.382	0.434
	0.333	0.297	0.331	0.281	0.303	0.258	0.290	0.338	0.334	0.294	0.331	0.323	0.313	0.306	0.247	0.264	0.291	0.287	0.280

MOBILE GEAR - FALL SPAWNERS 4TI
ENGINS MOBILES - GÉNITEURS D'AUTOMNE 4TI

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.061	0.115	0.096	0.108	0.111	0.000	0.000	0.142	0.096	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.180	0.201	0.192	0.179	0.171	0.173	0.162	0.000	0.000	0.203	0.165	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.170
4	0.223	0.247	0.199	0.226	0.212	0.208	0.212	0.000	0.000	0.243	0.225	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.188
5	0.259	0.273	0.270	0.250	0.261	0.234	0.236	0.000	0.000	0.268	0.260	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.225
6	0.285	0.290	0.257	0.286	0.283	0.285	0.259	0.000	0.000	0.289	0.305	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.233
7	0.000	0.313	0.304	0.341	0.386	0.319	0.303	0.000	0.000	0.315	0.333	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.268
8	0.342	0.323	0.337	0.255	0.356	0.368	0.331	0.000	0.000	0.335	0.324	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.273
9	0.000	0.335	0.367	0.260	0.306	0.365	0.370	0.000	0.000	0.344	0.380	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.321
10	0.323	0.320	0.400	0.262	0.424	0.264	0.328	0.000	0.000	0.407	0.404	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.343
11+	0.398	0.370	0.392	0.257	0.446	0.458	0.424	0.000	0.000	0.445	0.411	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.486
	0.236	0.320	0.252	0.213	0.202	0.212	0.237	0.000	0.000	0.300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.229

ALL GEARS - FALL SPAWNERS 4TI
TOUS LES ENGINS - GÉNITEURS D'AUTOMNE 4TI

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.000	0.000	0.000	0.096	0.108	0.111	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.180	0.210	0.207	0.223	0.218	0.174	0.231	0.281	0.225	0.248	0.233	0.226	0.192	0.186	0.000	0.000	0.000	0.000	0.170
4	0.226	0.256	0.252	0.250	0.272	0.215	0.253	0.274	0.264	0.233	0.277	0.259	0.238	0.236	0.218	0.216	0.208	0.215	0.222
5	0.267	0.284	0.320	0.313	0.307	0.251	0.270	0.307	0.296	0.262	0.305	0.292	0.288	0.278	0.249	0.241	0.244	0.244	0.250
6	0.297	0.290	0.316	0.362	0.370	0.300	0.319	0.352	0.331	0.310	0.357	0.327	0.325	0.312	0.000	0.260	0.269	0.266	0.260
7	0.294	0.318	0.365	0.397	0.446	0.352	0.350	0.370	0.370	0.334	0.392	0.352	0.343	0.354	0.281	0.266	0.302	0.285	0.302
8	0.352	0.334	0.386	0.414	0.446	0.368	0.393	0.380	0.390	0.333	0.396	0.374	0.369	0.360	0.340	0.327	0.335	0.294	0.313
9	0.422	0.342	0.400	0.494	0.000	0.365	0.442	0.421	0.403	0.365	0.457	0.389	0.375	0.374	0.324	0.341	0.369	0.365	0.328
10	0.319	0.324	0.422	0.460	0.000	0.264	0.358	0.438	0.451	0.248	0.401	0.411	0.399	0.412	0.389	0.360	0.393	0.368	0.391
11+	0.410	0.373	0.443	0.542	0.000	0.458	0.495	0.508	0.456	0.406	0.000	0.405	0.415	0.416	0.398	0.385	0.428	0.382	0.434
	0.259	0.315	0.303	0.281	0.302	0.229	0.286	0.338	0.334	0.294	0.331	0.323	0.313	0.306	0.247	0.264	0.291	0.287	0.279

Table 9. Catch-at-age for 4Tf,g,h,j,k herring fall spawners, 1978-1996. Numbers are in thousands of fish.
Tableau 9. Prises selon l'âge pour les géniteurs d'automne dans 4Tf,g,h,j,k 19781996. En milliers de poissons.

FIXED GEAR - FALL SPAWNERS 4Tf,g,h,j,k
ENGINS FIXES - GÉNITEURS D'AUTOMNE 4Tf,g,h,j,k

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	904	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	82	8	38	6	0	0	0	0	253	0	0	0	0	0	0	0	0	0	0
3	3389	198	4534	595	352	394	399	572	976	1154	299	11	771	11	0	0	0	0	9
4	1500	4388	2296	6479	7256	7897	15893	4433	21298	12014	4291	1460	5824	5004	1297	115	1555	370	3470
5	573	2211	2363	1732	3633	4705	5384	14452	5587	13864	16267	1654	5812	1690	7469	1904	307	7953	1943
6	165	715	218	832	3068	2998	4253	5848	11335	6523	9609	7784	6681	1214	1106	3196	9730	1786	12357
7	78	278	821	395	2120	904	2310	3075	2755	14777	4599	3495	31371	1202	596	835	13621	11141	4550
8	118	279	136	267	744	1250	594	1398	1461	6693	6778	1609	8484	3932	1492	644	1772	10039	11535
9	51	153	96	133	299	384	362	420	462	4061	3043	2391	3629	1233	3372	1570	2288	2531	11584
10	0	48	151	72	89	57	112	415	120	1887	954	479	3816	769	1195	923	6009	2676	3064
11+	3	49	14	13	9	86	20	36	163	1184	447	219	1743	1152	1362	1319	8144	8345	8670
	5959	9231	10667	10524	17570	18675	29327	30649	44410	62157	46287	19102	68131	16208	17889	10506	43426	44840	57181

MOBILE GEAR - FALL SPAWNERS 4Tf,g,h,j,k
ENGINS MOBILES - GÉNITEURS D'AUTOMNE 4Tf,g,h,j,k

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	1	140	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2	1326	195	2342	75	0	3	0	0	23	0	52	0	0	0	0	6	0	0	3
3	15859	4032	36489	4337	0	81	1	0	114	6	36	0	0	0	0	8	0	391	7
4	4897	13005	14346	4281	0	114	1	0	83	10	40	0	0	0	162	62	804	55	681
5	936	10331	11347	598	0	50	6	0	11	16	37	0	0	0	133	346	308	256	613
6	287	6322	6590	104	0	25	0	0	5	50	44	0	0	0	146	84	873	121	628
7	383	1896	7340	304	0	4	0	0	1	46	119	0	0	0	99	110	1491	434	720
8	663	1478	5462	88	0	1	0	0	3	38	101	0	0	0	36	113	338	784	390
9	155	950	3184	257	0	1	0	0	1	13	56	0	0	0	39	115	154	0	87
10	197	340	1562	111	0	1	0	0	0	2	17	0	0	0	49	207	127	117	145
11+	1080	1501	896	62	0	0	0	0	0	0	32	0	0	0	16	474	334	66	90
	25783	40051	89698	10217	0	280	8	0	241	181	535	0	0	0	680	1525	4429	2224	3364

ALL GEARS - FALL SPAWNERS 4Tf,g,h,j,k
TOUS LES ENGINS - GÉNITEURS D'AUTOMNE 4Tf,g,h,j,k

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	905	140	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2	1408	203	2380	81	0	3	0	0	276	0	52	0	0	0	0	6	0	0	3
3	19248	4230	41023	4932	352	475	400	572	1090	1160	335	11	771	11	0	8	0	391	16
4	6397	17393	16642	10760	7256	8011	15894	4433	21381	12024	4331	1460	5824	5004	1459	177	2359	425	4151
5	1509	12542	13710	2330	3633	4755	5390	14452	5598	13880	16304	1654	5812	1690	7602	2250	615	8209	2555
6	452	7037	6808	936	3068	3023	4253	5848	11340	6573	9653	7784	6681	1214	1252	3280	10603	1907	12985
7	461	2174	8161	699	2120	908	2310	3075	2756	14823	4718	3495	31371	1202	695	945	15112	11575	5271
8	781	1757	5598	355	744	1251	594	1398	1464	6731	6879	1609	8484	3932	1528	757	2110	10823	11925
9	206	1103	3280	390	299	385	362	420	463	4074	3099	2391	3629	1233	3411	1685	2442	2531	11670
10	197	388	1713	183	89	58	112	415	120	1889	971	479	3816	769	1244	1130	6136	2792	3208
11+	1083	1550	910	75	9	86	20	36	163	1184	479	219	1743	1152	1378	1793	8478	8411	8759
	31742	49282	100365	20741	17570	18955	29335	30649	44651	62338	46822	19102	68131	16207	18569	12031	47855	47064	60544

Table 10. Weight-at-age (kg) for 4Tf,g,h,j,k herring fall spawners, 1978-1996.
Tableau 10. Poids selon l'âge (kg) pour les g"eniteurs d'automne dan 4T f,g,h,j,k, 1978-1996.

FIXED GEAR - FALL SPAWNERS 4Tf,g,h,j,k
ENGINS FIXES - GÉNITEURS D'AUTOMNE 4Tf,g,h,j,k

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.079	0.107	0.212	0.035	0.000	0.000	0.000	0.000	0.179	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3	0.130	0.183	0.206	0.195	0.210	0.000	0.227	0.236	0.179	0.228	0.234	0.233	0.193	0.174	0.000	0.000	0.000	0.000	0.000
4	0.177	0.246	0.250	0.226	0.262	0.194	0.243	0.251	0.241	0.240	0.267	0.255	0.243	0.236	0.220	0.214	0.211	0.212	0.217
5	0.214	0.282	0.298	0.325	0.300	0.251	0.277	0.282	0.281	0.273	0.292	0.278	0.277	0.262	0.253	0.232	0.227	0.226	0.251
6	0.218	0.324	0.324	0.383	0.333	0.283	0.307	0.315	0.313	0.305	0.322	0.319	0.325	0.298	0.279	0.251	0.260	0.252	0.254
7	0.267	0.364	0.340	0.380	0.370	0.304	0.337	0.349	0.350	0.330	0.353	0.352	0.347	0.334	0.289	0.284	0.285	0.270	0.278
8	0.277	0.402	0.339	0.400	0.365	0.334	0.399	0.362	0.360	0.351	0.380	0.378	0.371	0.356	0.337	0.318	0.326	0.295	0.305
9	0.305	0.429	0.374	0.443	0.386	0.356	0.402	0.390	0.385	0.370	0.398	0.384	0.396	0.376	0.342	0.351	0.326	0.321	0.323
10	0.000	0.446	0.432	0.467	0.354	0.395	0.394	0.381	0.396	0.370	0.405	0.404	0.408	0.391	0.365	0.357	0.360	0.356	0.348
11+	0.409	0.457	0.364	0.435	0.400	0.410	0.486	0.458	0.361	0.420	0.451	0.431	0.430	0.414	0.381	0.390	0.370	0.376	0.388
	0.158	0.251	0.255	0.268	0.301	0.238	0.272	0.297	0.276	0.303	0.325	0.333	0.340	0.310	0.295	0.296	0.307	0.294	0.303

MOBILE GEAR - FALL SPAWNERS 4Tf,g,h,j,k
ENGINS MOBILES - GÉNITEURS D'AUTOMNE 4Tf,g,h,j,k

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.069	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.093	0.033	0.103	0.114	0.000	0.108	0.000	0.000	0.114	0.142	0.096	0.000	0.000	0.000	0.000	0.066	0.000	0.000	0.032
3	0.135	0.073	0.141	0.179	0.000	0.173	0.131	0.000	0.138	0.203	0.165	0.000	0.000	0.000	0.000	0.138	0.000	0.072	0.076
4	0.168	0.150	0.167	0.226	0.000	0.208	0.167	0.000	0.169	0.243	0.225	0.000	0.000	0.000	0.148	0.205	0.150	0.113	0.124
5	0.215	0.182	0.224	0.250	0.000	0.235	0.195	0.000	0.193	0.268	0.260	0.000	0.000	0.000	0.208	0.269	0.166	0.147	0.159
6	0.228	0.200	0.236	0.287	0.000	0.285	0.250	0.000	0.245	0.289	0.305	0.000	0.000	0.000	0.272	0.285	0.190	0.199	0.187
7	0.286	0.225	0.263	0.341	0.000	0.319	0.281	0.000	0.276	0.315	0.333	0.000	0.000	0.000	0.292	0.334	0.234	0.229	0.181
8	0.314	0.280	0.250	0.257	0.000	0.368	0.000	0.000	0.289	0.335	0.324	0.000	0.000	0.000	0.326	0.375	0.222	0.230	0.219
9	0.295	0.329	0.274	0.261	0.000	0.365	0.396	0.000	0.276	0.344	0.380	0.000	0.000	0.000	0.322	0.392	0.251	0.000	0.270
10	0.315	0.346	0.283	0.262	0.000	0.264	0.000	0.000	0.000	0.407	0.404	0.000	0.000	0.000	0.302	0.401	0.335	0.342	0.257
11+	0.364	0.381	0.359	0.263	0.000	0.458	0.000	0.000	0.000	0.445	0.411	0.000	0.000	0.000	0.382	0.427	0.327	0.300	0.309
	0.162	0.181	0.187	0.212	0.000	0.211	0.183	0.000	0.154	0.303	0.293	0.000	0.000	0.000	0.243	0.355	0.215	0.196	0.180

ALL GEARS - FALL SPAWNERS 4Tf,g,h,j,k
TOUS LES ENGINS - GÉNITEURS D'AUTOMNE 4Tf,g,h,j,k

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.023	0.031	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.075	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.092	0.036	0.105	0.109	0.000	0.108	0.000	0.000	0.174	0.000	0.096	0.000	0.000	0.000	0.000	0.066	0.000	0.000	0.032
3	0.134	0.078	0.148	0.181	0.210	0.030	0.227	0.236	0.174	0.228	0.227	0.233	0.193	0.174	0.000	0.138	0.000	0.072	0.035
4	0.170	0.174	0.178	0.226	0.262	0.195	0.243	0.251	0.240	0.240	0.267	0.255	0.243	0.236	0.212	0.211	0.190	0.199	0.201
5	0.214	0.200	0.236	0.306	0.300	0.251	0.277	0.282	0.281	0.273	0.292	0.278	0.277	0.262	0.252	0.238	0.196	0.223	0.229
6	0.224	0.212	0.239	0.373	0.333	0.283	0.307	0.315	0.313	0.305	0.322	0.319	0.325	0.298	0.279	0.252	0.254	0.248	0.250
7	0.282	0.243	0.271	0.363	0.370	0.304	0.337	0.349	0.350	0.330	0.353	0.352	0.347	0.334	0.289	0.290	0.280	0.268	0.265
8	0.309	0.300	0.252	0.365	0.365	0.334	0.399	0.362	0.360	0.351	0.379	0.378	0.371	0.356	0.337	0.327	0.309	0.290	0.302
9	0.297	0.343	0.276	0.323	0.386	0.356	0.402	0.390	0.385	0.370	0.398	0.384	0.396	0.376	0.342	0.354	0.321	0.321	0.322
10	0.315	0.359	0.296	0.343	0.354	0.392	0.394	0.381	0.396	0.370	0.405	0.404	0.408	0.391	0.363	0.365	0.360	0.355	0.344
11+	0.364	0.384	0.359	0.292	0.400	0.410	0.486	0.458	0.361	0.420	0.448	0.431	0.430	0.414	0.381	0.400	0.369	0.375	0.387
	0.161	0.194	0.194	0.240	0.301	0.238	0.272	0.297	0.275	0.303	0.325	0.333	0.340	0.310	0.293	0.303	0.298	0.290	0.296

Table 11. Catch-at-age for 4Vn herring fall spawners, 1978-1996. Numbers are in thousands of fish.
Tableau 11. Prises selon l'âge pour les géniteurs d'automne dans 4Vn, 19781996. En milliers de poissons.

FALL SPAWNERS 4Vn
GÉNITEURS D'AUTOMNE 4Vn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	0	0	0	0	0	0	0	5	20	12	0	0	0	0	0	0	0	0
2	42	5827	628	377	1888	1352	997	827	604	816	441	26	0	0	0	25	15	14	237
3	563	2622	2865	541	3147	4652	3551	1987	2533	1613	833	559	697	2105	20	159	280	137	1335
4	1601	656	2602	6800	3103	3651	4271	3920	5162	4138	1103	1408	2264	5406	1096	456	1964	551	7966
5	1092	167	888	693	1428	2114	2790	2982	2394	1413	3328	1130	1524	2547	3273	1814	722	4374	2560
6	842	100	655	591	359	584	775	927	1375	735	2394	2443	413	750	1427	4357	2426	1266	3309
7	628	324	663	0	158	218	377	590	1770	1040	575	460	2716	856	1474	1687	3193	3844	1657
8	366	0	636	206	40	50	66	66	967	620	734	684	642	1266	990	1473	984	3294	1176
9	449	0	905	236	47	83	58	130	245	165	346	429	857	1309	1379	1594	695	967	887
10	280	0	638	0	0	0	0	0	75	75	183	123	1686	539	983	1564	829	909	579
11+	156	0	493	0	57	38	19	48	7	22	79	292	3033	1699	4317	2587	1689	1732	589
	6019	9696	10973	9444	10227	12742	12904	11477	15137	10657	10028	7554	13833	16478	14959	15716	12798	17086	20294

Table 12. Weight-at-age (kg) for 4Vn herring fall spawners, 1978-1996.
Tableau 12. Poids selon l'âge (kg) pour les g"eniteurs d'automne dan 4Vn, 1978-1996.

FALL SPAWNERS 4Vn
GÉNITEURS D'AUTOMNE 4Vn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.038	0.039	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.193	0.107	0.130	0.080	0.118	0.141	0.126	0.114	0.089	0.075	0.096	0.120	0.000	0.000	0.000	0.028	0.091	0.085	0.085
3	0.183	0.176	0.165	0.190	0.195	0.190	0.199	0.201	0.148	0.145	0.159	0.164	0.173	0.144	0.132	0.118	0.139	0.128	0.122
4	0.247	0.226	0.233	0.209	0.236	0.238	0.241	0.247	0.184	0.186	0.209	0.208	0.203	0.192	0.180	0.153	0.161	0.161	0.146
5	0.304	0.274	0.304	0.281	0.257	0.262	0.266	0.269	0.220	0.211	0.240	0.236	0.224	0.223	0.209	0.178	0.180	0.192	0.165
6	0.332	0.298	0.337	0.315	0.294	0.296	0.293	0.298	0.254	0.254	0.261	0.274	0.265	0.248	0.238	0.204	0.212	0.213	0.186
7	0.356	0.346	0.366	0.000	0.325	0.324	0.319	0.317	0.260	0.261	0.294	0.291	0.292	0.263	0.247	0.227	0.230	0.220	0.206
8	0.374	0.000	0.392	0.428	0.361	0.360	0.354	0.351	0.293	0.297	0.319	0.310	0.315	0.297	0.276	0.246	0.247	0.249	0.228
9	0.388	0.000	0.400	0.414	0.396	0.405	0.359	0.379	0.328	0.330	0.333	0.341	0.336	0.307	0.286	0.269	0.282	0.267	0.238
10	0.399	0.000	0.414	0.000	0.000	0.000	0.000	0.000	0.320	0.318	0.352	0.337	0.342	0.321	0.285	0.283	0.299	0.290	0.263
11+	0.429	0.000	0.435	0.000	0.421	0.419	0.408	0.421	0.446	0.392	0.370	0.348	0.347	0.354	0.330	0.311	0.324	0.339	0.322
	0.305	0.146	0.272	0.225	0.210	0.220	0.233	0.246	0.205	0.196	0.243	0.259	0.285	0.235	0.264	0.237	0.232	0.234	0.175

Table 13. Catch-at-age for 4TVn herring spring spawners, 1978-1996. Numbers are in thousands of fish.
Tableau 13. Prises selon l'âge pour les géniteurs de printemps dans 4TVn, 19781996. En milliers de poissons.

FIXED GEAR - SPRING SPAWNERS 4TVn
ENGINS FIXES - GÉNITEURS DE PRINTEMPS 4TVn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	425	0	14	10	0	0	0	0	0	59	0	0	0	53	0	0	0	0
2	14	198	169	394	162	248	84	330	10	271	501	0	104	65	619	6	0	0	0
3	5644	6922	10538	13093	23717	16174	4538	6009	3593	1684	4012	4093	2897	6293	2725	280	1817	331	320
4	25469	3140	6746	8353	4509	25937	13994	15844	18110	8051	8626	16434	14297	12101	30568	6477	5278	12469	1511
5	1255	17307	2632	2688	1066	2097	8044	14353	12735	22119	11447	6223	10323	14809	11750	37705	26443	11120	46691
6	1831	641	8501	1818	493	460	376	5198	11482	11213	15722	6114	3415	9180	7680	17143	47296	16846	8154
7	1391	1242	1824	3363	323	102	58	1304	2932	8669	9255	7153	3074	3488	3497	6448	9030	24526	13512
8	259	274	942	486	337	0	49	696	444	3676	7012	4491	4865	3201	1745	2676	4437	4948	9769
9	447	136	851	454	123	0	4	61	32	516	1651	2635	2609	4764	1888	1954	1198	2003	3399
10	1375	302	462	195	91	0	5	0	130	331	89	901	1000	2261	1888	1614	1225	1029	989
11+	1496	1454	699	961	571	0	0	1	205	162	530	283	265	1138	1738	2023	1599	2088	1598
	39181	32041	33364	31819	31402	45018	27152	43796	49673	56692	58904	48327	42849	57299	64151	76326	98325	75482	85943

MOBILE GEAR - SPRING SPAWNERS 4TVn
ENGINS MOBILES - GÉNITEURS DE PRINTEMPS 4TVn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	1479	12367	965	595	1525	302	522	826	167	73	2447	332	38	0	61	17	0	0	0
2	15379	14047	10852	4683	3790	4120	1850	1963	2362	409	4987	396	3463	1372	862	741	39	995	272
3	5909	16513	13124	3136	2821	5201	1989	2619	5218	1224	1515	1650	3521	4682	2742	597	3085	1235	3273
4	16315	12113	12773	137	715	1519	1480	2090	5536	1966	1005	2100	2574	2481	4719	1968	2269	10147	2018
5	2673	12527	5335	443	372	462	815	998	3132	4683	1362	856	2079	1378	2328	3520	5807	4633	10131
6	4929	3627	6435	101	6	1	20	511	2634	3889	4768	2317	1165	771	1754	2620	8184	5268	3908
7	5128	1772	3526	229	4	16	0	58	719	3148	2874	4075	715	674	374	1265	2015	7577	2695
8	1303	1672	1783	389	19	36	15	0	495	1225	2411	1768	1925	1355	329	764	1886	1724	1837
9	1328	411	1280	1	67	0	0	113	194	0	1617	1413	1034	336	453	1283	641	504	297
10	1107	145	295	252	1	0	0	0	0	0	0	428	425	364	342	1360	326	932	562
11+	5628	1450	340	3	8	0	0	145	45	37	570	23	178	344	250	1621	811	1237	357
	61178	76644	56708	9969	9328	11657	6691	9323	20502	16654	23556	15358	17115	13757	14214	15756	25063	34252	25349

ALL GEARS - SPRING SPAWNERS 4TVn
TOUS LES ENGINS - GÉNITEURS DE PRINTEMPS 4TVn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	1479	12792	965	609	1535	302	522	826	167	73	2506	332	38	0	114	17	0	0	0
2	15393	14245	11021	5077	3952	4368	1934	2293	2372	680	5488	396	3567	1437	1481	747	39	995	272
3	11553	23435	23662	16229	26538	21375	6527	8628	8811	2908	5527	5743	6418	10975	5467	877	4902	1566	3593
4	41784	15253	19519	8490	5224	27456	15474	17934	23646	10017	9631	18534	16871	14582	35287	8445	7547	22616	3529
5	3928	29834	7967	3131	1438	2559	8859	15351	15867	26802	12809	7079	12402	16187	14078	41225	32250	15753	56822
6	6760	4268	14936	1919	499	461	396	5709	14116	15102	20490	8431	4580	9951	9434	19763	55480	22114	12061
7	6519	3014	5350	3592	327	118	58	1362	3651	11817	12129	11228	3789	4162	3871	7713	11045	32102	16207
8	1562	1946	2725	875	356	36	64	696	939	4901	9423	6259	6790	4556	2074	3440	6323	6672	11606
9	1775	547	2131	455	190	0	4	174	226	516	3268	4048	3643	5100	2341	3237	1839	2507	3696
10	2482	447	757	447	92	0	5	0	130	331	89	1329	1425	2625	2230	2974	1551	1960	1551
11+	7124	2904	1039	964	579	0	0	146	250	199	1100	306	441	1482	1988	3644	2410	3325	1955
	100359	108685	90072	41788	40730	56675	33843	53119	70175	73346	82460	63685	59964	71057	78365	92082	123386	109734	111292

Table 14. Weight-at-age (kg) for 4TVn herring spring spawners, 1978-1996.
Tableau 14. Poids selon l'âge (kg) pour les géniteurs de printemps dan 4TVn, 1978-1996.

FIXED GEAR - SPRING SPAWNERS 4TVn
ENGINS FIXES - GÉNITEURS DE PRINTEMPS 4TVn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.020	0.000	0.101	0.037	0.000	0.000	0.000	0.000	0.000	0.038	0.000	0.000	0.000	0.050	0.000	0.000	0.000	0.000
2	0.142	0.161	0.182	0.140	0.195	0.172	0.093	0.213	0.107	0.151	0.080	0.000	0.150	0.148	0.111	0.124	0.000	0.000	0.000
3	0.148	0.170	0.167	0.183	0.175	0.155	0.176	0.184	0.160	0.188	0.161	0.166	0.160	0.145	0.142	0.141	0.149	0.124	0.137
4	0.189	0.214	0.186	0.236	0.211	0.208	0.196	0.216	0.196	0.196	0.203	0.202	0.196	0.181	0.171	0.167	0.155	0.160	0.173
5	0.211	0.229	0.228	0.285	0.264	0.242	0.214	0.246	0.242	0.218	0.240	0.232	0.224	0.218	0.200	0.186	0.177	0.183	0.173
6	0.256	0.244	0.269	0.327	0.317	0.268	0.268	0.279	0.256	0.252	0.266	0.255	0.258	0.244	0.231	0.207	0.199	0.204	0.189
7	0.322	0.305	0.307	0.336	0.372	0.327	0.303	0.350	0.319	0.271	0.288	0.281	0.264	0.258	0.254	0.240	0.218	0.220	0.210
8	0.308	0.336	0.332	0.339	0.379	0.000	0.384	0.371	0.339	0.278	0.304	0.294	0.289	0.286	0.260	0.251	0.257	0.240	0.233
9	0.311	0.343	0.368	0.379	0.403	0.000	0.443	0.400	0.349	0.296	0.323	0.312	0.306	0.299	0.289	0.275	0.294	0.277	0.236
10	0.331	0.317	0.363	0.399	0.406	0.000	0.371	0.000	0.316	0.296	0.375	0.324	0.307	0.304	0.302	0.286	0.294	0.285	0.282
11+	0.367	0.353	0.373	0.408	0.446	0.000	0.000	0.491	0.418	0.391	0.337	0.298	0.331	0.321	0.320	0.295	0.321	0.319	0.304
	0.205	0.223	0.226	0.243	0.196	0.192	0.199	0.235	0.229	0.234	0.253	0.239	0.231	0.225	0.200	0.203	0.198	0.207	0.193

MOBILE GEAR - SPRING SPAWNERS 4TVn
ENGINS MOBILES - GÉNITEURS DE PRINTEMPS 4TVn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.079	0.097	0.107	0.106	0.100	0.118	0.099	0.089	0.065	0.057	0.081	0.088	0.079	0.000	0.051	0.059	0.000	0.000	0.070
2	0.131	0.152	0.153	0.179	0.161	0.164	0.168	0.163	0.129	0.152	0.113	0.172	0.172	0.142	0.119	0.116	0.146	0.089	0.113
3	0.182	0.148	0.162	0.223	0.219	0.195	0.218	0.217	0.168	0.170	0.174	0.213	0.199	0.177	0.147	0.137	0.151	0.131	0.159
4	0.252	0.177	0.214	0.239	0.251	0.229	0.237	0.242	0.237	0.254	0.237	0.252	0.244	0.197	0.200	0.175	0.178	0.176	0.181
5	0.256	0.249	0.247	0.368	0.289	0.293	0.274	0.297	0.282	0.297	0.304	0.263	0.279	0.234	0.244	0.189	0.196	0.198	0.217
6	0.282	0.251	0.273	0.410	0.324	0.273	0.303	0.311	0.307	0.328	0.323	0.313	0.299	0.253	0.273	0.224	0.222	0.225	0.226
7	0.303	0.282	0.263	0.329	0.380	0.246	0.000	0.282	0.324	0.338	0.359	0.341	0.337	0.289	0.281	0.263	0.264	0.249	0.236
8	0.304	0.312	0.281	0.285	0.334	0.238	0.319	0.000	0.300	0.367	0.389	0.350	0.321	0.291	0.307	0.331	0.257	0.270	0.266
9	0.314	0.353	0.338	0.384	0.322	0.000	0.000	0.588	0.291	0.000	0.402	0.367	0.344	0.339	0.333	0.366	0.299	0.293	0.315
10	0.376	0.312	0.382	0.325	0.433	0.000	0.000	0.000	0.000	0.000	0.000	0.383	0.393	0.341	0.341	0.308	0.327	0.333	0.309
11+	0.362	0.392	0.359	0.408	0.447	0.000	0.000	0.347	0.393	0.533	0.428	0.384	0.329	0.351	0.373	0.325	0.333	0.307	0.342
	0.232	0.179	0.208	0.212	0.182	0.190	0.206	0.220	0.227	0.299	0.258	0.301	0.251	0.216	0.216	0.239	0.216	0.214	0.218

ALL GEARS - SPRING SPAWNERS 4TVn
TOUS LES ENGINS - GÉNITEURS DE PRINTEMPS 4TVn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.079	0.094	0.107	0.106	0.099	0.118	0.099	0.089	0.065	0.057	0.080	0.088	0.079	0.000	0.051	0.059	0.000	0.000	0.070
2	0.131	0.152	0.154	0.176	0.162	0.164	0.165	0.170	0.129	0.152	0.110	0.172	0.172	0.142	0.116	0.116	0.146	0.089	0.113
3	0.165	0.155	0.164	0.191	0.179	0.165	0.189	0.194	0.165	0.181	0.164	0.179	0.181	0.159	0.145	0.138	0.151	0.130	0.157
4	0.214	0.185	0.204	0.236	0.216	0.210	0.200	0.219	0.205	0.207	0.207	0.208	0.203	0.184	0.175	0.169	0.162	0.167	0.178
5	0.241	0.237	0.241	0.297	0.270	0.252	0.219	0.249	0.250	0.231	0.247	0.235	0.233	0.220	0.208	0.187	0.181	0.187	0.181
6	0.275	0.250	0.271	0.331	0.317	0.268	0.270	0.282	0.266	0.272	0.279	0.271	0.269	0.244	0.239	0.209	0.202	0.209	0.201
7	0.307	0.291	0.278	0.336	0.372	0.316	0.303	0.347	0.320	0.288	0.304	0.303	0.278	0.263	0.256	0.243	0.227	0.227	0.214
8	0.305	0.316	0.299	0.315	0.377	0.238	0.369	0.371	0.319	0.300	0.326	0.310	0.298	0.287	0.268	0.268	0.257	0.248	0.238
9	0.313	0.350	0.350	0.379	0.374	0.000	0.443	0.522	0.299	0.296	0.362	0.332	0.317	0.302	0.297	0.311	0.296	0.280	0.242
10	0.351	0.316	0.370	0.357	0.406	0.000	0.371	0.000	0.316	0.296	0.375	0.343	0.333	0.309	0.308	0.296	0.301	0.308	0.291
11+	0.363	0.372	0.369	0.408	0.446	0.000	0.000	0.348	0.414	0.418	0.384	0.304	0.330	0.328	0.327	0.309	0.325	0.315	0.311
	0.222	0.192	0.215	0.235	0.193	0.191	0.201	0.233	0.228	0.249	0.255	0.254	0.236	0.223	0.203	0.209	0.202	0.209	0.199

Table 15. Catch-at-age for 4T herring spring spawners, 1978-1996. Numbers are in thousands of fish.
Tableau 15. Prises selon l'âge pour les géniteurs de printemps dans 4T 1978-1996. En milliers de poissons.

FIXED GEAR - SPRING SPAWNERS 4T
ENGINS FIXES - GÉNITEURS DE PRINTEMPS 4T

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	425	0	14	10	0	0	0	0	0	59	0	0	0	53	0	0	0	0
2	14	198	169	394	162	248	84	330	10	271	501	0	104	65	619	6	0	0	0
3	5644	6922	10538	13093	23717	16174	4538	6009	3593	1684	4012	4093	2897	6293	2725	280	1817	331	320
4	25469	3140	6746	8353	4509	25937	13994	15844	18110	8051	8626	16434	14297	12101	30568	6477	5278	12469	1511
5	1255	17307	2632	2688	1066	2097	8044	14353	12735	22119	11447	6223	10323	14809	11750	37705	26443	11120	46691
6	1831	641	8501	1818	493	460	376	5198	11482	11213	15722	6114	3415	9180	7680	17143	47296	16846	8154
7	1391	1242	1824	3363	323	102	58	1304	2932	8669	9255	7153	3074	3488	3497	6448	9030	24526	13512
8	259	274	942	486	337	0	49	696	444	3676	7012	4491	4865	3201	1745	2676	4437	4948	9769
9	447	136	851	454	123	0	4	61	32	516	1651	2635	2609	4764	1888	1954	1198	2003	3399
10	1375	302	462	195	91	0	5	0	130	331	89	901	1000	2261	1888	1614	1225	1029	989
11+	1496	1454	699	961	571	0	0	1	205	162	530	283	265	1138	1738	2023	1599	2088	1598
	39181	32041	33364	31819	31402	45018	27152	43796	49673	56692	58904	48327	42849	57299	64151	76326	98325	75482	85943

MOBILE GEAR - SPRING SPAWNERS 4T
ENGINS MOBILES - GÉNITEURS DE PRINTEMPS 4T

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	1421	6688	616	0	0	0	0	211	50	0	2447	332	30	0	61	1	0	0	0
2	14570	9040	8238	1854	716	737	91	1010	1433	183	4773	396	3245	1205	834	698	4	959	199
3	4931	16130	12223	1303	827	3640	287	1490	1154	397	1383	1545	2969	4574	2731	570	2611	1223	2722
4	15957	12113	12630	137	48	993	844	1454	4070	1525	860	1920	1966	1491	4645	1917	2082	9858	1809
5	2343	12527	5218	5	10	173	444	580	3132	4683	1235	757	1378	1089	2146	3344	5669	4529	8689
6	4474	3329	6158	101	6	1	20	511	2369	3825	4768	2098	832	637	1181	2355	7976	5155	2976
7	5128	1772	3526	229	4	16	0	58	719	3148	2815	4075	497	293	374	1115	1832	7435	2616
8	1189	1672	1740	389	19	36	15	0	82	1158	2382	1659	1890	198	329	644	1833	1697	1810
9	1314	411	1263	1	67	0	0	113	194	0	1617	1413	987	150	453	1283	558	500	201
10	1107	145	295	252	1	0	0	0	0	0	0	428	326	178	342	1360	326	924	558
11+	5596	1450	285	3	8	0	0	145	45	37	570	23	176	150	102	1621	811	1217	293
	58030	65277	52192	4274	1706	5596	1701	5572	13248	14956	22850	14646	14296	9965	13198	14908	23702	33497	21872

ALL GEARS - SPRING SPAWNERS 4T
TOUS LES ENGINS - GÉNITEURS DE PRINTEMPS 4T

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	1421	7113	616	14	10	0	0	211	50	0	2506	332	30	0	114	1	0	0	0
2	14584	9238	8407	2248	878	985	175	1340	1443	454	5274	396	3349	1270	1453	704	4	1695	199
3	10575	23052	22761	14396	24544	19814	4825	7499	4747	2081	5395	5638	5866	10867	5456	850	4428	1445	3042
4	41426	15253	19376	8490	4557	26930	14838	17298	22180	9576	9486	18354	16263	13592	35213	8394	7360	26478	3320
5	3598	29834	7850	2693	1076	2270	8488	14933	15867	26802	12682	6980	11701	15898	13896	41049	32112	15847	55380
6	6305	3970	14659	1919	499	461	396	5709	13851	15038	20490	8212	4247	9817	8861	19498	55272	22022	11129
7	6519	3014	5350	3592	327	118	58	1362	3651	11817	12070	11228	3571	3781	3871	7563	10862	31250	16128
8	1448	1946	2682	875	356	36	64	696	526	4834	9394	6150	6755	3399	2074	3320	6270	6533	11579
9	1761	547	2114	455	190	0	4	174	226	516	3268	4048	3596	4914	2341	3237	1756	2549	3600
10	2482	447	757	447	92	0	5	0	130	331	89	1329	1326	2439	2230	2974	1551	1843	1547
11+	7092	2904	984	964	579	0	0	146	250	199	1100	306	441	1288	1840	3644	2410	3345	1891
	97211	97318	85556	36093	33108	50614	28853	49368	62921	71648	81754	62973	57145	67265	77349	91234	122025	108979	107815

Table 16. Weight-at-age (kg) for 4T herring spring spawners, 1978-1996.
Tableau 16. Poids selon l'âge (kg) pour les géniteurs de printemps dan 4T, 1978-1996.

FIXED GEAR - SPRING SPAWNERS 4T
ENGINS FIXES - GÉNITEURS DE PRINTEMPS 4T

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.020	0.000	0.101	0.037	0.000	0.000	0.000	0.000	0.000	0.038	0.000	0.000	0.000	0.050	0.000	0.000	0.000	0.000
2	0.142	0.161	0.182	0.140	0.195	0.172	0.093	0.213	0.107	0.151	0.080	0.000	0.150	0.148	0.111	0.124	0.000	0.000	0.000
3	0.148	0.170	0.167	0.183	0.175	0.155	0.176	0.184	0.160	0.188	0.161	0.166	0.160	0.145	0.142	0.141	0.149	0.124	0.137
4	0.189	0.214	0.186	0.236	0.211	0.208	0.196	0.216	0.196	0.196	0.203	0.202	0.196	0.181	0.171	0.167	0.155	0.160	0.173
5	0.211	0.229	0.228	0.285	0.264	0.242	0.214	0.246	0.242	0.218	0.240	0.232	0.224	0.218	0.200	0.186	0.177	0.183	0.173
6	0.256	0.244	0.269	0.327	0.317	0.268	0.268	0.279	0.256	0.252	0.266	0.255	0.258	0.244	0.231	0.207	0.199	0.204	0.189
7	0.322	0.305	0.307	0.336	0.372	0.327	0.303	0.350	0.319	0.271	0.288	0.281	0.264	0.258	0.254	0.240	0.218	0.220	0.210
8	0.308	0.336	0.332	0.339	0.379	0.000	0.384	0.371	0.339	0.278	0.304	0.294	0.289	0.286	0.260	0.251	0.257	0.240	0.233
9	0.311	0.343	0.368	0.379	0.403	0.000	0.443	0.400	0.349	0.296	0.323	0.312	0.306	0.299	0.289	0.275	0.294	0.277	0.236
10	0.331	0.317	0.363	0.399	0.406	0.000	0.371	0.000	0.316	0.296	0.375	0.324	0.307	0.304	0.302	0.286	0.294	0.285	0.282
11+	0.367	0.353	0.373	0.408	0.446	0.000	0.000	0.491	0.418	0.391	0.337	0.298	0.331	0.321	0.320	0.295	0.321	0.319	0.304
	0.205	0.223	0.226	0.243	0.196	0.192	0.199	0.235	0.229	0.234	0.253	0.239	0.231	0.225	0.200	0.203	0.198	0.207	0.193

MOBILE GEAR - SPRING SPAWNERS 4T
ENGINS MOBILES - GÉNITEURS DE PRINTEMPS 4T

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.079	0.097	0.105	0.000	0.000	0.000	0.000	0.086	0.087	0.000	0.081	0.088	0.079	0.000	0.051	0.061	0.000	0.000	0.000
2	0.128	0.151	0.153	0.175	0.140	0.143	0.139	0.158	0.135	0.189	0.113	0.172	0.173	0.148	0.118	0.117	0.097	0.088	0.117
3	0.173	0.148	0.158	0.214	0.213	0.184	0.187	0.203	0.210	0.196	0.173	0.218	0.196	0.178	0.147	0.136	0.152	0.131	0.164
4	0.251	0.177	0.213	0.239	0.244	0.216	0.222	0.232	0.253	0.273	0.243	0.259	0.244	0.208	0.199	0.174	0.176	0.176	0.181
5	0.246	0.249	0.246	0.270	0.274	0.281	0.253	0.286	0.282	0.297	0.311	0.269	0.279	0.235	0.244	0.187	0.196	0.198	0.217
6	0.273	0.241	0.268	0.410	0.324	0.273	0.303	0.311	0.316	0.330	0.323	0.317	0.306	0.255	0.263	0.219	0.222	0.226	0.225
7	0.303	0.282	0.263	0.329	0.380	0.246	0.000	0.282	0.324	0.338	0.360	0.341	0.344	0.320	0.281	0.258	0.261	0.249	0.235
8	0.298	0.312	0.279	0.285	0.334	0.238	0.319	0.000	0.339	0.371	0.389	0.354	0.322	0.341	0.307	0.329	0.257	0.271	0.265
9	0.312	0.353	0.336	0.384	0.322	0.000	0.000	0.588	0.291	0.000	0.402	0.367	0.343	0.345	0.333	0.366	0.299	0.293	0.318
10	0.376	0.312	0.382	0.325	0.433	0.000	0.000	0.000	0.000	0.000	0.000	0.383	0.408	0.348	0.341	0.308	0.327	0.333	0.309
11+	0.361	0.392	0.343	0.408	0.447	0.000	0.000	0.347	0.393	0.533	0.428	0.384	0.329	0.380	0.346	0.325	0.333	0.307	0.347
	0.231	0.188	0.209	0.222	0.191	0.188	0.221	0.229	0.259	0.314	0.260	0.305	0.250	0.206	0.210	0.238	0.217	0.214	0.219

ALL GEARS - SPRING SPAWNERS 4T
TOUS LES ENGINS - GÉNITEURS DE PRINTEMPS 4T

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.079	0.092	0.105	0.101	0.037	0.000	0.000	0.086	0.087	0.000	0.080	0.088	0.079	0.000	0.051	0.061	0.000	0.000	0.000
2	0.128	0.151	0.153	0.169	0.150	0.151	0.117	0.172	0.135	0.167	0.110	0.172	0.173	0.148	0.115	0.117	0.097	0.088	0.117
3	0.159	0.154	0.162	0.186	0.176	0.161	0.177	0.188	0.172	0.190	0.164	0.180	0.178	0.159	0.145	0.137	0.151	0.130	0.161
4	0.213	0.185	0.204	0.236	0.211	0.209	0.197	0.217	0.206	0.208	0.207	0.208	0.202	0.184	0.175	0.168	0.161	0.167	0.177
5	0.234	0.237	0.240	0.285	0.264	0.245	0.216	0.247	0.250	0.231	0.247	0.236	0.231	0.219	0.207	0.186	0.181	0.187	0.180
6	0.268	0.242	0.269	0.331	0.317	0.268	0.270	0.282	0.266	0.272	0.279	0.271	0.268	0.244	0.235	0.208	0.202	0.209	0.199
7	0.307	0.291	0.278	0.336	0.372	0.316	0.303	0.347	0.320	0.288	0.305	0.303	0.275	0.262	0.256	0.242	0.226	0.227	0.214
8	0.300	0.316	0.297	0.315	0.377	0.238	0.369	0.371	0.339	0.300	0.325	0.310	0.298	0.289	0.268	0.266	0.257	0.248	0.238
9	0.312	0.350	0.349	0.379	0.374	0.000	0.443	0.522	0.299	0.296	0.362	0.332	0.316	0.301	0.297	0.311	0.296	0.280	0.241
10	0.351	0.316	0.370	0.357	0.406	0.000	0.371	0.000	0.316	0.296	0.375	0.343	0.332	0.307	0.308	0.296	0.301	0.308	0.291
11+	0.363	0.372	0.364	0.408	0.446	0.000	0.000	0.348	0.414	0.418	0.384	0.304	0.330	0.328	0.321	0.309	0.325	0.315	0.310
	0.221	0.199	0.216	0.240	0.196	0.191	0.200	0.235	0.235	0.251	0.255	0.254	0.236	0.222	0.202	0.209	0.202	0.209	0.198

Table 17. Catch-at-age for 4Tm,n,o herring spring spawners, 1978-1996. Numbers are in thousands of fish.
Tableau 17. Prises selon l'âge pour les géniteurs de printemps dans 4Tm,n,o, 1978-1996. En milliers de poissons.

FIXED GEAR - SPRING SPAWNERS 4Tm,n,o
ENGINS FIXES - GÉNITEURS DE PRINTEMPS 4Tm,n,o

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	10	99	91	132	6	3	6	10	118	17	0	97	65	0	6	0	0	0
3	1147	1297	3329	1594	3708	7724	832	2044	1088	1014	741	852	366	441	72	40	2	297	61
4	4839	509	589	920	2157	2824	1478	4244	5113	2983	3650	1866	1864	1545	2522	1028	29	492	258
5	171	3190	371	241	198	466	752	3949	5339	8047	6362	2551	1580	1337	3536	4737	169	385	3157
6	15	119	3085	241	106	45	92	1748	3497	5428	9251	2437	1267	1284	1748	5501	2715	1930	499
7	29	132	357	1061	50	0	43	873	1805	5277	5892	3698	1278	960	1264	2364	2745	2089	939
8	10	24	70	82	92	0	36	510	267	2317	4834	2571	2090	815	876	1099	1168	914	976
9	0	0	120	50	19	0	2	0	2	364	1377	1671	1282	1392	1177	1021	634	664	648
10	293	35	0	23	28	0	0	0	61	122	38	825	443	920	1125	965	559	529	296
11+	35	55	0	16	16	0	0	0	182	104	521	265	169	550	1048	1310	904	821	563
	6539	5371	8020	4327	6506	11065	3238	13374	17364	25774	32683	16736	10434	9308	13368	18071	8926	8120	7397

MOBILE GEAR - SPRING SPAWNERS 4Tm,n,o
ENGINS MOBILES - GÉNITEURS DE PRINTEMPS 4Tm,n,o

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	6282	0	0	0	0	0	211	50	0	2419	332	30	0	61	1	0	0	0
2	2038	7253	0	25	713	28	86	1010	1430	182	4719	396	3245	1205	834	698	4	710	183
3	1579	1313	0	18	824	140	270	1490	1152	395	1367	1545	2969	4574	1092	453	1584	624	1995
4	12071	419	0	2	48	37	796	1454	4062	1516	850	1920	1966	1491	3508	1601	1088	7607	620
5	1368	5489	0	0	10	7	418	580	3126	4656	1221	757	1378	1089	1375	1691	1101	4054	6663
6	2608	1406	0	1	6	0	19	511	2364	3803	4714	2098	832	637	752	710	3242	4581	2338
7	2300	1019	0	3	4	1	0	58	718	3129	2783	4075	497	293	157	493	662	6465	1595
8	609	635	0	5	19	1	14	0	82	1151	2355	1659	1890	198	120	84	268	1223	1098
9	593	130	0	0	67	0	0	113	194	0	1599	1413	987	150	301	35	191	123	148
10	893	67	0	3	1	0	0	0	0	0	0	428	326	178	323	634	90	440	313
11+	2369	432	0	0	8	0	0	145	45	37	564	23	176	150	94	410	174	759	54
	26428	24445	0	57	1700	214	1603	5572	13223	14869	22591	14646	14296	9965	8617	6810	8405	26586	15006

ALL GEARS - SPRING SPAWNERS 4Tm,n,o
TOUS LES ENGINS - GÉNITEURS DE PRINTEMPS 4Tm,n,o

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	6282	0	8	0	0	0	211	50	0	2419	332	30	0	61	1	0	0	0
2	2038	7263	99	116	845	34	89	1016	1440	300	4736	396	3342	1270	834	704	4	710	183
3	2726	2610	3329	1612	4532	7864	1102	3534	2240	1409	2108	2397	3335	5015	1164	493	1586	921	2055
4	16910	928	589	922	2205	2861	2274	5698	9175	4499	4500	3786	3830	3036	6030	2629	1117	8099	877
5	1539	8679	371	241	208	473	1170	4529	8465	12703	7583	3308	2958	2426	4911	6428	1270	4438	9820
6	2623	1525	3085	242	112	45	111	2259	5861	9231	13965	4535	2099	1921	2500	6211	5957	6510	2837
7	2329	1151	357	1064	54	1	43	931	2523	8406	8675	7773	1775	1253	1421	2857	3407	8554	2535
8	619	659	70	87	111	1	50	510	349	3468	7189	4230	3980	1013	996	1183	1436	2137	2074
9	593	130	120	50	86	0	2	113	196	364	2976	3084	2269	1542	1478	1056	825	787	796
10	1186	102	0	26	29	0	0	0	61	122	38	1253	769	1098	1448	1599	649	970	609
11+	2404	487	0	16	24	0	0	145	227	141	1085	288	345	700	1142	1720	1078	1580	617
	32967	29816	8020	4384	8206	11279	4841	18946	30587	40643	55274	31382	24732	19274	21985	24881	17329	34706	22404

Table 18. Weight-at-age (kg) for 4Tm,n,o herring spring spawners, 1978-1996.
Tableau 18. Poids selon l'âge (kg) pour les géniteurs de printemps dan 4Tm,n,o, 1978-1996.

FIXED GEAR - SPRING SPAWNERS 4Tm,n,o
ENGINS FIXES - GÉNITEURS DE PRINTEMPS 4Tm,n,o

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.000	0.000	0.144	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.176	0.179	0.188	0.209	0.187	0.155	0.179	0.107	0.220	0.158	0.000	0.150	0.148	0.000	0.124	0.000	0.000	0.000
3	0.155	0.174	0.165	0.199	0.185	0.138	0.206	0.197	0.210	0.206	0.187	0.190	0.186	0.172	0.134	0.171	0.119	0.124	0.190
4	0.184	0.217	0.203	0.238	0.220	0.202	0.209	0.259	0.233	0.213	0.225	0.212	0.217	0.185	0.184	0.195	0.159	0.172	0.206
5	0.202	0.234	0.258	0.273	0.273	0.274	0.223	0.297	0.268	0.231	0.255	0.241	0.241	0.219	0.204	0.192	0.177	0.187	0.193
6	0.310	0.221	0.261	0.311	0.292	0.217	0.304	0.330	0.277	0.268	0.272	0.263	0.291	0.238	0.226	0.217	0.208	0.217	0.211
7	0.348	0.299	0.334	0.329	0.329	0.000	0.302	0.375	0.337	0.278	0.292	0.284	0.281	0.260	0.249	0.241	0.226	0.216	0.226
8	0.229	0.346	0.300	0.326	0.319	0.000	0.386	0.388	0.345	0.287	0.306	0.298	0.300	0.274	0.273	0.250	0.275	0.240	0.235
9	0.000	0.000	0.367	0.344	0.345	0.000	0.488	0.000	0.452	0.291	0.323	0.311	0.318	0.290	0.288	0.270	0.295	0.231	0.236
10	0.344	0.306	0.000	0.375	0.347	0.000	0.373	0.000	0.323	0.320	0.411	0.322	0.308	0.298	0.304	0.281	0.295	0.240	0.249
11+	0.390	0.338	0.000	0.422	0.405	0.000	0.000	0.000	0.423	0.419	0.334	0.293	0.318	0.308	0.325	0.282	0.316	0.259	0.285
	0.188	0.222	0.221	0.255	0.206	0.160	0.217	0.282	0.266	0.252	0.274	0.269	0.270	0.246	0.237	0.225	0.244	0.219	0.217

MOBILE GEAR - SPRING SPAWNERS 4Tm,n,o
ENGINS MOBILES - GÉNITEURS DE PRINTEMPS 4Tm,n,o

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.101	0.000	0.000	0.037	0.000	0.000	0.086	0.087	0.000	0.081	0.088	0.079	0.000	0.051	0.061	0.000	0.000	0.000
2	0.188	0.173	0.000	0.175	0.140	0.143	0.139	0.158	0.135	0.189	0.113	0.172	0.173	0.148	0.118	0.117	0.097	0.101	0.119
3	0.208	0.229	0.000	0.214	0.213	0.184	0.187	0.203	0.210	0.196	0.173	0.218	0.196	0.178	0.148	0.145	0.156	0.140	0.176
4	0.259	0.263	0.000	0.240	0.244	0.216	0.222	0.232	0.253	0.273	0.243	0.259	0.244	0.208	0.199	0.176	0.187	0.181	0.212
5	0.245	0.293	0.000	0.000	0.274	0.282	0.253	0.286	0.282	0.297	0.311	0.269	0.279	0.235	0.240	0.187	0.208	0.200	0.227
6	0.271	0.246	0.000	0.413	0.324	0.000	0.303	0.311	0.316	0.330	0.323	0.317	0.306	0.255	0.260	0.220	0.238	0.225	0.236
7	0.304	0.281	0.000	0.328	0.380	0.245	0.000	0.282	0.324	0.338	0.360	0.341	0.344	0.320	0.291	0.260	0.262	0.255	0.252
8	0.290	0.271	0.000	0.284	0.334	0.238	0.319	0.000	0.339	0.371	0.389	0.354	0.322	0.341	0.322	0.333	0.301	0.267	0.287
9	0.313	0.307	0.000	0.000	0.322	0.000	0.000	0.588	0.291	0.000	0.402	0.367	0.343	0.345	0.343	0.365	0.281	0.317	0.332
10	0.392	0.305	0.000	0.325	0.433	0.000	0.000	0.000	0.000	0.000	0.000	0.383	0.408	0.348	0.342	0.281	0.356	0.357	0.353
11+	0.360	0.436	0.000	0.000	0.447	0.000	0.000	0.347	0.393	0.533	0.428	0.384	0.329	0.380	0.341	0.303	0.328	0.300	0.467
	0.270	0.203	0.000	0.219	0.191	0.188	0.222	0.229	0.259	0.314	0.260	0.305	0.250	0.206	0.211	0.201	0.220	0.217	0.231

ALL GEARS - SPRING SPAWNERS 4Tm,n,o
TOUS LES ENGINS - GÉNITEURS DE PRINTEMPS 4Tm,n,o

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.101	0.000	0.144	0.000	0.000	0.000	0.086	0.087	0.000	0.081	0.088	0.079	0.000	0.051	0.061	0.000	0.000	0.000
2	0.188	0.173	0.179	0.185	0.151	0.151	0.139	0.158	0.135	0.202	0.113	0.172	0.173	0.148	0.118	0.117	0.097	0.101	0.119
3	0.186	0.202	0.165	0.199	0.190	0.139	0.201	0.200	0.210	0.204	0.178	0.208	0.195	0.178	0.147	0.147	0.156	0.135	0.176
4	0.237	0.238	0.203	0.238	0.221	0.202	0.213	0.252	0.242	0.233	0.228	0.236	0.231	0.196	0.192	0.184	0.187	0.180	0.210
5	0.241	0.272	0.258	0.273	0.273	0.274	0.234	0.296	0.273	0.255	0.264	0.247	0.259	0.226	0.214	0.190	0.204	0.199	0.216
6	0.271	0.244	0.261	0.311	0.293	0.217	0.304	0.326	0.293	0.293	0.289	0.288	0.297	0.244	0.236	0.218	0.224	0.223	0.231
7	0.304	0.283	0.334	0.329	0.332	0.245	0.302	0.369	0.333	0.300	0.314	0.314	0.299	0.274	0.254	0.244	0.233	0.246	0.243
8	0.289	0.274	0.300	0.324	0.321	0.238	0.367	0.388	0.344	0.315	0.333	0.320	0.311	0.287	0.279	0.255	0.280	0.255	0.263
9	0.313	0.307	0.367	0.344	0.327	0.000	0.488	0.588	0.293	0.291	0.366	0.337	0.329	0.295	0.299	0.273	0.292	0.245	0.254
10	0.380	0.305	0.000	0.369	0.350	0.000	0.000	0.000	0.323	0.320	0.411	0.343	0.350	0.306	0.312	0.281	0.304	0.293	0.302
11+	0.361	0.425	0.000	0.422	0.419	0.000	0.000	0.347	0.417	0.449	0.383	0.300	0.323	0.323	0.327	0.287	0.318	0.279	0.301
	0.254	0.206	0.221	0.255	0.203	0.161	0.219	0.267	0.263	0.275	0.268	0.286	0.259	0.225	0.227	0.219	0.232	0.218	0.227

Table 19. Catch-at-age for 4TI herring spring spawners, 1978-1996. Numbers are in thousands of fish.
Tableau 19. Prises selon l'âge pour les géniteurs de printemps dans 4TI, 1978-1996. En milliers de poissons.

FIXED GEAR - SPRING SPAWNERS 4TI
ENGINS FIXES - GÉNITEURS DE PRINTEMPS 4TI

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	319	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	144	0	247	0	211	0	129	0	0	14	0	7	0	0	0	0	0	0
3	4155	5409	6728	8441	15201	6228	2871	2768	2212	4	819	885	1241	2947	340	149	761	0	81
4	19229	2219	5318	4926	1369	16759	11055	7215	9234	1674	2544	3108	5313	7765	18270	2892	3005	5546	1149
5	930	12615	1508	1150	169	1194	6616	6573	2804	11035	3490	1045	1979	7958	6104	19146	10110	4087	31880
6	1333	367	3531	585	0	300	174	2514	3754	2764	5039	1188	931	3339	2687	6638	24567	7489	3973
7	1139	608	762	1136	0	74	4	0	141	1340	2446	2092	698	1386	1318	1327	3316	15660	6410
8	85	111	278	179	0	0	4	0	0	605	1335	542	1898	1740	472	675	1114	2066	6241
9	360	0	90	96	0	0	0	0	0	62	88	210	372	2405	461	318	230	340	1311
10	463	160	32	49	0	0	3	0	59	5	22	48	72	801	578	348	211	72	65
11+	753	254	23	231	0	0	0	0	0	0	3	2	23	205	228	272	240	216	81
	28447	22206	18270	17040	16739	24766	20727	19197	18204	17489	15800	9120	12534	28546	30458	31765	43554	35476	51191

MOBILE GEAR - SPRING SPAWNERS 4TI
ENGINS MOBILES - GÉNITEURS DE PRINTEMPS 4TI

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	180	87	165	4	3	691	5	0	0	0	0	0	0	0	0	0	0	0	13
3	1224	0	83	3	3	3411	15	0	0	0	0	0	0	0	0	0	0	0	82
4	1791	0	27	0	0	932	45	0	0	1	0	0	0	0	0	0	0	0	32
5	91	500	15	0	0	162	24	0	0	4	0	0	0	0	0	0	0	0	633
6	167	200	94	0	0	1	1	0	0	3	0	0	0	0	0	0	0	0	130
7	60	130	68	0	0	15	0	0	0	3	0	0	0	0	0	0	0	0	143
8	0	0	31	1	0	34	1	0	0	1	0	0	0	0	0	0	0	0	139
9	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
10	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
11+	151	34	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
	3664	951	523	8	6	5246	91	0	0	12	0	0	0	0	0	0	0	0	1184

ALL GEARS - SPRING SPAWNERS 4TI
TOUS LES ENGINS - GÉNITEURS DE PRINTEMPS 4TI

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	319	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	180	231	165	251	3	902	5	129	0	0	14	0	7	0	0	0	0	0	13
3	5379	5409	6811	8444	15204	9639	2886	2766	2212	4	819	885	1241	2947	340	149	761	0	164
4	21020	2219	5345	4926	1369	17691	11100	7215	9234	1675	2544	3108	5313	7765	18270	2892	3005	5546	1181
5	1021	13115	1523	1150	169	1356	6640	6573	2804	11039	3490	1045	1979	7958	6104	19146	10110	4087	32513
6	1500	567	3625	585	0	301	175	2514	3754	2767	5039	1188	931	3339	2687	6638	24567	7489	4103
7	1199	738	830	1136	0	89	4	0	141	1343	2446	2092	698	1386	1318	1327	3316	15660	6553
8	85	111	309	180	0	34	5	0	0	606	1335	542	1898	1740	472	675	1114	2066	6380
9	360	0	107	96	0	0	0	0	0	62	88	210	372	2405	461	318	230	340	1312
10	463	160	36	49	0	0	3	0	59	5	22	48	72	801	578	348	211	72	71
11+	904	288	27	231	0	0	0	0	0	0	3	2	23	205	228	272	240	216	86
	32111	23157	18793	17048	16745	30012	20818	19197	18204	17501	15800	9120	12534	28546	30458	31765	43554	35476	52376

Table 20. Weight-at-age (kg) for 4TI herring spring spawners, 1978-1996.
Tableau 20. Poids selon l'âge (kg) pour les géniteurs de printemps dan 4TI, 1978-1996.

FIXED GEAR - SPRING SPAWNERS 4TI
ENGINS FIXES - GÉNITEURS DE PRINTEMPS 4TI

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.000	0.165	0.000	0.125	0.000	0.172	0.000	0.151	0.000	0.000	0.163	0.000	0.150	0.000	0.000	0.000	0.000	0.000	0.000
3	0.146	0.169	0.167	0.181	0.168	0.172	0.169	0.172	0.134	0.132	0.155	0.149	0.150	0.143	0.165	0.131	0.124	0.000	0.115
4	0.189	0.215	0.181	0.238	0.184	0.209	0.193	0.191	0.169	0.183	0.199	0.191	0.197	0.181	0.171	0.160	0.158	0.157	0.163
5	0.208	0.226	0.214	0.283	0.211	0.234	0.212	0.215	0.216	0.209	0.230	0.214	0.233	0.219	0.198	0.187	0.177	0.173	0.168
6	0.247	0.237	0.267	0.308	0.000	0.273	0.268	0.245	0.232	0.229	0.260	0.237	0.249	0.242	0.229	0.199	0.198	0.195	0.186
7	0.327	0.299	0.285	0.327	0.000	0.327	0.311	0.000	0.302	0.248	0.279	0.271	0.276	0.241	0.257	0.241	0.214	0.216	0.201
8	0.311	0.346	0.325	0.307	0.000	0.000	0.347	0.000	0.000	0.253	0.299	0.295	0.281	0.290	0.239	0.249	0.258	0.235	0.225
9	0.307	0.000	0.468	0.380	0.000	0.000	0.000	0.000	0.000	0.270	0.300	0.308	0.308	0.298	0.286	0.275	0.268	0.265	0.220
10	0.329	0.306	0.345	0.411	0.000	0.000	0.373	0.000	0.290	0.326	0.345	0.337	0.318	0.301	0.294	0.291	0.295	0.293	0.262
11+	0.374	0.338	0.400	0.407	0.000	0.000	0.000	0.000	0.000	0.000	0.505	0.346	0.329	0.329	0.301	0.303	0.307	0.299	0.297
	0.201	0.212	0.204	0.224	0.169	0.202	0.196	0.203	0.186	0.214	0.245	0.224	0.223	0.219	0.191	0.193	0.193	0.200	0.182

MOBILE GEAR - SPRING SPAWNERS 4TI
ENGINS MOBILES - GÉNITEURS DE PRINTEMPS 4TI

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.000	0.105	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.081	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.176	0.176	0.163	0.175	0.140	0.143	0.139	0.000	0.000	0.189	0.113	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.100
3	0.186	0.000	0.191	0.214	0.215	0.184	0.187	0.000	0.000	0.196	0.173	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.160
4	0.234	0.000	0.222	0.240	0.251	0.216	0.221	0.000	0.000	0.273	0.243	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.172
5	0.211	0.296	0.265	0.000	0.000	0.281	0.252	0.000	0.000	0.297	0.311	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.192
6	0.278	0.285	0.267	0.413	0.000	0.273	0.303	0.000	0.000	0.330	0.323	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.204
7	0.292	0.354	0.256	0.328	0.000	0.246	0.000	0.000	0.000	0.338	0.360	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.223
8	0.000	0.000	0.264	0.284	0.317	0.238	0.319	0.000	0.000	0.371	0.389	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.238
9	0.000	0.000	0.302	0.000	0.320	0.000	0.000	0.000	0.000	0.000	0.402	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.294
10	0.000	0.000	0.390	0.325	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.223
11+	0.433	0.413	0.306	0.000	0.000	0.000	0.000	0.000	0.000	0.533	0.428	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.414
	0.225	0.295	0.216	0.203	0.178	0.188	0.221	0.000	0.000	0.320	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.200

ALL GEARS - SPRING SPAWNERS 4TI
TOUS LES ENGINS - GÉNITEURS DE PRINTEMPS 4TI

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.020	0.105	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.176	0.169	0.163	0.126	0.140	0.150	0.139	0.151	0.000	0.000	0.163	0.000	0.150	0.000	0.000	0.000	0.000	0.000	0.100
3	0.155	0.169	0.168	0.181	0.168	0.176	0.169	0.172	0.134	0.132	0.155	0.149	0.150	0.143	0.165	0.131	0.124	0.000	0.137
4	0.193	0.215	0.182	0.238	0.184	0.210	0.193	0.191	0.169	0.183	0.199	0.191	0.197	0.181	0.171	0.160	0.158	0.157	0.163
5	0.208	0.229	0.214	0.283	0.211	0.240	0.212	0.215	0.216	0.209	0.230	0.214	0.233	0.219	0.198	0.187	0.177	0.173	0.168
6	0.251	0.254	0.267	0.308	0.000	0.273	0.268	0.245	0.232	0.229	0.260	0.237	0.249	0.242	0.229	0.199	0.198	0.195	0.186
7	0.325	0.309	0.282	0.327	0.000	0.313	0.311	0.000	0.302	0.248	0.279	0.271	0.276	0.241	0.257	0.241	0.214	0.216	0.201
8	0.311	0.346	0.319	0.307	0.000	0.238	0.341	0.000	0.000	0.253	0.299	0.295	0.281	0.290	0.239	0.249	0.258	0.235	0.225
9	0.307	0.000	0.442	0.380	0.000	0.000	0.000	0.000	0.000	0.270	0.300	0.308	0.308	0.298	0.286	0.275	0.268	0.265	0.220
10	0.329	0.306	0.350	0.411	0.000	0.000	0.373	0.000	0.290	0.326	0.345	0.337	0.318	0.301	0.294	0.291	0.295	0.293	0.259
11+	0.384	0.347	0.386	0.407	0.000	0.000	0.000	0.000	0.000	0.000	0.505	0.346	0.329	0.329	0.301	0.303	0.307	0.299	0.303
	0.204	0.216	0.204	0.224	0.169	0.199	0.196	0.203	0.186	0.214	0.245	0.224	0.223	0.219	0.191	0.193	0.193	0.200	0.182

Table 21. Catch-at-age for 4Tf,g,h,j,k herring spring spawners, 1978-1996. Numbers are in thousands of fish.
Tableau 21. Prises selon l'âge pour les géniteurs de printemps dans 4T f,g,h,j,k, 1978-1996. En milliers de poissons.

FIXED GEAR - SPRING SPAWNERS 4Tf,g,h,j,k
ENGINS FIXES - GÉNITEURS DE PRINTEMPS 4Tf,g,h,j,k

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0	481	0	5	10	0	0	0	0	0	59	0	0	0	0	0	0	0	0
2	14	1698	70	56	30	31	81	195	0	153	470	0	0	0	0	0	0	0	0
3	342	14821	481	3054	4808	2222	835	1198	293	665	2452	2356	1290	2905	1852	91	1054	34	178
4	1402	11692	840	2508	982	6354	1461	4384	3763	3394	2432	11460	7119	2792	9524	2557	2243	6431	105
5	154	6512	753	1298	698	437	677	3832	4592	3037	1594	2627	6764	5514	2078	13821	16165	6648	11653
6	483	1717	1884	992	387	114	109	936	4231	3021	1433	2490	1217	4556	3246	5004	20015	7427	3682
7	223	618	705	1167	273	28	12	431	985	2053	916	1364	1099	1142	915	2758	2969	6777	6162
8	163	1034	594	225	245	0	9	186	177	754	843	1378	878	646	396	902	2155	1969	2552
9	87	280	641	308	104	0	2	61	30	91	186	754	956	967	251	615	334	999	1440
10	619	77	430	124	62	0	2	0	10	203	29	28	486	539	185	301	455	427	628
11+	708	982	675	714	554	0	0	1	22	58	6	16	73	383	463	441	455	1051	954
	4195	39912	7073	10451	8153	9186	3188	11224	14103	13429	10420	22473	19881	19445	18910	26490	45844	31887	27354

MOBILE GEAR - SPRING SPAWNERS 4Tf,g,h,j,k
ENGINS MOBILES - GÉNITEURS DE PRINTEMPS 4Tf,g,h,j,k

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	1421	406	601	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0
2	12352	1700	8073	1825	0	18	0	0	3	1	54	0	0	0	0	0	0	249	4
3	2128	14817	12140	1282	0	89	2	0	2	2	16	0	0	0	1639	117	1027	599	645
4	2095	11694	12603	135	0	24	3	0	8	8	10	0	0	0	1137	316	994	2251	1157
5	884	6538	5203	5	0	4	2	0	6	23	14	0	0	0	771	1653	4568	475	1394
6	1699	1723	6064	100	0	0	0	0	5	19	54	0	0	0	429	1645	4734	574	508
7	2768	623	3458	226	0	0	0	0	1	16	32	0	0	0	217	622	1170	970	878
8	580	1037	1709	383	0	1	0	0	0	6	27	0	0	0	209	560	1565	474	573
9	721	281	1246	1	0	0	0	0	0	0	18	0	0	0	152	1248	367	377	53
10	214	78	291	249	0	0	0	0	0	0	0	0	0	0	19	726	236	483	237
11+	3076	984	281	3	0	0	0	0	0	0	6	0	0	0	8	1211	637	459	234
	27938	39881	51669	4209	0	136	7	0	25	75	259	0	0	0	4581	8098	15298	6911	5682

ALL GEARS - SPRING SPAWNERS 4Tf,g,h,j,k
TOUS LES ENGINS - GÉNITEURS DE PRINTEMPS 4Tf,g,h,j,k

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	1421	887	601	5	10	0	0	0	0	0	87	0	0	0	0	0	0	0	0
2	12366	3398	8143	1881	30	49	81	195	3	154	524	0	0	0	0	0	0	249	4
3	2470	29638	12621	4336	4808	2311	837	1198	295	667	2468	2356	1290	2905	3491	208	2081	632	823
4	3497	23386	13443	2643	982	6378	1464	4384	3771	3402	2442	11460	7119	2792	10661	2873	3237	8683	1262
5	1038	13050	5956	1303	698	441	679	3832	4598	3060	1608	2627	6764	5514	2849	15474	20733	7123	13047
6	2182	3440	7948	1092	387	114	109	936	4236	3040	1487	2490	1217	4556	3675	6649	24749	8002	4190
7	2991	1241	4163	1393	273	28	12	431	986	2069	948	1364	1099	1142	1132	3380	4139	7747	7040
8	743	2071	2303	608	245	1	9	186	177	760	870	1378	878	646	605	1462	3720	2443	3125
9	808	561	1887	309	104	0	2	61	30	91	204	754	956	967	403	1863	701	1376	1492
10	833	155	721	373	62	0	2	0	10	203	29	28	486	539	204	1027	691	910	866
11+	3784	1966	956	717	554	0	0	1	22	58	12	16	73	383	471	1652	1092	1510	1187
	32133	79793	58742	14660	8153	9322	3195	11224	14128	13504	10679	22473	19882	19444	23491	34588	61143	38797	33036

Table 22. Weight-at-age (kg) for 4Tf,g,h,j,k herring spring spawners, 1978-1996.
Tableau 22. Poids selon l'âge (kg) pour les géniteurs de printemps dan 4T f,g,h,j,k, 1978-1996.

FIXED GEAR - SPRING SPAWNERS 4Tf,g,h,j,k
ENGINS FIXES - GÉNITEURS DE PRINTEMPS 4Tf,g,h,j,k

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.000	0.031	0.000	0.030	0.037	0.000	0.000	0.000	0.000	0.000	0.038	0.000	.	.	0.000	0.000	.	0.000	0.000
2	0.142	0.057	0.185	0.125	0.135	0.172	0.091	0.256	0.000	0.098	0.075	0.000	.	.	0.000	0.000	.	0.000	0.000
3	0.150	0.140	0.187	0.182	0.000	0.170	0.172	0.189	0.173	0.160	0.154	0.163	0.162	0.143	0.141	0.143	0.168	0.130	0.130
4	0.199	0.174	0.206	0.231	0.227	0.209	0.206	0.216	0.212	0.188	0.174	0.203	0.189	0.181	0.168	0.163	0.150	0.161	0.200
5	0.240	0.207	0.243	0.288	0.274	0.231	0.222	0.245	0.228	0.213	0.203	0.230	0.218	0.217	0.203	0.189	0.177	0.189	0.181
6	0.279	0.232	0.286	0.342	0.324	0.273	0.239	0.275	0.260	0.245	0.250	0.257	0.232	0.247	0.235	0.206	0.198	0.209	0.190
7	0.295	0.269	0.317	0.352	0.380	0.327	0.303	0.299	0.290	0.266	0.280	0.285	0.237	0.276	0.255	0.238	0.217	0.229	0.217
8	0.311	0.338	0.339	0.370	0.402	0.000	0.394	0.323	0.330	0.272	0.299	0.286	0.278	0.287	0.257	0.253	0.246	0.245	0.252
9	0.329	0.374	0.354	0.384	0.413	0.000	0.414	0.400	0.340	0.333	0.335	0.317	0.289	0.317	0.297	0.283	0.310	0.311	0.251
10	0.326	0.317	0.364	0.398	0.433	0.000	0.367	0.000	0.422	0.282	0.352	0.347	0.305	0.319	0.309	0.299	0.293	0.339	0.299
11+	0.360	0.371	0.372	0.408	0.447	0.000	0.000	0.491	0.383	0.341	0.462	0.376	0.361	0.335	0.316	0.329	0.340	0.370	0.315
	0.263	0.175	0.291	0.269	0.131	0.202	0.200	0.234	0.238	0.224	0.202	0.222	0.215	0.224	0.194	0.203	0.194	0.212	0.208

MOBILE GEAR - SPRING SPAWNERS 4Tf,g,h,j,k
ENGINS MOBILES - GÉNITEURS DE PRINTEMPS 4Tf,g,h,j,k

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.079	0.039	0.105	0.030	0.000	0.000	0.000	0.000	0.087	0.000	0.081	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.118	0.057	0.152	0.175	0.000	0.143	0.091	0.000	0.135	0.189	0.113	0.000	0.000	0.000	0.000	0.000	0.000	0.050	0.064
3	0.139	0.140	0.158	0.214	0.000	0.184	0.165	0.000	0.210	0.196	0.173	0.000	0.000	0.000	0.146	0.099	0.145	0.122	0.128
4	0.225	0.174	0.213	0.239	0.000	0.216	0.203	0.000	0.253	0.273	0.243	0.000	0.000	0.000	0.201	0.162	0.164	0.162	0.165
5	0.251	0.208	0.245	0.270	0.000	0.282	0.220	0.000	0.282	0.297	0.311	0.000	0.000	0.000	0.251	0.188	0.193	0.176	0.182
6	0.277	0.232	0.268	0.410	0.000	0.000	0.228	0.000	0.316	0.330	0.323	0.000	0.000	0.000	0.267	0.219	0.211	0.231	0.180
7	0.302	0.270	0.264	0.329	0.000	0.245	0.306	0.000	0.324	0.338	0.360	0.000	0.000	0.000	0.273	0.257	0.260	0.210	0.204
8	0.308	0.337	0.279	0.285	0.000	0.238	0.416	0.000	0.339	0.371	0.389	0.000	0.000	0.000	0.298	0.328	0.250	0.280	0.229
9	0.311	0.373	0.336	0.384	0.000	0.000	0.404	0.000	0.291	0.000	0.402	0.000	0.000	0.000	0.314	0.366	0.309	0.285	0.279
10	0.310	0.317	0.382	0.325	0.000	0.000	0.367	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.333	0.332	0.316	0.311	0.252
11+	0.359	0.372	0.344	0.408	0.000	0.000	0.000	0.000	0.393	0.533	0.428	0.000	0.000	0.000	0.397	0.333	0.334	0.319	0.318
	0.194	0.176	0.209	0.222	0.000	0.188	0.197	0.000	0.258	0.313	0.259	0.000	0.000	0.000	0.209	0.269	0.215	0.204	0.190

ALL GEARS - SPRING SPAWNERS 4Tf,g,h,j,k
TOUS LES ENGINS - GÉNITEURS DE PRINTEMPS 4Tf,g,h,j,k

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.079	0.034	0.105	0.030	0.037	0.000	0.000	0.000	0.000	0.000	0.052	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	0.118	0.057	0.153	0.173	0.135	0.161	0.091	0.256	0.135	0.099	0.078	0.000	0.000	0.000	0.000	0.000	0.000	0.050	0.064
3	0.140	0.140	0.159	0.192	0.000	0.171	0.172	0.189	0.174	0.160	0.154	0.163	0.162	0.143	0.144	0.118	0.157	0.122	0.128
4	0.215	0.174	0.213	0.232	0.227	0.209	0.206	0.216	0.212	0.188	0.175	0.203	0.189	0.181	0.171	0.163	0.155	0.161	0.168
5	0.250	0.208	0.245	0.288	0.274	0.232	0.222	0.245	0.228	0.214	0.204	0.230	0.218	0.217	0.216	0.189	0.181	0.188	0.181
6	0.277	0.232	0.272	0.348	0.324	0.273	0.239	0.275	0.261	0.245	0.253	0.257	0.232	0.247	0.239	0.210	0.200	0.210	0.189
7	0.301	0.270	0.273	0.349	0.380	0.327	0.303	0.299	0.290	0.266	0.283	0.285	0.237	0.276	0.259	0.241	0.229	0.227	0.215
8	0.308	0.337	0.294	0.316	0.402	0.238	0.394	0.323	0.330	0.273	0.302	0.286	0.278	0.287	0.271	0.282	0.248	0.252	0.248
9	0.313	0.373	0.342	0.384	0.413	0.000	0.414	0.400	0.340	0.333	0.341	0.317	0.289	0.317	0.303	0.338	0.309	0.304	0.252
10	0.322	0.317	0.372	0.349	0.433	0.000	0.367	0.000	0.422	0.282	0.352	0.347	0.305	0.319	0.311	0.322	0.301	0.324	0.286
11+	0.359	0.372	0.364	0.408	0.447	0.000	0.000	0.491	0.383	0.341	0.445	0.376	0.361	0.335	0.318	0.332	0.337	0.355	0.316
	0.203	0.175	0.219	0.255	0.131	0.202	0.200	0.234	0.239	0.224	0.203	0.222	0.215	0.224	0.196	0.218	0.199	0.210	0.205

Table 23. Catch-at-age for 4Vn herring spring spawners, 1978-1996. Numbers are in thousands of fish.
Tableau 23. Prises selon l'âge pour les géniteurs de printemps dans 4Vn, 1978-1996. En milliers de poissons.

SPRING SPAWNERS 4Vn
GÉNITEURS DE PRINTEMPS 4Vn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	58	5679	349	595	1525	302	522	615	117	73	0	0	8	0	0	16	0	0	0
2	809	5007	2614	2829	3074	3383	1759	953	929	226	214	0	218	167	28	43	35	36	72
3	978	383	901	1833	1994	1561	1702	1129	4064	827	132	105	552	108	11	27	474	13	551
4	358	0	143	0	667	526	636	636	1466	441	145	180	608	990	74	51	187	289	209
5	330	0	117	438	362	289	371	418	0	0	127	99	701	289	182	176	138	104	1442
6	455	298	277	0	0	0	0	0	265	64	0	219	333	134	573	265	208	113	932
7	0	0	0	0	0	0	0	0	0	0	59	0	218	381	0	150	183	141	79
8	114	0	43	0	0	0	0	0	413	67	29	109	35	1157	0	120	53	27	27
9	14	0	17	0	0	0	0	0	0	0	0	0	47	186	0	0	83	4	96
10	0	0	0	0	0	0	0	0	0	0	0	0	99	186	0	0	0	8	4
11+	32	0	55	0	0	0	0	0	0	0	0	0	0	194	148	0	0	20	64
	3148	11367	4516	5695	7622	6061	4990	3751	7254	1698	706	712	2821	3790	1016	848	1362	755	3477

Table 24. Weight-at-age (kg) for 4Vn herring spring spawners, 1978-1996.
Tableau 24. Poids selon l'âge (kg) pour les géniteurs de printemps dan 4Vn, 1978-1996.

SPRING SPAWNERS 4Vn
GÉNITEURS DE PRINTEMPS 4Vn

AGE	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
1	0.071	0.097	0.110	0.106	0.100	0.118	0.099	0.090	0.056	0.057	0.000	0.000	0.079	0.000	0.000	0.059	0.000	0.000	0.070
2	0.174	0.154	0.156	0.182	0.166	0.168	0.169	0.168	0.121	0.121	0.123	0.000	0.157	0.094	0.140	0.099	0.151	0.108	0.103
3	0.228	0.181	0.215	0.230	0.221	0.220	0.224	0.234	0.156	0.158	0.181	0.145	0.217	0.113	0.179	0.163	0.149	0.126	0.136
4	0.290	0.000	0.275	0.000	0.252	0.254	0.257	0.263	0.192	0.188	0.198	0.177	0.242	0.181	0.207	0.222	0.195	0.177	0.183
5	0.323	0.000	0.314	0.369	0.289	0.301	0.300	0.313	0.000	0.000	0.242	0.213	0.279	0.228	0.243	0.233	0.187	0.199	0.221
6	0.370	0.364	0.383	0.000	0.000	0.000	0.000	0.000	0.228	0.228	0.000	0.274	0.280	0.245	0.294	0.269	0.220	0.218	0.228
7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.287	0.000	0.319	0.265	0.000	0.296	0.296	0.241	0.265
8	0.363	0.000	0.387	0.000	0.000	0.000	0.000	0.000	0.293	0.294	0.390	0.279	0.279	0.282	0.000	0.342	0.254	0.239	0.324
9	0.480	0.000	0.483	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.360	0.335	0.000	0.000	0.296	0.321	0.310
10	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.341	0.335	0.000	0.000	0.000	0.317	0.314
11+	0.433	0.000	0.441	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.329	0.392	0.000	0.000	0.314	0.318
	0.257	0.132	0.193	0.204	0.180	0.193	0.201	0.207	0.167	0.165	0.195	0.223	0.256	0.243	0.287	0.258	0.203	0.202	0.211

Table 25. Catch (t) of 4T herring caught in spring and fall, by gear (fixed and mobile) and spawning group (as calculated by the GSI method). Catch (t) in 4Vn from the purse seine fishery (Nov-Mar) is assigned to a spawning group according to otolith characteristics up to 1991 inclusive. Catches are derived from purchase slips, and are provisional from 1992-1994; mobile gear landings for 1992 and 1993 are based on quota-monitoring reports. Totals for tables 1,2, and 3 differ from 4,5, and 6 because of rounding and estimation differences in deriving spawning groups by area.

YEAR ANNÉE	SPAWNING GROUP a/ GROUPE DE FRAI a	4T SPRING / PRINTEMPS		4T FALL / AUTOMNE		4T CATCH PRISES	4T TAC TPA	4Vn CATCH PRISES	4Vn TAC TPA	BIOMASS BIOMASSE	
		Fixed Fixes	Mobile Mobiles	Fixed Fixes	Mobile Mobiles					Fall 4+	Spring 4+
1978	P	8.098	6.277	109	8.047	22.531		1.168			
	A	449	1,770	5,032	23,708	30,959		1,681			
	Total	**8,547**	**8,047**	**5,141**	**31,755**	**53,490**	**55,000**	**2,849**	**8,000**	73,261	44,990
1979	P	7,089	6,951	282	5,821	20,143		1,426			
	A	535	6,951	5,793	14,798	28,077		1,484			
	Total	**7,624**	**13,902**	**6,075**	**20,619**	**48,220**	**55,000**	**2,910**	**3,000**	57,824	30,776
1980	P	7,216	6,123	306	4,519	18,164		1,348			
	A	56	7,794	6,239	10,293	24,382		2,503			
	Total	**7,272**	**13,917**	**6,545**	**14,812**	**42,546**	**55,000**	**3,851**	**4,500**	42,083	19,949
1981	P	7,028	10	665	938	8,641		1,374			
	A	473	11	10,560	2,250	13,294		2,060			
	Total	**7,501**	**21**	**11,225**	**3,188**	**21,935**	**16,000**	**3,434**	**3,000**	64,513	10,359
1982	P	5,872	29	332	335	6,568		1,549			
	A	51	33	12,650	2,243	14,977		1,971			
	Total	**5,923**	**62**	**12,982**	**2,578**	**21,545**	**15,000**	**3,520**	**3,000**	104,675	8,347
1983	P	8,211	9	425	1,047	9,692		1,154			
	A	312	10	13,415	2,442	16,179		2,826			
	Total	**8,523**	**19**	**13,840**	**3,489**	**25,871**	**20,000**	**3,980**	**5,000**	158,451	23,154
1984	P	5,001	2	481	387	5,871		1,138			
	A	281	2	15,493	1,891	17,667		2,787			
	Total	**5,282**	**4**	**15,974**	**2,278**	**23,538**	**19,000**	**3,925**	**3,500**	245,126	40,619
1985	P	6,535	0	4,018	2,036	12,589	6,000	1,006			
	A	682	0	19,689	4,986	25,357	26,500	2,464			
	Total	**7,217**	**0**	**23,707**	**7,022**	**37,946**	**32,500**	**3,470**	**3,500**	290,238	64,925
1986	P	8,015	0	3,249	4,026	15,290	7,200	1,262			
	A	535	0	36,642	6,889	44,066	36,200	3,090			
	Total	**8,550**	**0**	**39,891**	**10,915**	**59,356**	**43,400**	**4,352**	**4,200**	318,900	87,983
1987	P	10,789	0	2,417	4,393	17,599	8,200	332			
	A	970	0	49,711	9,341	60,022	64,600	2,040			
	Total	**11,759**	**0**	**52,128**	**13,734**	**77,621**	**72,800**	**2,372**	**4,200**	343,718	83,069

a P: Spring/Printemps; A: Fall/Automne

Table 25 (cont'd). Catch (t) of 4T herring caught in spring and fall, by gear and spawning group.

Year Annee	Spawning Group/ Groupe de frai	4T Spring/ Printemps		4T Fall/ Automne		4T Catch Prises	4T TAC TPA	4Vn Catch Prises	4Vn TAC TPA	Fall 4+ Biomass	Spring 4+ Bioimass
		Fixed Rixes	Mobile Mobiles	Fixed Rixes	Mobile Mobiles						
1988	P	11,541	0	3,278	6,644	21,463	12,800	257			
	A	1,346	1	37,933	10,887	50,167	66,100	2,315			
	Total	**12,887**	**1**	**41,211**	**17,531**	**71,630**	**78,900**	**2,572**	**4,200**	353,962	75,250
1989	P	10,441	0	1,564	4,138	16,143	16,800	212			
	A	652	0	32,285	10,131	43,068	70,100	1,905			
	Total	**11,093**	**0**	**33,849**	**14,269**	**59,211**	**86,900**	**2,117**	**4,200**	325,500	68,970
1990	P	8,520	1	1,331	3,815	13,667	21,000	706			
	A	540	0	55,790	6,494	62,824	65,900	4,005			
	Total	**9,060**	**1**	**57,121**	**10,309**	**76,491**	**86,900**	**4,711**	**4,200**	307,668	69,667
1991	P	12,586	17	178	2,095	14,876	21,000	957			
	A	306	1	26,966	5,964	33,237	65,900	3,832			
	Total	**12,892**	**18**	**27,144**	**8,059**	**48,113**	**86,900**	**4,789**	**4,200**	413,580	78,275
1992	P	12,438	952	239	1,850	15,479	21,000	296			
	A	37	168	32,840	5,265	38,310	65,900	3,932			
	Total	**12,475**	**1,121**	**33,079**	**7,115**	**53,790**	**86,900**	**4,228**	**4,200**	432,867	112,993
1993	P	14,584	2,175	917	1,388	19,064	21,000	219			
	A	598	541	22,181	4,840	28,160	80,800	3,736			
	Total	**15,182**	**2,716**	**23,098**	**6,228**	**47,224**	**101,800**	**3,955**	**4,200**	368,668	116,169
1994	P	18,754	2,910	1,422	1,879	24,965	21,000	324			
	A	260	1,023	52,390	5,081	58,754	80,800	2,920			
	Total	**19,014**	**3,933**	**53,812**	**6,960**	**83,719**	**101,800**	**3,244**	**4,200**	360,060	98,288
1995	P	13,970	1,406	1,798	5,775	22,950	21,000	153			
	A	31	436	52,937	9,567	62,982	80,800	3,990			
	Total	14,001	1,842	54,735	15,342	85,932	101,800	4,143	4,200	286,760	106,357
1996	P	15536	1280	1061	3500	21378	15114	734			
	A	548	627	44733	4406	50313	60494	3551			
	Total	16084	1907	45794	7906	71690	75608	4285	6423	231,724	79,680

a P: Spring/Printemps; A: Fall/Automne

Table 26. Landings (t) of spring and fall spawners in 4T southern Gulf of St. Lawrence fishery from 1978 to 1996 showing percent of spring and fall spawners caught by each gear type.

	Spring 4T				Fall 4T				4Vn - Landings (t)			
	Landings			Percent	Landings			Percent	Spring	Fall		Percent
Year	Inshore	L. Seiner	Total	Inshore	Inshore	L. Seiner	Total	Inshore	L. Seiner	L. Seiner	Total	Spring
1978	8,207	14,324	22,531	36	5,481	25,478	30,959	18	1,168	1,681	2,849	41
1979	7,371	12,772	20,143	37	6,328	21,749	28,077	23	1,426	1,484	2,910	49
1980	7,522	10,642	18,164	41	6,295	18,087	24,382	26	1,348	2,503	3,851	35
1981	7,693	948	8,641	89	11,033	2,261	13,294	83	1,374	2,060	3,434	40
1982	6,204	364	6,568	94	12,701	2,276	14,977	85	1,549	1,971	3,520	44
1983	8,636	1,056	9,692	89	13,727	2,452	16,179	85	1,154	2,826	3,980	29
1984	5,482	389	5,871	93	15,774	1,893	17,667	89	1,138	2,787	3,925	29
1985	10,553	2,036	12,589	84	20,371	4,986	25,357	80	1,006	2,464	3,470	29
1986	11,264	4,026	15,290	74	37,177	6,889	44,066	84	1,262	3,090	4,352	29
1987	13,206	4,393	17,599	75	50,681	9,341	60,022	84	332	2,040	2,372	14
1988	14,819	6,644	21,463	69	39,279	10,888	50,167	78	257	2,315	2,572	10
1989	12,005	4,138	16,143	74	32,937	10,131	43,068	76	212	1,905	2,117	10
1990	9,851	3,816	13,667	72	56,330	6,494	62,824	90	706	4,005	4,711	15
1991	12,764	2,112	14,876	86	27,272	5,965	33,237	82	957	3,832	4,789	20
1992	12,677	2,802	15,479	82	32,877	5,433	38,310	86	296	3,932	4,228	7
1993	15,501	3,563	19,064	81	22,779	5,381	28,160	81	219	3,736	3,955	6
1994	20,176	4,789	24,965	81	52,650	6,104	58,754	90	324	2,920	3,244	10
1995	15,625	7,168	22,793	69	49,042	9,982	59,025	83	153	3,998	4,151	4
1996	16,587	4,790	21,377	78	45,328	5,166	50,495	90	734	3,551	4,285	17
Mean 91-95	15,349	4,087	19,435	80	36,924	6,573	43,497	84	390	3,684	4,073	9

Table 27. Landings and percentage of each spawning group caught by gear type for 4T + 4Vn.

	Spring				Fall				
Year	Inshore	L. Seiner	Total	Percent Inshore	Inshore	L. Seiner	Total	Percent Inshore	Total
1978	8,207	15,492	23,699	35	5,481	27,159	32,640	17	56,339
1979	7,371	14,198	21,569	34	6,328	23,233	29,561	21	51,130
1980	7,522	11,990	19,512	39	6,295	20,590	26,885	23	46,397
1981	7,693	2,322	10,015	77	11,033	4,321	15,354	72	25,369
1982	6,204	1,913	8,117	76	12,701	4,247	16,948	75	25,065
1983	8,636	2,210	10,846	80	13,727	5,278	19,005	72	29,851
1984	5,482	1,527	7,009	78	15,774	4,680	20,454	77	27,463
1985	10,553	3,042	13,595	78	20,371	7,450	27,821	73	41,416
1986	11,264	5,288	16,552	68	37,177	9,979	47,156	79	63,708
1987	13,206	4,725	17,931	74	50,681	11,381	62,062	82	79,993
1988	14,819	6,901	21,720	68	39,279	13,203	52,482	75	74,202
1989	12,005	4,350	16,355	73	32,937	12,036	44,973	73	61,328
1990	9,851	4,522	14,373	69	56,330	10,499	66,829	84	81,202
1991	12,764	3,069	15,833	81	27,272	9,797	37,069	74	52,902
1992	12,677	3,098	15,775	80	32,877	9,365	42,242	78	58,017
1993	15,501	3,782	19,283	80	22,779	9,117	31,896	71	51,179
1994	20,176	5,113	25,289	80	52,650	9,024	61,674	85	86,963
1995	15,625	7,321	22,946	68	49,042	13,980	63,023	78	85,969
1996	16,587	5,524	22,111	75	45,328	8,718	54,046	84	76,157
mean 91-95	15,349	4,477	19,825	78	36,924	10,257	47,181	77	67,006

Table 28. Landings by inshore and large seiners by fishing season.

	Spring				Fall				4Vn	Spring + Fall (including 4Vn)			
Year	Inshore	L. Seiner	Total	Percent Inshore	Inshore	L. Seiner	Total	Percent Inshore	L. Seiner	Fixed	L. Seiner	Total	Percent Inshore
1978	8,547	8,047	16,594	52	5,141	31,755	36,896	14	2,849	13,688	42,651	56,339	24
1979	7,624	13,902	21,526	35	6,075	20,619	26,694	23	2,910	13,699	37,431	51,130	27
1980	7,272	13,917	21,189	34	6,545	17,812	24,357	27	3,851	13,817	35,580	49,397	28
1981	7,501	21	7,522	100	11,225	3,188	14,413	78	3,434	18,726	6,643	25,369	74
1982	5,923	62	5,985	99	12,982	2,578	15,560	83	3,520	18,905	6,160	25,065	75
1983	8,523	19	8,542	100	13,840	3,489	17,329	80	3,980	22,363	7,488	29,851	75
1984	5,282	4	5,286	100	15,974	2,278	18,252	88	3,925	21,256	6,207	27,463	77
1985	7,217	0	7,217	100	23,707	7,022	30,729	77	3,470	30,924	10,492	41,416	75
1986	8,550	0	8,550	100	39,891	10,915	50,806	79	4,352	48,441	15,267	63,708	76
1987	11,759	0	11,759	100	52128	13,734	65,862	79	2,372	63,887	16,106	79,993	80
1988	12,887	1	12,888	100	41,211	17,531	58,742	70	2,572	54,098	20,104	74,202	73
1989	11,093	0	11,093	100	33,849	14,269	48,118	70	2,117	44,942	16,386	61,328	73
1990	9,060	1	9,061	100	57121	10,309	67,430	85	4,711	66,181	15,021	81,202	82
1991	12,892	18	12,910	100	27,144	8,059	35,203	77	4,789	40,036	12,866	52,902	76
1992	12,475	1,121	13,596	92	33,079	7,115	40,194	82	4,228	45,554	12,464	58,018	79
1993	15,182	2,716	17,898	85	23,098	6,228	29,326	79	3,955	38,280	12,899	51,179	75
1994	19,014	3,933	22,947	83	53,812	6,960	60,772	89	3,244	72,826	14,137	86,963	84
1995	13,995	1,825	15,820	88	54,735	15,266	70,001	78	4,143	68,730	21,234	89,964	76
1996	16,096	1,907	18,003	89	45,803	8,023	53,826	85	4,267	61,899	14,197	76,096	81
Mean 91-95	14,712	1,923	16,634	90	38,374	8,726	47,099	81	4,072	53,085	14,720	67,805	78

Table 29. Average price paid per pound to purse seiners and gillnetters in the Gulf Region, spring and fall fisheries combined.. na = not available.

Year	Purse Seine (cents/lb)	Gillnets (cents/lb)
83	9.44	na/nd
84	8.08	na/nd
85	9.10	na/nd
86	8.07	na/nd
87	9.04	12.00
88	7.15	8.00
89	5.00	3.00-4.00
90	6.21	5.00-6.00
91	5.65	3.00-4.00
92	5.60	3.00-4.00
93	5.00	3.00-4.00
94	5.50	6.00-8.00
95	6.50	10.00-12.00
96	7.60	14.20

Table 30. Average length of gillnets (fathoms) used in the 1996 herring fishery.
Tableau 30. Longueur moyenne des filets maillants (en brasses) utilisés dans la pêche au hareng en 1996

Area\Région	Spring\Printemps	Fall\Automne
Mag Is\Iles Mad.	18.9	18.4
Quebec	32.4	18.9
Ac Pen\Pén. Acad.	13.9	15.1
Escuminac	17.5	15.9
SE NB	18.0	-
NS\NE	15.4	19.3
EPEI\I.P.E. est	14.0	16.6
WPEI\I.P.E. ouest	15.5	17.1

Table 31. Percent distribution of gillnet types used in the 1995 herring fishery.
Tableau 31. Distribution en pourcentage des types de filets maillants utilisés dans la pêche au hareng en 1995

	Spring/ Printemps %		Fall/ Automne %	
Area\Région	Set/ Ancré	Modified/ Modifé	Set/ Ancré	Modified/ Modifé
Mag Is\Iles Mad.	100.0	0.0	0.0	100.0
Quebec	92.0	8.0	61.3	38.7
Ac Pen\Pén. Acad.	98.2	1.8	4.2	95.8
Escuminac	99.0	1.0	83.3	16.7
SE NB	100.0	0.0	-	-
NS\NE	100.0	0.0	98.2	1.8
EPEI\I.P.E. est	100.0	0.0	100.0	0.0
WPEI\I.P.E. ouest	100.0	0.0	87.7	12.3

Table 32. Acoustic survey biomass-at-age (t) for fall spawners from Chaleur-Miscou strata, 1990-1996.
Tableau 32. Relevés acoustique, biomasse à l'âge (tonnes) pour les géniteurs d'automne, estimée pour les strates de Chaleur-Miscou, 1990-1996.

AGE	1990	1991	1992	1993	1994	1995	1996
0	0	0	0	0	0	0	0
1	16281	26	0	0	54	2	2232
2	126196	482	2088	592	238	1075	11192
3	86213	6400	2567	13010	1230	2510	18727
4	27005	11349	23612	7349	52424	2208	43666
5	0	2930	46537	8485	18106	16291	9873
6	0	1155	10826	36234	20328	3199	31206
7	0	851	3971	8247	22716	8054	6122
8	0	1435	4448	0	3212	8234	2748
9	0	831	1549	636	1980	1280	5360
10	0	362	3258	0	0	303	2878
11	0	1336	3981	0	1721	145	0
Total	255694	27158	102836	74552	122008	43300	134003
4+	27005	20249	98181	60950	120486	39713	101852

Table 33. Acoustic survey same strata coverage fall spawners biomass-at-age (t) for Chaleur-Miscou, 1994-1996.
Tableau 33. Relevés acoustiques, biomasse par age (t), géniteurs d'automne, pour les mêmes strates couvertes pendant les 3 années, 1994 à 1996.

AGE	1994	1995	1996
0	0	0	0
1	48	2	1631
2	212	1075	8178
3	1097	2510	13685
4	46744	2208	31908
5	16144	16291	7215
6	18126	3199	22803
7	20255	8054	4474
8	2864	8234	2008
9	1765	1280	3916
10	0	303	2103
11	1534	145	0
Total	108788	43300	97921
4+	107431	39713	74427
Percentage/ Pourcentage of Chaleur-Miscou/	89	100	73

Table 34. Acoustic survey biomass-at-age (t) for spring spawners from Chaleur-Miscou strata, 1990-1996.
Tableau 34. Relevés acoustique, biomasse à l'âge (tonnes) pour les géniteurs de printemps, estimée pour les strates de Chaleur-Miscou, 1990-1996.

Age	1990	1991	1992	1993	1994	1995	1996
0	675	0	0	0	351	2	1697
1	184063	1255	5572	1635	37	1006	2452
2	323726	4884	5200	25778	433	5819	36441
3	25128	2919	5253	2799	22840	833	17625
4	2831	1341	15868	6654	9778	6334	3403
5	1416	416	4079	6918	9286	534	20183
6	3738	245	2284	0	9596	2815	1287
7	0	391	789	0	2581	1873	4567
8	0	355	1458	0	154	761	1678
9	1774	452	642	0	1152	398	0
10	0	138	859	0	517	0	0
11	0	386	0	0	691	0	0
Total	543350	12780	42004	43784	57415	20376	89332
4+	9758	3723	25978	13572	33755	12715	31117

Table 35. Acoustic survey same strata coverage fall spawners biomass-at-age (t) for Chaleur-Miscou, 1994-1996.
Tableau 35. Relevés acoustiques, biomasse par age (t), géniteurs d'automne, pour les mêmes strates couvertes pendant les 3 années, 1994 à 1996.

AGE	1994	1995	1996
0	313	2	1240
1	33	1006	1792
2	386	5819	26629
3	20365	833	12879
4	8718	6334	2486
5	8280	534	14748
6	8556	2815	940
7	2302	1873	3337
8	138	761	1226
9	1027	398	0
10	461	0	0
11	616	0	0
Biomass	51195	20376	65278
Biomass	30098	12715	22738
Percentage of Chaleur-Miscou/ Pourcentage de Chaleur-Miscou	89	100	73

Table 36. 1996 Acoustic Survey stratum and per area herring biomass densities and estimates.
Tableau 36. Relevé acoustique 1996, densités et estimés de biomasse de hareng par strate et région.

Area and Stratum	Average TS	Stratum Area	Weighted	Biomass	Biomass Index per Stratum			Set Number
					Total (tons)	SE (tons)	SE % of Total	
CHALEUR-MISCOU INSHORE								
PTE_SECHE	-34.9	65.9	-52.40	0.0176	1162	997	86	
RIV_RENARD	-34.9	124.6	-50.72	0.0260	3239	1656	51	
CAP_BON_AMI	-34.9	109.8	-60.03	0.0030	335	105	31	
LA_MALBAIE	-34.9	191.2	-67.46	0.0005	105	47	44	
ANSE_BEAUFILS	-34.9	191.9	-66.27	0.0007	139	24	18	
GDE_RIVIERE	-34.9	173.8	-45.54	0.0857	14891	4304	29	
NEWPORT	-34.9	187.0	-52.19	0.0185	3459	1248	36	
SHIGAWAKE	-34.9	323.3	-45.67	0.0832	26885	5541	21	4,5,6,8
MAISONNETTE	-35.4	137.5	-39.24	0.4098	56353	12150	22	2,12
NEPISIGUIT	-34.4	278.0	-45.30	0.0820	22804	16432	72	3,11
WEST_MISCOU	-34.7	354.0	-48.12	0.0457	16188	2188	14	13,14,15
NORTH_MISCOU	-34.6	417.8	-44.76	0.0957	39980	23551	59	17
NEW_CARLISLE	-34.8	167.0	-47.42	0.0542	9059	2053	23	
BELLEDUNE	-33.5	348.0	-48.31	0.0331	11521	2342	20	10
NEW_RICHMOND	-33.5	253.6	-50.86	0.0184	4658	811	17	
MISCOU_NW	-34.6	524.0	-60.40	0.0026	1370	757	55	
MISCOU_SW	-34.2	524.0	-54.20	0.0099	5192	2106	41	
TRACADIE_WEST	-34.2	524.0	-47.44	0.0470	24653	20549	83	18
TOTAL		4895.5			241993			
Mean				0.0494		38331		
Mean CV							0.16	
CHALEUR-MISCOU OFFSHORE								
GASPE_OFF	-34.9	150.0	-63.61	0.0013	200	65	33	
AMERICAN_BK	-34.9	187.4	-59.71	0.0033	614	535	87	
CENTRAL_CHALEUR	-35.4	208.0	-61.05	0.0027	562	256	46	
CARLISLE_OFF	-34.8	410.4	-58.30	0.0044	1815	1104	61	9
RICHMOND_OFF	-33.5	350.1	-56.94	0.0045	1589	653	41	
MISCOU_NE	-34.6	524.0	-66.70	0.0006	321	220	69	
MISCOU_SE	-34.2	524.0	-53.10	0.0128	6682	3751	56	
TRACADIE_EAST	-34.2	524.0	-56.16	0.0063	3307	1424	43	
TOTAL		2877.9			15090			
Mean				0.0052		4260		
Mean CV							0.28	
PEI-PICTOU-GEORGES								
NORTH_CAPE	-33	415.9	-55.31	0.0058	2429	1823	75	
CASCUMPEC	-33	515.0	-55.56	0.0055	2839	351	12	
MALPEQUE	-33	489.3	-55.67	0.0054	2630	407	15	
STANHOPE	-33	230.0	-48.39	0.0287	6601	1048	16	
SAVAGE_HBR	-33	231.8	-46.87	0.0407	9440	2661	28	
MONTICELLO	-33	260.6	-46.44	0.0450	11718	9844	84	
EAST_POINT	-33	180.3	-47.47	0.0355	6405	4169	65	
MILNE	-33	312.5	-47.38	0.0362	11310	3499	31	19,20
EAST_PEI	-33	557.8	-57.85	0.0033	1815	475	26	
FISHERMAN'S_BK	-31.6	222.1	-57.61	0.0025	555	218	39	
RIDGE	-31.6	125.2	-52.88	0.0074	928	458	49	
PICTOU	-31.6	555.8	-54.68	0.0049	2727	292	11	23,24,25
CAPE_GEORGE	-31.6	190.6	-51.53	0.0101	1929	822	43	
ST.GEORGE_W	-31.6	352.6	-56.52	0.0032	1131	484	43	
ST.GEORGE_E	-31.6	283.6	-60.21	0.0014	389	69	18	
TOTAL		4923.1			62846			
Mean				0.0128		11824		
Mean CV							0.19	
CAPE BRETON								
ASPY_BAY	-35.5	168.3	-47.04	0.0701	11805	2950	25	99*
WRECK_COVE	-35.5	109.7	-61.275	0.0026	290	268	92	
ST_ANNS	-35.5	159.0	-69.087	0.0004	70	34	48	
HADDOCK_BK	-35.5	94.9	-53.416	0.0162	1534	509	33	
SYDNEY	-35.5	168.6	-49.18	0.0429	7226	2818	39	
NEW_WATERFORD	-35.5	141.3	-57.25	0.0067	944	644	68	
TOTAL		841.8			21869			
Mean				0.026		4170		
Mean CV							0.19	

* Commercial seiner samples used to determine catch composition. / Echantillons de la pêche des grands seineurs utilisés.

Table 37. Acoustic survey herring total biomass density and estimates in the Southern Gulf of St. Lawrence, 1991-1996.
Tableau 37. Densités et estimés totales de biomasse provenant des relevés acoustiques dans le sud du golfe du Saint.-Laurent, 1991-1996.

Date	Area	Number of Transects	Proportion surveyed at night	Mean Density (kg/m^2)	Biomass Index (t/area)	C.V.	Proportion of biomass observed at night
1996	CHALEUR-MISCOU INSHORE	142	1	0.0494	241992	0.16	1
Sept 24-	CHALEUR-MISCOU OFFSHORE	36	1	0.0052	15090	0.28	1
16-Oct	PEI-PICTOU-GEORGES	55	1	0.0128	62846	0.19	1
	CAPE BRETON INSHORE	28	1	0.0260	21869	0.19	1
	1996 TOTAL	**261**	**1**	**0.0252**	**341797**	**0.12**	**1**
1995	CHALEUR-MISCOU INSHORE	98	1	0.0181	62229	0.22	1
Sept 23-	CHALEUR-MISCOU OFFSHORE	18	1	0.0058	9156	0.20	1
8-Oct	MILNE - GEORGES	21	1	0.0083	10564	--	1
	CAPE BRETON INSHORE	35	1	0.0066	7295	0.50	1
	1995 TOTAL	**172**	**1**	**0.0121**	**89244**	**0.16**	**1**
1994	CHALEUR-MISCOU INSHORE &	106	1	0.0415	162585	0.11	1
Oct 16-28	CHALEUR-MISCOU OFFSHORE &&	27	1	0.0063	16838	0.34	1
	1994 TOTAL	**133**	**1**	**0.0272**	**179423**	**0.10**	**1**
1993	CHALEUR-MISCOU INSHORE &	163	0.71	0.0202	114052	0.35	0.93
Oct 2-20	CHALEUR-MISCOU OFFSHORE &&	45	0.02	0.0010	4284	0.41	0
	CAPE BRETON INSHORE	91	0.84	0.0039	7945	0.23	0.68
	CAPE BRETON OFFSHORE	39	0.18	0.0019	4567	0.41	0.09
	1993 TOTAL	**338**	**0.58**	–	**130848**	**0.31**	**0.85**
1992	CHALEUR-MISCOU INSHORE	216	0.57	0.0207	48258	0.10	0.65
Oct 1-22	CHALEUR-MISCOU OFFSHORE &&&	102	0.48	0.0078	96582	0.52	0.75
	CAPE BRETON INSHORE	78	0.58	0.0227	44762	0.25	0.85
	CAPE BRETON OFFSHORE	22	0.14	0.0008	83	0.69	0
	1992 TOTAL	**418**	**0.53**	–	**189685**	**0.29**	**0.75**
1991	CHALEUR-MISCOU INSHORE	158	0.59	0.0054	16724	0.46	0.87
Oct 10-24	CHALEUR-MISCOU OFFSHORE &&&	50	0.32	0.0015	23214	0.55	0.65
	CAPE BRETON INSHORE	49	0.61	0.0026	4418	0.32	0.98
	CAPE BRETON OFFSHORE	0	0	0.0000	0	0.00	0
	1991 TOTAL	**257**	**0.54**		**44356**	**0.33**	**0.75**

Table 38. Acoustic survey Chaleur - Miscou same strata comparison of transect length surveyed, proportion with herring backscatter detected and resulting biomass estimates.
Tableau 38. Comparaison de la distance et proportion de difusion acoustique détectée, pour mêmes strates de Chaleur - Miscou.

Stratum	Transect Length (km)	Distance (km) with backscatter	Proportion of total distance with backscatter	Biomass index per stratum (t)
1996 Survey				
Grande Riviere	74.80	11.6	0.155	14891
Shigawake	128.86	15.4	0.120	26885
Newport	79.24	5.3	0.067	3459
New Carlilse	52.40	16.8	0.321	9059
New Richmond	37.22	11.2	0.301	4658
Belledune	35.39	21.0	0.593	11521
Maisonnette	68.34	22.3	0.326	56353
Nepisiguit	82.69	21.4	0.259	22804
E Miscou NW	89.10	7.5	0.084	1370
E Miscou NE	63.24	0.4	0.006	321
E Miscou SW	90.85	6.0	0.066	5192
E Miscou SE	63.06	1.1	0.017	6682
1996 TOTAL	**865.19**	**140.0**	**0.162**	**163195**
1995 Survey				
Grande Riviere	64.54	4.1	0.064	1803
Shigawake	122.99	13.0	0.105	6959
Newport	72.52	7.8	0.108	5970
New Carlilse	57.10	15.1	0.264	3042
New Richmond	41.97	0.6	0.014	1465
Belledune	40.05	3.4	0.085	3923
Maisonnette	73.94	5.6	0.075	7936
Nepisiguit	79.37	20.1	0.253	9440
E Miscou SE	50.60	4.2	0.083	2598
E Miscou SW	91.29	0.6	0.007	2537
E Miscou NW	88.19	14.6	0.166	16234
E Miscou NE	75.74	3.9	0.051	1769
1995 TOTAL	**858.28**	**92.9**	**0.108**	**63676**
1994 Survey				
Grande_Riviere	61.39	0.4	0.007	895
Shigawake	100.20	33.6	0.335	55252
Newport	85.63	5.4	0.063	9497
New_Carlilse	68.52	27.8	0.406	14533
New_Richmond	84.54	1.3	0.015	3524
Belledune	53.42	17.1	0.320	23978
Maisonnette	69.60	15.9	0.228	22003
Nepisiguit	66.32	35.1	0.529	30301
East_Miscou_NW	75.96	0.0	0.000	0
East_Miscou_NE	78.32	0.0	0.000	0
East_Miscou_SW	61.73	0.0	0.000	0
East_Miscou_SE	50.47	0.0	0.000	0
1994 TOTAL	**856.10**	**136.6**	**0.160**	**159983**

Table 39. 1996 Acoustic Survey Chaleur - Miscou transect backscatter and biomass density.
Tableau 39. Difusion acoustique et biomasse, relevé acoustique 1996, Chaleur - Miscou.

Stratum Date (DD-MM) Location	Transect Number	Transect Length (km)	Target Strength (dB/kg)	Average Sa ($\overline{dB/m^2}$)	Biomass Density (kg/m^2)	Set Number
PTE_SECHE	8	1.867	-34.87	-56.001	0.0077	
24-09	9	2.189	-34.87	-63.507	0.0014	
Inshore	10	2.411	-34.87	-65.459	0.0009	
	11	2.39	-34.87	-63.635	0.0013	
	12	2.224	-34.87	-1010.461	0	
	13	2.702	-34.87	-1011.306	0	
	14	2.284	-34.87	-73.143	0.0001	
	15	2.484	-34.87	-43.987	0.1224	
RIV_RENARD	16	2.655	-34.87	-61.355	0.0022	
24-09	17	2.577	-34.87	-49.358	0.0355	
25-09	18	2.335	-34.87	-44.927	0.0986	
Inshore	19	2.295	-34.87	-53.134	0.0149	
	20	2.65	-34.87	-46.145	0.0745	
	21	2.793	-34.87	-60.037	0.003	
	22	3.505	-34.87	-60.438	0.0028	
	23	3.917	-34.87	-59.629	0.0033	
CAP_BON_A	24	8.239	-34.87	-57.228	0.0058	
25-09	25	9.964	-34.87	-63.875	0.0013	
Inshore	26	9.463	-34.87	-60.266	0.0029	
	27	7.597	-34.87	-60.701	0.0026	
GASPE_OFF	28	10.004	-34.87	-65.876	0.0008	
25-09	29	11.207	-34.87	-62.505	0.0017	
Offshore	30	12.81	-34.87	-61.394	0.0022	
	35	9.968	-34.87	-70.038	0.0003	
AMERICAN_B	31	5.306	-34.87	-74.109	0.0001	
25-09	32	10.054	-34.87	-54.198	0.0117	
Offshore	33	10.907	-34.87	-69.517	0.0003	
	34	11.694	-34.87	-71.163	0.0002	
LA_MALBAIE	36	8.253	-34.87	-69.269	0.0004	
25/26-09	37	14.992	-34.87	-64.126	0.0012	
Inshore	38	10.753	-34.87	-75.312	0.0001	
	39	10.658	-34.87	-70.647	0.0003	
ANSE_BEAUF	40	6.539	-34.87	-65.411	0.0009	
26-09	41	6.924	-34.87	-69.353	0.0004	
Inshore	42	10.428	-34.87	-66.506	0.0007	
	43	10.538	-34.87	-65.298	0.0009	
GDE_RIVIERE	44	7.672	-34.87	-60.02	0.0031	
26/27-09	45	8.41	-34.87	-44.963	0.0978	
Inshore	46	8.261	-34.87	-52.126	0.0188	
	47	9.204	-34.87	-48.025	0.0483	
	48	8.971	-34.87	-47.549	0.0539	
	49	9.234	-34.87	-48.942	0.0391	
	51	8.068	-34.87	-41.563	0.2139	
	52	7.557	-34.87	-43.377	0.1409	
	53	7.423	-34.87	-42.337	0.179	
NEWPORT	54	8.299	-34.87	-50.997	0.0244	
27-09	55	10.674	-34.87	-49.985	0.0308	
Inshore	56	7.386	-34.87	-46.602	0.067	
	57	9.652	-34.87	-54.302	0.0114	
	58	9.21	-34.87	-59.168	0.0037	
	59	9.429	-34.87	-58.741	0.0041	
	60	9.249	-34.87	-55.339	0.009	
	61	8.457	-34.87	-55.267	0.0091	
	62	6.882	-34.87	-53.356	0.0142	

Table 39. Chaleur - Miscou Con't.... Suite....

Stratum Date (DD-MM) Location	Transect Number	Transect Length (km)	Target Strength (dB/kg)	Average Sa (dB/m^2)	Biomass Density (kg/m^2)	Set Number
SHIGAWAKE	63	7.115	-34.87	-49.454	0.0348	
30-09 / 01-10	120	6.518	-34.87	-71.268	0.0002	6
Inshore	121	7.131	-34.87	-69.853	0.0003	
	122	7.78	-34.87	-61.786	0.002	4
	124	8.441	-34.87	-72.623	0.0002	
	125	9.391	-34.87	-51.176	0.0234	
	126	9.647	-34.87	-44.681	0.1043	5
	127	9.631	-34.87	-41.373	0.2235	
	128	10.28	-34.87	-43.146	0.1485	
	129	7.881	-34.87	-43.762	0.1289	8
	130	6.859	-34.87	-43.287	0.1438	
	131	6.493	-34.87	-45.316	0.0901	
	132	6.423	-34.87	-43.896	0.125	
	133	5.735	-34.87	-49.96	0.0309	
	134	6.337	-34.87	-43.261	0.1447	
	135	6.92	-34.87	-52.207	0.0184	
	136	6.275	-34.87	-43.159	0.1481	
MAISONNETT	80	6.78	-35.37	-47.943	0.0553	
28-09	81	6.295	-35.37	-42.657	0.1868	
Inshore	82	6.074	-35.37	-41.766	0.2293	
	83	5.831	-35.37	-40.789	0.2872	
	84	5.524	-35.37	-40.832	0.2843	
	85	5.024	-35.37	-36.567	0.7591	2
	86	4.456	-35.37	-37.989	0.5471	
	87	4.386	-35.37	-41.145	0.2645	
	88	4.681	-35.37	-40.904	0.2796	
	89	4.376	-35.37	-39.87	0.3548	12
	90	4.811	-35.37	-40.722	0.2916	
	92	4.777	-35.37	-36.583	0.7563	
	93	5.329	-35.37	-34.485	1.2259	
NEPISIGUIT	94	5.937	-34.44	-36.47	0.6268	
29-09	95	6.004	-34.44	-43.633	0.1205	11
Inshore	96	6.802	-34.44	-47.296	0.0518	
	97	7.096	-34.44	-48.262	0.0415	
	98	8.524	-34.44	-47.534	0.0491	
	99	9.519	-34.44	-47.547	0.0489	
	100	10.89	-34.44	-50.382	0.0255	
	102	10.765	-34.44	-51.165	0.0213	
	103	8.934	-34.44	-50.327	0.0258	
	104	8.217	-34.44	-55.053	0.0087	3
WEST_MISCO	105	7.049	-34.72	-46.218	0.0709	
29/30-09	106	7.375	-34.72	-46.272	0.07	13
Inshore	107	7.255	-34.72	-46.361	0.0685	
	108	8.67	-34.72	-47.723	0.0501	
	109	11.49	-34.72	-49.35	0.0344	
	110	13.951	-34.72	-47.288	0.0554	14
	111	12.477	-34.72	-48.82	0.0389	
	112	10.514	-34.72	-50.53	0.0262	
	113	9.663	-34.72	-53.699	0.0127	
	114	11.024	-34.72	-49.704	0.0318	
	115	8.369	-34.72	-46.297	0.0696	15
NORTH_MISC	116	13.48	-34.57	-50.227	0.0272	
30-09	117	12.289	-34.57	-48.39	0.0415	
Inshore	118	13.505	-34.57	-48.876	0.0371	
	119	14.452	-34.57	-40.413	0.2604	17

Table 39. Chaleur - Miscou Con't.... Suite....

Stratum Date (DD-MM) Location	Transect Number	Transect Length (km)	Target Strength (dB/kg)	Average Sa (dB/m^2)	Biomass Density (kg/m^2)	Set Number
CENTRAL_CH	137	9.963	-35.37	-59.834	0.0036	
1-Oct	138	10.262	-35.37	-57.876	0.0056	
Offshore	139	8.758	-35.37	-73.978	0.0001	
	140	10.336	-35.37	-64.785	0.0011	
NEW_CARLIS	141	7.102	-34.76	-49.561	0.0331	
1-Oct	142	7.094	-34.76	-50.881	0.0244	
Inshore	143	6.931	-34.76	-48.353	0.0437	
	144	5.282	-34.76	-49.227	0.0358	
	145	5.284	-34.76	-47.974	0.0477	
	146	4.647	-34.76	-47.471	0.0536	
	147	4.391	-34.76	-44.524	0.1056	
	148	4.754	-34.76	-51.581	0.0208	
	149	6.915	-34.76	-43.723	0.127	
CARLISLE_OF	150	15.604	-34.76	-59.285	0.0035	9
3-Oct	151	17.834	-34.76	-61.471	0.0021	
Offshore	153	9.677	-34.76	-52.842	0.0156	
	156	11.436	-34.76	-58.27	0.0045	
	157	12.695	-34.76	-71.274	0.0002	
BELLEDUNE	154	8.204	-33.51	-47.59	0.039	
3-Oct	155	8.573	-33.51	-46.912	0.0456	
Inshore	158	5.062	-33.51	-47.583	0.0391	10
	160	4.533	-33.51	-47.544	0.0395	
	161	4.285	-33.51	-53.838	0.0093	
	162	4.737	-33.51	-53.85	0.0092	
NEW_RICHM	163	4.765	-33.51	-50.51	0.0199	
3-Oct	165	8.168	-33.51	-48.918	0.0288	
Inshore	166	6.471	-33.51	-54.493	0.008	
	169	5.512	-33.51	-53.314	0.0104	
	170	5.987	-33.51	-51.367	0.0164	
	173	6.315	-33.51	-49.844	0.0232	
RICHMOND_O	167	13.193	-33.51	-53.546	0.0099	
4-Oct	168	12.938	-33.51	-57.997	0.0036	
Offshore	171	13	-33.51	-58.675	0.003	
	172	12.34	-33.51	-62.007	0.0014	
MISCOU_NW	174	12.762	-34.57	-65.022	0.0009	
4/5-Oct	177	12.745	-34.57	-66.355	0.0007	
Inshore	178	12.438	-34.57	-69.258	0.0003	
	181	12.824	-34.57	-54.308	0.0106	
	182	12.541	-34.57	-58.05	0.0045	
	183	12.36	-34.57	-68.804	0.0004	
	184	13.433	-34.57	-65.206	0.0009	
MISCOU_NE	175	13.791	-34.57	-76.449	0.0001	
4/5-Oct	176	12.571	-34.57	-74.799	0.0001	
Offshore	179	12.468	-34.57	-72.538	0.0002	
	180	12.971	-34.57	-66.324	0.0007	
	185	11.434	-34.57	-61.004	0.0023	
MISCOU_SE	186	11.963	-34.16	-72.122	0.0002	
5/6-Oct	198	12.225	-34.16	-50.212	0.0248	
Offshore	199	12.917	-34.16	-48.747	0.0348	
	200	13.094	-34.16	-62.909	0.0013	
	201	12.858	-34.16	-60.183	0.0025	
MISCOU_SW	188	12.536	-34.16	-66.52	0.0006	
5/6-Oct	189	13.021	-34.16	-67.654	0.0004	
Inshore	190	12.91	-34.16	-59.224	0.0031	
	191	12.93	-34.16	-52.557	0.0145	
	192	13.4	-34.16	-49.911	0.0266	
	193	12.867	-34.16	-51.065	0.0204	
	194	13.189	-34.16	-59.244	0.0031	

Table 39. Chaleur - Miscou Con't.... Suite....

Stratum Date (DD-MM) Location	Transect Number	Transect Length (km)	Target Strength (dB/kg)	Average Sa (dB/m^2)	Biomass Density (kg/m^2)	Set Number
TRACADIE_E	195	12.879	-34.16	-54.736	0.0088	
6/7-Oct	196	12.734	-34.16	-52.144	0.0159	
Offshore	206	13.251	-34.16	-58.84	0.0034	
	207	13.06	-34.16	-59.285	0.0031	
	210	13.171	-34.16	-65.285	0.0008	
TRACADIE_W	202	12.817	-34.16	-57.594	0.0045	
6/7-Oct	203	12.705	-34.16	-55.45	0.0074	
Inshore	204	12.739	-34.16	-50.82	0.0216	18
	205	12.508	-34.16	-40.299	0.2433	
	208	12.598	-34.16	-54.789	0.0087	
	209	12.951	-34.16	-64.731	0.0009	

Table 40. 1996 Acoustic Survey Cape Breton transect backscatter and biomass density. Difusion acoustique et biomasse, relevé acoustique 1996, Cap Breton.

Stratum Date (DD-MM) Location	Transect Number	Transect Length (km)	Target Strength (dB/kg)	Average Sa (dB/m^2)	Biomass Density (kg/m^2)	Set Number
ASPY_BAY	288	3.832	-35.5	-42.631	0.1936	
14-10	290	4.301	-35.5	-46.303	0.0831	
Inshore	291	6.254	-35.5	-49.436	0.0404	
	292	7.859	-35.5	-50.276	0.0333	99*
	294	11.103	-35.5	-46.862	0.0731	
	296	11.816	-35.5	-46.816	0.0739	
	298	11.758	-35.5	-47.464	0.0636	
	299	11.633	-35.5	-47.332	0.0656	
WRECK_COVE	314	8.624	-35.5	-72.457	0.0002	
15-10	315	8.768	-35.5	-84.305	0	
Inshore	316	8.809	-35.5	-55.574	0.0098	
	317	7.253	-35.5	-88.478	0	
ST_ANNS	309	7.032	-35.5	-71.334	0.0003	
14/15-10	310	7.49	-35.5	-69.043	0.0004	
Inshore	311	8.351	-35.5	-65.473	0.001	
	313	8.197	-35.5	-87.424	0	
HADDOCK_BK	304	9.082	-35.5	-53.856	0.0146	
14-10	305	9.977	-35.5	-52.72	0.019	
Inshore	307	10.994	-35.5	-50.677	0.0304	
	308	14.515	-35.5	-59.018	0.0044	
SYDNEY	301	14.002	-35.5	-47.646	0.061	
14-10	302	12.73	-35.5	-46.667	0.0764	
Inshore	319	12.506	-35.5	-54.339	0.0131	
	320	9.603	-35.5	-55.213	0.0107	
NEW_WATERFORD	323	9.175	-35.5	-52.437	0.0202	
16-10	324	8.551	-35.5	-64.652	0.0012	
	326	8.243	-35.5	-60.655	0.0031	
	327	10.185	-35.5	-62.495	0.002	

* Commercial seiner samples used for catch composition. / Echantillons des grands seineurs utilisés.

Table 41. 1996 Acoustic Survey PEI - Pictou transect backscatter and biomass density.
Difusion acoustique et biomasse, relevé acoustique 1996, IPE - Pictou.

Stratum Date (DD-MM) Location	Transect Number	Transect Length (km)	Target Strength (dB/kg)	Average Sa (dB/m^2)	Biomass Density (kg/m^2)	Set Number
NORTH_CAPE	212	9.413	-32.97	-61.143	0.0015	
8-Oct	213	9.787	-32.97	-57.146	0.0038	
Inshore	214	7.744	-32.97	-50.093	0.0194	
	215	8.87	-32.97	-63.859	0.0008	
CASCUMPEC	216	19.133	-32.97	-54.83	0.0065	
8-Oct	217	21.277	-32.97	-55.201	0.006	
Inshore	218	23.262	-32.97	-56.68	0.0043	
MALPEQUE	219	14.686	-32.97	-57.174	0.0038	
8-Oct	220	14.272	-32.97	-54.831	0.0065	
Inshore	222	11.216	-32.97	-55.199	0.006	
STANHOPE	224	11.162	-32.97	-47.272	0.0371	
8/9-Oct	225	11.717	-32.97	-48.051	0.031	
Inshore	227	10.121	-32.97	-48.375	0.0288	
	228	9.305	-32.97	-51.062	0.0155	
SAVAGE_HBR	230	8.346	-32.97	-44.768	0.0661	
9-Oct	231	7.807	-32.97	-46.814	0.0413	
Inshore	232	7.225	-32.97	-47.019	0.0394	
	233	6.706	-32.97	-52.977	0.01	
MONTICELLO	234	6.356	-32.97	-55.578	0.0055	
9-Oct	235	6.358	-32.97	-57.004	0.004	
Inshore	236	6.065	-32.97	-56.388	0.0046	
	237	6.831	-32.97	-41.046	0.1558	
EAST_POINT	279	8.039	-32.97	-42.98	0.0998	
13-Oct	281	6.313	-32.97	-53.403	0.0091	
Inshore	282	6.137	-32.97	-56.204	0.0047	
	284	5.876	-32.97	-53.819	0.0082	
MILNE	239	15.413	-32.97	-49	0.0249	19
10-Oct	240	15.215	-32.97	-48.708	0.0267	
Inshore	241	15.107	-32.97	-49.312	0.0232	
	243	15.369	-32.97	-44.541	0.0696	20
EAST_PEI	245	20.562	-32.97	-58.78	0.0026	
10-Oct	246	20.004	-32.97	-57.635	0.0034	
Inshore	248	21.474	-32.97	-55.578	0.0055	
	266	20.972	-32.97	-61.406	0.0014	
FISHERMAN'S_BK	249	14.933	-31.59	-62.067	0.0009	
11/12-Oct	261	14.434	-31.59	-57.991	0.0023	
Inshore	262	11.829	-31.59	-58.18	0.0022	
	264	10.171	-31.59	-54.174	0.0055	
RIDGE	265	5.063	-31.59	-50.491	0.0129	
12-Oct	267	5.034	-31.59	-64.993	0.0005	
Inshore	278	5.013	-31.59	-52.094	0.0089	
PICTOU	252	12.511	-31.59	-56.129	0.0035	
11-Oct	253	20.179	-31.59	-54.386	0.0052	23
Inshore	254	19.181	-31.59	-55.113	0.0044	24
	256	18.75	-31.59	-53.842	0.0059	25
CAPE_GEORGE	257	13.684	-31.59	-53.996	0.0057	
11/12-Oct	259	9.559	-31.59	-48.709	0.0194	
Inshore	269	1.757	-31.59	-62.484	0.0008	
	270	1.435	-31.59	-59.747	0.0015	
ST.GEORGE_W	271	21.024	-31.59	-53.829	0.006	
12/13-Oct	272	22.571	-31.59	-59.411	0.0016	
Inshore	273	20.129	-31.59	-58.413	0.0021	
ST.GEORGE_E	275	20.572	-31.59	-60.155	0.0014	
12/13-Oct	276	15.152	-31.59	-59.018	0.0018	
Inshore	277	16.731	-31.59	-61.76	0.001	

Table 42 . Mean lengths and weights, spawning group and target strength of herring from 1996 acoustic survey samples.
Tableau 42. Longueurs et poids moyens, groupe géniteur et indice de réflexion acoustique des échantillons receuillis en 1996.

Strata	Mean Lenght (cm)	Number sampled	Weight at Mean Length (g)	Length-Weight Relation	Percent of Fall Spawners by Weight	Target Strength (dB/Kg)
1996						
CHALEUR-MISCOU						
Belledune	20.7	53	62.0	$0.00417*len^{3.170}$	60*	-33.51
Maisonnette	28.1	77	175.0	$0.00213*len^{3.393}$	"	-35.37
New Carlisle	25.5	56	126.0	$0.00417*len^{3.184}$	"	-34.76
Nepisiquit	25.5	24	116.2	$0.00237*len^{3.337}$	"	-34.44
North Miscou	26.1	30	125.6	$0.00340*len^{3.225}$	"	-34.57
Shigawake	26.4	187	138.0	$0.00281*len^{3.299}$	"	-34.87
West Miscou	25.2	133	121.6	$0.00312*len^{3.276}$	"	-34.72
West Tracadie	23.9	21	96.2	$0.00031*len^{3.983}$	"	-34.16
MILNE-GEORGES						
Milne	18.0	27	41.6	$0.01430*len^{2.757}$	---	-32.97
Pictou	13.9	42	18.1	$0.03080*len^{2.420}$	---	-31.59
CAPE BRETON						
Aspy Bay**	30.1	---	---	---	---	-35.5

* Percent represents all Chaleur-Miscou samples combined
** Sample taken from same date commercial seiner catch length frequency.

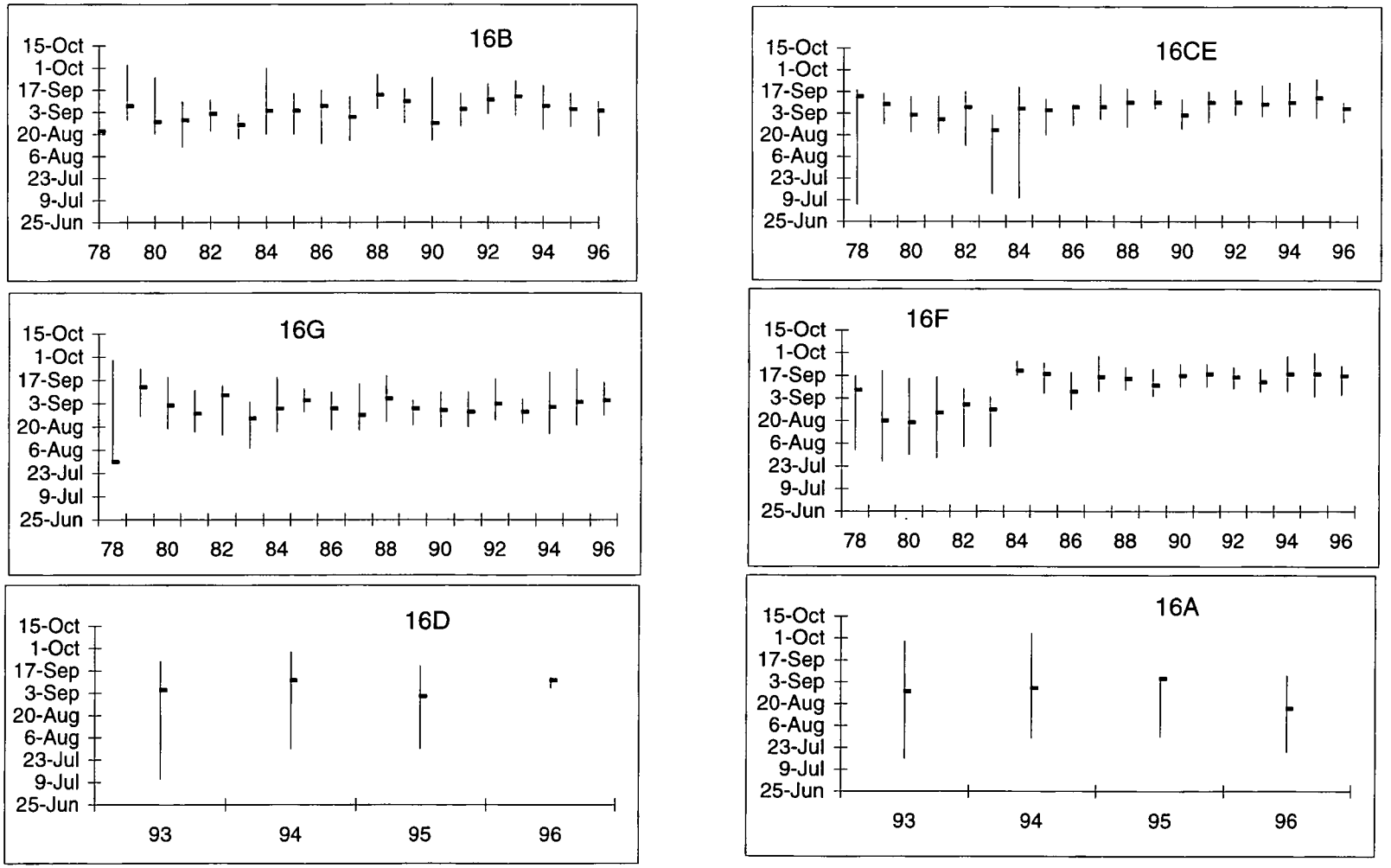


Fig. 1. Timing of catch in management areas of 4T. Rectangular box is time to 50% of catch. Bottom line is 12.5% of catch and top is 87.5%.

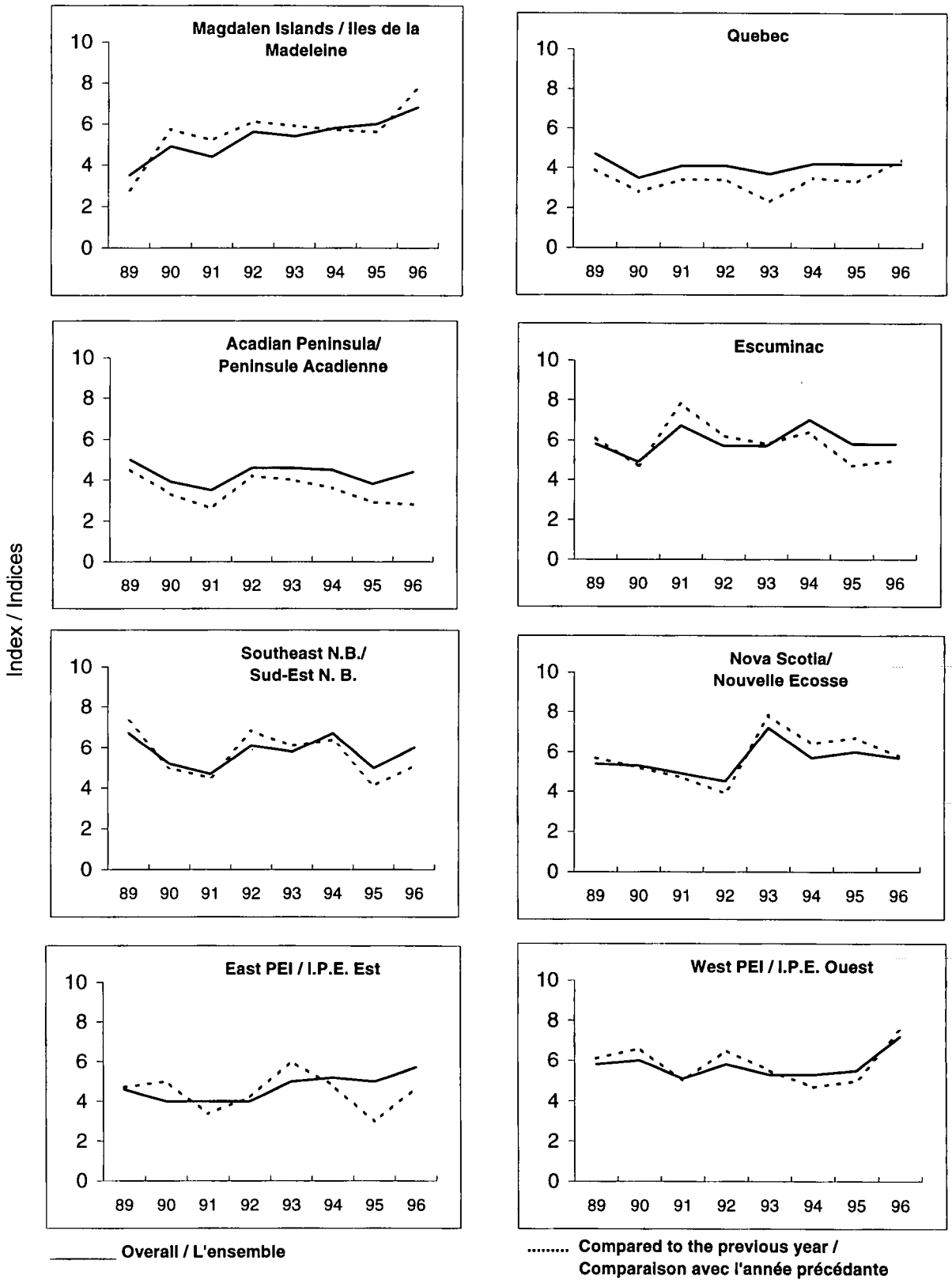


Fig. 2. Spring indices of abundance by area from phone survey

Fig. 2. Indices d'abondance au printemps d'après le sondage

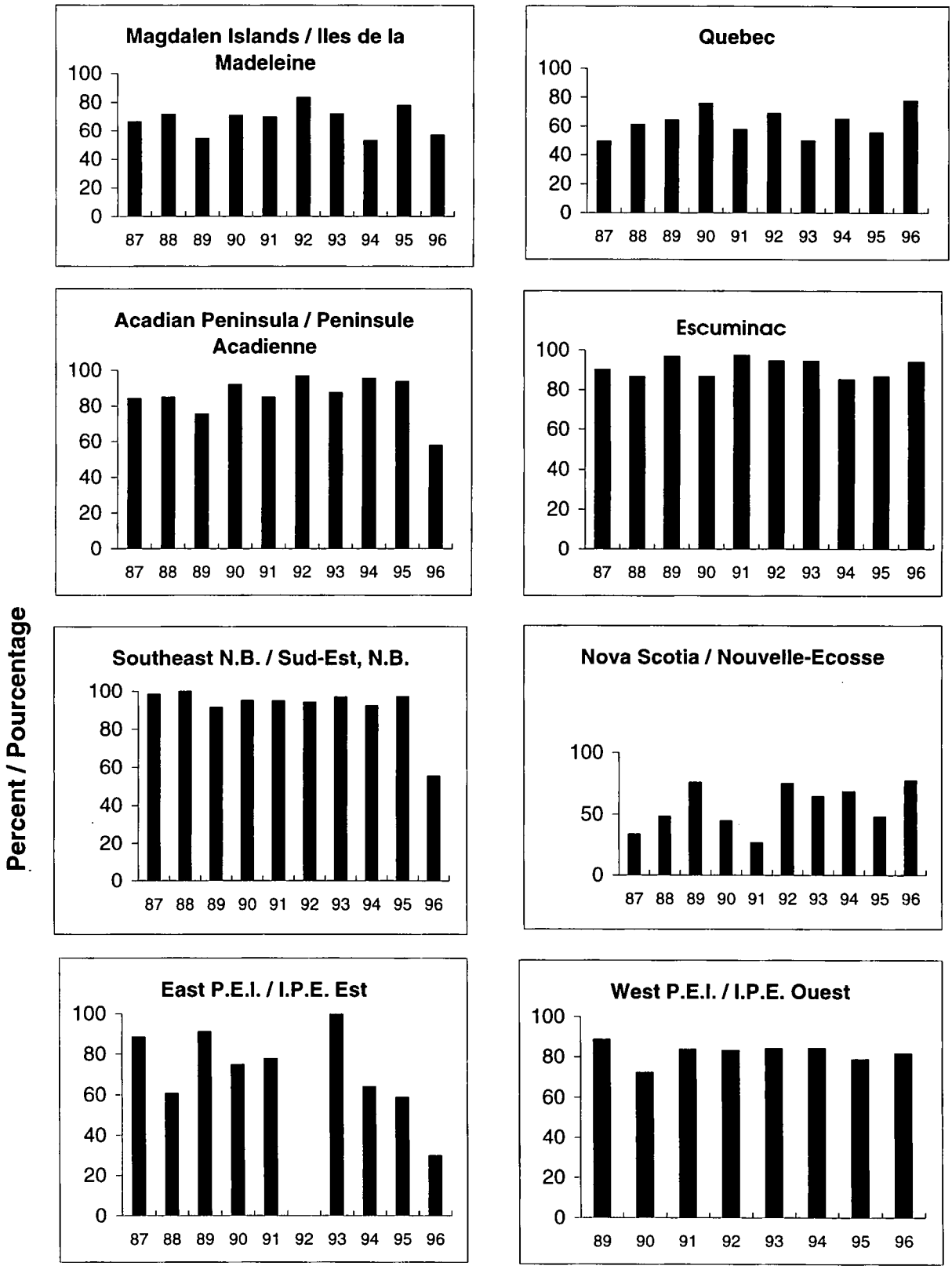


Fig. 3. Percent of nets fished that are between 2 1/4" and 2 1/2" mesh in the 4T spring fishery

Fig. 3. Pourcentage de filets pêchés avec mailles entre 2 1/4" et 2 1/2" dans la zone 4T - printemps

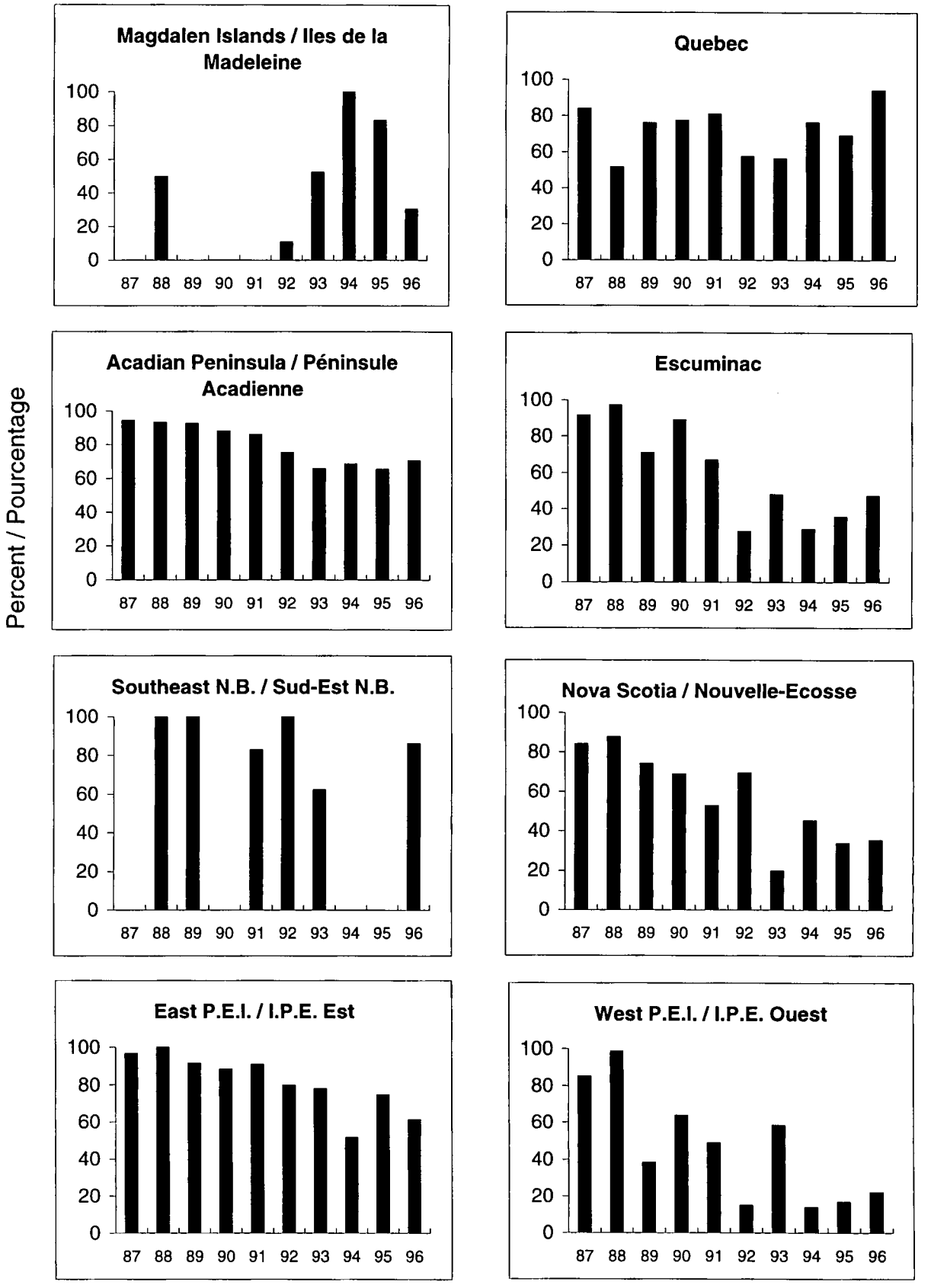


Fig. 4. Percent of nets fished that are 2 5/8" mesh in the 4T fall fishery
Fig. 4. Pourcentage des filets pêchés avec mailles de 2 5/8"dans la zone 4T - automne

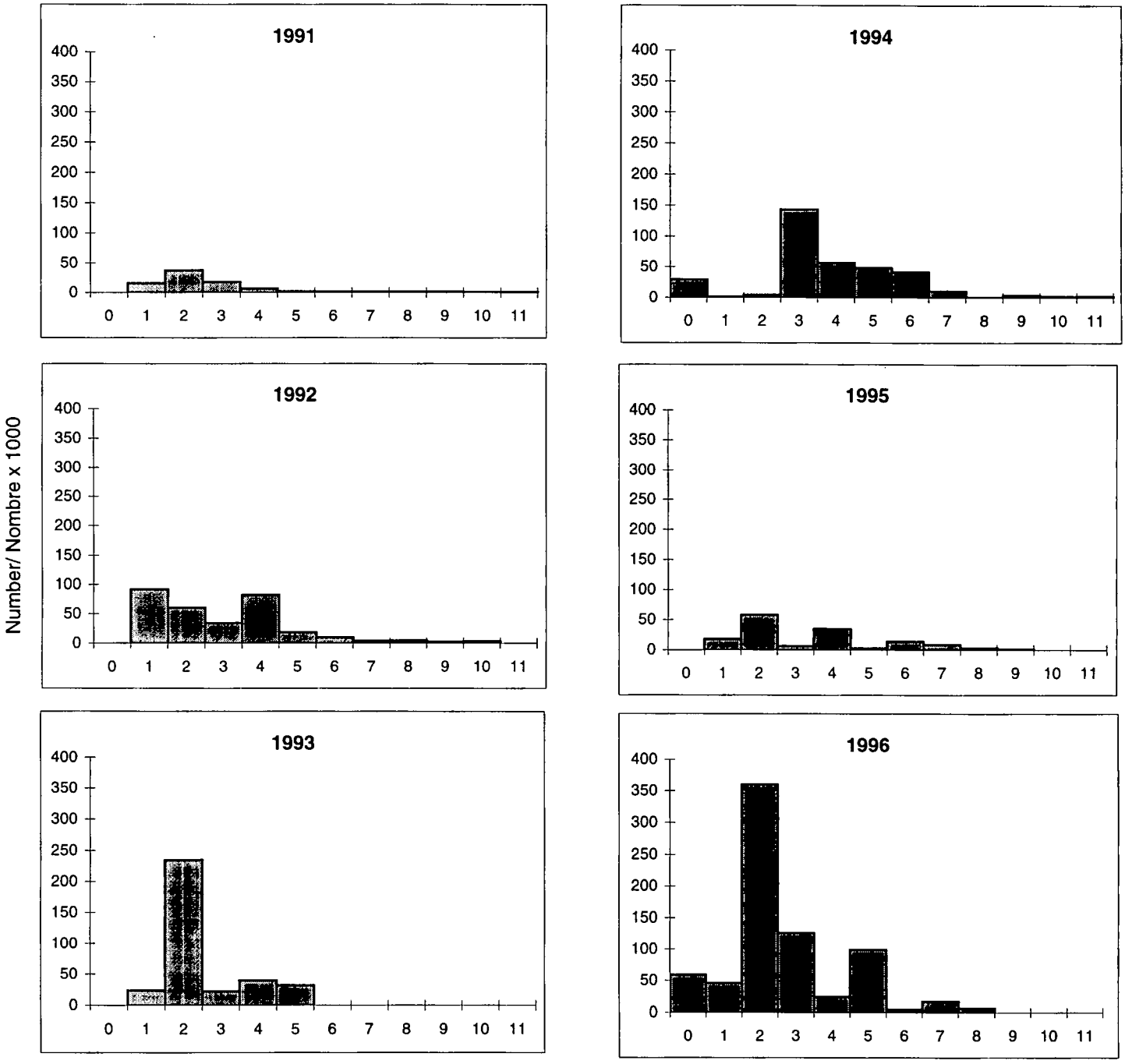


Fig. 5. Acoustic survey numbers-at-age of Chaleur-Miscou strata spring spawners.
Fig. 5. Nombres-à-l'âge des géniteurs de pringtemps, Chaleur-Miscou relevés acoustiques.

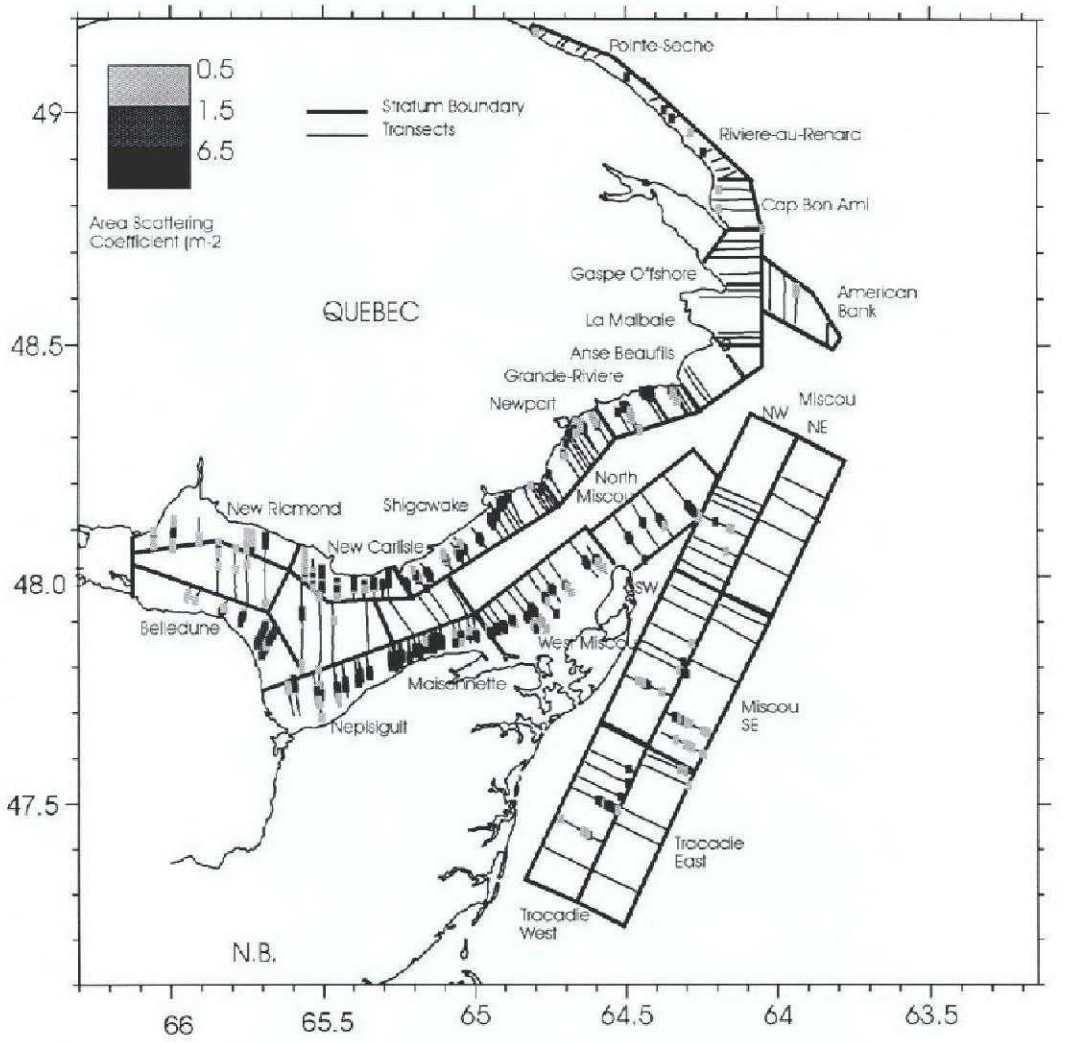


Fig. 6. Chaleur-Miscou area stratum and acoustic transect locations, with relative backscatter detected between Sept. 24 - Oct. 8, 1996.
Fig. 6. Position des strates et des lignes du releve acousticque, et intensite relative detectee entre le 24 sep et 8 oct., 1996, dans la region Chaleur-Miscou.

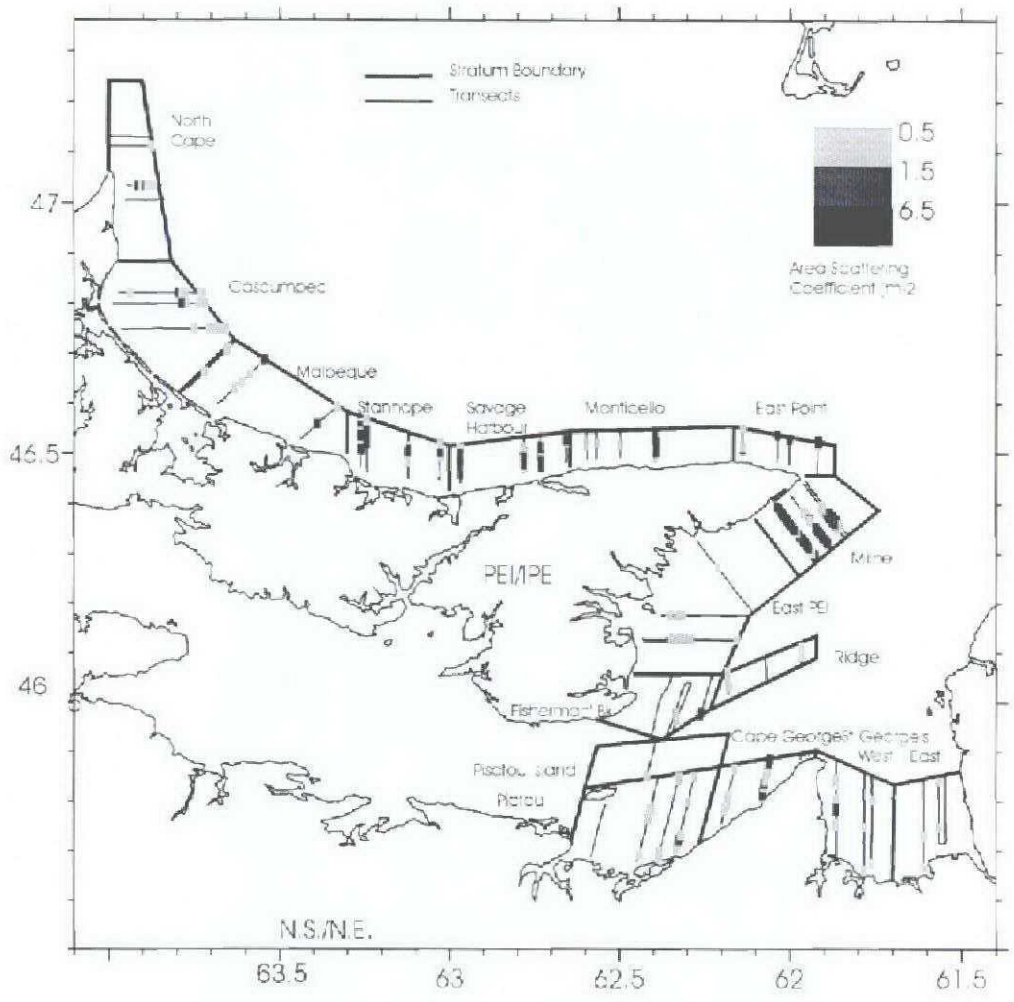


Fig. 7. Prince Edward Island and Pictou area stratum and acoustic transect locations, with relative backscatter detected between Oct. 8-13, 1996.
Fig. 7. Position des strates et des lignes du releve acousticque, et intensite relative detectee entre le 14 et 16 octobre, 1996, dans les regions de l'Ile-du Prince-Edouard et Pictou entre le 8 et 13 octobre, 1996..

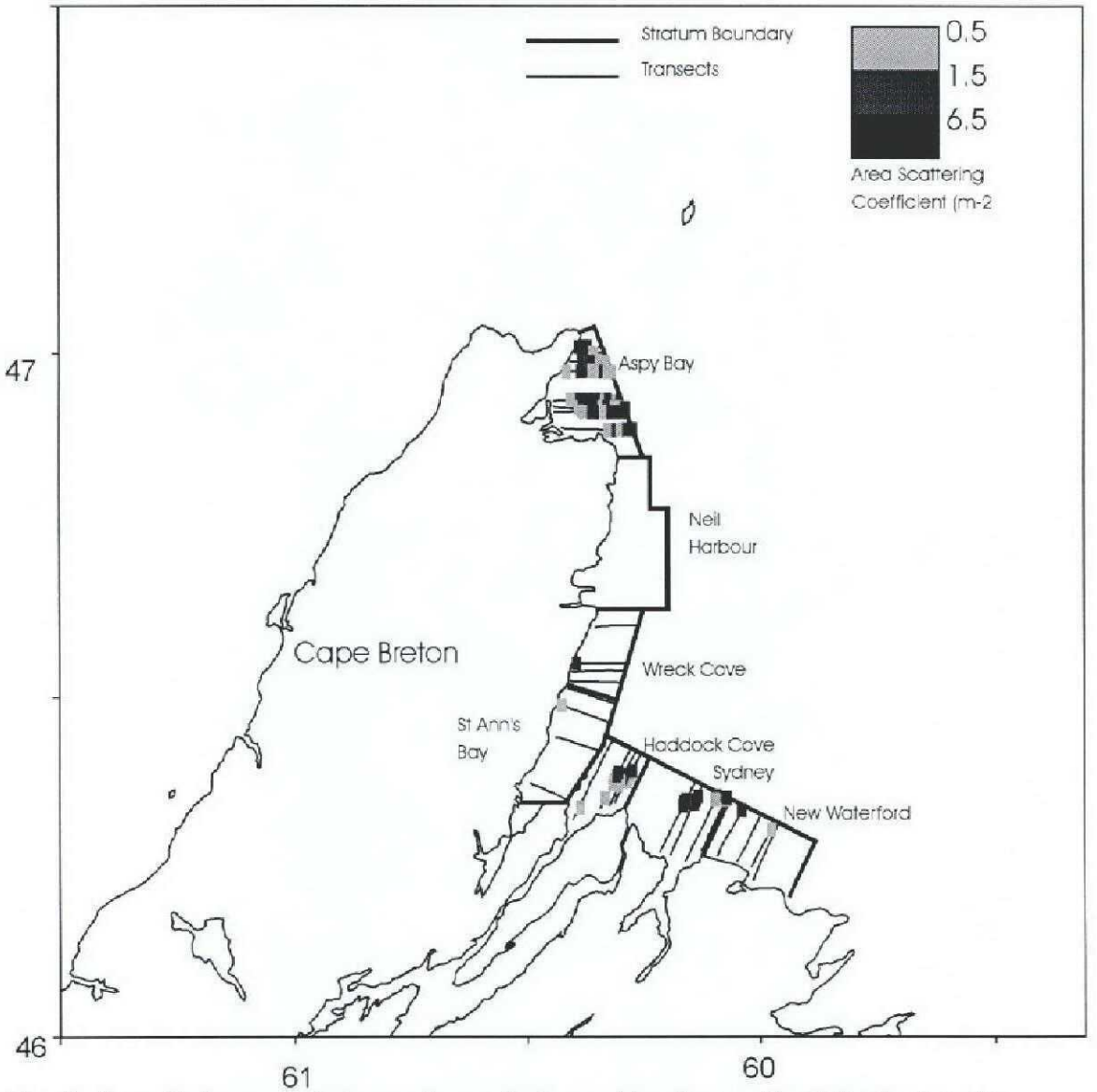


Fig. 8. Cape Breton area stratum and acoustic transect locations, with relative backscatter detected between Oct. 14 and 16, 1996.

Fig. 8. Position des strates et des lignes du releve acousticque, et intensite relative detectee entre le 14 et 16 octobre, 1996, dsans la region du Cap Breton.

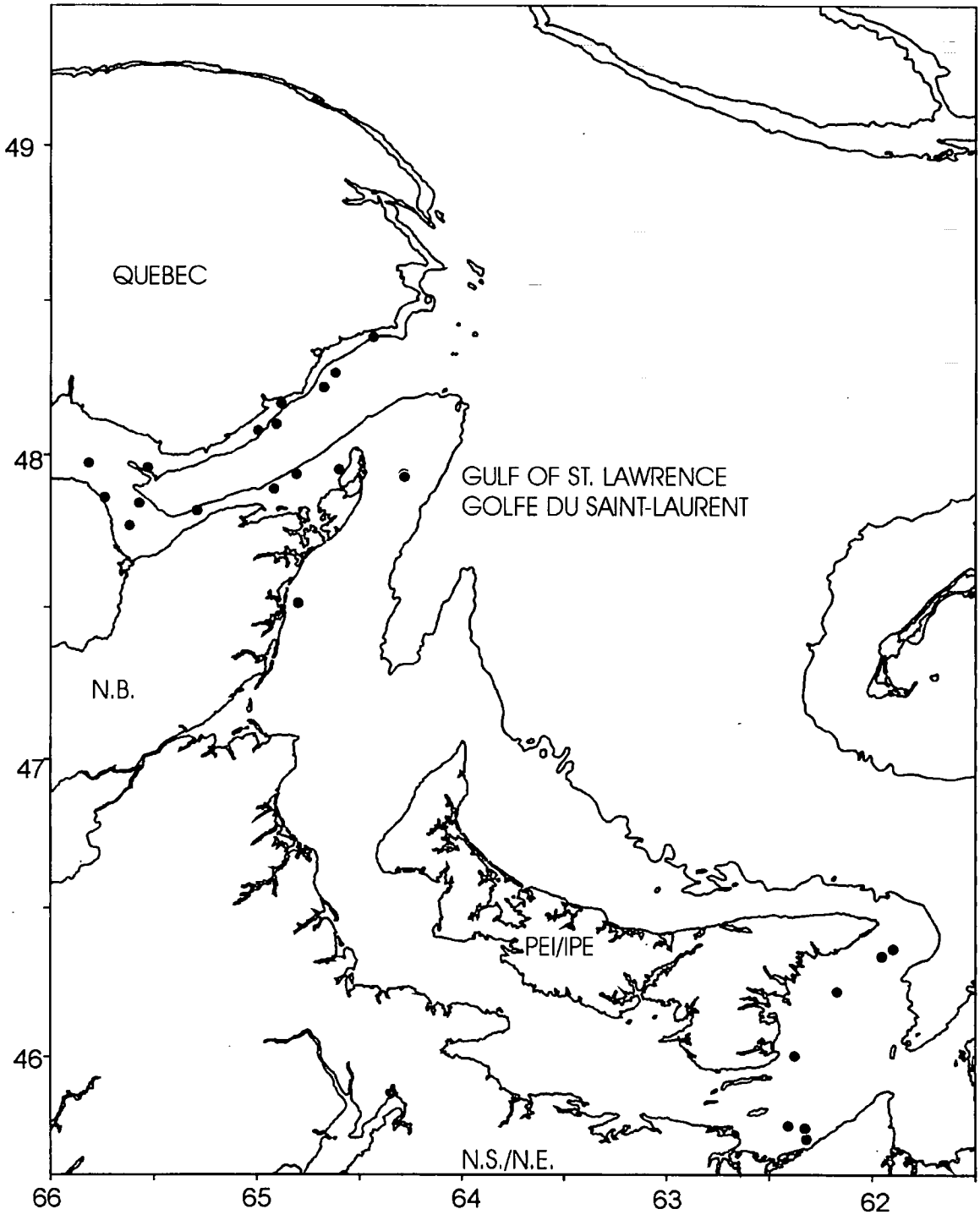


Fig. 9. Acoustic survey set locations Sep. 29 - Oct. 12, 1996.
Fig. 9. Position des traits de chalut, sep. 29 - oct. 12, 1996.
Offshore line is 50m contour.

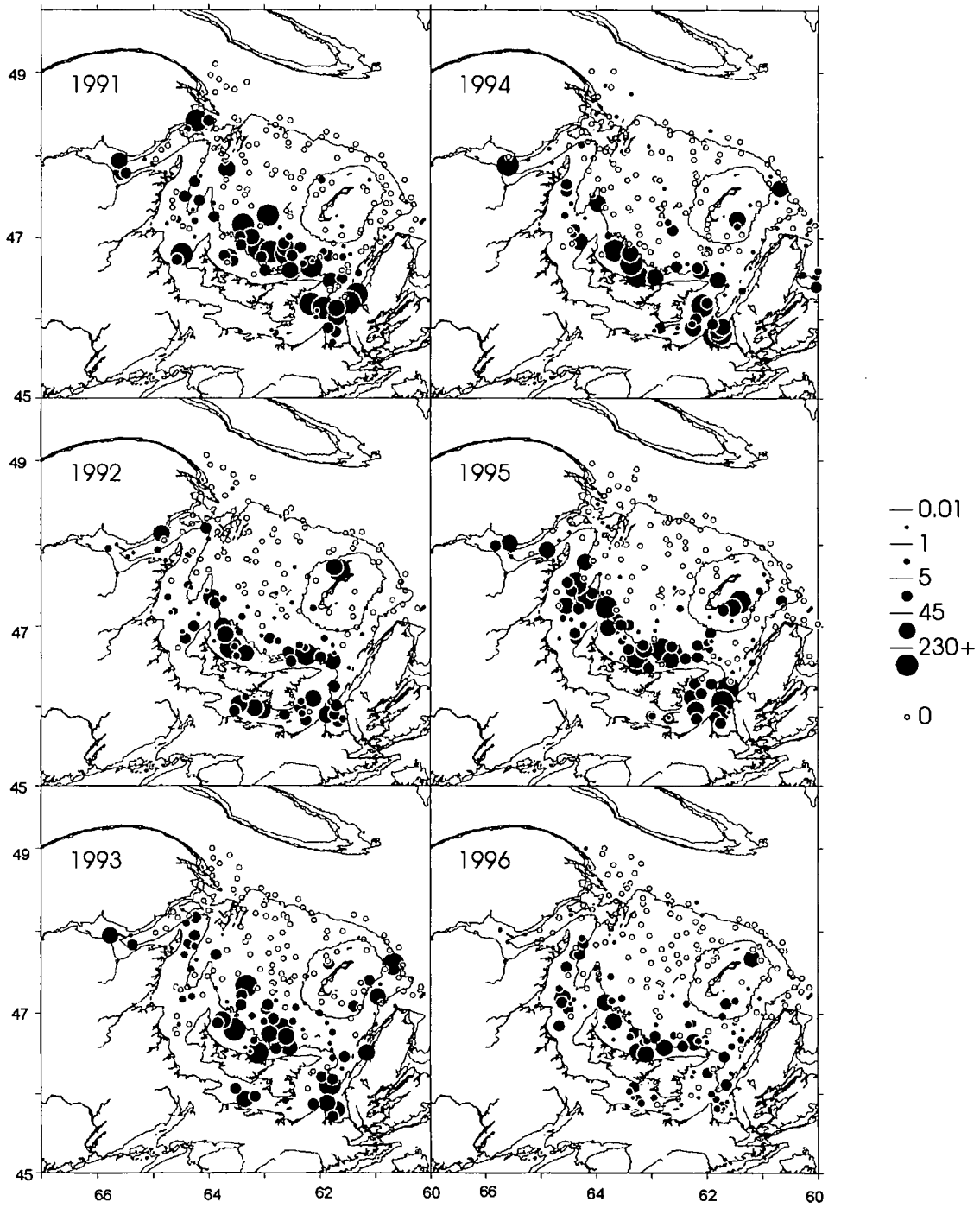


Fig. 10 Herring distribution in sets made during September bottom trawl survey from 1991 to 1996. Units for symbols are kg/tow.

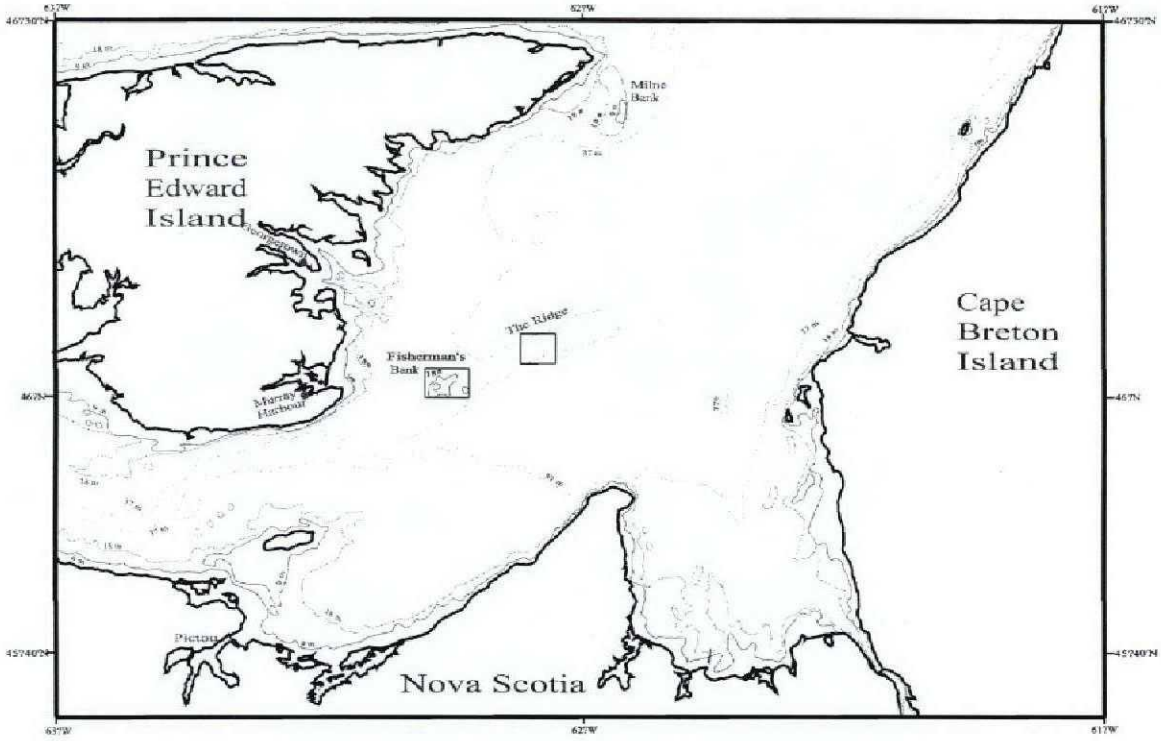


Fig. 11. Eastern Northumberland strait, showing the location of Fisherman's Bank and the Ridge. Boxes correspond to areas in survey maps.

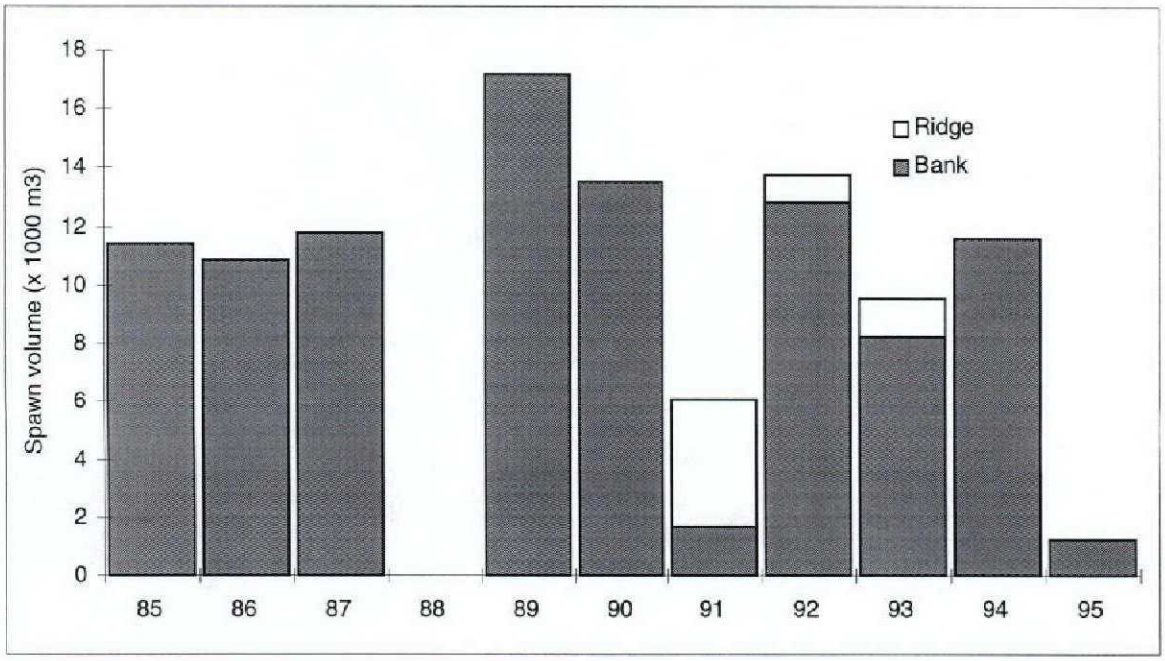


Fig. 12. Egg deposition volumne at Fisherman's Bank and the Ridge as estimated by spawning bed survey.