Resource Management Committee

ICES CM 1998/D:4
Ref. ACFM

REPORT OF THE

STUDY GROUP ON THE EVALUATION OF THE QUARTERLY IBTS SURVEYS

ICES Headquarters
13 - 18 August 1998

International Council for the Exploration of the Sea
Conseil International pour l'Exploration de la Mer

Palægade 2–4 DK-1261 Copenhagen K Denmark

TABLE OF CONTENTS

Section **Page**

1 INTRODUCTION 1
- 1.1 Participants 1
- 1.2 Terms of Reference 1
- 1.3 Background 1
- 1.4 Study Group Membership 2
- 1.5 Data Availability 3
- 1.6 Other Requests 3
- 1.7 Working Papers 3
- 1.8 Structure of the Report 3
- 1.9 Data Used 3

Tables 1.8.1 - 1.8.5 4

2 USEFULNESS OF THE IBTS SURVEY INDICES 9
- 2.1 Basic Consistency 9
- 2.2 Use of the IBTS indices in assessments 9
- 2.3 Linear Model Comparisons of IBTS Indices 11
  - 2.3.1 Models 11
  - 2.3.2 Results 12
- 2.4 Survey based estimates of stock size trends 12
- 2.5 Standard areas 14
- 2.6 Data transformation 14

Tables 2.2.1 - 2.5.1 16
Figures 2.1.1 - 2.5.2 20

3 THE ABILITY OF THE QUARTERLY SURVEYS TO DESCRIBE SPATIAL DISTRIBUTION AND ITS SEASONAL VARIABILITY 60
- 3.1 General distribution patterns 60
- 3.2 Changes in distribution 60
  - 3.2.1 Patterns by roundfish area 60
    - 3.2.1.1 Changes in percentage by age 60
    - 3.2.1.2 Within- and between-year differences in median catch rates 61
  - 3.2.2 Differences in distribution 61
    - 3.2.2.1 Between-year and within-year differences in spatial distribution 62
    - 3.2.2.2 Overlap between species-age groups 62
  - 3.2.3 Possible ship effects on abundance indices 62
- 3.3 Section summary 63

Tables 3.2.1.2.1 - 3.2.3.1 65
Figures 3.2.1.1.1 - 3.2.3.7 66

4 IBTS AND ECOSYSTEM STUDIES 90
- 4.1 Background 90
- 4.2 Biodiversity 90
- 4.3 Species Composition 92
- 4.4 Biomass 93
- 4.5 Summary 94

Tables 4.2.1 - 4.4.1 95
Figures 4.2.1 - 4.4.3 96

5 CORRECTION FACTORS FOR CATCHES MADE WITH GEARS OTHER THAN THE GOV TRAWL 106
- 5.1 Background 106
- 5.2 Method 106
- 5.3 Results 107
- 5.4 Discussion 107

Section **Page**

Tables 5.2.1 - 5.3.2 109
Figure 5.3.1 113

6 REDUCTION IN SURVEY EFFORT - CONCENTRATION OF EFFORT IN QUARTERS 1 AND 3 118
  6.1 Exclusion of Quarter 2 and Quarter 4 Surveys from Assessments 118
  6.2 Summary 118

Tables 6.1.1 - 6.1.3 119

7 LITERATURE CITED 120
  7.1 Working Papers 120
  7.2 References 120

Annex 1 124

Annex 2 156

1 INTRODUCTION

1.1 Participants

John Cotter	United Kingdom
Siegfried Ehrich	Germany
Simon Greenstreet	United Kingdom
Henk Heessen	Netherlands
Knut Korsbrekke	Norway
Phil Kunzlik (Chairman)	United Kingdom
Gerjan Piet	Netherlands
Odd M Smedstad	Norway
Christoph Stransky	Germany
Kai Wieland	Denmark

1.2 Terms of Reference

It was decided at the 85 th Annual Science Conference in 1997 (C. Res. 1997/2:36) to establish a Study Group on the Evaluation of the Quarterly IBTS Surveys [SGQIBS] under the Chairmanship of Mr P Kunzlik (UK) to meet at ICES Headquarters from 13–18 August 1998 to:

a) evaluate the usefulness of the quarterly IBTS survey indices for cod, haddock, whiting, saithe, herring, sprat, mackerel and Norway pout for the period 1991 to 1996;

b) analyse the ability of the surveys to describe the spatial distribution and its seasonal variability for the above species;

c) evaluate the usefulness of the surveys for ecosystem studies, such as changes in biodiversity, species composition, overall biomass, etc;

d) consider correction factors for data sampled with gears other than the GOV trawl;

e) consider the effects on fish stock assessments of a reduction in total survey effort and a concentration of survey effort in the first and third quarters.

1.3 Background

The formal justification for this Study Group was:

"It was decided in 1990 that the IBTS (International Bottom Trawl Survey) covering the North Sea and Division IIIa in the first quarter of the year should be extended to cover all 4 quarters of the year for the period 1991–1995. The main reasons for this were that 1) the multi-species and multi-fleets models under development needed data on distribution of fish by quarter, and 2) the increasing problems in getting precise data from the commercial fisheries could be counterbalanced with more and better survey data. It is now time to analyse the data sampled in order to evaluate the performance of the surveys in each quarter with the aim of creating a basis for the planning of the future IBTS surveys.

The main users of the survey data are the fisheries assessment Working Groups. However, in order not to overload these Groups with tasks and in order to obtain consistencies within the analysis, it is regarded as appropriate to have a special meeting only dealing with evaluating the quarterly IBTS surveys. This will also allow other users of the data like the Working Group on Ecosystem effects of Fishing Activities to participate in the evaluation".

The two main reasons for establishing the quarterly survey series were, therefore, to provide data to support the development of the multispecies and multi-fleet assessment model(s), and to help counter-balance the declining quality of commercial catch-at-age data used in stock assessments. The Study Group has, therefore, interpreted certain, but not all, of its Terms of Reference largely, in this light.

Much of the background relating to the "philosophy" of the four-quarter IBTS survey design is contained in ICES CM 1990/H:3. A section of its text is quoted below, which should be borne in mind when undertaking or considering any analysis of its data:

"It should be noted that the new series of surveys are envisaged as less rigourously coordinated than the existing IYFS, in the sense that each ship's surveys are intended to provide a self-standing series, conducted according to a standard protocol, probably using inter-ship calibration factors rather than as exchangeable contributions to a common and undifferentiated data set as in the past. This will allow some of the practical difficulties which have arisen in practise (e.g., the difficulty of enforcing 100% compliance to the standard gear design) to be handles more gracefully, and also provide a larger measure of resilience in the event of a ship being withdrawn for any reason - the other time series of survey indices would remain valid, even if part of the spatial coverage (or resolution) were lost. In addition, this permits the inclusion of existing non-standard surveys in the overall coordinated programme".

From the assessment perspective, one earlier perceived methodological development was for a multispecies, multi-fleet, multi-area stock assessment model (see, for example, ICES CM 1993/Assess:8), that essentially combined the attributes of MSVPA, MSFOR and the ABC method and databases (multispecies Virtual Population Analysis, Multispecies Forecast, Assessments of Bioeconomic Consequences of Technical measures). A degree of spatial information is already contained within the current MSVPA through the use of "food suitabilities" of species and age-specific prey to species and age-specific predators. Clearly, if there is not an overlap in the true distribution of a predator and an otherwise appropriate prey species, then the suitability of predator and potential prey is zero, although non-zero suitabilities require both a distributional overlap and an appropriate food preference of the predator. As the suitabilities are estimated on the basis of stomach sampling programmes undertaken predominantly in 1981 and 1991, with some other year/quarter samples taken from 1985–1987, it is important to know whether the quarterly distributional overlap of predator and prey remains constant over years, i.e., between sampling occasions. Quarterly survey data were considered the appropriate means by which to examine this. If there is little evidence of between year changes in distribution and predator-prey overlap, then the issue resolves more closely to one of determining how fish are distributed within years in, for example, a quarterly-based, spatially-disaggregated model. This Study Group has sought to examine the consistency of distribution and predator-prey overlap for selected examples. However, it has not tried to evaluate within-year movement rates

In order to address the problems arising from the degradation of commercial catch-at-age data due to misreporting and non-reporting of landings, the Study Group has examined the consistency of quarterly survey indices on a species by species basis and reports on one approach for using the indices to derive stock-related variable such as fishing mortality and recruitment estimates. In addition, it has summarised the use to date of the quarterly series by stock assessment working groups, although uptake by the Working Groups has been very limited due to the short length of the quarters 2, 3 (combined IBTS) and 4 time series.

Because not all contributions to the survey series are based on the GOV trawl, i.e., the Scottish third quarter survey, the Study Group was asked to consider the calibration of gears for inclusion in an overall third quarter index. From an earlier Report of the IBTS Working Group (ICES CM 1990/H:3), it was envisaged that conversion factors would be feasible by species and length or age group, assuming suitable overlap of gear and trawling stations. This has been addressed by the Study Group in a broader setting, including quarter and vessel effects, as well as those of gear, although in its current form the calibration does not generate age-specific calibration factors. The calibration analysis has also contributed to the consideration of consistency between survey series.

1.4 Study Group Membership

Although the justification to establish the Study Group was mostly derived from the perspective of single-species and multispecies stock assessments, this was not reflected in the membership of the Study Group. In particular, its membership does not include currently active participants of the following Working Groups:

Multispecies Assessment Working Group
Herring Assessment Working Group for the Area South of 62°N
Working Group on the Assessment of Mackerel, Horse mackerel, Sardine and Anchovy

It does, however, comprise the bracketed number of currently active participants in the following Working Groups:

Working Group on Ecosystem Effects of Fishing Activities (4)
Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (2)
International Bottom Trawl Survey Working Group (4)

1.5 Data Availability

In early 1998, catch rate data by year, quarter, species and haul were available in exchange file format for all quarters of 1991–1995, 1996 Q1 & Q3, 1997 Q1 and 1998 Q1, although the 1996 Q3 data were based on an incomplete set. To facilitate usage of the indices and to prevent unnecessary duplication of effort and potentially conflicting results in deriving the indices, a set of "official" index values was also requested from ICES at that time. Indices for 1991–1995 were made available to the Study Group only three days before its meeting. Final 1996 indices were not available until late in the meeting. Therefore, for the most part the Study Group has confined its attention to the 1991–1995 dataset, excluding the full period outlined in its Terms of Reference.

1.6 Other Requests

At its March 1998 meeting, the Herring Assessment Working Group for the Area South of 62°N (ICES CM 1998/ACFM:14) outlined an issue relating to splitting the overall IBTS 1-ringer index into "Downs" herring and other herring, by splitting the index into 1-ringers < 13 cm and 1-ringers > 13 cm. It "recommends this problem to be a matter which could be taken up by the Study Group on the Evaluation of the Quarterly IBTS Surveys in 13–18 August 1998".

Unfortunately, time did not permit such an analysis.

1.7 Working Papers

Three Working Papers were made available to the Study Group. These are listed in Section 7.1.

1.8 Structure of the Report

Terms of Reference (b) and (c) are explicit sub-sets of Term of Reference (a). Therefore, in this Report, Section 2 covers an interpretation of Term of Reference (a) that is largely devoted to the utility of the indices in the routine stock assessment procedure as practised for North Sea stocks. Sections 3-6 cover the more specific Terms of Reference b) to e) one by one.

1.9 Data Used

Four-quarter IBTS data as officially reported by the IBTS WG is shown in Tables 1.8.1 to 1.8.5 for the years 1991–1995. These correspond closely to the values used by this Study Group for most species. Where typographical errors in the IBTS Reports have been identified, they have been corrected here. However, for saithe, there exist a number of discrepancies between the indices as reported by the IBTS WG and those provided by ICES for use at this meeting. The Study Group evaluations presented here have used the data as supplied by ICES, not as presented in the IBTS Reports.

Standard areas for the calculation of indices are not shown here. they can be found in the annual Reports of the IBTS WG (ICES CM 1998/D:8 - D:12) together with detailed information for the years 1991-1995.

Table 1.8.1 Age composition of standard species in 1991 for the relevant standard areas.

	Quarter	Age						
		0	1	2	3	4	5	6+
Herring	1	.0	1,180.3	763.2	268.3	240.4	162.0	-
	2	.0	1,869.2	658.8	314.6	72.7	181.7	-
	3	634.9	2,575.2	215.8	97.4	66.6	110.3	-
	4	1,077.6	454.0	12.3	5.0	6.5	15.9	-
Sprat	1	.0	1,117.8	113.6	25.7	3.2	.2	-
	2	.0	1,118.2	643.9	154.2	12.7	20.0	-
	3	16.8	416.6	150.7	57.0	1.1	.0	-
	4	1,517.9	5,278.8	443.7	457.3	13.3	.0	-
Mackerel	1	.0	6.9	(0.2)	.0	.1	.0	.1
	2	.0	11.3	52.3	9.0	9.1	3.8	9.1
	3	.0	26.0	15.8	3.7	3.5	4.0	13.1
	4	.2	60.0	59.2	14.1	5.5	3.1	5.7
Cod	1	.0	2.3	4.7	4.4	.8	.4	.8
	2	3.5	13.3	5.4	3.9	.6	.3	.3
	3	29.4	8.2	2.5	1.2	.2	.1	.1
	4	28.4	6.9	1.9	1.3	.5	.1	.2
Haddock	1	.0	678.0	133.0	24.8	4.2	8.4	2.4
	2	.6	793.9	73.5	12.6	2.5	4.4	1.1
	3	720.4	232.8	22.9	2.8	.5	1.5	.3
	4	1,134.2	496.7	34.8	6.8	1.4	3.1	.8
Whiting	1	.0	1,009.2	686.2	479.2	70.9	37.6	7.6
	2	.0	1,380.5	335.4	182.0	59.4	24.4	10.0
	3	529.4	700.5	158.7	78.9	14.6	5.2	1.6
	4	759.1	917.2	251.4	117.3	24.2	12.3	4.9
Saithe	1	.0	.0	.1	5.0	2.2	1.0	.1
	2	.0	.5	.7	5.9	3.0	.3	.5
	3	.0	.7	.7	2.1	.4	.1	.2
	4	.2	.2	.5	9.4	1.2	.3	.3
Norway pout	1	.0	2,451.1	712.8	130.2	.2	.1	10.7
	2	2.7	2,843.4	586.4	51.4	6.1	.0	.1
	3	7,382.9	1,104.9	222.2	2.6	.0	.0	.0
	4	7,450.9	862.6	43.2	1.1	.0	.0	.0

Table 1.8.2 Age composition of standard species in 1992 for the relevant standard areas.

		Age						
	Quarter	**0**	**1**	**2**	**3**	**4**	**5**	**6+**
Herring	1	.0	1,204.8	380.4	181.3	63.6	101.7	-
	2	.0	3,164.4	766.7	110.1	22.2	42.5	-
	3	2,901.6	1,074.3	452.9	166.2	80.6	159.9	-
	4	3,318.2	773.5	301.5	55.5	27.9	66.2	-
Sprat	1	.0	1,560.5	340.2	37.8	5.5	.4	-
	2	.0	2,388.7	2,962.8	587.6	175.8	.0	-
	3	56.5	3,992.4	3,372.7	204.9	33.6	2.5	-
	4	2,916.2	8,339.8	2,625.6	164.8	51.4	13.2	-
Mackerel	1	.0	16.0	.4	2.2	1.1	.0	.0
	2	.0	.8	2.7	3.1	.9	.2	2.0
	3	.1	40.1	46.7	30.2	10.5	10.4	15.0
	4	1.4	5.8	6.2	6.7	3.9	2.1	4.0
Cod	1	.0	13.0	4.4	1.1	1.0	.3	.5
	2	2.9	51.2	5.2	1.5	.9	.2	.2
	3	19.7	43.8	3.6	.7	.5	.2	.1
	4	51.4	40.4	3.0	1.3	.5	.2	.2
Haddock	1	.0	1,114.6	343.5	18.0	3.0	.6	2.0
	2	1.5	740.2	257.1	17.2	2.7	.6	1.7
	3	2,716.9	589.7	187.1	10.4	1.6	.4	1.4
	4	2,474.1	860.7	213.8	7.2	.8	.1	.4
Whiting	1	.0	904.3	677.5	250.2	162.8	14.9	14.2
	2	.2	881.1	357.7	116.1	47.5	19.2	11.7
	3	1,381.5	595.0	297.8	72.9	57.9	10.3	6.3
	4	1,194.5	682.3	359.6	105.1	53.6	17.2	13.7
Saithe	1	.0	.0	.1	.6	3.0	.4	.7
	2	.0	.0	.1	.9	7.5	.9	.4
	3	.0	.4	.4	1.4	3.0	.5	.3
	4	.1	.1	.3	1.6	3.9	3.4	4.6
Norway pout	1	.0	8,094.7	934.6	32.3	4.2	.0	.2
	2	.0	7,133.6	1,148.9	108.5	2.7	.0	.0
	3	2,587.8	4,365.8	640.2	48.2	2.8	.0	.1
	4	5,984.1	4,657.6	312.6	3.0	.0	.0	.0

Table 1.8.3 Age composition of standard species in 1993 for the relevant standard areas.

		Age						
	Quarter	**0**	**1**	**2**	**3**	**4**	**5**	**6+**
Herring	1	.0	2,954.0	779.3	209.1	43.6	63.8	-
	2	.0	2,126.7	618.4	415.5	62.1	63.7	-
	3	3,799.2	1,136.9	324.8	175.2	92.0	195.8	-
	4	3,488.5	293.8	63.0	23.3	10.5	22.3	-
Sprat	1	.0	1,688.6	589.8	83.8	4.2	.1	-
	2	.0	7,815.4	5,196.1	504.6	19.5	.9	-
	3	6.8	2,575.1	2,728.4	559.3	23.5	.0	-
	4	2,528.0	9,476.2	2,918.0	81.3	.3	1.1	-
Mackerel	1	.0	1.0	.8	.9	.4	.2	.3
	2	.0	3.8	22.9	6.8	2.5	1.5	3.1
	3	5.3	91.3	67.6	25.7	18.9	10.1	18.1
	4	11.9	8.5	10.2	6.1	6.3	3.3	7.6
Cod	1	.0	13.1	19.5	2.0	.7	.6	.4
	2	2.1	8.4	13.6	1.9	.5	.3	.2
	3	17.0	10.0	8.0	.9	.2	.1	.1
	4	25.4	9.1	5.6	.8	.3	.1	.1
Haddock	1	.0	1,254.3	540.8	154.5	8.9	1.1	1.0
	2	.1	1,121.3	317.2	97.7	20.2	.9	.9
	3	571.9	604.3	141.5	37.7	2.4	.4	.3
	4	667.0	906.1	201.3	45.3	2.7	.5	.4
Whiting	1	.0	1,087.6	523.7	244.5	65.5	59.0	11.4
	2	7.2	742.5	244.2	147.0	35.1	21.4	6.7
	3	915.9	634.2	176.9	67.1	14.8	16.2	3.1
	4	1,014.1	755.5	324.1	110.3	42.0	14.2	7.6
Saithe	1	.0	.1	2.0	.5	1.3	2.5	1.8
	2	.0	.1	1.3	1.2	1.5	1.8	.8
	3	.0	.9	1.8	8.5	2.9	1.2	.4
	4	.0	.2	1.6	7.3	1.9	.6	.4
Norway pout	1	.0	2,681.4	2,644.1	258.5	6.0	7.0	.1
	2	.0	2,075.2	1,252.5	193.8	.2	.0	.0
	3	4,103.9	1,831.5	608.5	52.6	3.3	.0	.0
	4	4,775.1	1,767.0	579.9	47.5	2.7	.0	.0

Table 1.8.4 Age composition of standard species in 1994 for the relevant standard areas.

		Age						
	Quarter	**0**	**1**	**2**	**3**	**4**	**5**	**6+**
Herring	1	.0	1,666.7	1,093.6	199.3	63.6	40.0	-
	2	.0	2,890.3	595.8	141.6	74.6	28.8	-
	3	1,552.0	1,653.1	889.0	197.0	180.5	133.0	-
	4	2,989.1	825.8	196.0	43.8	24.0	19.7	-
Sprat	1	.0	4,002.9	1,368.0	127.0	2.7	.6	-
	2	.1	2,402.5	1,019.7	330.2	18.8	.0	-
	3	5.2	4,298.1	500.8	131.1	12.3	.0	-
	4	1,051.0	7,958.7	6,166.0	654.9	.2	.6	-
Mackerel	1	.0	2.2	.1	.1	.0	.0	.0
	2	.0	2.5	3.7	1.7	.9	.2	.7
	3	.0	82.6	64.6	14.8	5.0	4.3	7.2
	4	.2	88.4	18.2	6.3	2.4	1.4	2.9
Cod	1	.0	14.8	4.4	3.0	.8	.5	.5
	2	.0	30.8	4.1	2.2	.5	.2	.2
	3	15.7	43.2	6.2	2.4	.2	.1	.1
	4	20.5	52.9	6.0	2.2	.3	.1	.1
Haddock	1	.0	228.7	503.9	98.3	23.3	1.6	.8
	2	.0	249.1	338.6	40.9	11.1	.7	.3
	3	1,771.9	194.3	264.8	32.4	8.4	.4	.1
	4	3,404.7	345.5	354.6	53.4	11.8	.7	.1
Whiting	1	.0	721.0	637.0	179.8	66.6	11.6	8.9
	2	.4	736.7	330.7	94.9	24.8	9.3	5.7
	3	609.9	674.5	222.5	76.3	19.8	4.8	3.2
	4	925.5	926.2	564.0	180.7	55.4	19.9	9.6
Saithe	1	.0	.1	.5	3.7	10.1	1.4	.6
	2	.0	.0	.1	1.3	6.0	1.2	.9
	3	.0	.0	.6	1.3	1.7	.9	.9
	4	.0	.0	.8	2.4	2.0	.5	.6
Norway pout	1	.0	1,867.8	375.4	67.0	2.9	.2	.0
	2	.0	2,813.7	436.6	59.7	2.3	.0	.0
	3	3,195.8	704.4	101.6	13.5	.3	.0	.0
	4	18,083.0	1,972.7	215.7	20.3	.3	.0	.0

Table 1.8.5 Age composition of standard species in 1995 for the relevant standard areas.

		Age						
	Quarter	**0**	**1**	**2**	**3**	**4**	**5**	**6+**
Herring	1	.0	1,186.2	1,284.9	152.4	46.2	9.3	-
	2	10.7	2,560.3	1,833.9	344.3	128.2	155.6	-
	3	652.4	564.6	353.1	160.0	56.3	60.3	-
	4	4,732.5	2,798.3	572.6	127.1	35.7	27.9	-
Sprat	1	.0	1,138.1	2,715.8	131.5	3.2	1.1	-
	2	.0	2,074.9	5,582.3	2,369.6	60.0	13.9	-
	3	.3	1,381.8	3,897.1	2,020.5	22.3	.9	-
	4	502.7	6,714.2	5,096.3	1,093.4	86.6	16.6	-
Mackerel	1	.0	.4	2.5	.9	.0	.0	.0
	2	.0	1.9	78.9	7.3	3.2	.9	.8
	3	.0	15.1	31.1	26.4	13.3	4.2	15.4
	4	3.1	9.7	48.7	26.7	12.6	2.7	6.3
Cod	1	.0	9.8	22.1	2.7	1.1	.3	.3
	2	.8	12.2	20.5	2.6	1.0	.2	.2
	3	15.1	18.1	17.4	1.5	.8	.1	.1
	4	21.9	23.6	13.6	1.7	.5	.1	.1
Haddock	1	.0	1,352.0	201.1	176.0	24.2	5.2	.8
	2	.2	1,450.2	159.2	167.1	18.2	8.8	1.6
	3	516.8	1,027.2	106.3	96.9	8.0	3.1	.3
	4	547.9	2,108.0	213.3	148.4	14.2	5.2	.5
Whiting	1	.0	676.0	448.4	239.4	58.0	11.8	5.6
	2	.1	1,276.8	636.8	215.1	46.2	14.9	7.1
	3	729.2	619.8	291.2	107.2	21.5	6.0	3.5
	4	1,666.3	989.7	498.3	118.5	21.4	5.2	2.0
Saithe	1	.0	.0	.0	.5	1.0	1.3	.8
	2	.0	.0	.0	.5	1.1	.7	.7
	3	.0	.0	.6	14.6	2.5	1.5	.8
	4	.2	.3	.7	17.4	1.2	.5	.4
Norway pout	1	.0	5,940.3	784.7	76.8	8.6	.0	.0
	2	.0	10,387.2	709.6	55.1	5.9	.2	.0
	3	2,859.6	4,440.2	597.4	68.6	1.7	.0	.0
	4	1,633.0	5,610.3	259.7	24.8	.0	.0	7.1

2 USEFULNESS OF THE IBTS SURVEY INDICES

2.1 Basic Consistency

Simple log-log scatterplots of the species and age-specific indices are presented for the period 1991–1995 in Figures 2.1.1 - 2.1.8. Where available, these were also plotted against log abundance-at-age results from the most recent available stock assessments (ICES CM 1998/Assess:7 for the gadoids and ICES CM 1998/ACFM:14 for herring). No stock assessment abundance values were available for sprat or the North Sea component of the mackerel stock.. Although longer time series of comparisons could be plotted for the quarter 1 survey and assessment estimates, these are not presented here as, for comparative purposes, it is the period 1991–1995 that is of interest. It should be noted that the range of the data are not indicated in these Figures, so careful interpretation is needed, particularly as many of these stocks were at relatively low levels during the period 1991–1995.

For cod at age 1, the Q3 and Q4 surveys and the assessment are the most consistent, with the Q1 survey plots affected by a point of high leverage. At age 2, there is better correspondence between all surveys and the assessment, Q3 and Q4 surveys and the assessment are again showing the greatest agreement, but there is also a high concordance for the Q1 and Q2 surveys. This pattern is repeated to a lesser degree at age 3. At the older ages, there is correspondence between some individual index pairs, but no clear pattern.

For haddock, there is a relatively high degree of concordance for all series up to age 3, although there are occasional aberrant points. This level of consistency is not surprising. Given the highly variable recruitment pattern of haddock. there is likely to be a strong signal in the data for the younger age groups. As with cod, for the older ages there is correspondence between some individual index pairs, but no clear pattern.

For whiting, the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak has often commented on the contrast between survey indices of abundance and the results of catch-at-age analyses. Indeed, it has also commented on apparent inconsistencies between the longer term quarter 1 IBTS survey, the 3rd quarter Scottish groundfish survey and the 3rd quarter English groundfish survey series. This contrast is also apparent in the five years of data presented here for the combined IBTS results within each quarter. The plots are generally characterised by slopes of varying sign, and either considerable scatter about the slopes or individual points of high leverage.

It is also generally considered by the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak that saithe are poorly sampled by the surveys. At their younger ages they have a close association with inshore waters and a more widely dispersed offshore distribution as adults. For all ages presented here, there are individual age/series comparisons that show greater correspondence than others, but it is not easy to discern a consistent pattern.

For Norway pout, ages 1 and 2 show positive associations in all pairwise series plots, although they demonstrate noise within the data. At ages 0 and 4, the data are even more variable.

The herring series show a lot of noise, and some reasonably strong negative associations, for example between the quarter 3 and 4 surveys at age 1 or the quarter 1 and 4 surveys at age 3. However, for 1, 2, 4 and 5 ringers, there appears to be an association between the quarter 1 survey and the assessment results.

For sprat, there is a greater degree of consistency shown. than for herring; the relationship between surveys is usually positive, although in many cases noisy and probably not discernible from zero correlation.

Comparisons between the mackerel series are also characterised by high variability and contrasting slopes.

2.2 Use of the IBTS indices in assessments

Two single species working groups have used the data from the IBTS in assessments, namely the Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (ICES CM 1998/Assess:7) and the Herring Assessment Working Group for the Area South of 62°N (ICES CM 1998/ACFM: 14).

The data from quarter 1 and 3 are widely used due to the long time series available while the data from the other quarters have recently been used mainly for estimating recruitment. Tables 2.2.1 and 2.2.2 indicate usage of the various indices in individual assessments. Short time series and a lack of final age-based indices at the time of the assessments seem to be the main reasons for not using the combined, all vessels, IBTS data in tuning the VPA for quarters 2, 3 and 4.

combined IBTS index is used for quarter 1 and the English groundfish survey (EGFS) and Scottish groundfish survey (SGFS) indices are used separately in Q3. Following survey indices were used:

IBTS1	Combined index for quarter 1, long series.
IBTS1_1	Index of 1-ringers of herring from IBTS1.
IBTS2	Combined index for quarter 2, start 1991.
IBTS3	Combined index for quarter 3, start 1991.
IBTS4	Combined index for quarter 4, 1991–1996.
SCOGFS(IBTS2)	Scottish groundfish survey, part of IBTS2.
SGFS(IBTS3)	Scottish groundfish survey, part of IBTS3, long series.
EGFS(IBTS3)	English groundfish survey, part of IBTS3, long series.
ENGGFS(IBTS4)	English groundfish survey, part of IBTS4.
FRAGFS_7D	French groundfish survey in area 7d.
GGFSQ1	German groundfish survey in the German Bight, Q1.
GGFSQ4	German groundfish survey in the German Bight, Q4.
ACOUSTIC	International acoustic survey on herring.
MIK	Herring larval index, Isaak Kid Midwatertrawl, IBTS1.
MLAI	Multiplicative larvae abundance, herring, biomass.
NORW0	0-group saithe index, observers, Norwegian coast.

Cod

The XSA was tuned with IBTS1, EGFS(IBTS3), SGFS(IBTS3) and 5 commercial fleets. IBTS2 and IBTS4 were excluded because of the short time series and large residuals from mean log catchabilities. In addition IBTS4 showed year effects and because the survey series was possibly ended. Input to RCT3 were IBTS1, IBTS2, IBTS4 and for quarter 3 the English and Scottish surveys. The contribution of the survey indices to the final weighted average prediction are shown in Table 2.2.3.

Haddock

The XSA was tuned with IBTS1, SCOGFS(IBTS2), SGFS(IBTS3), EGFS(IBTS3), ENGGFS(IBTS4) and 2 commercial fleets. No reasons are given in the report for excluding IBTS2 and IBTS4, but short time series and lack of age-based indices at the time of assessment seem to be the most likely reason (as for cod). All IBTS data are used in the RCT3. In addition English and Scottish surveys were used separately because the latest data were based on age/length keys and not approximated by length range as in the IBTS series. The contribution of the survey indices to the final weighted average prediction are shown in Table 2.2.3.

Whiting

The XSA was tuned with the same survey series as for haddock and 5 commercial fleets. IBTS2 and IBTS4 were excluded because of lack of final age-based indices in the most recent data year. The contribution of the survey indices to the final weighted average prediction are shown in Table 2.2.3.

Saithe

Only English and Scottish survey data from quarter 3 are used in the tuning together with 2 commercial fleets. For recruitment IBTS1 and an 0-group indices are used in addition. However, trawl surveys do not give good estimates of year class strength for saithe. The contribution of the survey indices to the final weighted average prediction are shown in Table 2.2.3.

Norway pout

IBTS1, EGFS(IBTS3) and SGFS(IBTS3) were used together with one combined commercial CPUE series to tune a seasonal XSA (SXSA), which also estimated the recruitment. No catch forecast which needed recruitment estimates were undertaken. No reasons are given for not using the other IBTS series.

Herring

Input to the ICA was 1-ringers from IBTS1_1, 2–5 ringers from IBTS1, 0-ringers from MIK (obtained on IBTS1), acoustic surveys and MLAI. The Working Group have not mentioned IBTS data from other quarters.

Sprat

The Herring Working Group have made the following remark on the use of IBTS data: "The IBTS surveys do not fully reflect strong and weak cohorts of sprat, which was also demonstrated by previous Working Groups (ICES 1997/Assess: 8). The 1-group:2-group ratio varies between 0.32 (1981 year class) and 7.57 (1988 year class) and does not adequately reflect the age structure of the stock. These problems may be due to difficulties in age reading and/or possible prolonged spawning and recruitment season. However, the IBTS-survey may still be a useful indicator of the stock biomass which enables the use of production models".

2.3 Linear Model Comparisons of IBTS Indices

2.3.1 Models

A simple way of modelling the IBTS survey indices is to use the multiplicative model described by Shepherd and Nicholson (1986). In essence, this model seeks to fit:

$$C_{ay} = F_y S_a R_k x_{ay} \qquad (2.3.1.1)$$

to observed catches, where C_{ay} is the index catch-at-age a in year y, F_y is a year effect and can be considered a measure of fishing mortality in that year, S_a is an age effect comparable to the survey selectivity at age and R_k is a *year class* effect corresponding to recruitment. The term x_{ay} is an interaction term reflecting survival to age a in year y. Although Pope and Stokes (1989) discuss models that include this interaction term, Shepherd and Nicholson (1986) take a simpler view, arguing that if fishing mortality is broadly constant, then the interaction term can be incorporated as a correction to the age effect. Despite this, due to the equality $k = y - a + n$, where n is the number of ages in the analysis, the model cannot be uniquely fitted to the data without the imposition of an additional constraint. Various additional constraints have been discussed by the above authors, including the one used here of forcing the slope of the year effects to be zero, as one would desire in standardised survey. Assuming log-normally distributed errors, the model can be log-transformed to:

$$c_{ay} = f_y + s'_a + r_k + \text{error} \qquad (2.3.1.2)$$

where lower case signifies a log-transformed value, and s'_a is the adjusted age effect. The model is then fitted to the observed log index values. The age, year and *year class* effects thus obtained from each of the four quarterly surveys can then be compared for consistency. In addition, the Working Group on Methods of Fish Stock Assessment (ICES CM 1995/Assess:11) has also considered this question, and extended the simple 3-factor model to include a factor for the survey effect and three survey * main effect interaction terms:

$$c_{ay} = f_y + s'_a + r_k + \text{survey}_q + \text{survey}*f + \text{survey}*s + \text{survey}*k + \text{error} \qquad (2.3.1.3)$$

where q indexes the surveys, for example in each of quarters I to IV. It has also discussed a number of simple diagnostics for interpreting the model fit and the appropriateness of the assumptions underlying the model, particularly that the survey catchabilities are constant over time, and that fishing mortality is separable. If log catch ratios are calculated for successive age-year pairings down a cohort, it has been shown that if plotted against year for each age, the series of lines corresponding to successive ages should fluctuate synchronously if the model is adequate. It is not necessary for the lines to fluctuate in parallel, but simply to follow the broadly the same pattern in time (ICES CM 1995/Assess:11).

Some authors have also sought to compare the underlying ANOVA structure of the commercial catch-at-age data with survey indices (see, for example, Pope and Stokes, 1989). Although this is of clear interest to the Study Group, it was not possible to address such methods at the meeting. Instead, the Study Group has examined the consistency of survey series through modelling the series including survey effects and survey*main effects interactions.

For the purpose of this Study Group, the log catch ratio plots were produced for each species. A three factor model (eqn 2.3.1.2) was fitted to each survey series for each species, and the resulting age, year and *year class* effects plotted. The four factor model (2.3.1.3) was fitted and the overall survey, age and year effects plotted and the ANOVA results presented.

2.3.2 Results

Results are presented in the following Figures for model fits by species incorporating the indicated age ranges. The first Figure in each triplet shows the log catch ratio plots by age and survey. The second gives the 3-factor and 4-factor main effect comparisons, and the third shows the residuals from the 4-factor model and the ANOVA results:

Species	Figures	Ages Used
Cod	2.3.3.1, 2 & 3	1–6
Haddock	2.3.3.4, 5 & 6	1–6
Whiting	2.3.3.7, 8 & 9	1–6
Saithe	2.3.3.10, 11 & 12	3–6
Norway pout	2.3.3.13, 14 & 15	1–3 (QI & QII), 0–3 (QIII & QIV)
Herring	2.3.3.16, 17 & 18	1–5
Sprat	2.3.3.19, 20 & 21	1–4
Mackerel	2.3.3.22, 23 & 24	1–6

Age ranges excluded from the analyses were those considered to be poorly sampled by the surveys, including 0-group fish for all species except Norway pout. Saithe up to age 3 were not considered to be representatively sampled by any survey and, although its older ages are also generally considered to be poorly sampled, they were nevertheless used here. For mackerel, the first quarter data were excluded from the model fits, due to very low catch rates at that time of year.

For most species/quarter/age combination of log catch ratios, the plots appear to show good consistency, perhaps remarkably so, although some contrasts are apparent, notably for the oldest age of whiting in quarters 1 and 3. Saithe does not have many pairings to consider, and a longer series of data would be preferable in all cases, to see how durable these apparent consistencies within surveys remain.

It is difficult to summarise the results from so many model fits. From the plots of main effects fitted by the 3-factor model, the results across surveys seem to be frequently consistent in pattern if not in detail, differing mostly in the estimates of year effects. In some cases, for example whiting and herring, the *year class* effects appear consistent with respect to relative year-on-year changes across surveys, but appear to lie on slopes of different sign. The pattern of the 4-factor year, age and *year class* effects generally reflects an "average" of the 3-factor effects from the four surveys. The survey effects for cod, haddock and whiting demonstrate a very similar pattern, declining from quarter 1 to quarter 3 before rising again in quarter 4.

From the 4-factor model residual plots, the residuals from the survey effect generally show the least scatter for the 2 nd and 3rd quarter surveys, with the greatest scatter shown for either the 1st or 4 th quarter surveys, or both. The ANOVA results imply a very poor fit for the main effects to the saithe data and, for most species, strong interaction terms, indicating that the main effects vary across surveys. This is true even for haddock, where inspection of the 3-factor model results for each survey suggest high consistency between the age and *year class* effects between surveys.

2.4 Survey based estimates of stock size trends

Each of the four IBTS survey series was analysed using Cooks model (Cook 1997) for research vessel data in order to examine consistency across these relative short series of survey indices. His approach was mainly developed due to the bias introduced by possible errors in reportings of traditional catch-at-age analysis. The model can be viewed as a modification of the commonly used separable model often used in the catch-at-age analysis. The model assumption is that the fishing mortality rate is a multiple of a year effect (*f*) and an age effect (*s*):

$$F_{a,y} = s_a f_y$$

where age and year are indexed. By adding an age dependent natural mortality rate M_a to the *F*'s to obtain total mortalities *Z*'s any cohort fulfils:

$$N_{a,y+a-1} = R_y e^{-\sum_{i=1}^{a-1} z_{i,y+i-1}}$$

By assuming age specific survey catchabilities ($u_{a,y} = q_a N_{a,y}$) the above equation can be rewritten as:

$$u_{a,y+a-1} = \frac{q_a}{q_r} u_{r,y} e^{-\sum_{i=1}^{a-1} Z_{i,y+i-1}}$$

where r is the recruiting age, u denotes survey index at age group a and year y. q is the catchability at age. The parameters to be estimated are the recruitment, age effect and year effect. They are found by minimising:

$$\sum_{a} \sum_{y} \left[\log(\hat{u}_{a,y}) - \log(u_{a,y})\right]^2 + \lambda \sum_{y} \left(\frac{f_y}{f_{y-1}} \right)$$

under the restraint that the mean of the year effects equals unity. The last term in the equation is a "penalty" term to reduce the annual change in year effect and thus reducing noise and smooth the estimates.

Necessary inputs to the model in addition to the survey indices are natural mortality by age and catchability by age.

The natural mortalities chosen in these analyses was equal to the ones used by the North Sea Demersal Working Group (ICES CM/1998 Assess:7). Catchabilities were set equal to 1 for all ages except age 1 (the recruiting age) where the catchability was set by trial and error to a level that produced similar mortalities for age 1 as the age 1 mortalities estimated by the working group.

The model was applied to all four series of survey data for cod, haddock and whiting and the penalty parameter l was set to 0.5 for cod and 0.8 for haddock and whiting. The year range 1991–1995 and age range 1–6 was used for all series.

Residual mean squares for each of the analyses are given in Table 2.4.1. This table indicates that the quarter 3 survey series gives a better fit to this kind of model for cod and haddock than the other series. And for whiting there seems to be a better fit using data from the first quarter. Please note that the results are strongly influenced by the choice of catchabilities and that other relations between them could possibly produce better fits for one of the other survey series.

Weight at age data was applied to the fitted indices to produce relative estimates of biomass. For each of the species are the estimated recruitment indices, the relative stock biomass and mean F's for ages 2–4 presented in scatterplots (pairwise comparisons). The recruitment comparisons for cod are presented in Figure 2.4.1, stock biomass in Figure 2.4.2 and fishing mortalities in Figure 2.4.3. Similar comparisons for haddock are given in Figures 2.4.4–2.4.6 and whiting in Figures 2.4.7–2.4.9. Similar trends will show up as the points closing in on a straight line for biomass and recruitment and a 1 to 1 line for fishing mortalities. Please note that the estimates of the last years recruitment is:

$$\hat{R}_{1995} = \frac{u_{1,1995}}{q_1}$$

and that changes in recruitment also has quite an impact on the stock biomass.

A summary of a subjective impression by visually inspecting the scatterplots are given in Table 2.4.2. Although the time series here analysed is very short, the conclusions are similar to some of Cook's conclusions. Cook uses survey series with lengths of 10–14 years. As he points out there is a better consistency between surveys for estimates of recruitment or stock biomass than for fishing mortality rates. And there seems to be a better consistency for the species cod and haddock than for whiting due to the stronger signals induced in the series by highly fluctuating recruitment. One should also note that the important assumption of separability in fishing mortality may be a good approximation for shorter time series, but fishing patterns is known to vary with time and thus violate the underlying model assumption. The very simple assumption of constant catchability except for the youngest age may also be violated and this can be reason why the IBTS quarter 1 series (with the youngest recruits) is not consistent with the other surveys (especially for haddock). One could be tempted to use catchabilities from a VPA assessment, but those would be affected by errors in catch-at-age data and such a bias in catchability would lead to bias in the model.

2.5 Standard areas

The IBTS abundance indices are calculated for species-specific standard areas (e.g., ICES CM 1998/D:6). These areas were chosen to incorporate all the statistical rectangles regularly fished excluding regions which are of limited or no significance for a given species (ICES CM 1981/H:10).

Cod and whiting were selected as examples to study effects of an extension the standard areas. In the case of whiting, a subset of 144 statistical rectangles was defined by the International Gadoid Survey Working Group in 1979 (ICES CM 1979/G:35). The standard area for cod was identical to that used for whiting until 1980, but since then five rectangles have been excluded (ICES CM 1983/G:62). Four of these rectangles are located in the coastal region of the German Bight (Figure 2.5.1). In this region, high catches of age 1 cod can occur in some years introducing an increased variability of the survey index. Exclusion of the coastal rectangles resulted in a reasonable correspondence with VPA estimates for the years 1969 to 1979 (Burd & Parnell 1982, ICES CM 1983/G:62). This, however, makes it difficult to compare the quarter 1 index for age 1 cod with those for other quarters and with those for older ages in subsequent years due to an immigration of young cod from the coastal region into the standard area in the course of the year. Similarly, the Skagerrak, from which at present only the western part is included in the standard area, has been identified as an important nursery area (Munk *et al.* 1995), and a considerable number of recruits can originate from this area, at least in some years. Results concerning effects of an extension of the standard areas for age 1 and 2 cod and whiting comparing quarters 1 and 3 surveys were presented in a Working Paper (WP1). The differences between indices based on extended areas and the standard ones were negligible for age 1 and 2 whiting as well as for age 2 cod. For age 1 cod, quarter 1 indices for the extended area were substantially higher than the standard ones in 4 out of the 7 years considered (1991 to 1997) while the differences were much less pronounced for quarter 3 (Figure 2.5.2). The degree of correspondence with VPA estimates was not adversely effected by these changes compared to the standard indices (Table 2.5.1). The Study Group recommends that the IBTS Working Group should consider a redefinition of the standard areas.

2.6 Data transformation

IBTS abundance indices are usually calculated by taking the average catch per hour trawling for all hauls within a statistical rectangle, and then the average for all rectangles within species-specific standard areas (Heessen *et al.* 1997). This neither accounts explicitly for the probability distributions of the catches, some of which are highly skewed, nor for potential influences of the environment on the spatial aggregation of the target species. Therefore, changes in average abundance linked with changes in distribution can be overlooked if the use of the habitat is density dependent. Density dependent habitat use could mean that survey estimates based on arithmetic averages may slow to detect serious stock decline as has recently been demonstrated by Hutchings (1996) for Atlantic cod in the north west Atlantic. He concluded that the geometric mean was a more responsive index in that case.

Various different methods for estimating survey indices have been tested in the past. In 1979 (ICES CM 1979/G:35) the International Gadoid Survey Working Group considered arithmetic and backtransformed geometric means (without variance adjustment). For cod this resulted in a higher correlation coefficient between abundance indices and assessed values, for haddock there was no difference, and for whiting the correlation was lower. In 1981 during a joint meeting of International Gadoid Survey Working Group and the International Young Herring Survey Working Group (ICES CM 1981/H:10) a modified procedure was followed for the gadoids: the geometric mean was calculated for all hauls in each rectangle. These values were then backtransformed, taking account of the variance adjustment. Then the arithmetic mean was calculated over all rectangles. The reason for this was that if the geometric mean was taken over all rectangles, the variance correction lead to meaningless values because in some years bimodal distributions were present. In 1983 (ICES CM 1983/G:62) indices were calculated with a bootstrap procedure, but the potential of this approach was subsequently not further investigated. In 1985 (ICES CM 1985/H:2) the effect of log transformation was studied for 1-group fish. For some species this resulted in a higher correlation, for others in a significantly lower one. During a workshop on the analysis of trawl survey data in 1992 (ICES CM 1992/D:6) the performance of General Linear Models and geostatistics (Kriging) were studied using herring data from the IBTS. It was concluded that the more elaborate methods do not give results which are significantly better than those obtained by the standard procedure. This is currently an active field of EU-funded and other research.

The possibility of using log transformed catches by square for calculating abundance indices was studied in WP1 for cod and whiting. For age 1 and 2 whiting the frequency distribution of log transformed catches could be approximated by a normal distribution. This allowed the calculation of abundance indices from the mean and the variance of the log transformed data. However, the new indices did not agree better with VPA estimates than with the standard indices. For age 1 and 2 cod, the logtransformation (with 1 added to the average CPUE by square) was not satisfactory, due to the occurrence of a high number of small values. Zero catches became clearly separated from the positive ones when a low constant (0.01) was added. In that case a delta approach similar to that introduced successfully by Stefánsson (1996) for Icelandic cod was used in a subsequent study (Wieland *et al.* 1998).

In the light of recent and continuing methodological developments the Study Group feels that the IBTS Working Group should continue the search for ways of analysing IBTS data which are sensitive to reductions of stocks which display density-dependent habitat utilisation.

Table 2.2.1. Data series used for tuning the VPA. Starting year of analysis and age range used.

	Cod		Haddock		Whiting		Saithe		Norw. pout		Herring	
Method	XSA		XSA		XSA		XSA		SXSA		ICA	
IBTS1	1987	1-6	1973	0-5	1987	0-4			1983	0-3	1983	2-5
IBTS1_1											1979	1
IBTS2	Short											
IBTS3												
IBTS4	Short											
SCOGFS(IBTS2)			1991	1-6	1991	1-6						
SGFS(IBTS3)	1987	1-6	1982	0-6	1987	1-6	1987	2-3	1983	0-3		
EGFS(IBTS3)	1987	1-5	1977	0-7	1987	1-5	1987	2-3	1983	0-3		
ENGGFS(IBTS4)			1991	0-7	1991	0-5						
FRAGFS_7D					1988	0-3						
ACOUSTIC											1989	2-9
MIK											1977	0
MLAI											1977	biom.
SCOTRL	1987	1-6										
SCOSEI	1987	1-10	1976	0-9	1987	1-7						
SCOLTR	1987	1-8	1976	0-9	1987	1-7						
ENGTRL	1987	1-8										
ENGSEI	1987	1-10										
FRATRB					1987	1-7	1987	3-9				
FRATRO					1987	0-7						
FRATRO_7D					1987	1-5						
NORTRL							1987	3-9				
COMMERCIAL									1983	0-3		

Table 2.2.2. Data series used for estimating recruitment.Starting year of analysis and age range used.

	Cod		Haddock		Whiting		Saithe		Norw. pout		Herring	
Method	RCT3		RCT3		XSA		RCT3		SXSA		ICA	
IBTS1	1970	1-2	1970	1-2	1987	0-4	1983	3	1983	0-3	1983	2-5
IBTS1_1											1979	1
IBTS2	1991	1	1991	1								
IBTS3												
IBTS4	1991	0-1	1991	0-1								
SCOGFS(IBTS2)			1991	1-2	1991	1-6						
SGFS(IBTS3)	1982	1-2	1982	0-2	1987	1-6	1982	2-3	1983	0-3		
EGFS(IBTS3)	1977	0-2	1977	0-2	1987	1-5	1977	2-3	1983	0-3		
ENGGFS(IBTS4)			1991	0-2	1991	0-5						
GGFSQ1	1982	1			1988	0-3						
GGFSQ4	1983	1										
NORWO							1981	0				
ACOUSTIC											1989	2-9
MIK											1977	0
MLAI											1977	biom.

Table 2.2.3. Scaled weights for the survey indices from XSA and RCT3 (ICES CM 1998/Assess:7)
Values of more than 10% weight are shown in bold.

	COD										
Age	IBTS1	IBTS2	IBTS3	IBTS4	SCOq2	SGFS	EGFS	ENGq4	FRA7d	GGFS1	GGFS4
1	**0.118**					**0.143**	**0.203**				
2	**0.117**					**0.109**	**0.175**				
3	**0.151**					**0.146**	0.087				
4	**0.185**					**0.101**	0.084				
5	**0.202**					0.057	0.086				
6	**0.221**					0.027	0.068				
7	**0.126**					0.015	0.038				
8	0.089					0.026	0.01				
9	0.06					0.018	0.007				
10	0.027					0.008	0.003				
Y.cl											
1997							**0.162**				
1996	0.054	**0.224**			0.003	0.077	**0.363**			**0.136**	0.049
1995	0.07	0.084		0.257	**0.162**	0.036	0.15			0.059	0.021
	HADDOCK										
Age	IBTS1	IBTS2	IBTS3	IBTS4	SCOq2	SGFS	EGFS	ENGq4	FRA7d	GGFS1	GGFS4
0	**0.291**				0	0.08	**0.162**	**0.291**			
1	**0.245**				0.053	0.1	**0.192**	**0.245**			
2	**0.202**				**0.103**	**0.123**	**0.154**	**0.196**			
3	**0.183**				0.094	**0.103**	**0.136**	**0.179**			
4	**0.175**				0.13	0.092	**0.137**	**0.116**			
5	**0.131**				0.098	0.099	**0.139**	0.08			
6	0.081				0.088	**0.138**	**0.103**	0.068			
7	0.058				0.063	0.098	0.074	0.047			
8	0.016				0.02	0.013	0.023	0.008			
9	0.016				0.016	0.028	0.036	0.018			
Y.cl											
1997						**0.308**	**0.507**				
1996	0.16					**0.227**	**0.304**				
1995	0.058				**0.353**	0.13	**0.109**				
	WHITING										
Age	IBTS1	IBTS2	IBTS3	IBTS4	SCOq2	SGFS	EGFS	ENGq4	FRA7d	GGFS1	GGFS4
0	**0.296**				0	0	0	**0.445**	0.064		
1	**0.204**				0.056	0.035	0.064	**0.231**	0.032		
2	**0.157**				0.087	0.047	0.073	**0.173**	0.034		
3	**0.138**				0.089	0.053	0.078	**0.147**	0.024		
4	**0.121**				0.076	0.05	**0.105**	0.11	0.016		
5	0.07				0.089	0.082	0.087	0.074	0.008		
6	0.034				**0.138**	0.08	0.044	0.033	0.004		
7	0.02				0.082	0.047	0.025	0.016	0.002		
	SAITHE										
Age	IBTS1	IBTS2	IBTS3	IBTS4	SCOq2	SGFS	EGFS	ENGq4	FRA7d	GGFS1	NORO
1						0	0				
2						0.024	0.071				
3						**0.239**	**0.249**				
4						**0.166**	**0.173**				
5						0.095	0.099				
6						0.072	0.074				
7						0.061	0.063				
8						0.027	0.027				
9						0.008	0.009				
Y.cl											
1997											**0.144**
1996											**0.15**
1995	**0.652**					**0.21**	0.027				**0.112**
1994	**0.271**					**0.353**	**0.207**				0.017

Table 2.4.1

	Residual mean square			
	IBTS Q1	IBTS Q2	IBTS Q3	IBTS Q4
Cod	0.1304	0.0846	0.0784	0.1085
Haddock	0.1433	0.2426	0.1110	0.2433
Whiting	0.0466	0.0705	0.0978	0.1064

Table 2.4.2 + similar trends (+) slightly similar trends 0 no similarity

(-) slightly opposite trends - opposite trends

	Q1			Q2			Q3		
Cod	R	B	F	R	B	F	R	B	F
Q2	(+)	(+)	0						
Q3	+	+	-	(+)	(+)	(-)			
Q4	+	+	(-)	(+)	(+)	-	+	+	+

	Q1			Q2			Q3		
Haddock	R	B	F	R	B	F	R	B	F
Q2	0	0	0						
Q3	0	0	0	+	+	+			
Q4	0	0	0	+	+	+	+	+	(-)

	Q1			Q2			Q3		
Whiting	R	B	F	R	B	F	R	B	F
Q2	(-)	0	0						
Q3	0	-	0	+	+	(+)			
Q4	(-)	-	0	+	0	(-)	+	+	+

Table 2.5.1: Correlation (r^2) between VPA (data from ICES CM1998/Assess:7) and IBTS abundance indices. 1st quarter: 1991-1996, 3rd quarter 1991-1995.

	Whiting age 1				Whiting age 2			
Index	standard area		extended area		standard area		extended area	
1st quarter	0.42	($p < 0.05$)	0.38	(n.s.)	0.04	(n.s.)	0.06	(n.s.)
3rd quarter	0.07	(n.s.)	0.15	(n.s.)	0.37	(n.s.)	0.38	(n.s.)

	Cod age 1				Cod age 2			
Index	standard area		extended area		standard area		extended area	
1st quarter	0.48	(n.s.)	0.52	(n.s.)	0.85	($p < 0.01$)	0.92	($p < 0.001$)
3rd quarter	0.91	($p < 0.01$)	0.89	($p < 0.01$)	0.90	($p < 0.01$)	0.89	($p < 0.01$)

Figures 2.1.1 - 2.1.8

Log-log scatterplots of survey indices by age. Careful interpretation is necessary, as the data range is not given. Many of these stocks were at a low level during the period covered by these data, and the plots may not represent the relationship between indices and/or assessment over the historical range of abundance. The upper box in each column represents a box and whisker plot of the distribution of the variable on the x-axis.

Figure 2.1.1

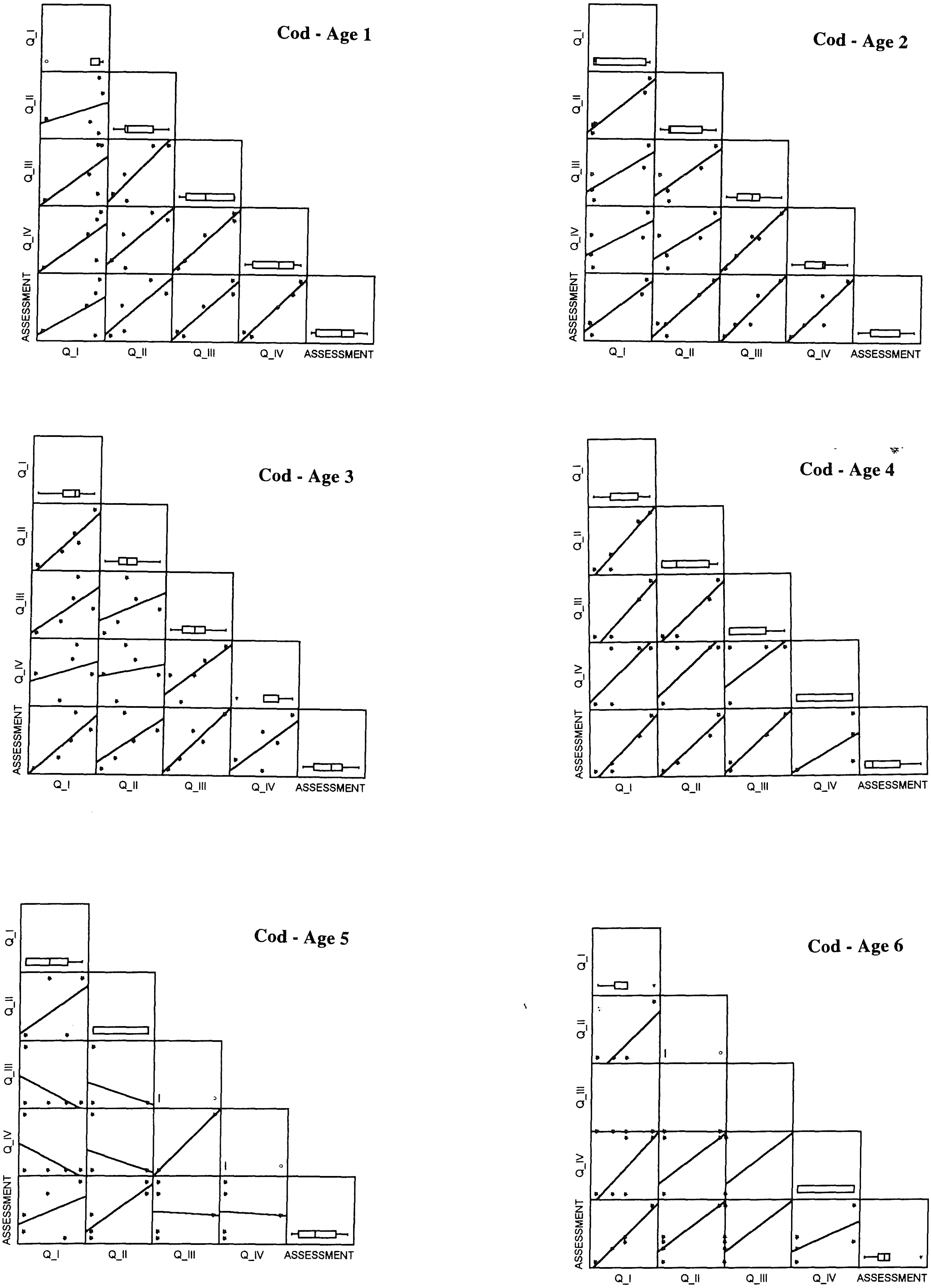

Cod - Age 1
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT
Cod - Age 2
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT
Cod - Age 3
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT
Cod - Age 4
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT
Cod - Age 5
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT
Cod - Age 6
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT

Figure 2.1.2

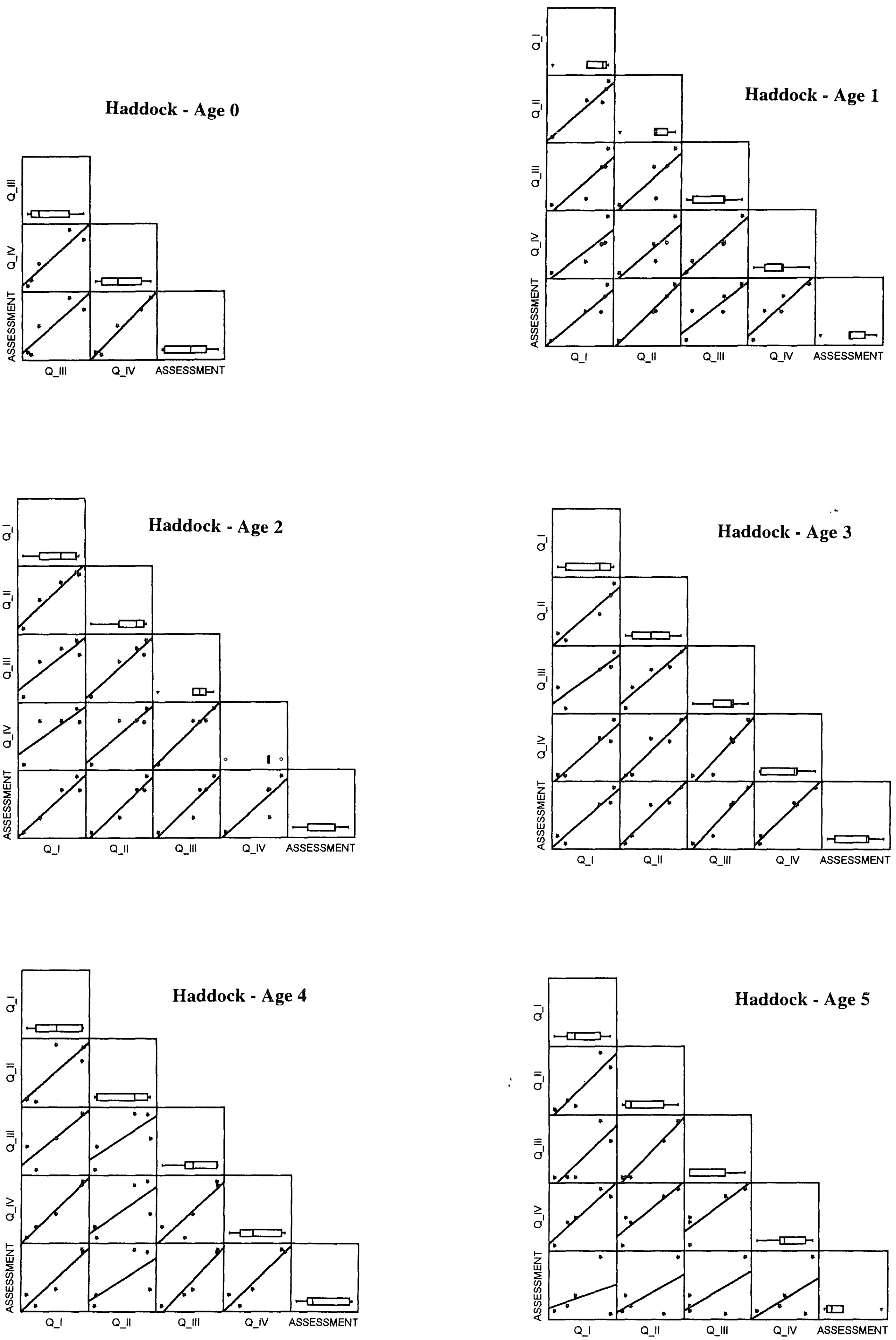
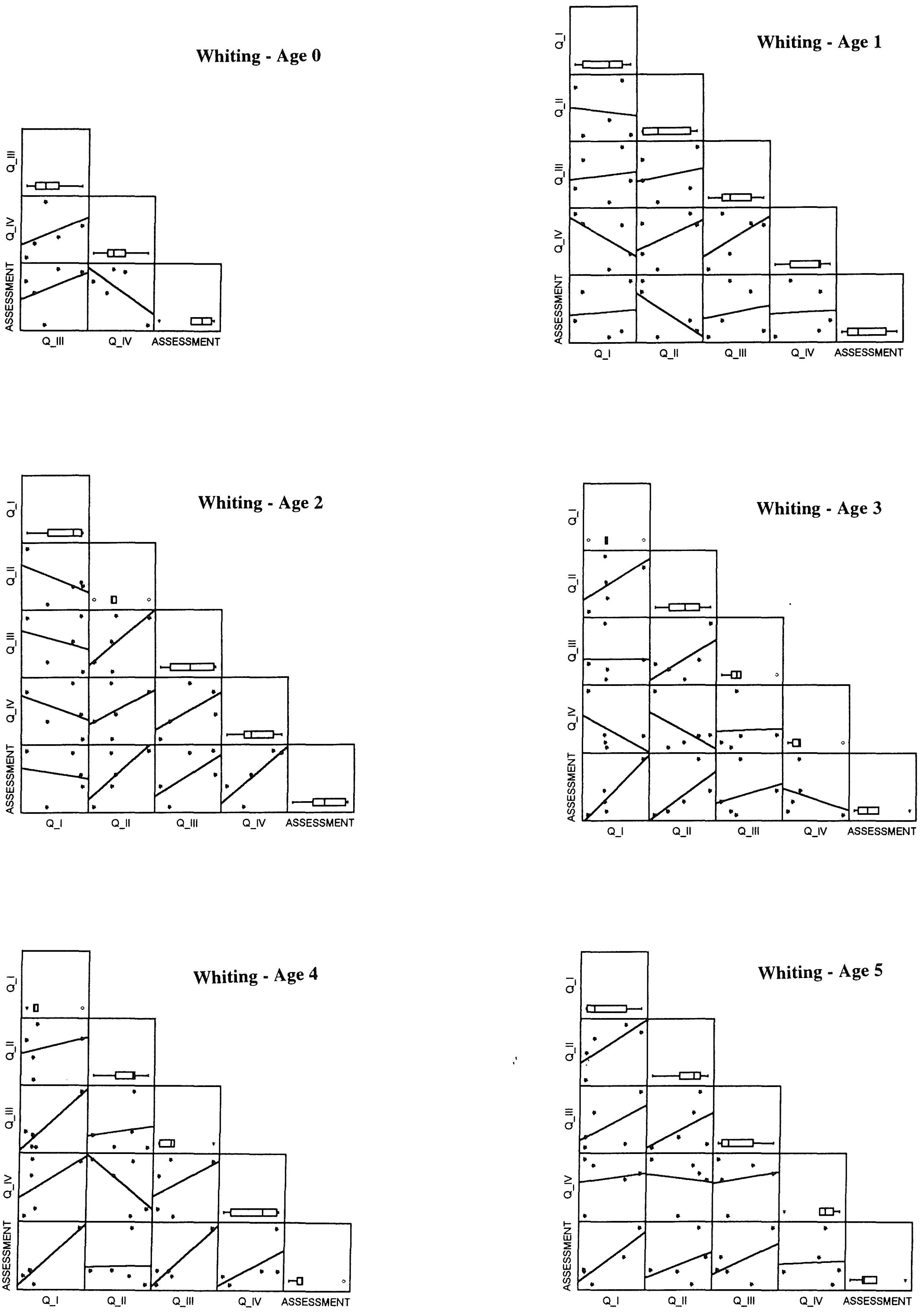

Haddock - Age 0
Q_III
Q_IV
ASSESSMENT
Haddock - Age 1
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT
Haddock - Age 2
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT
Haddock - Age 3
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT
Haddock - Age 4
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT
Haddock - Age 5
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT

Figure 2.1.3


Whiting - Age 0

Whiting - Age 1

Whiting - Age 2

Whiting - Age 3

Whiting - Age 4

Whiting - Age 5

Figure 2.1.4

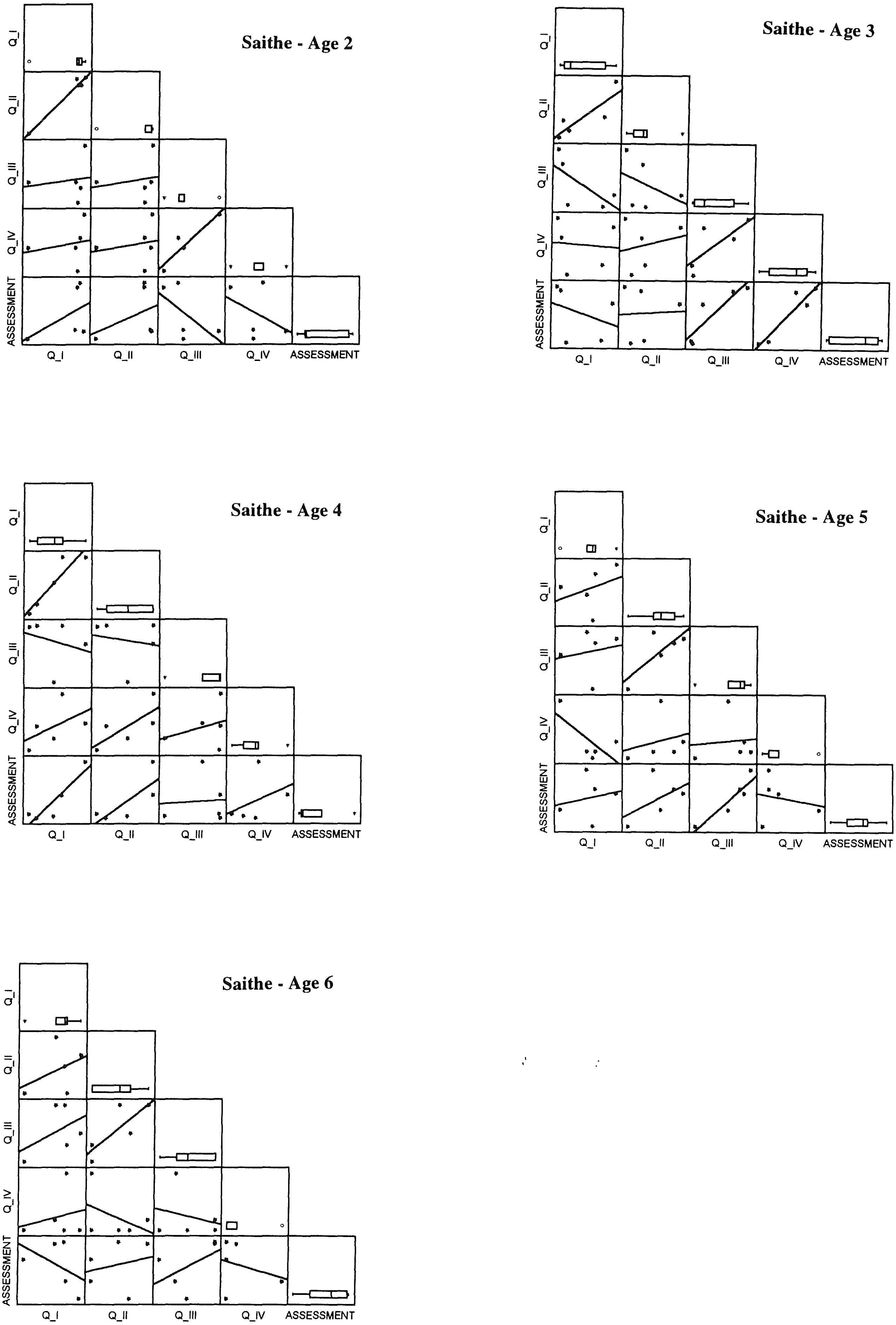
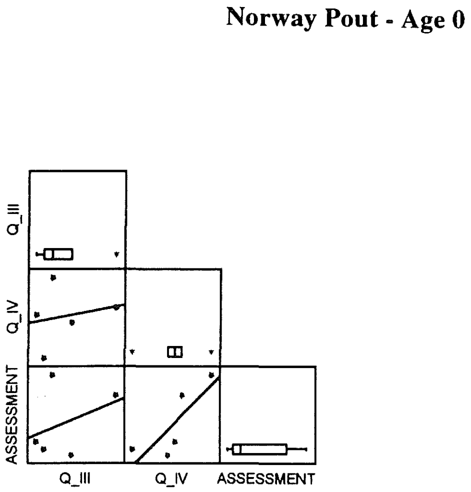
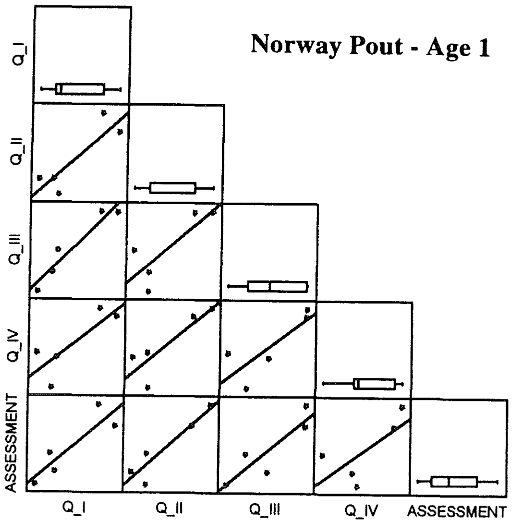
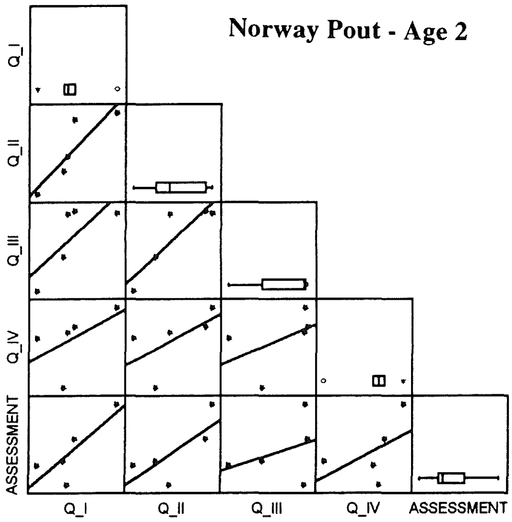

Saithe - Age 2
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT
Saithe - Age 3
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT
Saithe - Age 4
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT
Saithe - Age 5
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT
Saithe - Age 6
Q_I
Q_II
Q_III
Q_IV
ASSESSMENT

Figure 2.1.5


Norway Pout - Age 0


Norway Pout - Age 1


Norway Pout - Age 2

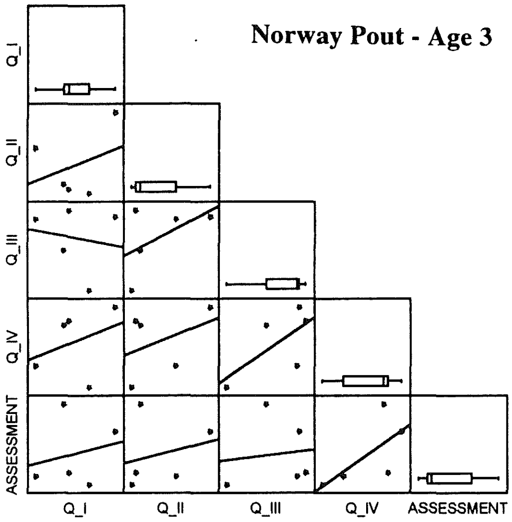
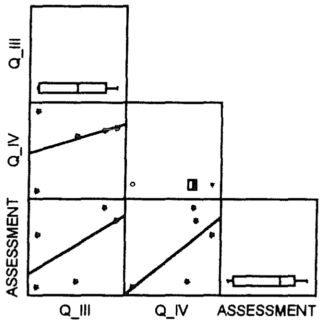
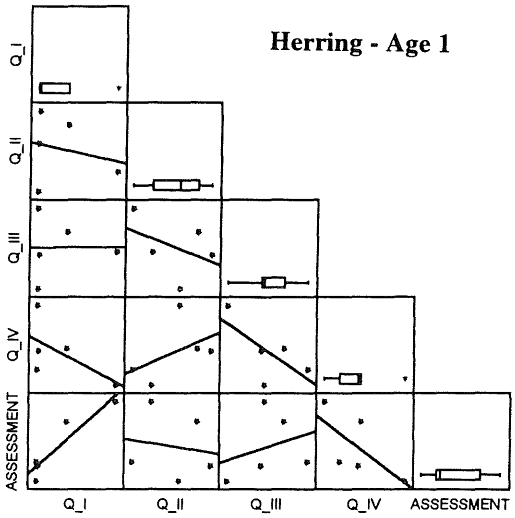
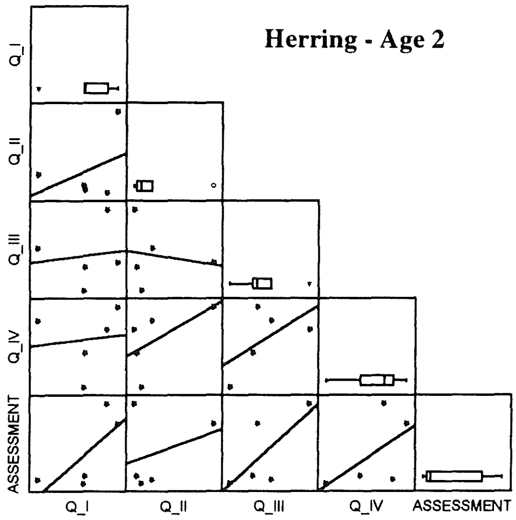
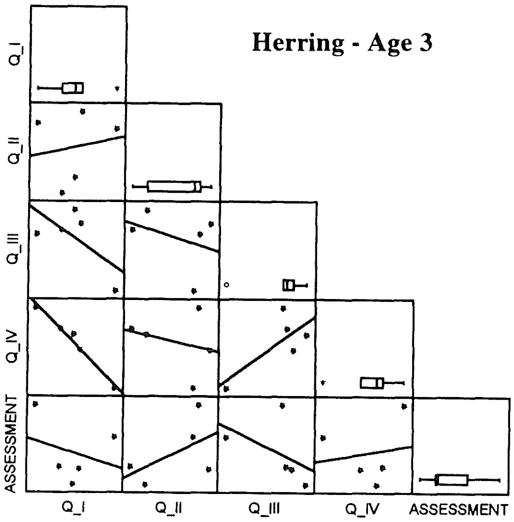

Norway Pout - Age 3

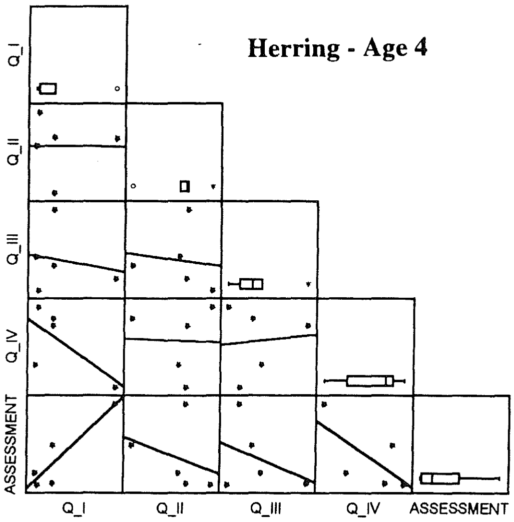
Figure 2.1.6


Herring - Age 0


Herring - Age 1


Herring - Age 2


Herring - Age 3


Herring - Age 4

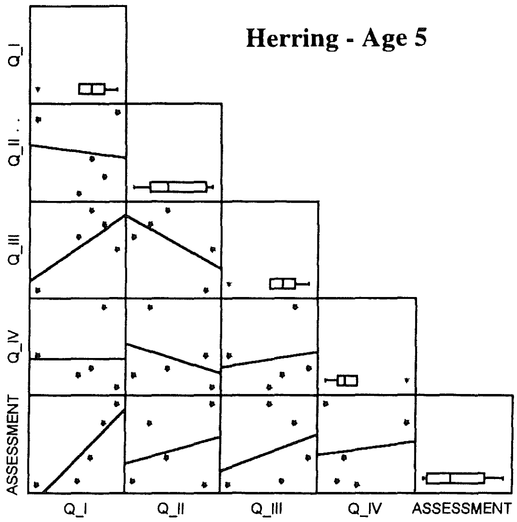

Herring - Age 5

Figure 2.1.7

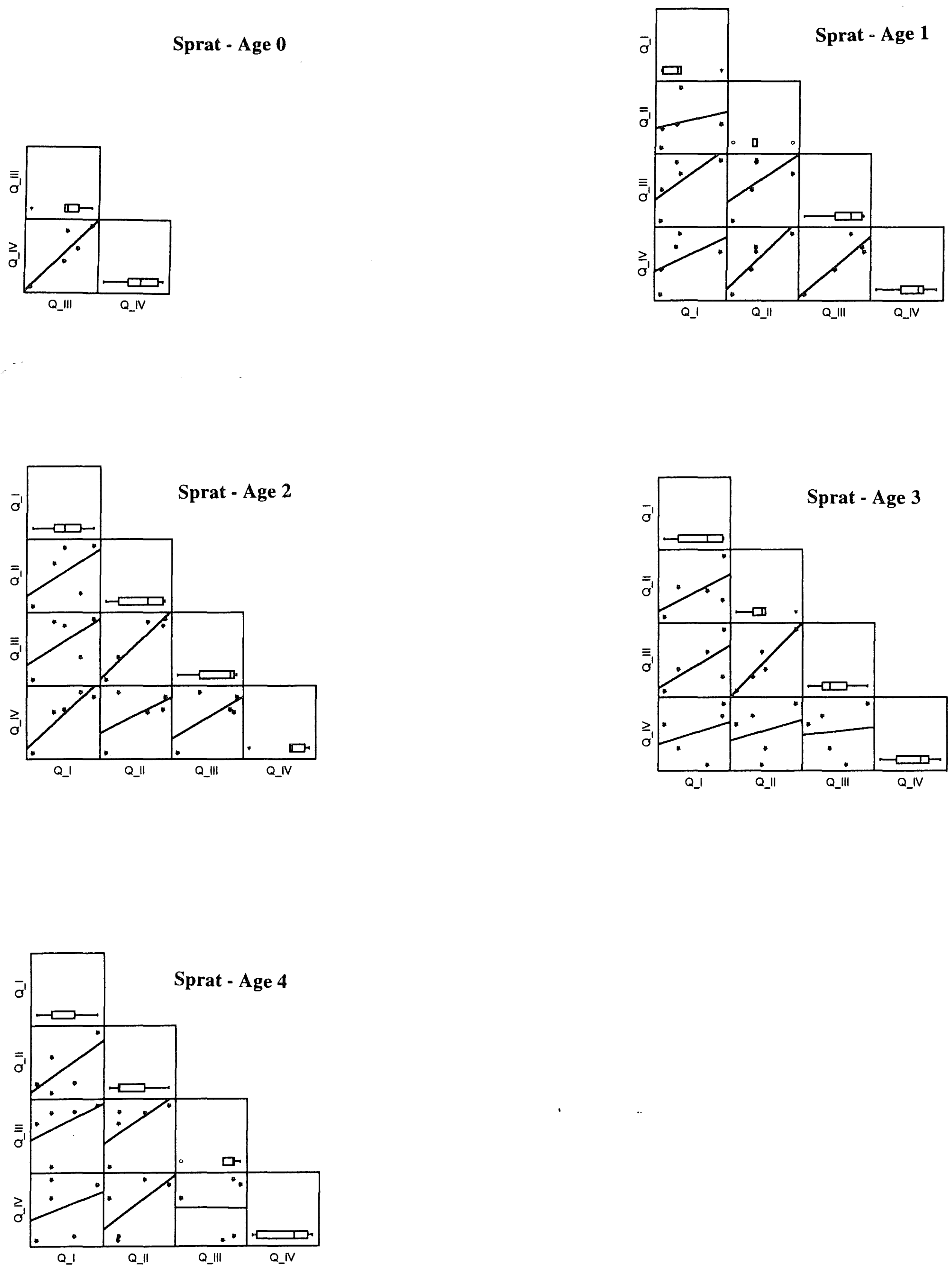
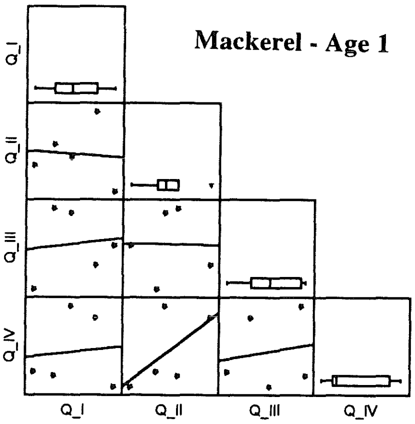
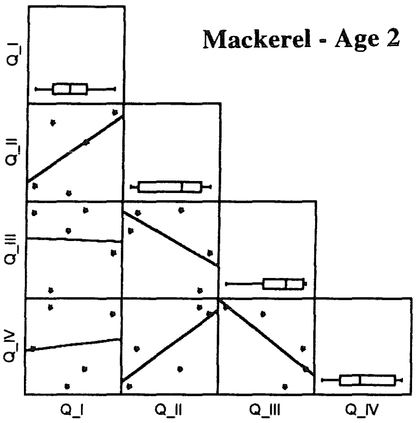

Sprat - Age 0
Q_III
Q_IV
Q_III
Q_IV
Sprat - Age 1
Q_I
Q_II
Q_III
Q_IV
Q_I
Q_II
Q_III
Q_IV
Sprat - Age 2
Q_I
Q_II
Q_III
Q_IV
Q_I
Q_II
Q_III
Q_IV
Sprat - Age 3
Q_I
Q_II
Q_III
Q_IV
Q_I
Q_II
Q_III
Q_IV
Sprat - Age 4
Q_I
Q_II
Q_III
Q_IV
Q_I
Q_II
Q_III
Q_IV

Figure 2.1.8

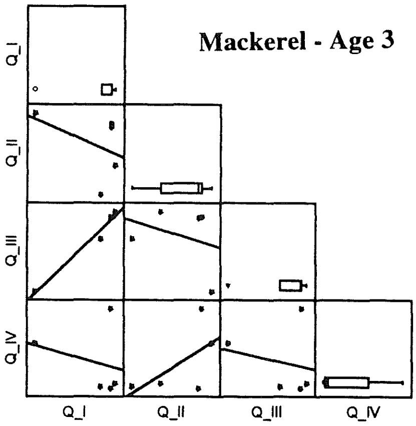
Mackerel - Age 1



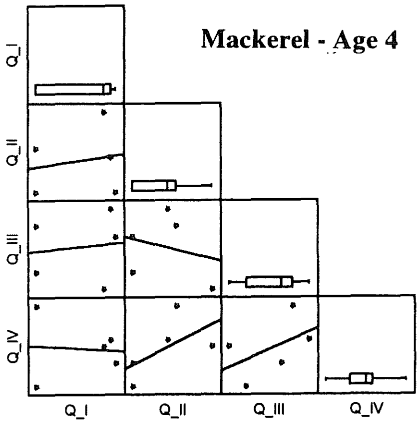
Mackerel - Age 2



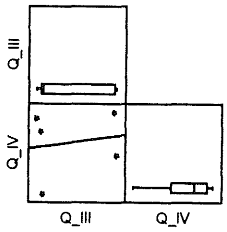
Mackerel - Age 3



Mackerel - Age 4



Mackerel - Age 5



Mackerel - Age 6

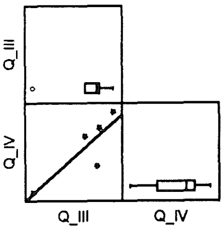
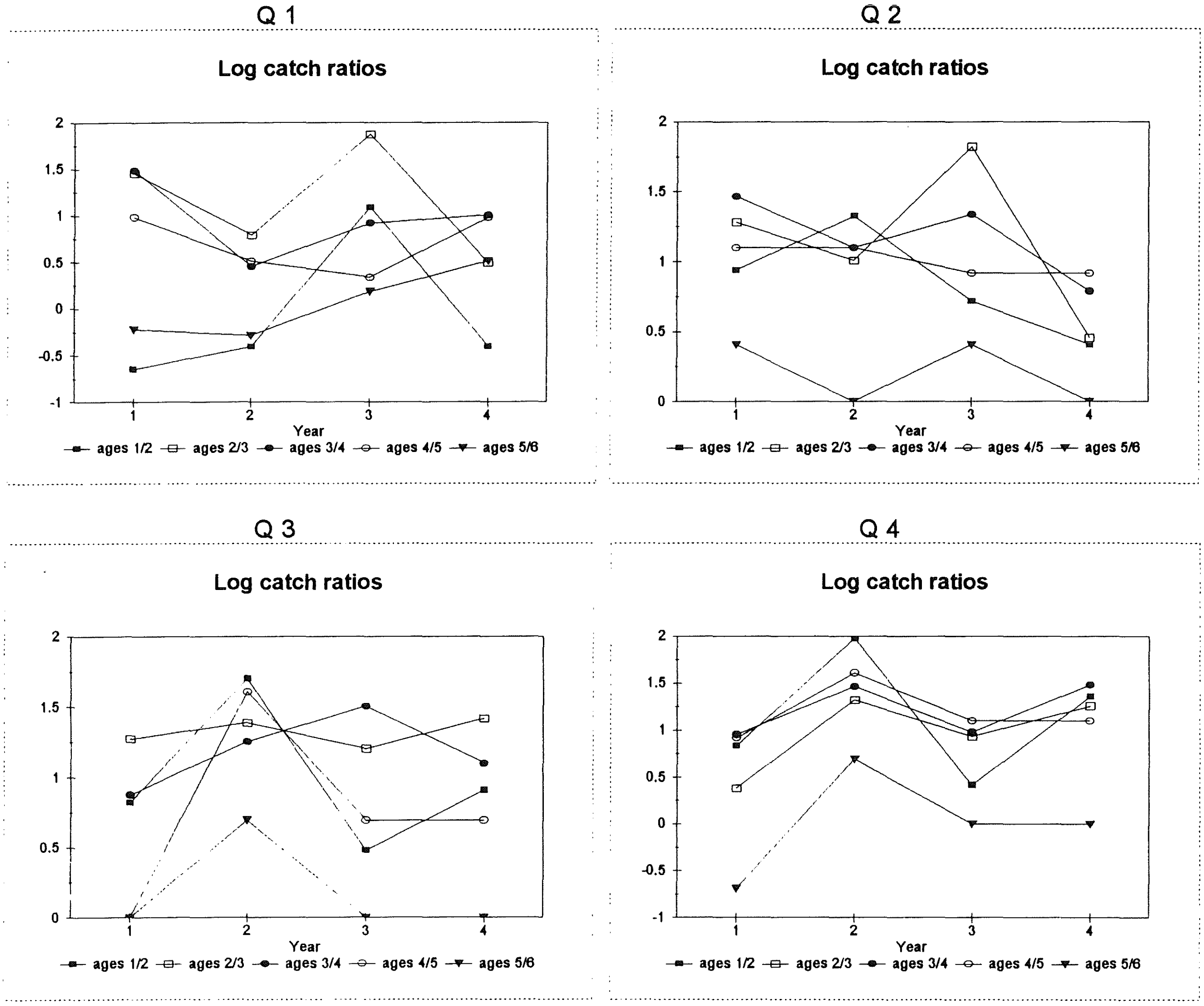


Figure 2.3.3.1

Cod Log catch ratio plots by survey



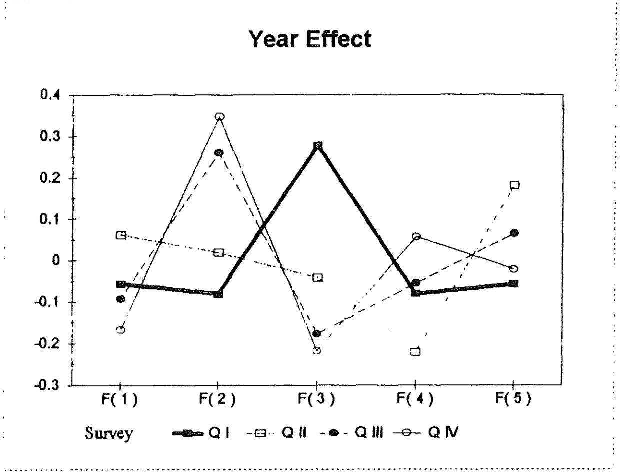
Variable codings

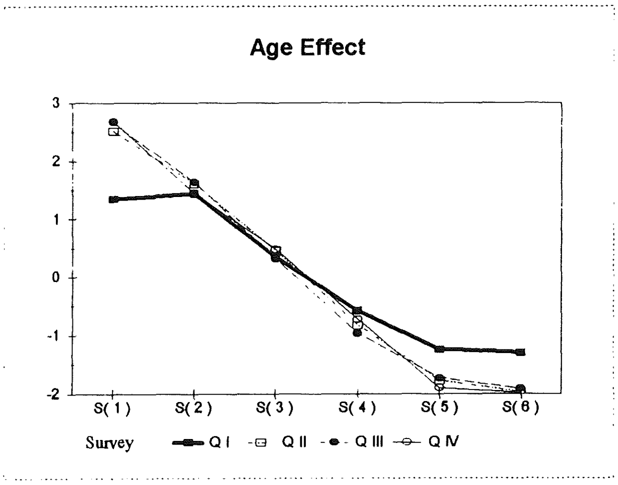
Year 1 = 1991
Age 1 = 1

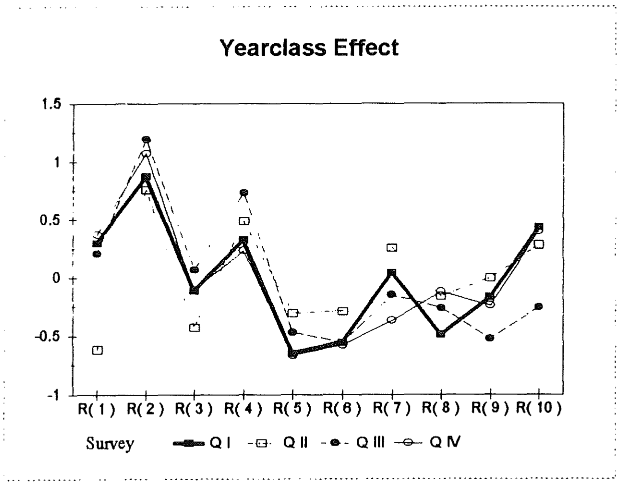
Figure 2.3.3.2

Cod Year, age and yearclass effects from a three factor model, and a four factor model with 1st order survey x main effect interactions

Three factor model


Year Effect

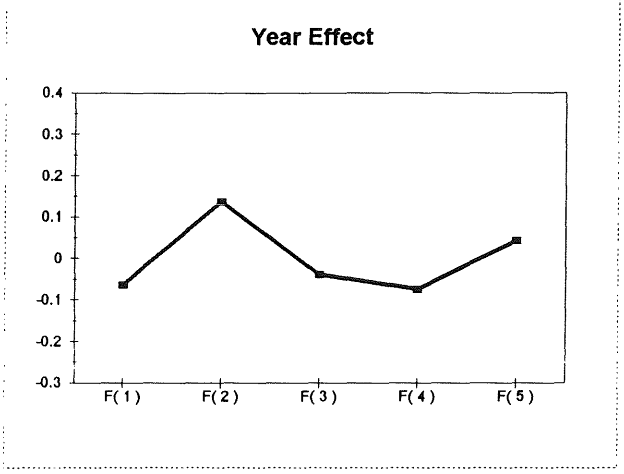

Age Effect

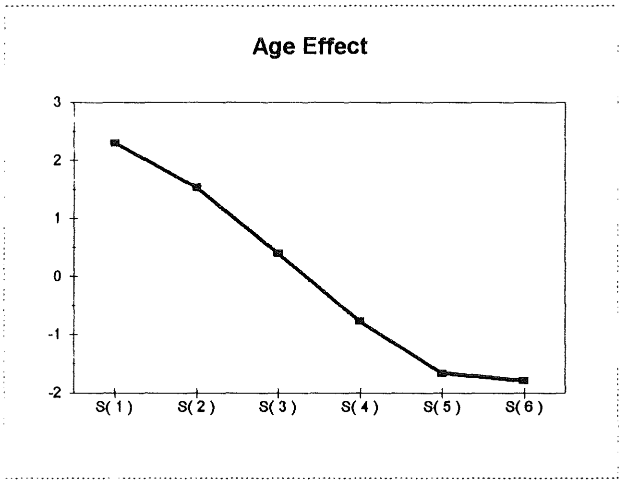

Yearclass Effect

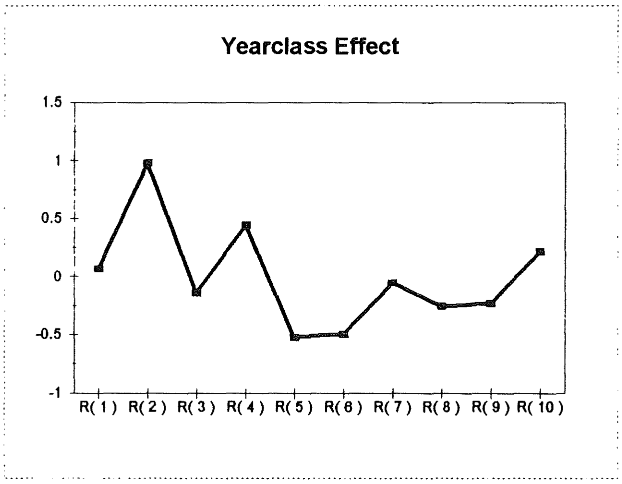
Variable codings

Year 1 = 1991
Age 1 = 1

Four factor model + survey*main effect interactions


Year Effect


Age Effect


Yearclass Effect

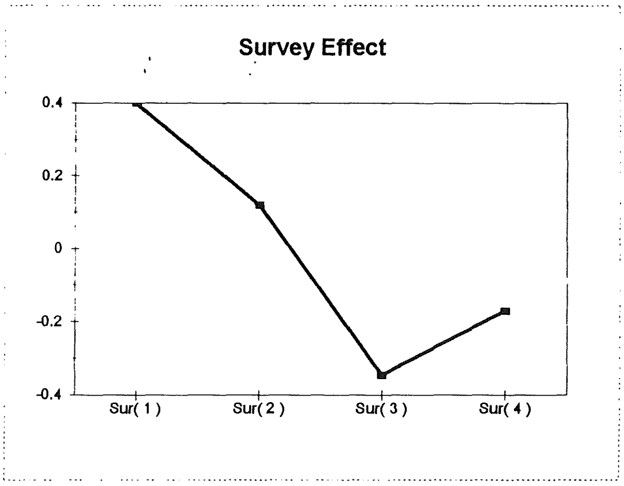
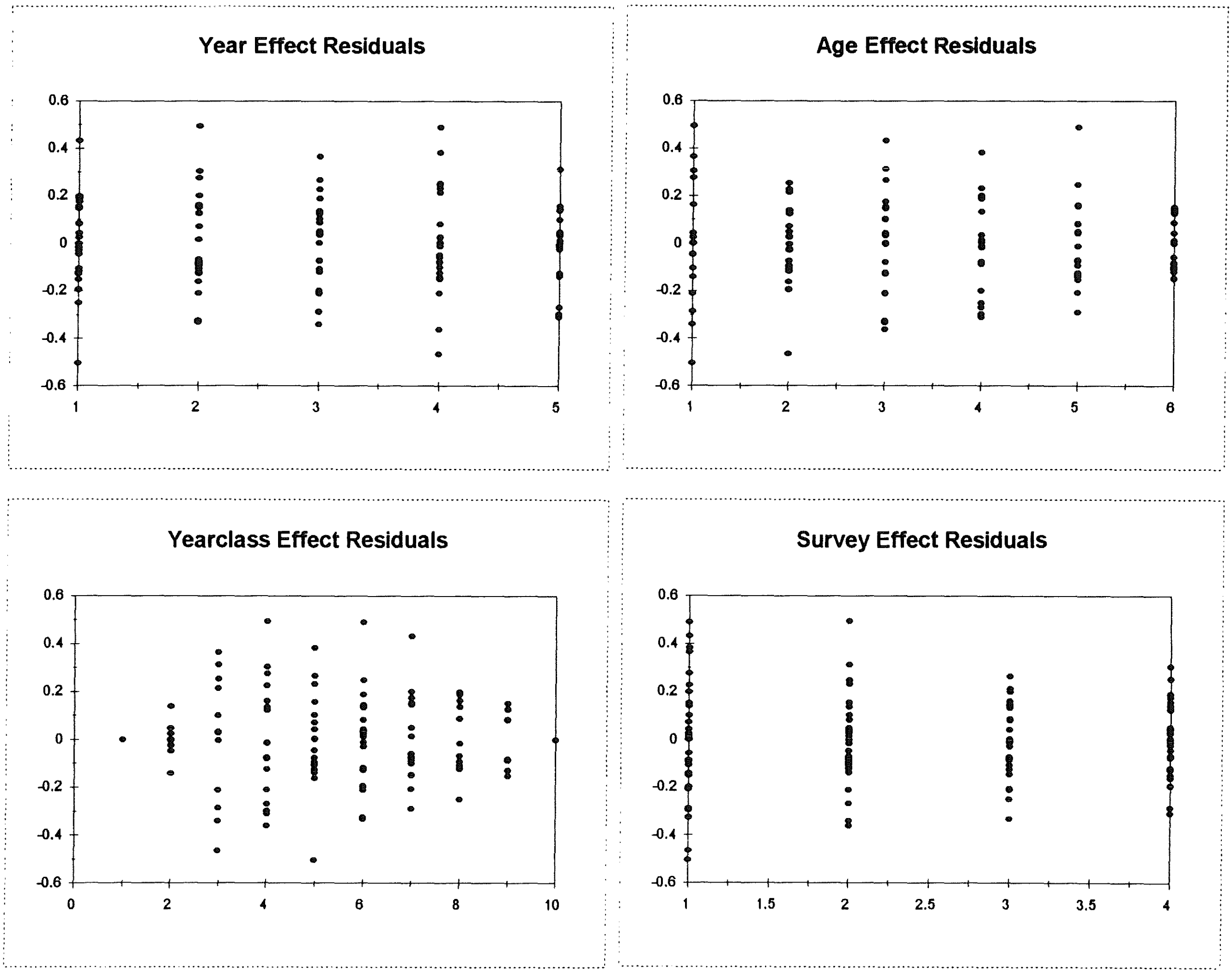

Survey Effect

Figure 2.3.3.3

Cod Year, age, yearclass and survey residuals from a four factor model

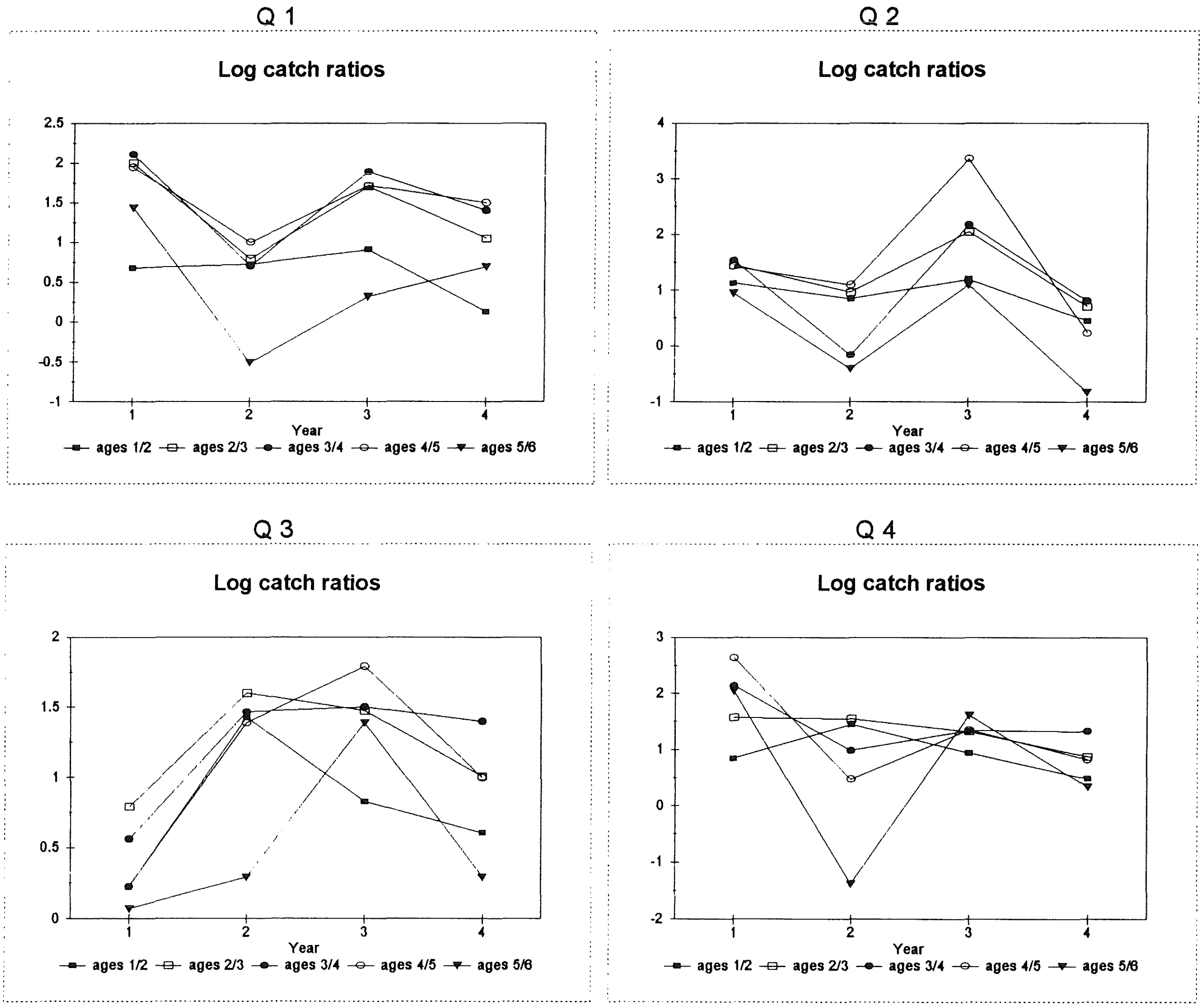


Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio
SURVEY	6.31	3	2.103	24.321
AGE	27.48	5	5.496	63.554
YEAR	0.728	4	0.182	2.105
YEARCLASS	17.047	9	1.894	21.903
SURVEY*AGE	7.625	15	0.508	5.878
SURVEY*YEAR	8.92	12	0.743	8.596
SURVEY*YEARCLASS	14.435	27	0.535	6.182
Error	4.151	48	0.086	

Figure 2.3.3.4

Haddock Log catch ratio plots by survey



Variable codings

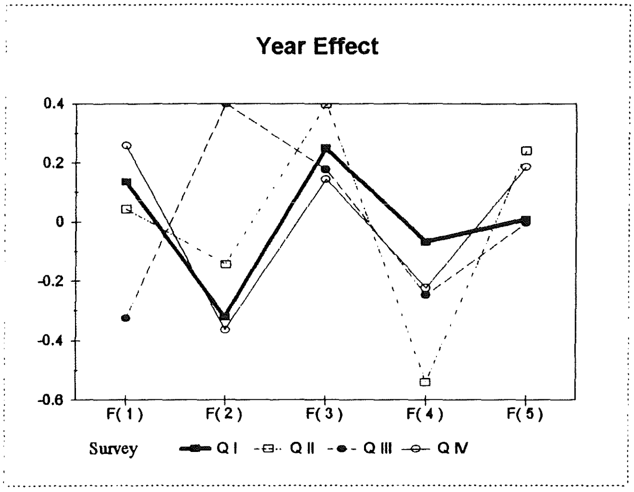
Year 1 = 1991
Age 1 = 1

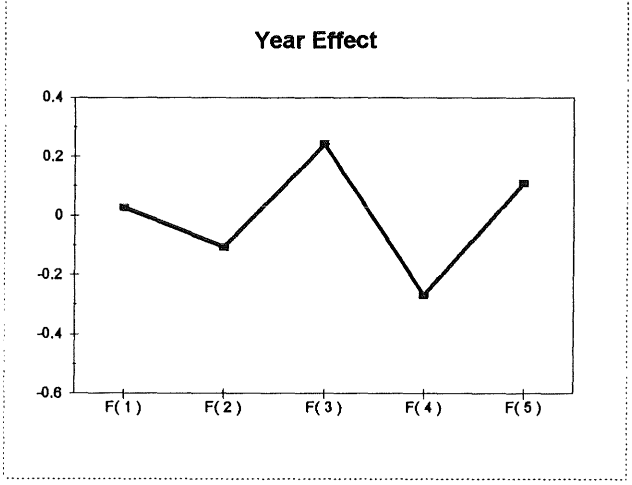
Figure 2.3.3.5

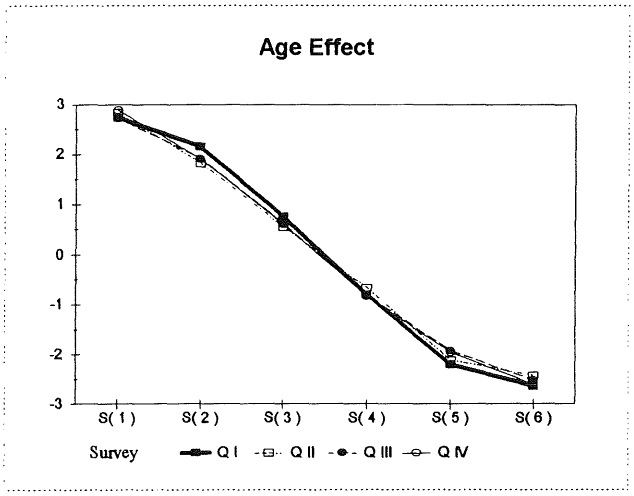
Haddock — Year, age and yearclass effects from a three factor model, and a four factor model with 1st order survey x main effect interactions

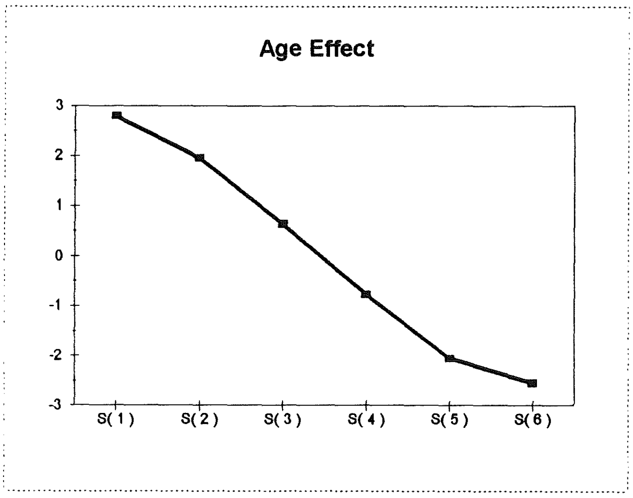
Three factor model

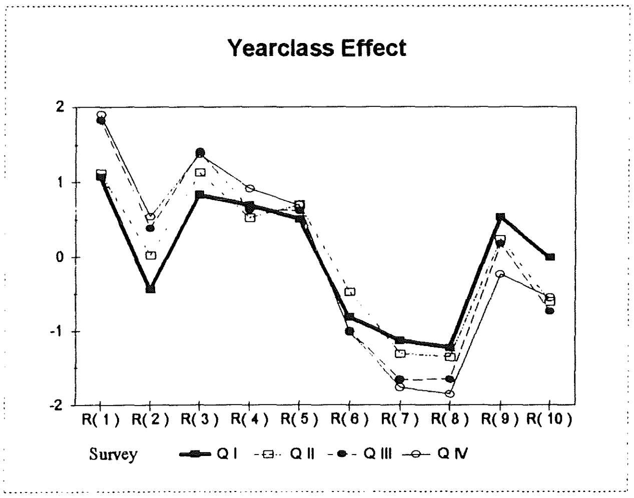
Four factor model + survey*main effect interactions

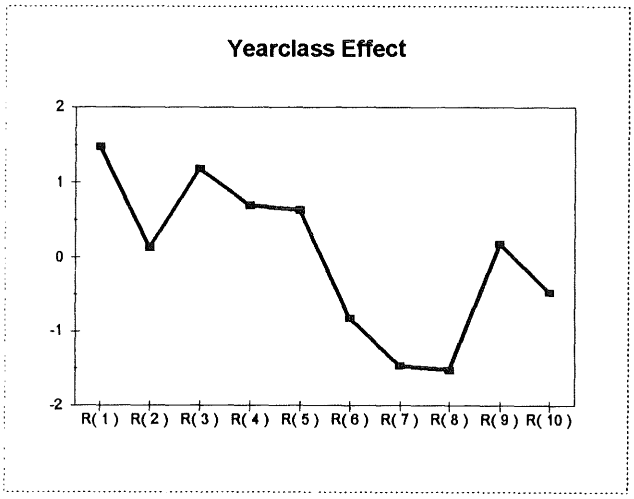

Year Effect


Year Effect


Age Effect


Age Effect


Yearclass Effect


Yearclass Effect

Variable codings

Year 1 = 1991
Age 1 = 1

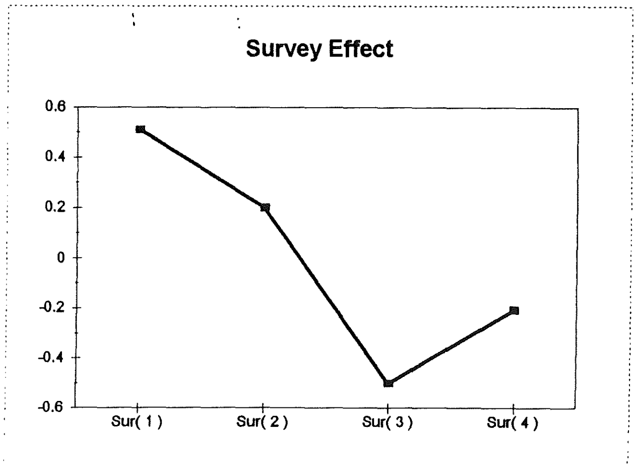
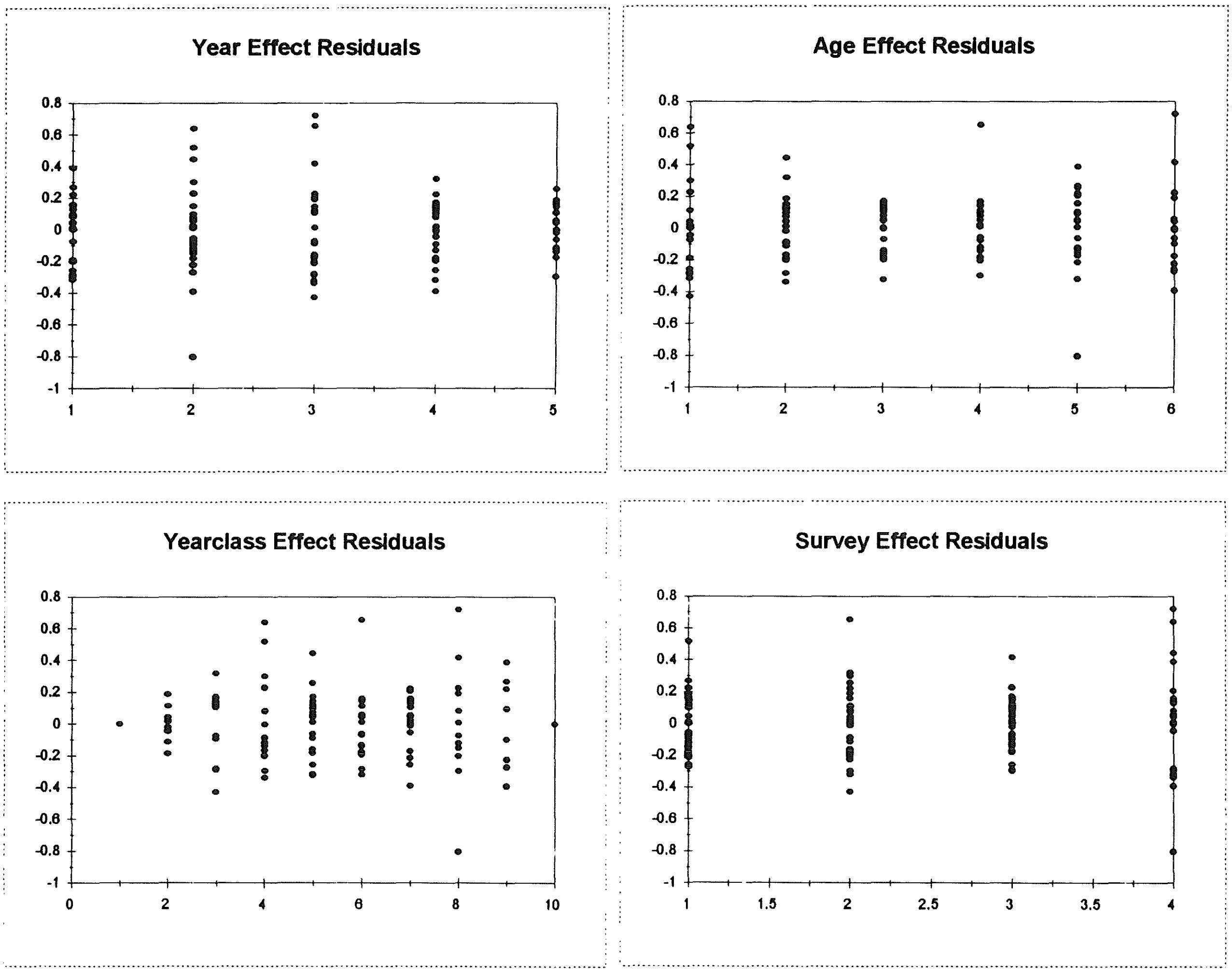

Survey Effect

Figure 2.3.3.6

Haddock Year, age, yearclass and survey residuals from a four factor model

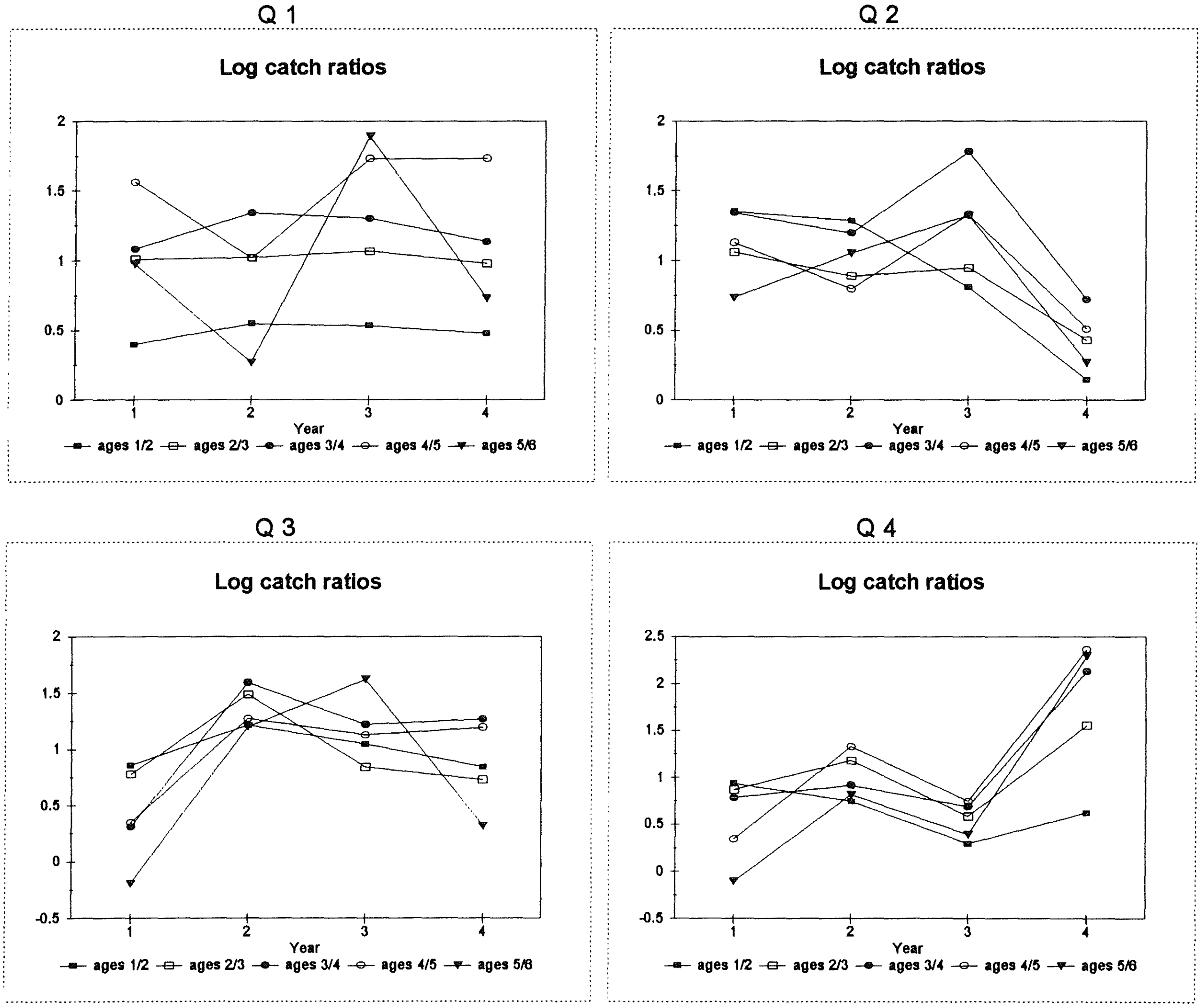


Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio
SURVEY	11.645	3	3.882	30.128
AGE	38.515	5	7.703	59.786
YEAR	3.565	4	0.891	6.918
YEARCLASS	61.669	9	6.852	53.182
SURVEY*AGE	9.595	15	0.64	4.965
SURVEY*YEAR	13.381	12	1.115	8.655
SURVEY*YEARCLASS	20.865	27	0.773	5.998
Error	6.184	48	0.129	

Figure 2.3.3.7

Whiting Log catch ratio plots by survey



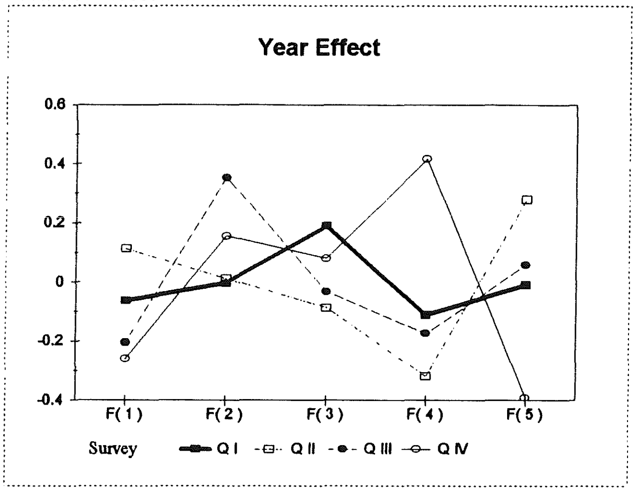
Variable codings

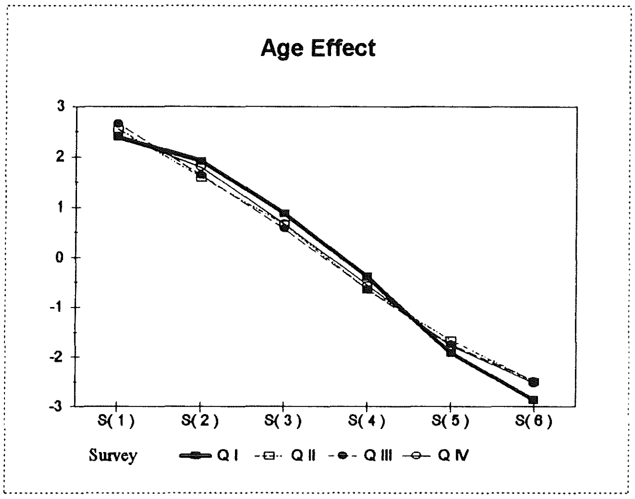
Year 1 = 1991
Age 1 = 1

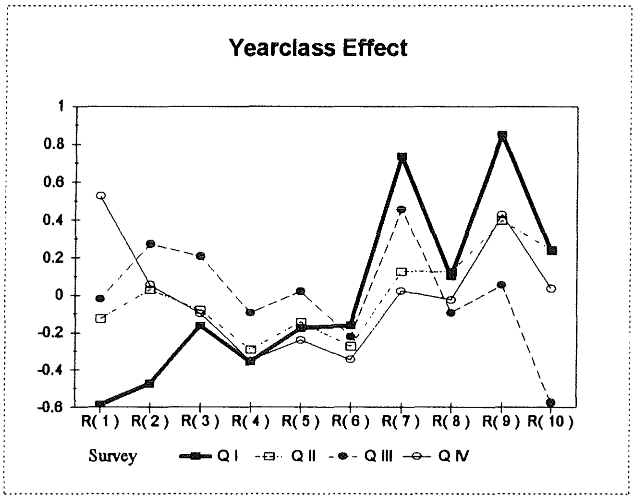
Figure 2.3.3.8

Whiting Year, age and yearclass effects from a three factor model, and a four factor model with 1st order survey x main effect interactions

Three factor model


Year Effect

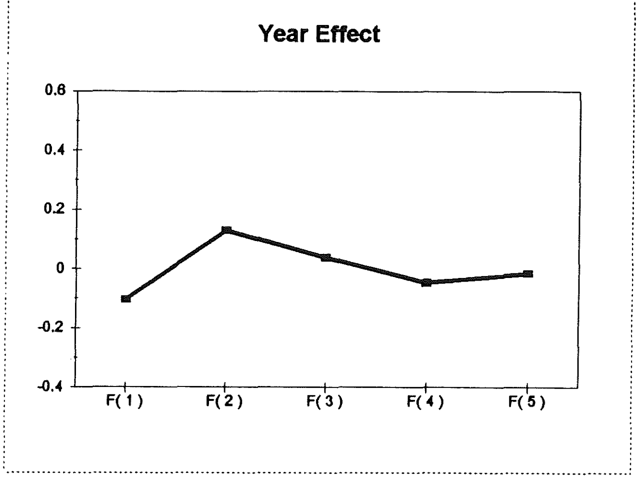

Age Effect

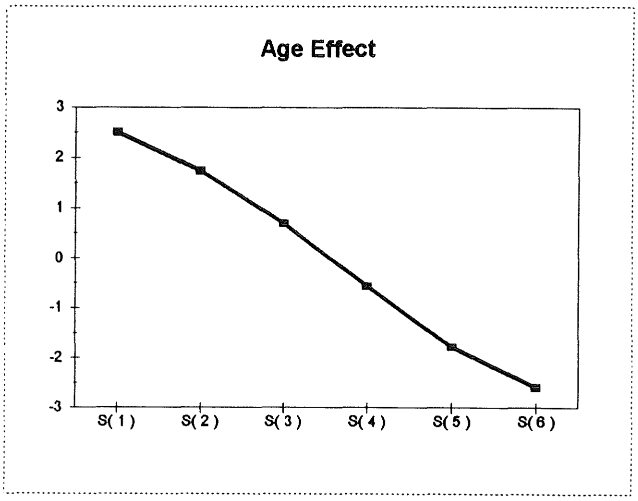

Yearclass Effect

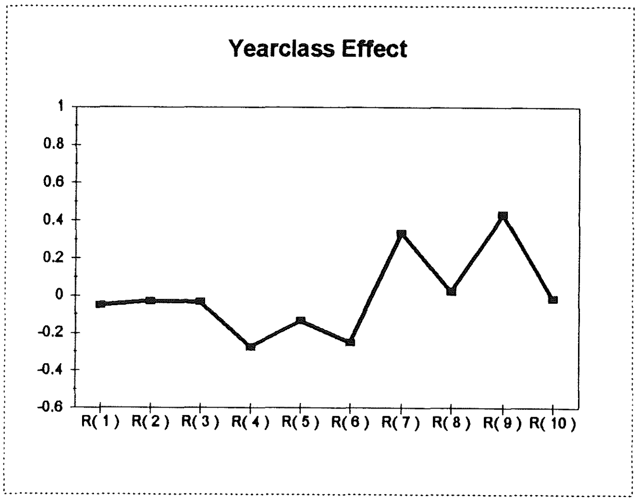
Variable codings

Year 1 = 1991
Age 1 = 1

Four factor model + survey*main effect interactions


Year Effect


Age Effect


Yearclass Effect

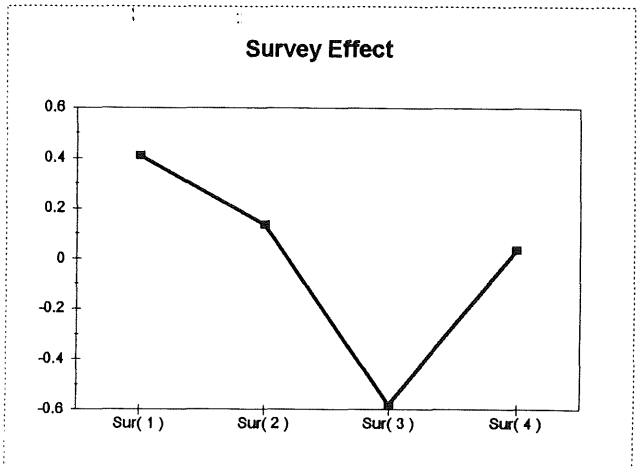
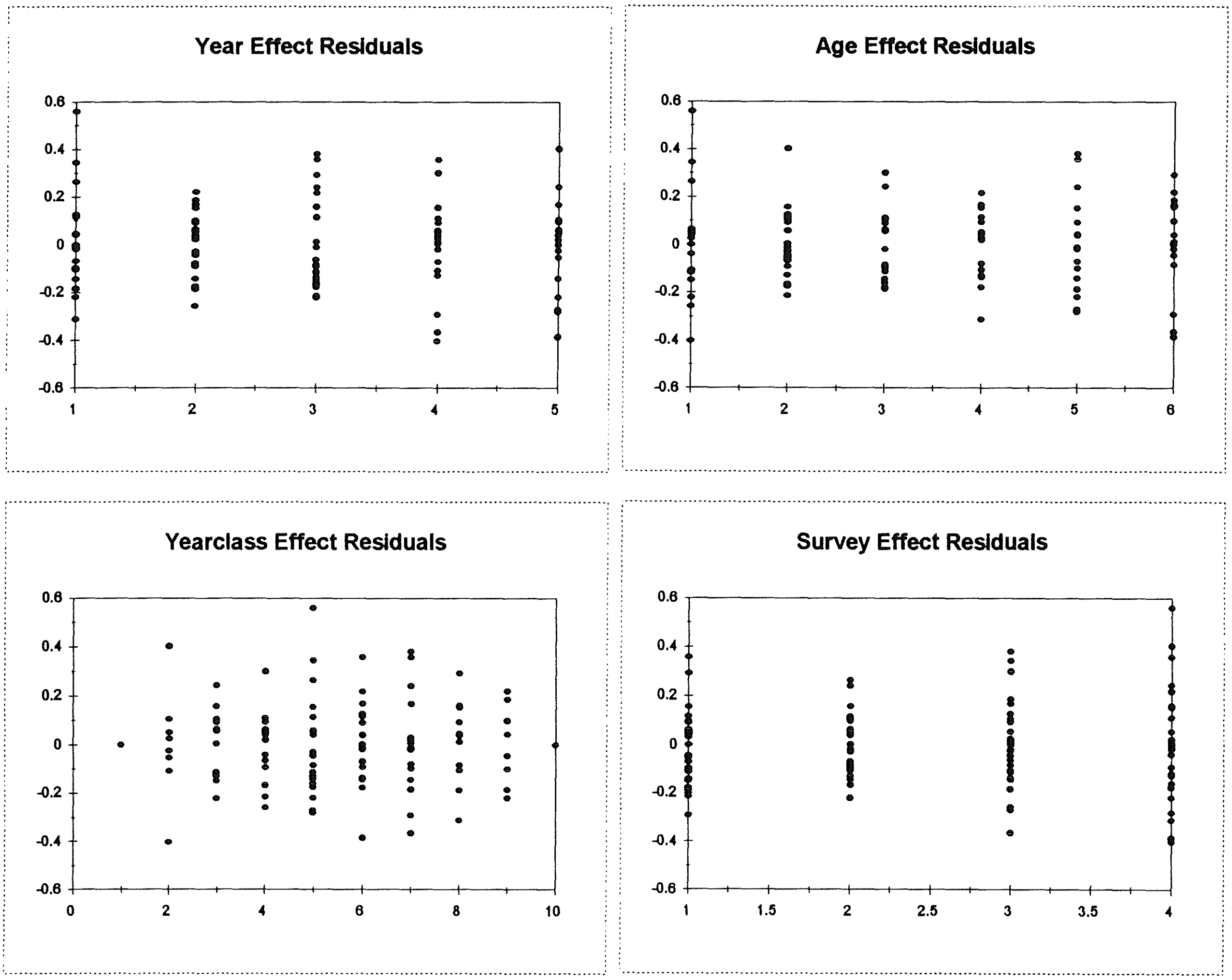

Survey Effect

Figure 2.3.3.9

Whiting Year, age, yearclass and survey residuals from a four factor model


Year Effect Residuals

Age Effect Residuals

Yearclass Effect Residuals

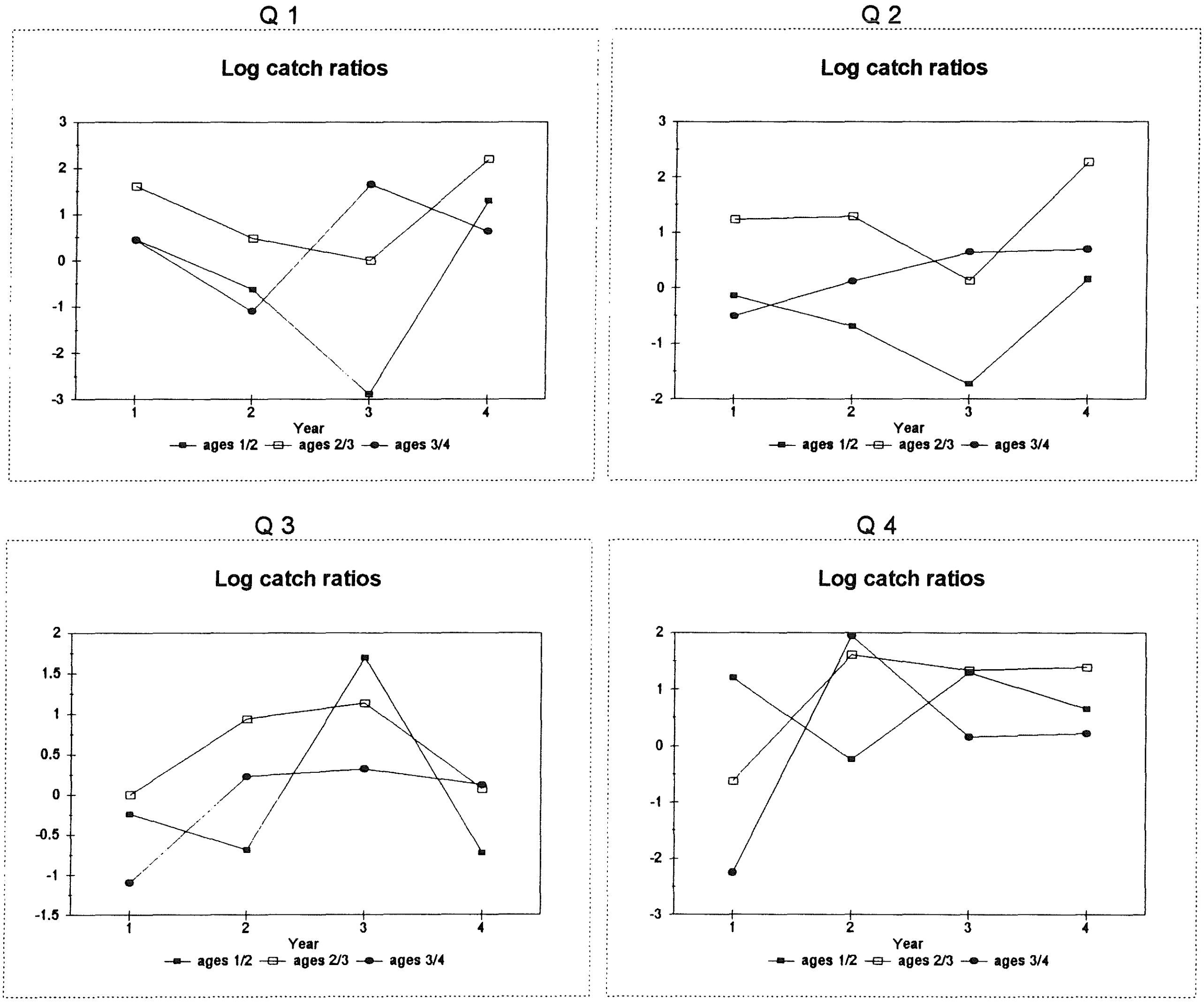
Survey Effect Residuals

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio
SURVEY	10.304	3	3.435	48.549
AGE	30.531	5	6.106	86.307
YEAR	0.685	4	0.171	2.419
YEARCLASS	4.425	9	0.492	6.95
SURVEY*AGE	25.054	15	1.67	23.608
SURVEY*YEAR	37.004	12	3.084	43.587
SURVEY*YEARCLASS	50.979	27	1.888	26.688
Error	3.396	48	0.071	

Figure 2.3.3.10

Saithe Log catch ratio plots by survey


Q 1

Q 2

Q 3

Q 4

Variable codings

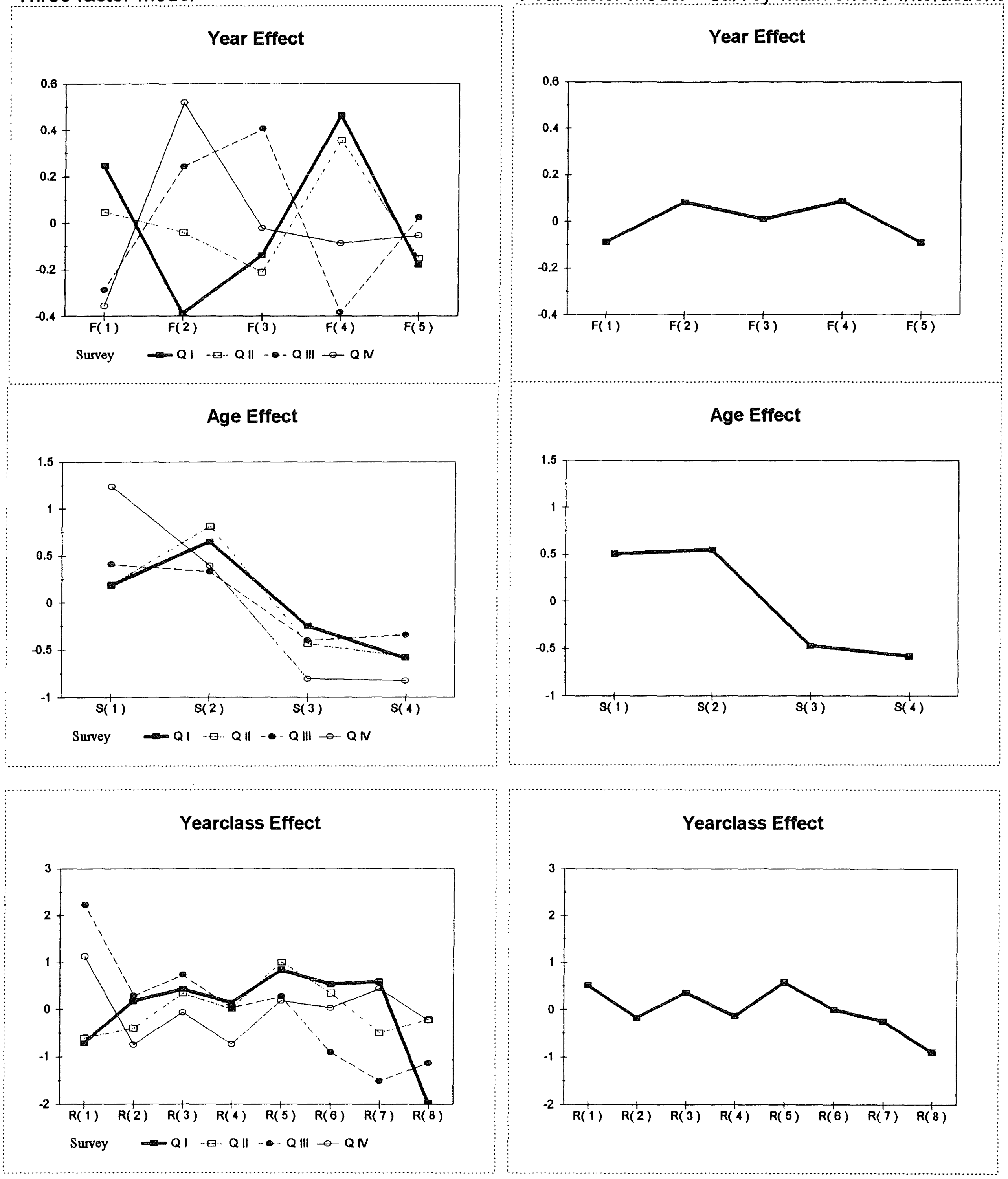
Year 1 = 1991
Age 1 = 3

Figure 2.3.3.11

Saithe Year, age and yearclass effects from a three factor model, and a four factor model with 1st order survey x main effect interactions

Three factor model

Four factor model + survey*main effect interactions



Variable codings

Year 1 = 1991
Age 1 = 3

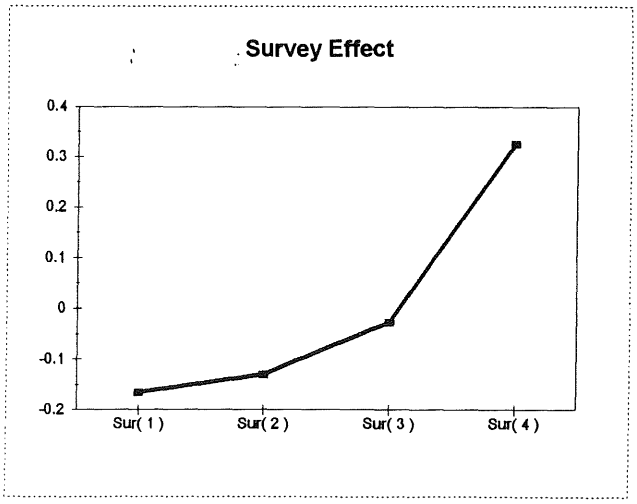
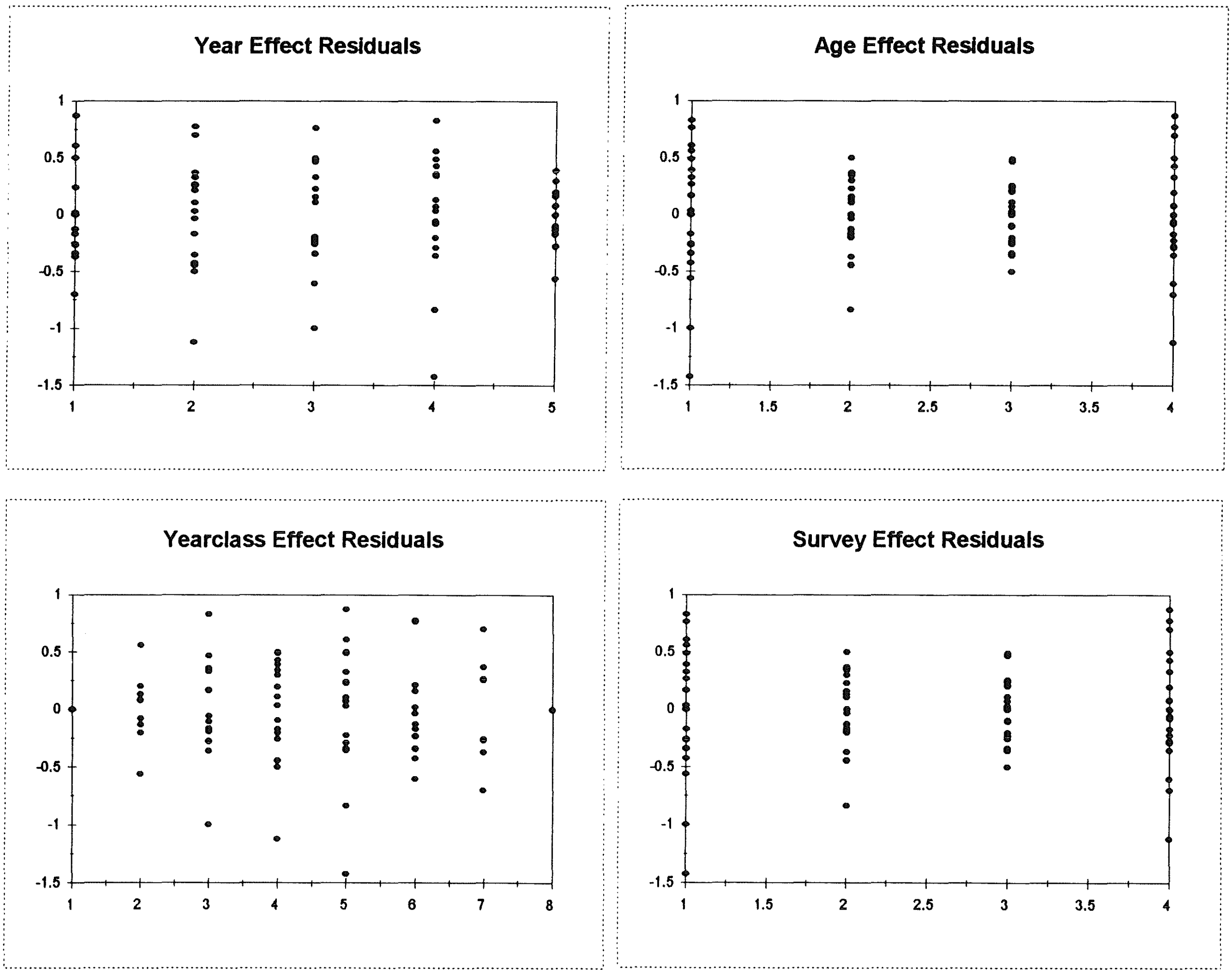


Figure 2.3.3.12

Saithe Year, age, yearclass and survey residuals from a four factor model

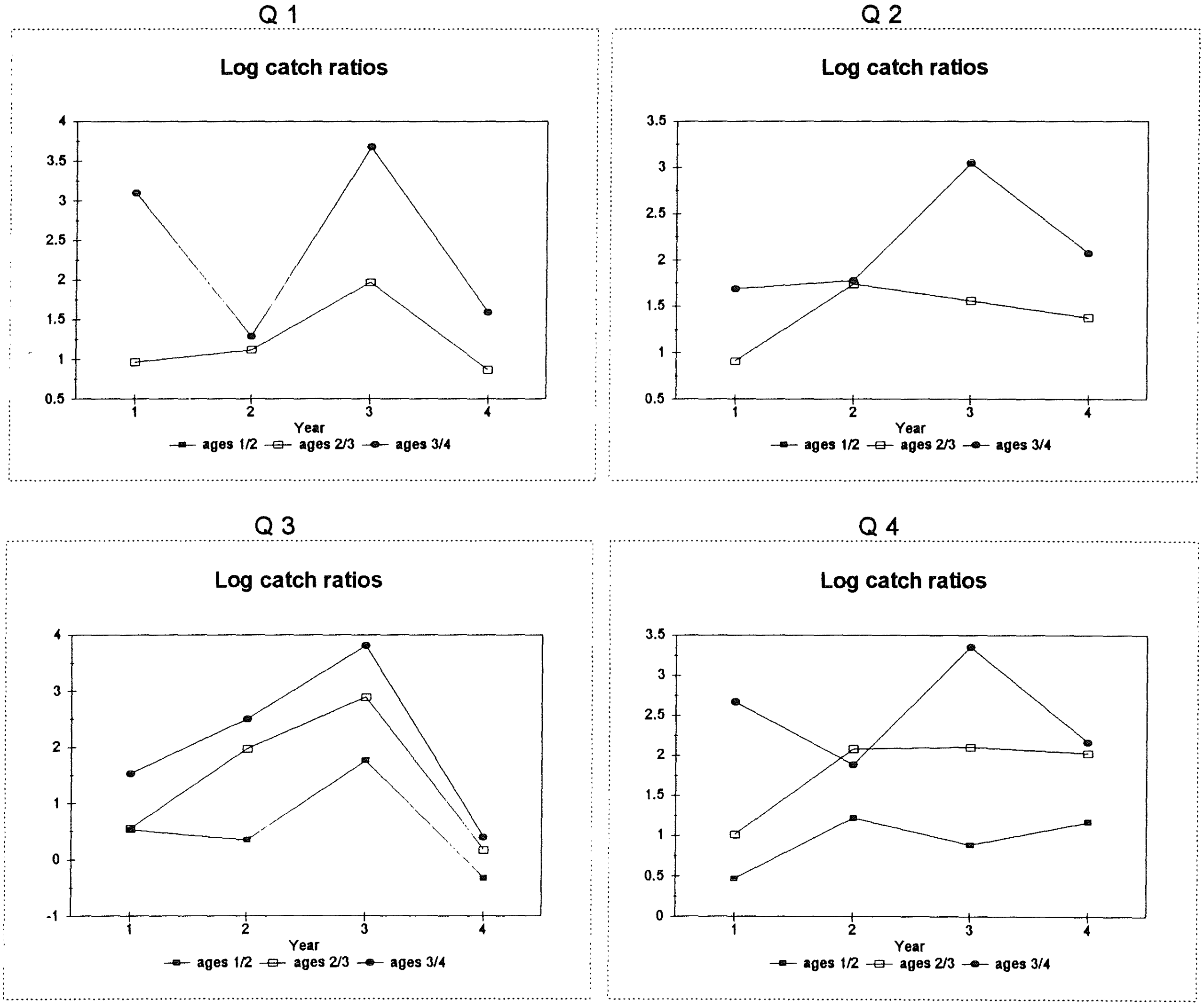


Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio
SURVEY	2.116	3	0.705	1.158
AGE	7.267	3	2.422	3.976
YEAR	0.397	4	0.099	0.163
YEARCLASS	9.673	7	1.382	2.268
SURVEY*AGE	34.512	9	3.835	6.294
SURVEY*YEAR	62.71	12	5.226	8.577
SURVEY*YEARCLASS	129.869	21	6.184	10.15
Error	14.623	24	0.609	

Figure 2.3.3.13

Norway pout Log catch ratio plots by survey


Q 1

Q 2

Q 3

Q 4

Variable codings

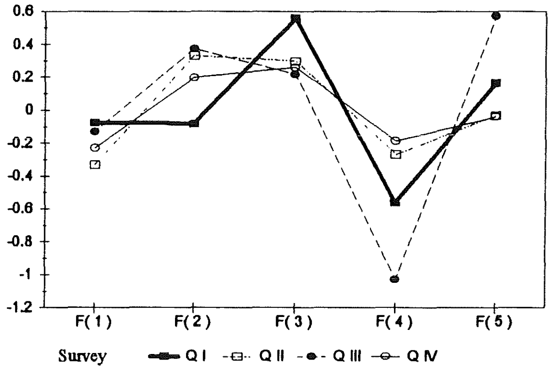
Year 1 = 1991
Age 1 = 0

Figure 2.3.3.14

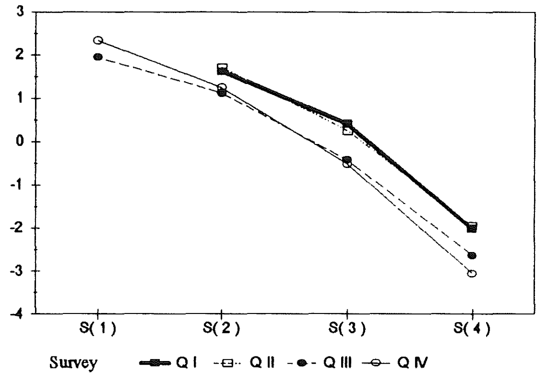
Norway pout Year, age and yearclass effects from a three factor model, and a four factor model with 1st order survey x main effect interactions

Three factor model

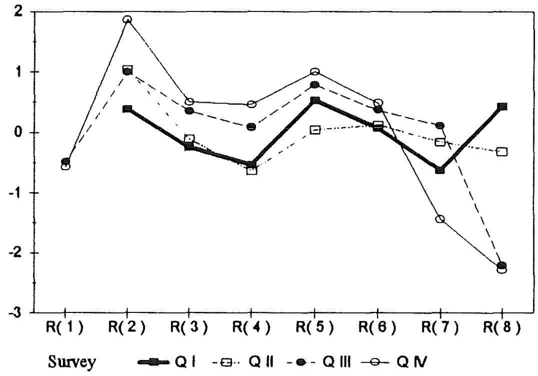
Year Effect



Age Effect



Yearclass Effect

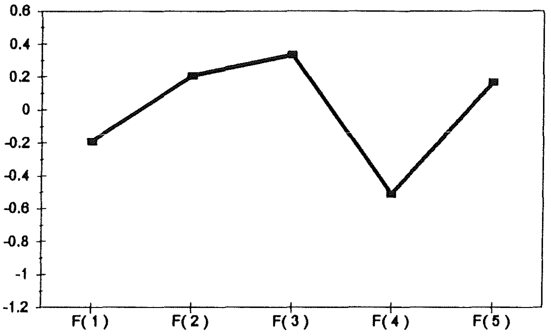


Variable codings

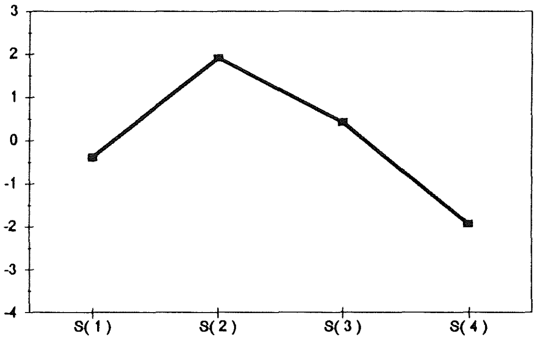
Year 1 = 1991
Age 1 = 0

Four factor model + survey*main effect interactions

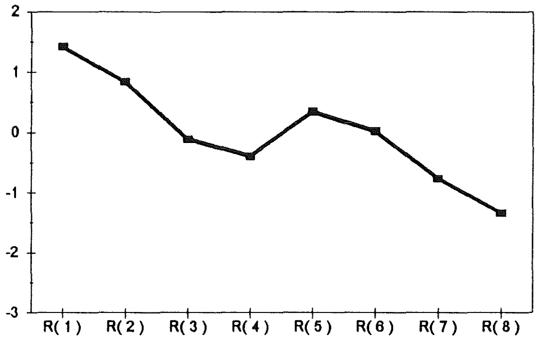
Year Effect



Age Effect



Yearclass Effect



Survey Effect

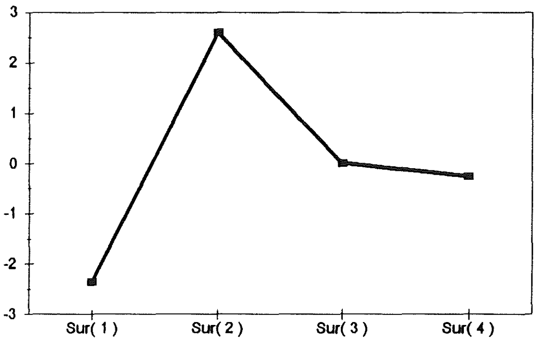
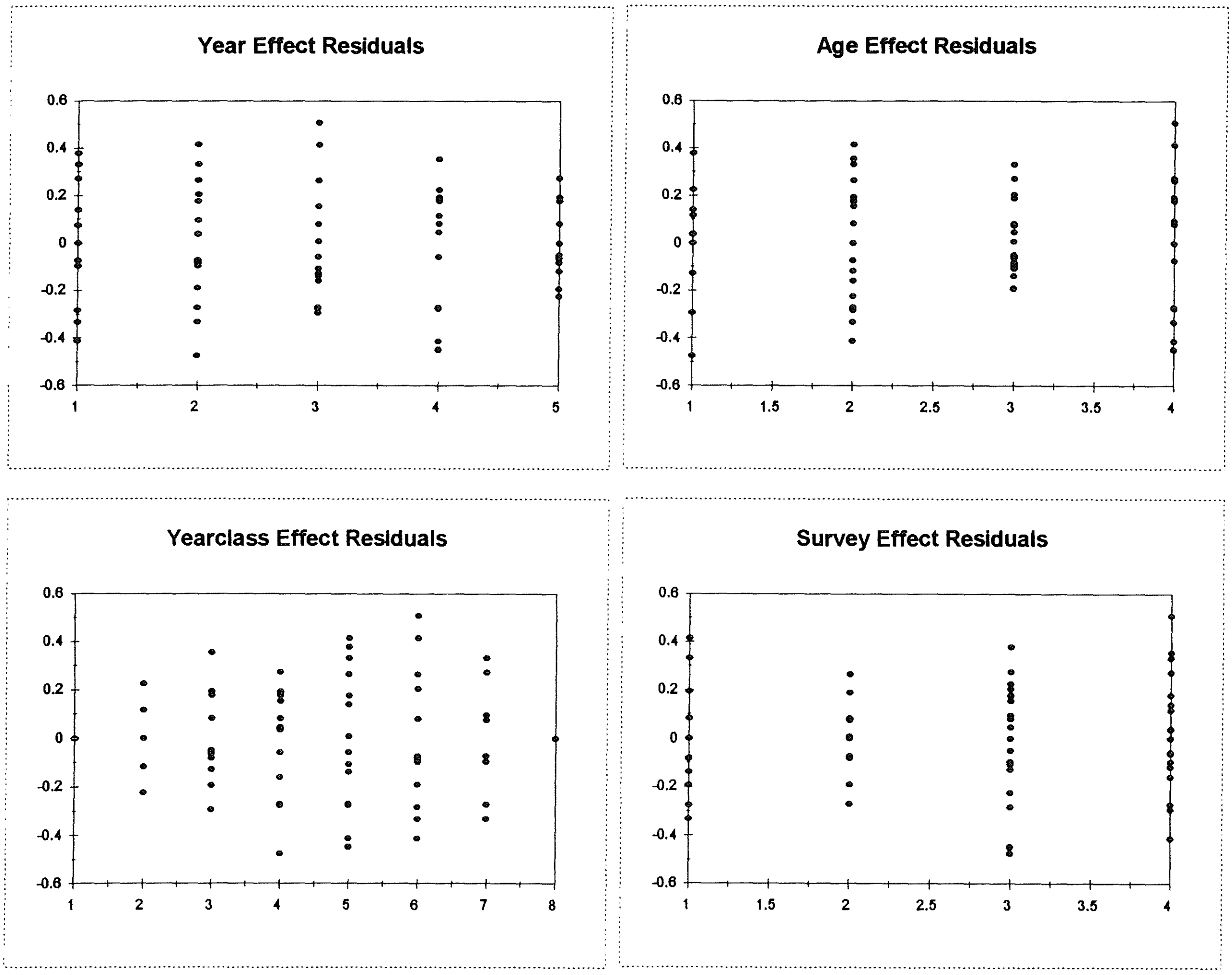


Figure 2.3.3.15

Norway pout Year, age, yearclass and survey residuals from a four factor model


Year Effect Residuals

Age Effect Residuals

Yearclass Effect Residuals

Survey Effect Residuals

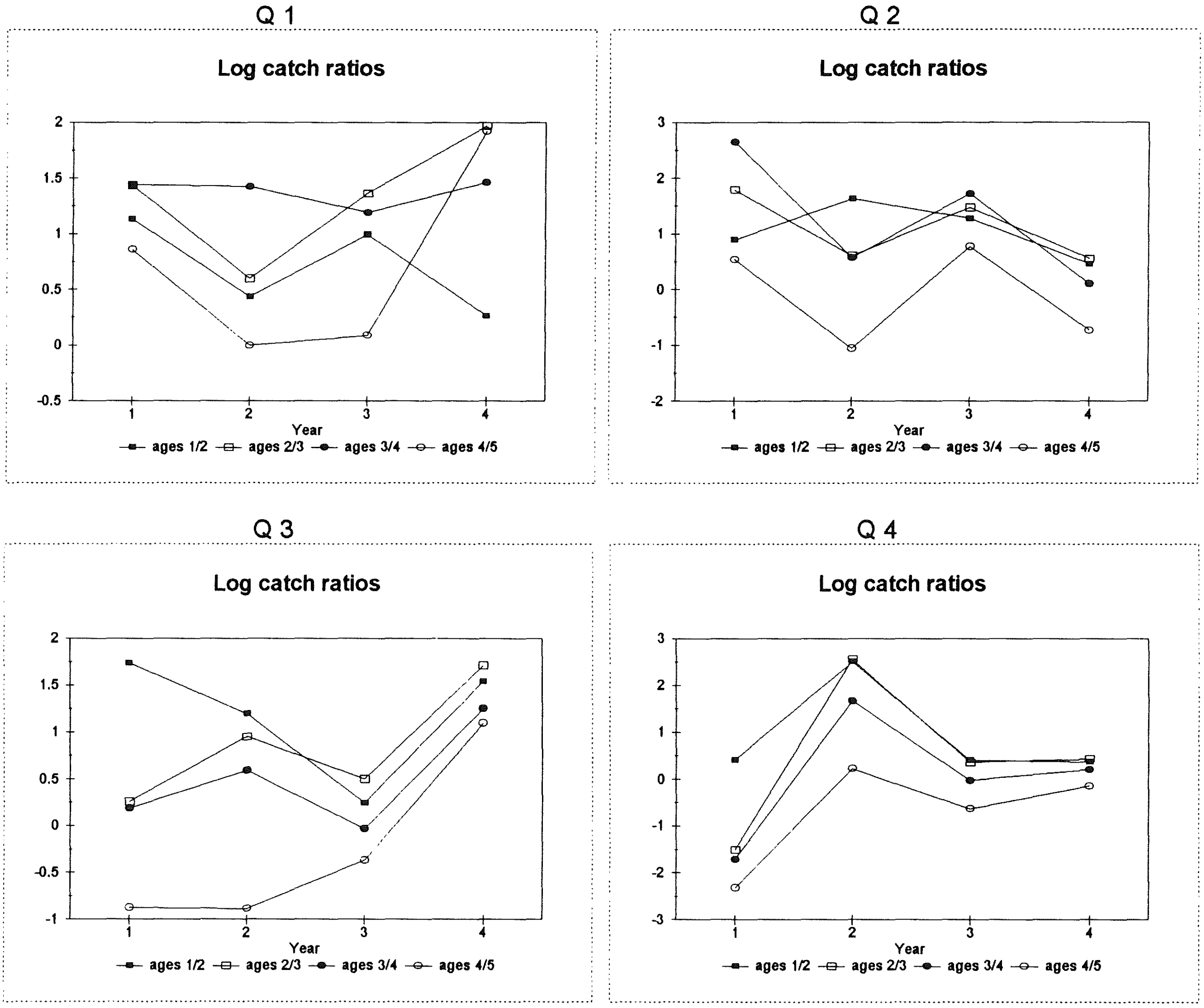
Effect	Initial df	Lost df	Final df
SURVEY*	9	2	7
SURVEY*	12	2	10

Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio
Model	659.313	55	11.988	60.494
Error	3.567	18	0.19	8

Figure 2.3.3.16

Herring Log catch ratio plots by survey



Variable codings

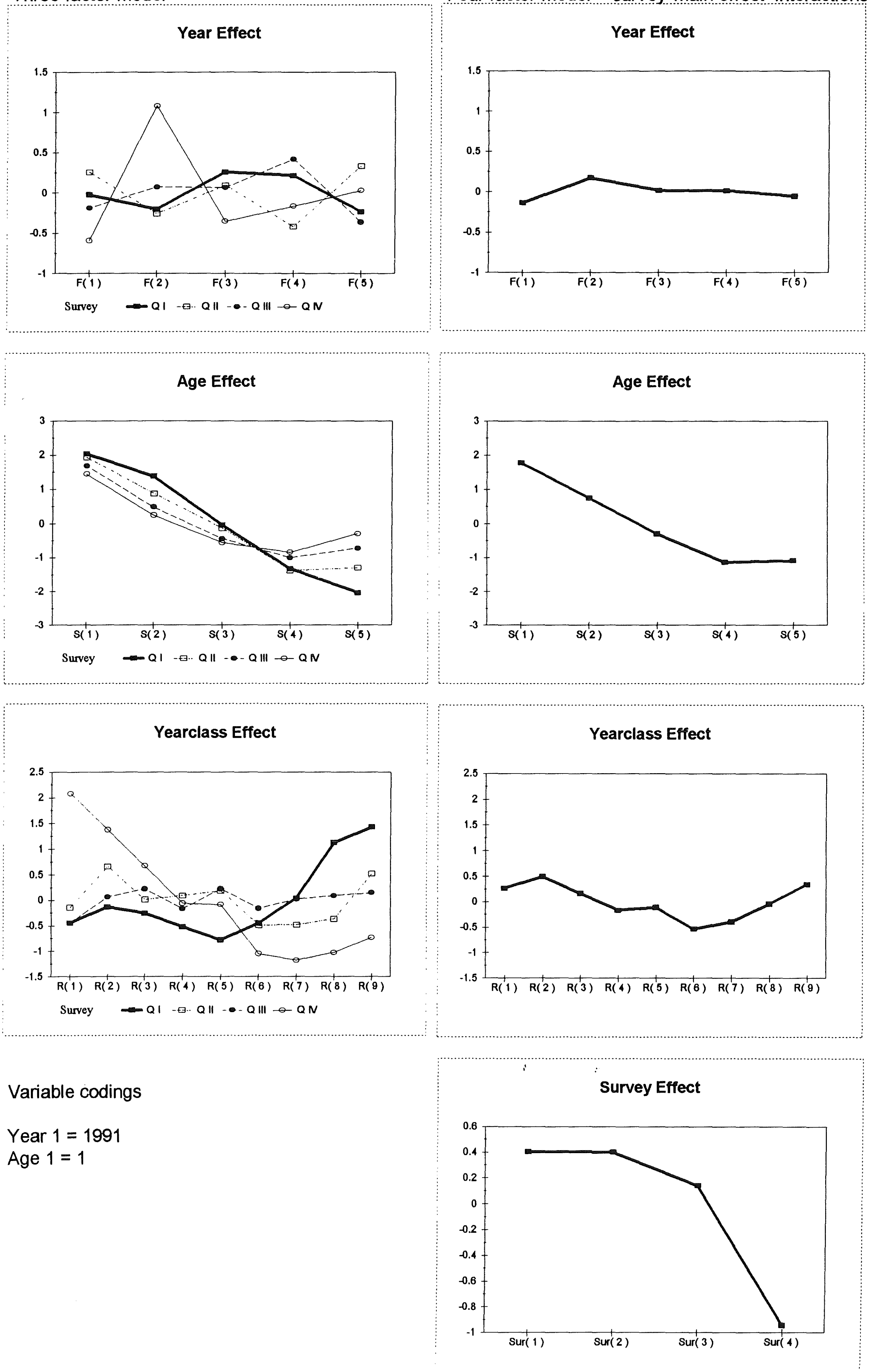
Year 1 = 1991
Age 1 = 1

Figure 2.3.3.17

Herring Year, age and yearclass effects from a three factor model, and a four factor model with 1st order survey x main effect interactions

Three factor model

Four factor model + survey*main effect interactions

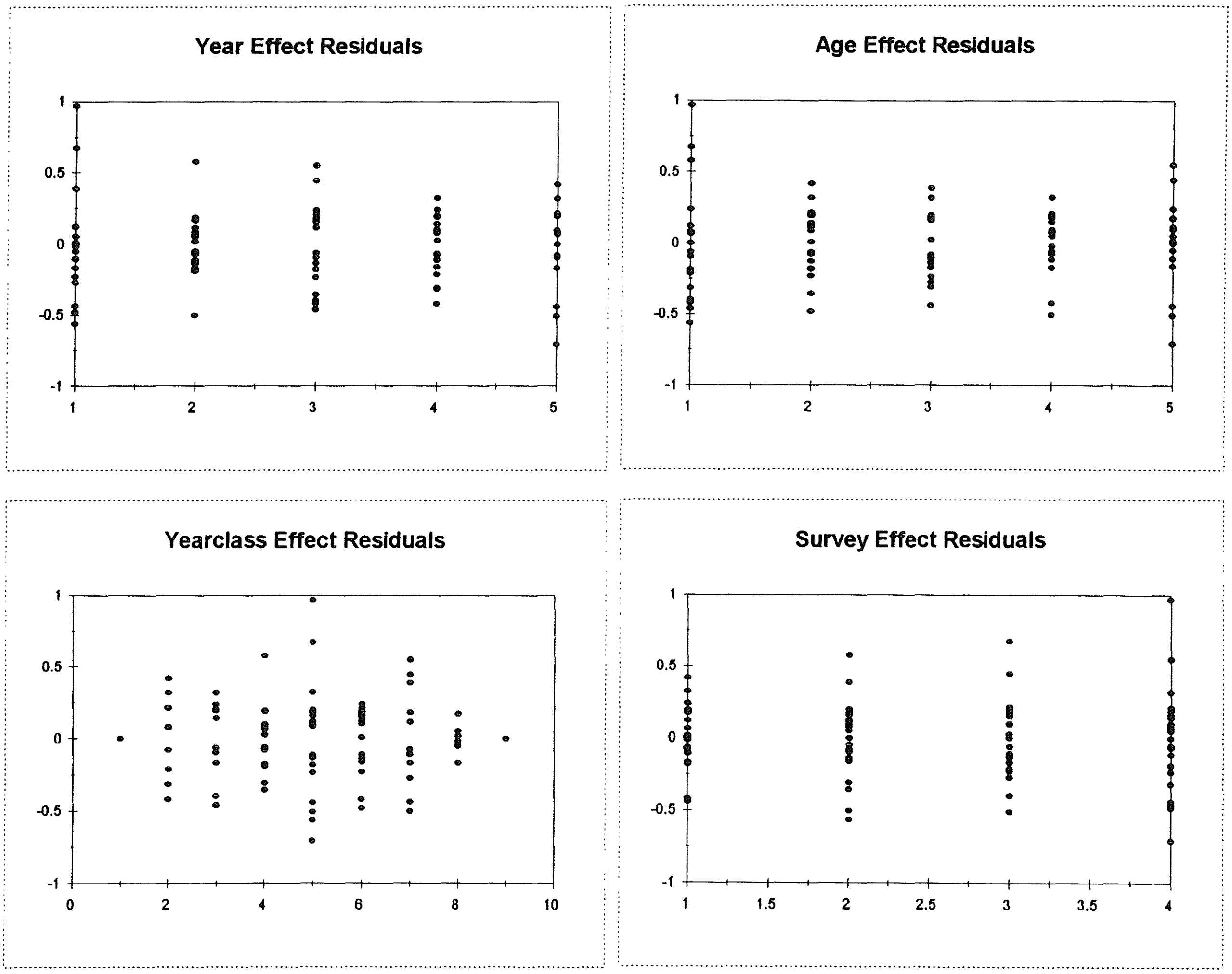


Variable codings

Year 1 = 1991
Age 1 = 1

Figure 2.3.3.18

Herring Year, age, yearclass and survey residuals from a four factor model



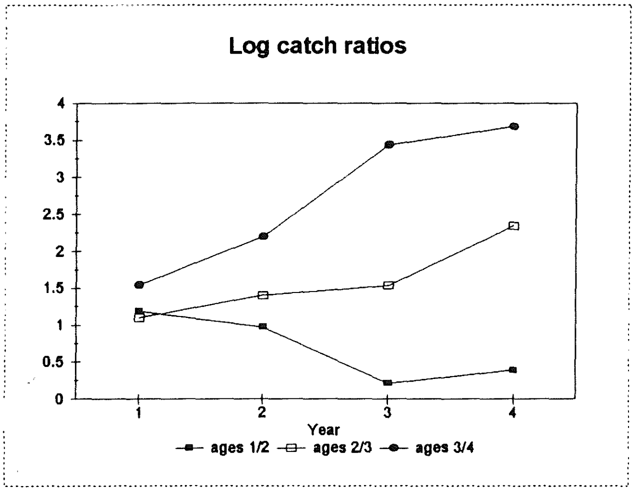
Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio
SURVEY	20.6	3	6.867	33.852
AGE	19.312	4	4.828	23.801
YEAR	0.93	4	0.232	1.146
YEARCLASS	5.89	8	0.736	3.63
SURVEY*AGE	5.416	12	0.451	2.225
SURVEY*YEAR	11.065	12	0.922	4.546
SURVEY*YEARCLASS	10.756	24	0.448	2.209
Error	7.303	36	0.203	

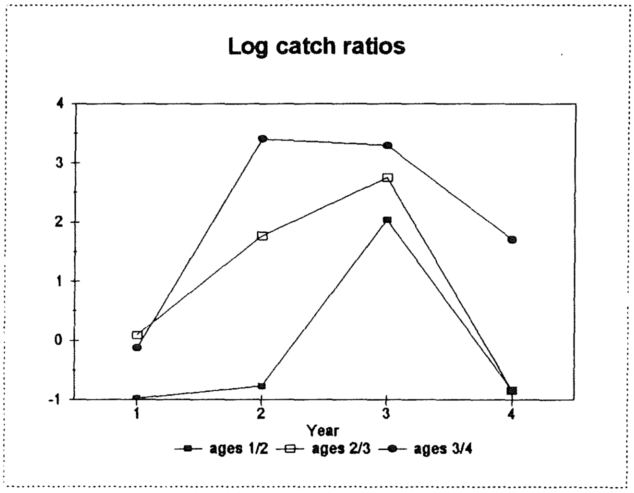
Figure 2.3.3.19

Sprat Log catch ratio plots by survey

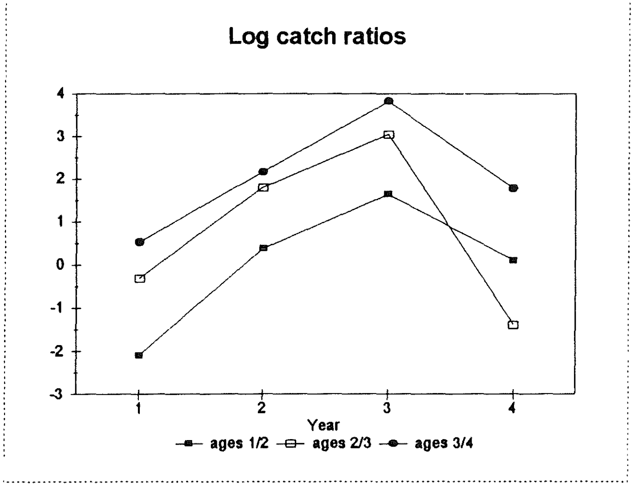
Q 1



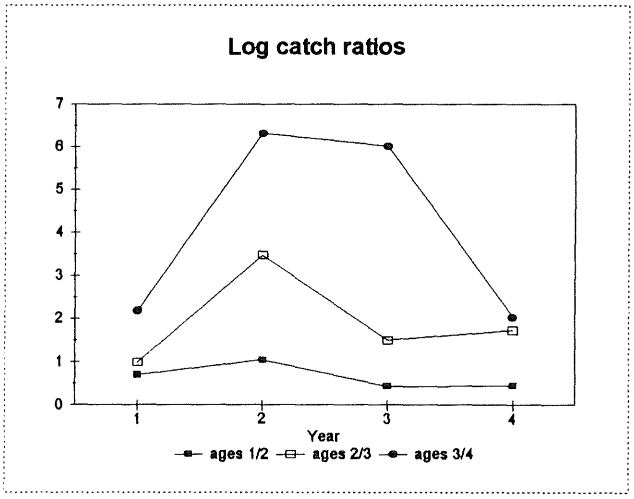
Q 2



Q 3



Q 4



Variable codings

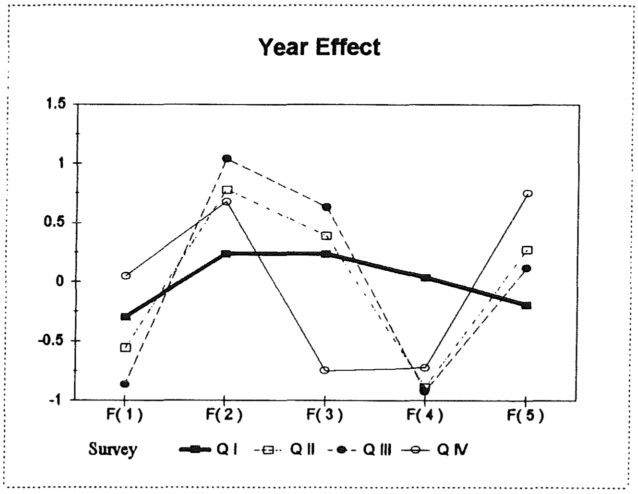
Year 1 = 1991
Age 1 = 1

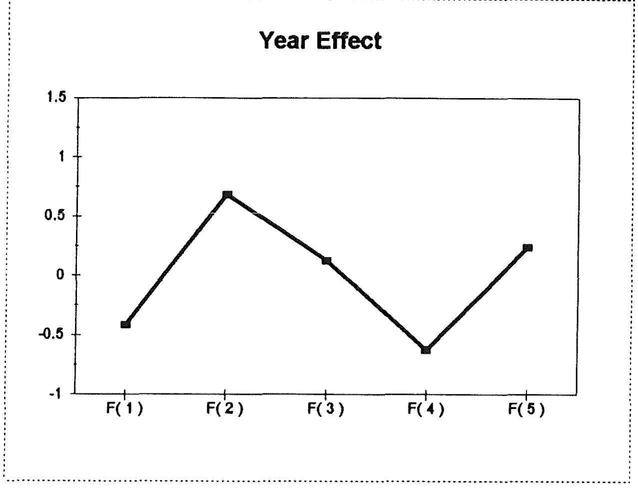
Figure 2.3.3.20

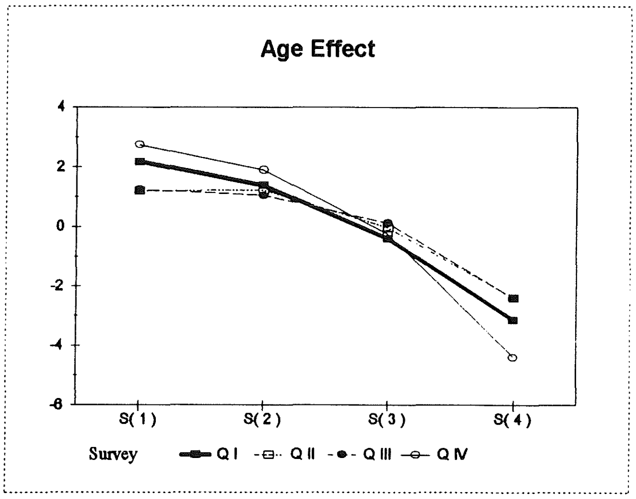
Sprat Year, age and yearclass effects from a three factor model, and a four factor model with 1st order survey x main effect interactions

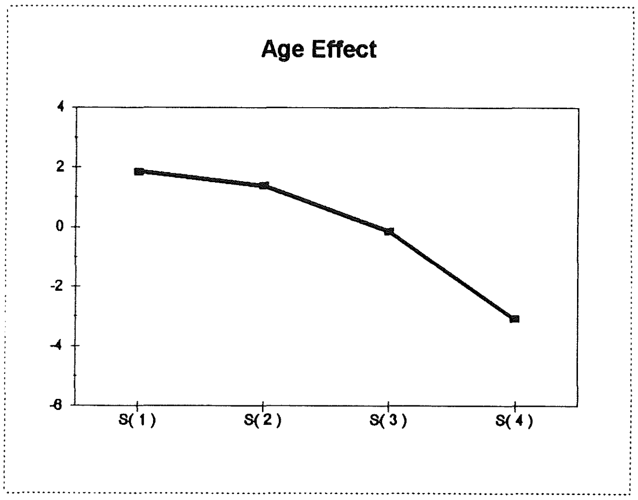
Three factor model

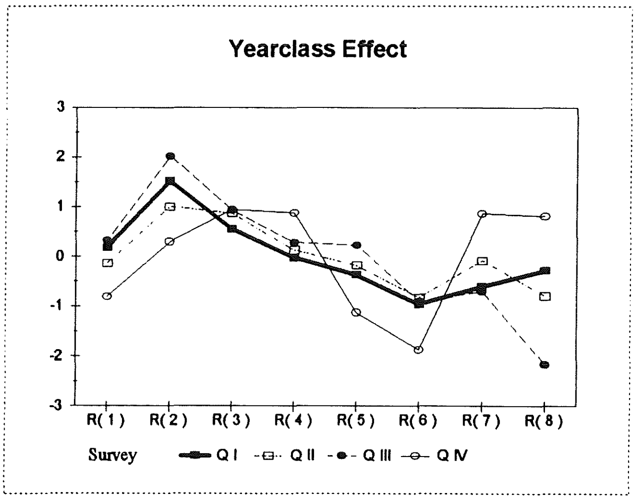
Four factor model + survey*main effect interactions

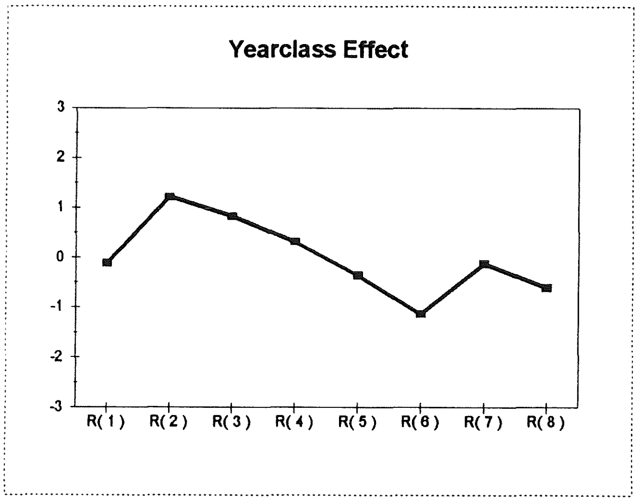












Variable codings

Year 1 = 1991
Age 1 = 1

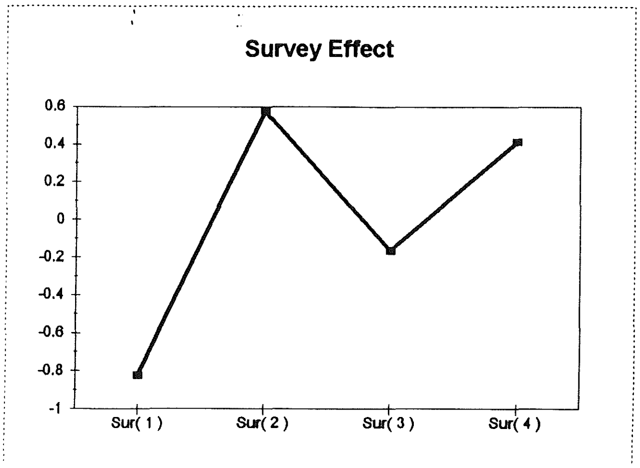
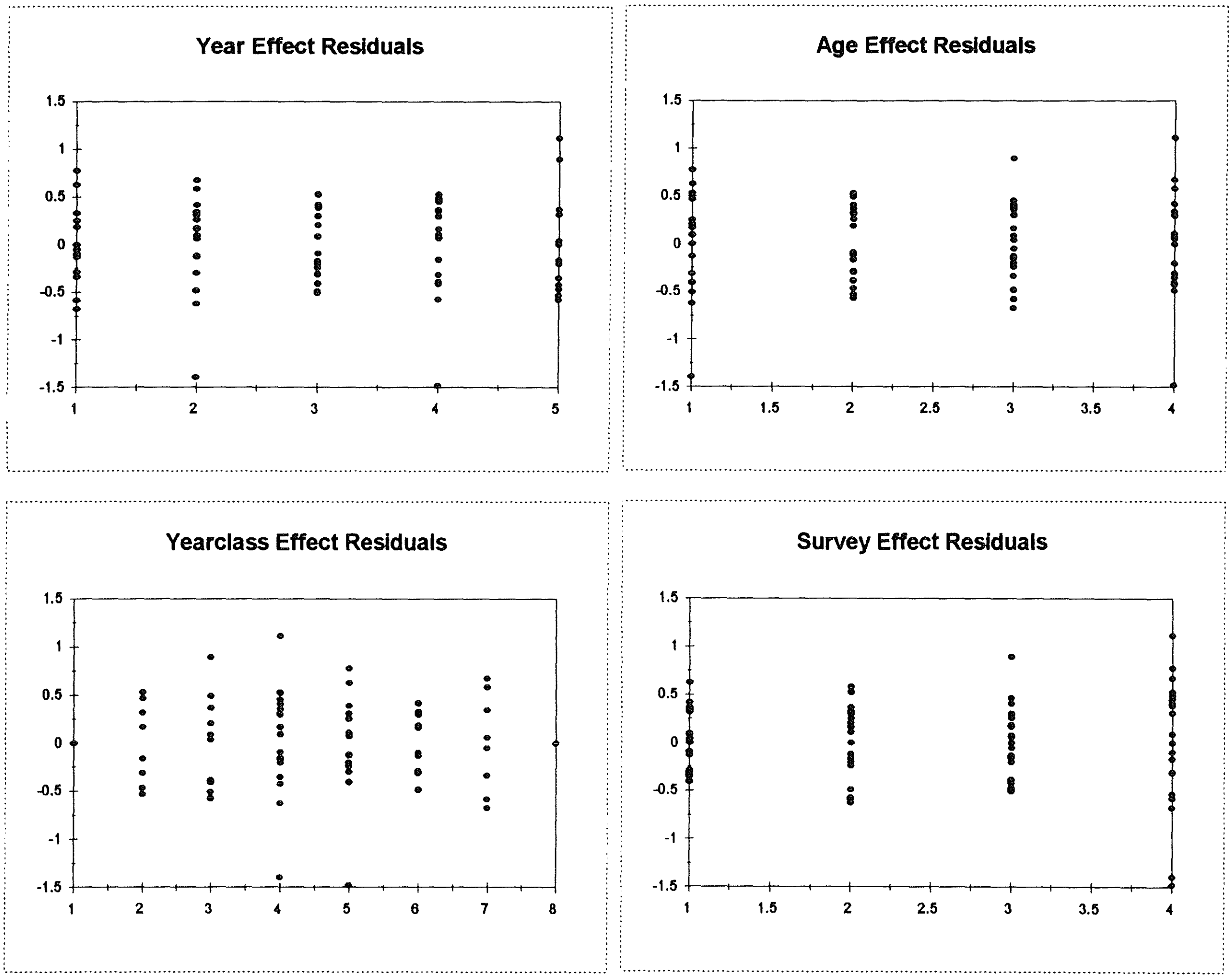


Figure 2.3.3.21

Sprat Year, age, yearclass and survey residuals from a four factor model



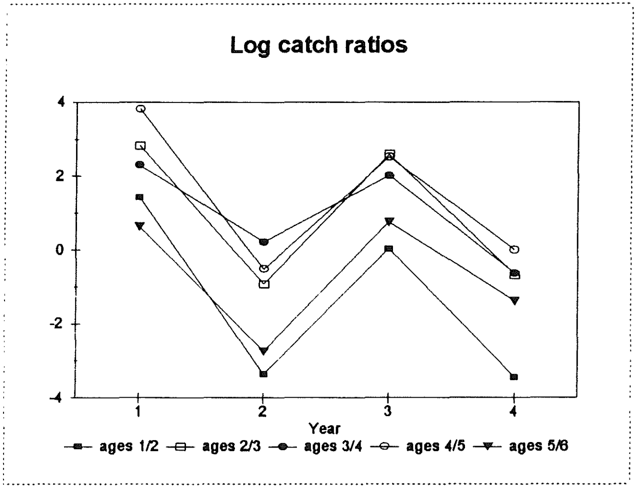
Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio
SURVEY	16.828	3	5.609	8.512
AGE	80.117	3	26.706	40.523
YEAR	16.504	4	4.126	6.261
YEARCLASS	18.407	7	2.63	3.99
SURVEY*AGE	57.799	9	6.422	9.745
SURVEY*YEAR	149.244	12	12.437	18.872
SURVEY*YEARCLASS	199.818	21	9.515	14.438
Error	15.817	24	0.659	

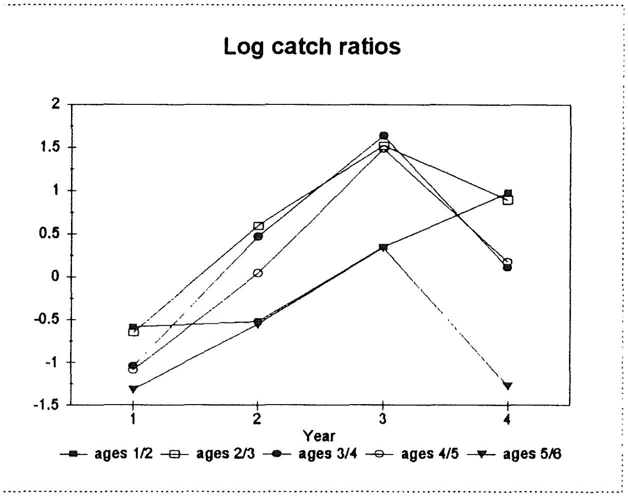
Figure 2.3.3.22

Mackerel Log catch ratio plots by survey

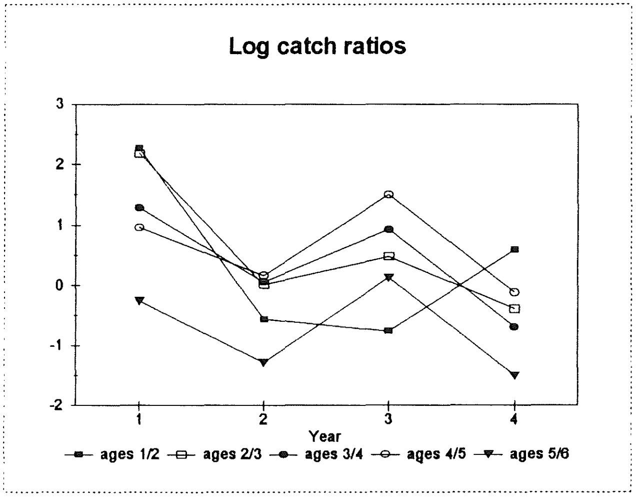
Q 2



Q 3



Q 4



Variable codings

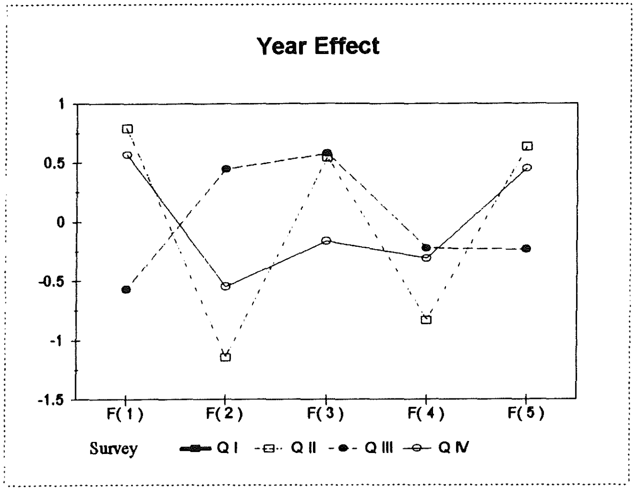
Year 1 = 1991
Age 1 = 1

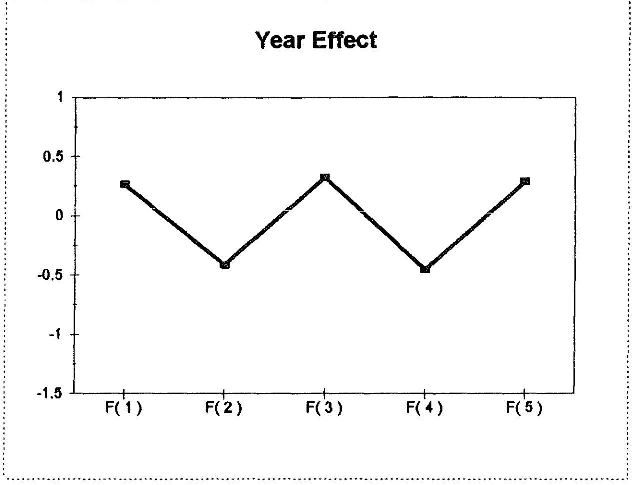
Figure 2.3.3.23

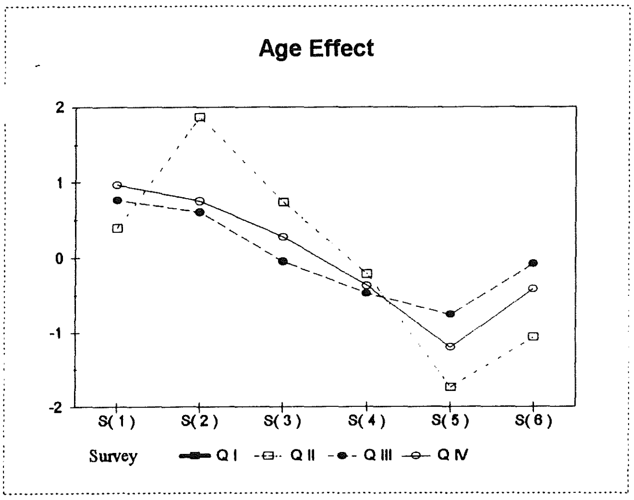
Mackerel Year, age and yearclass effects from a three factor model, and a four factor model with 1st order survey x main effect interactions

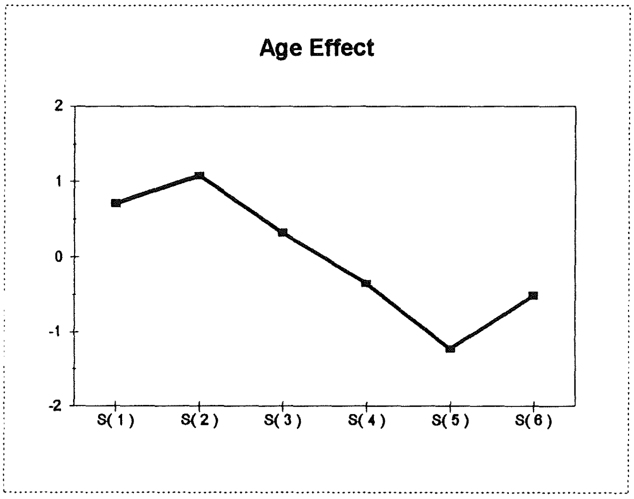
Three factor model

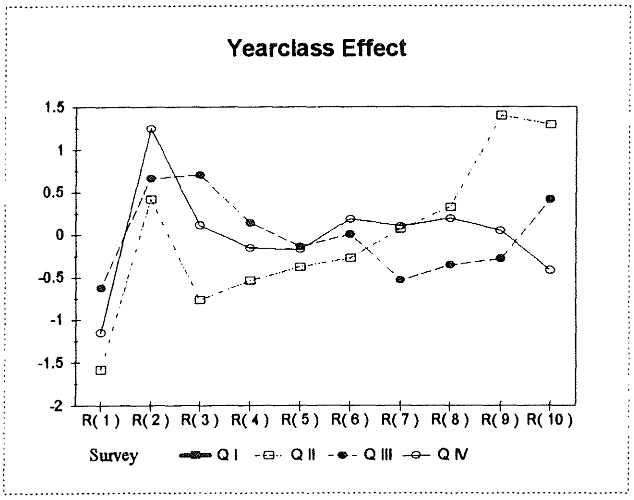
Four factor model + survey*main effect interactions

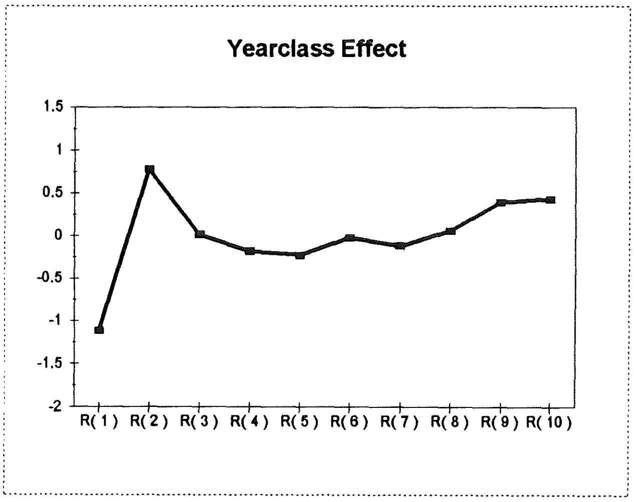












Variable codings

Year 1 = 1991
Age 1 = 1
Survey 1 = Quarter 2

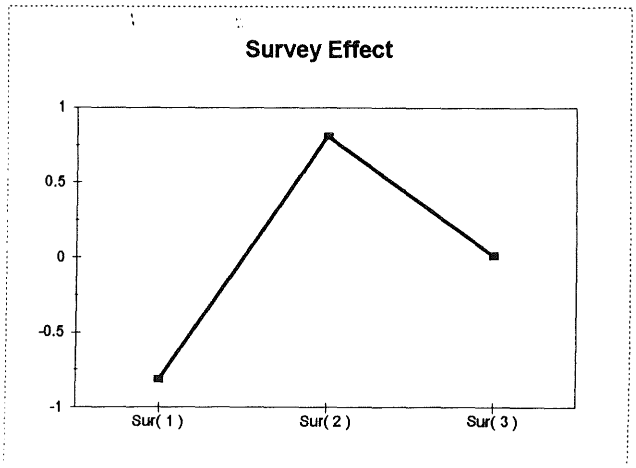
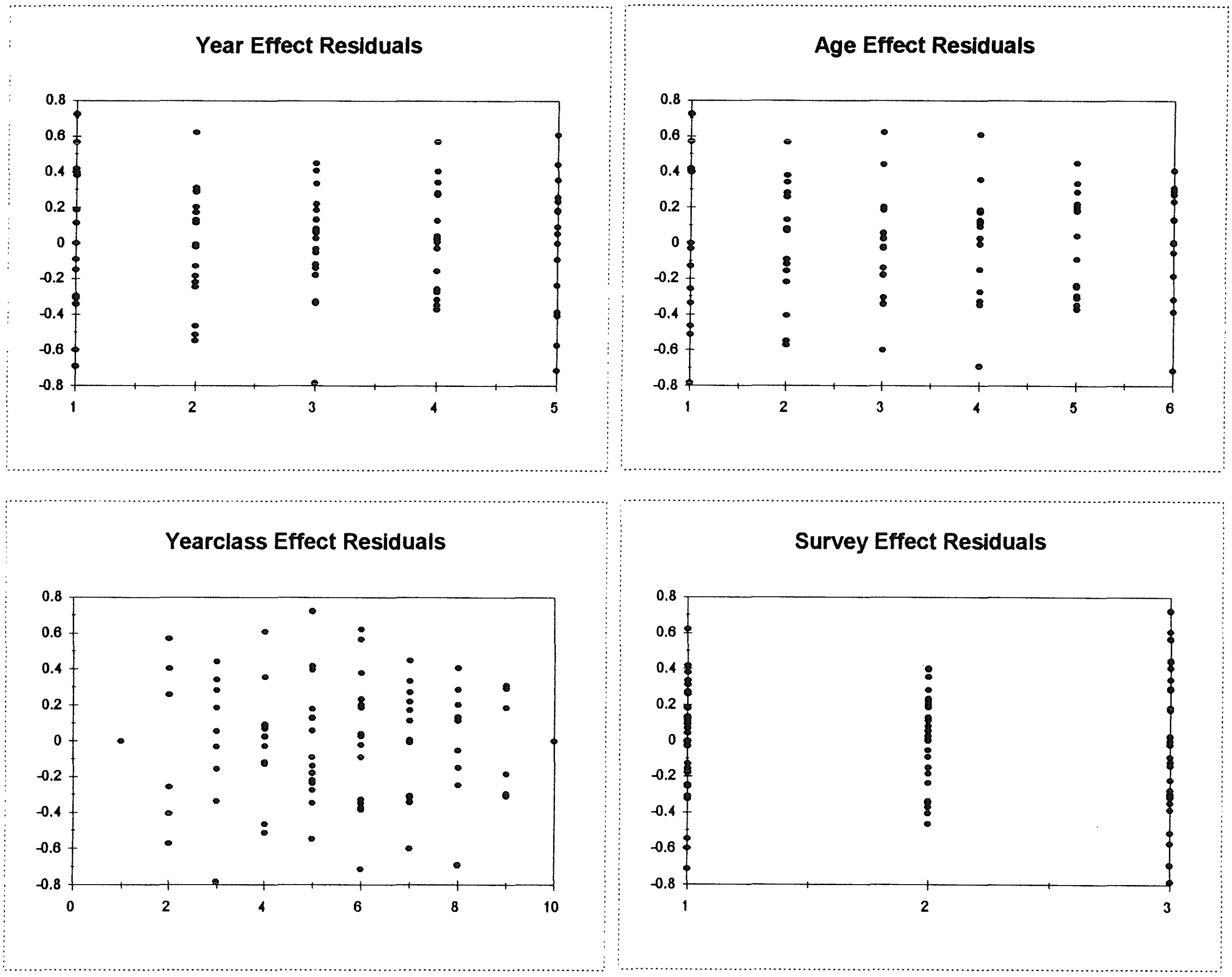


Figure 2.3.3.24

Mackerel Year, age, yearclass and survey residuals from a four factor model



Analysis of Variance

Source	Sum-of-Squares	df	Mean-Square	F-ratio
SURVEY	25.641	2	12.821	49.206
AGE	15.951	5	3.19	12.244
YEAR	10.62	4	2.655	10.19
YEARCLASS	11.257	9	1.251	4.801
SURVEY*AGE	8.009	10	0.801	3.074
SURVEY*YEAR	20.637	8	2.58	9.901
SURVEY*YEARCLASS	6.149	18	0.342	1.311
Error	9.38	36	0.261	

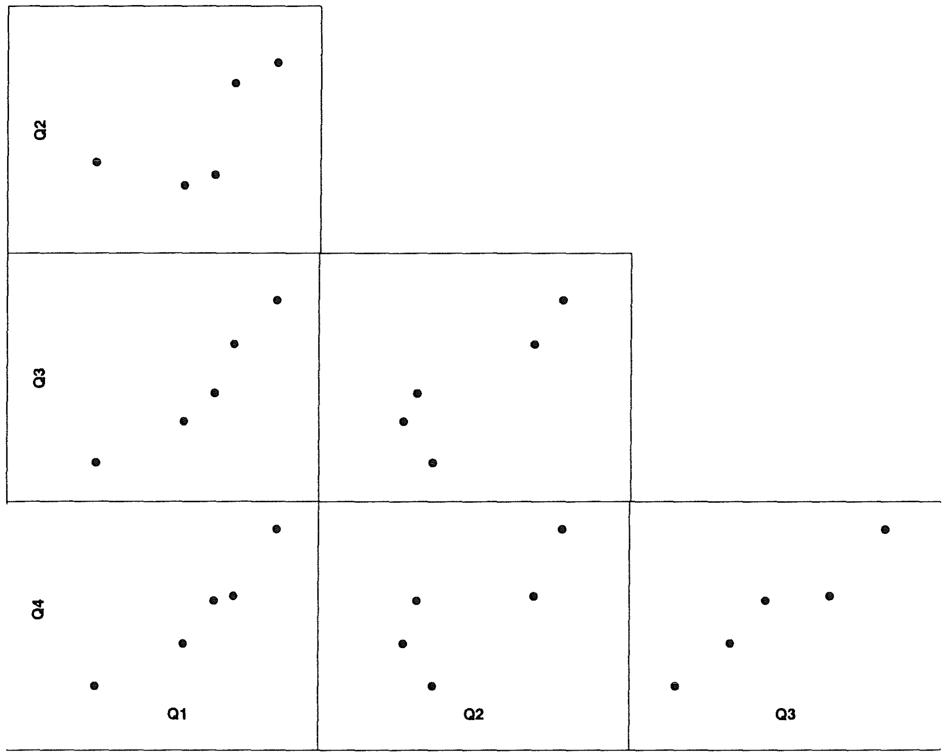


Figure 2.4.1 COD: Pairwise comparisons of the estimated recruitment indices derived from quarterly analysis.

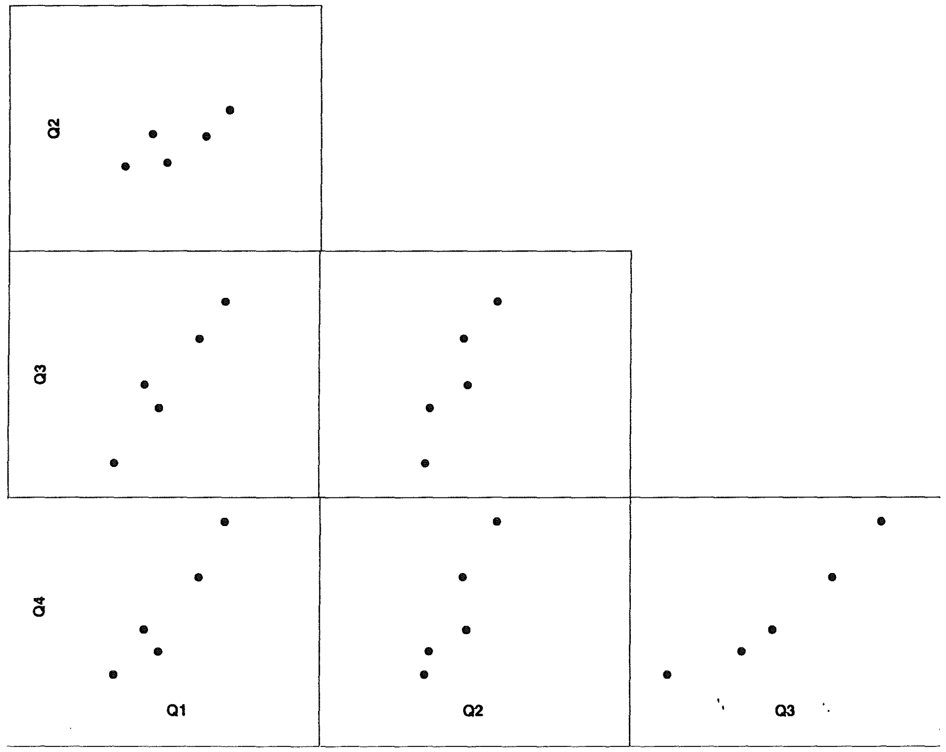


Figure 2.4.2 COD: Pairwise comparisons of the relative stock biomass estimates derived from quarterly analysis.

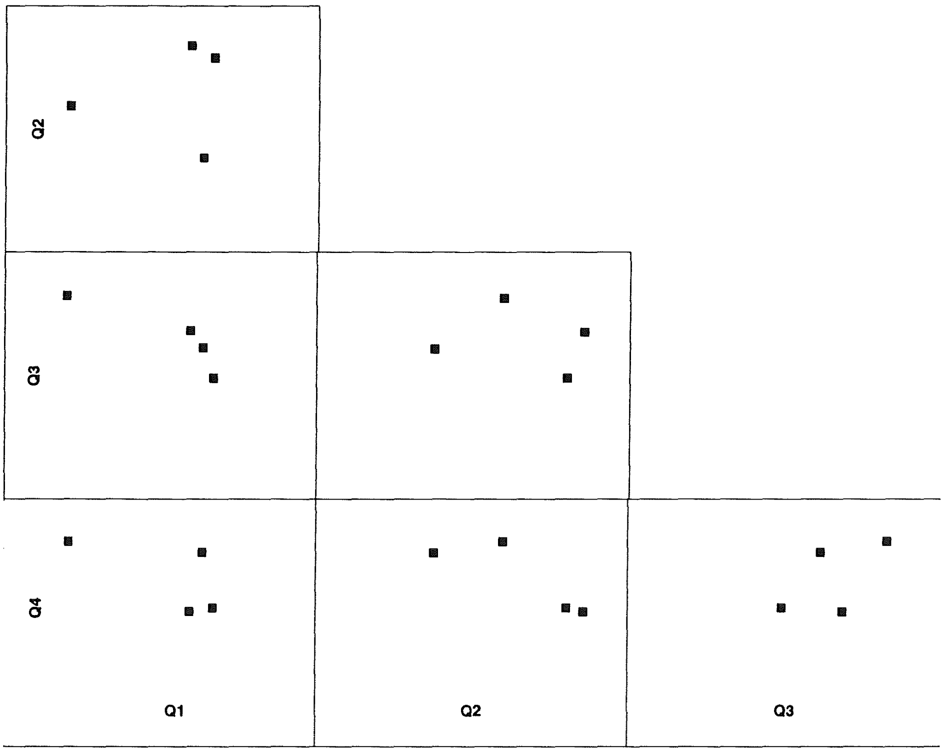


Figure 2.4.3 COD: Pairwise comparisons of the mean of the estimated fishing mortalities ages 2-4 (Fbar$_{2\text{-}4}$).

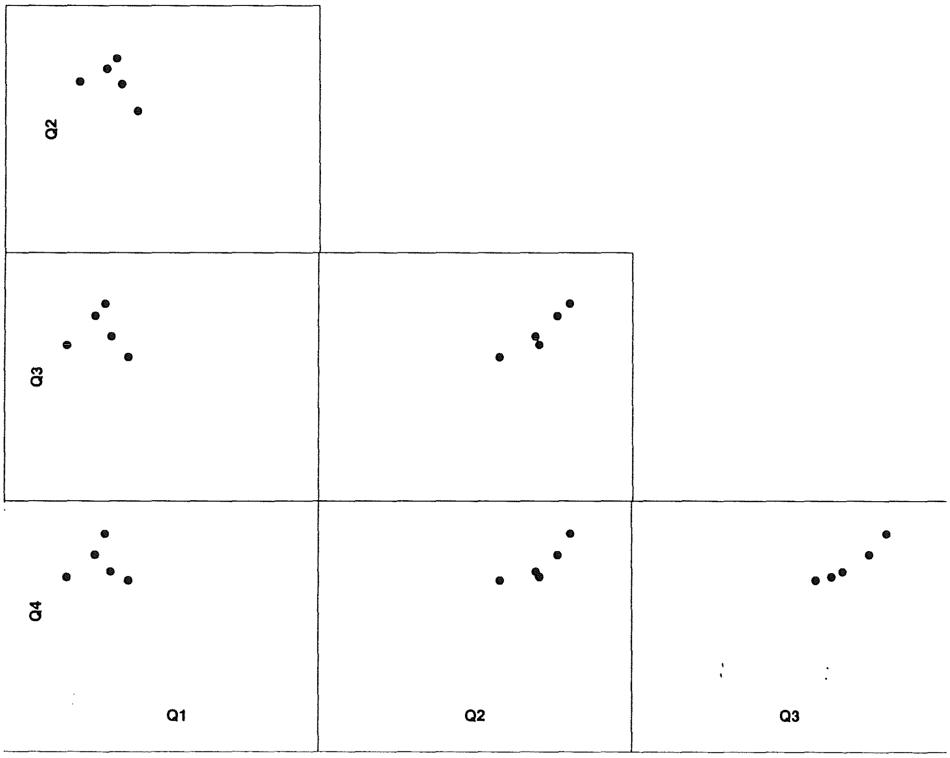


Figure 2.4.4 HADDOCK: Pairwise comparisons of the estimated recruitment indices derived from quarterly analysis.

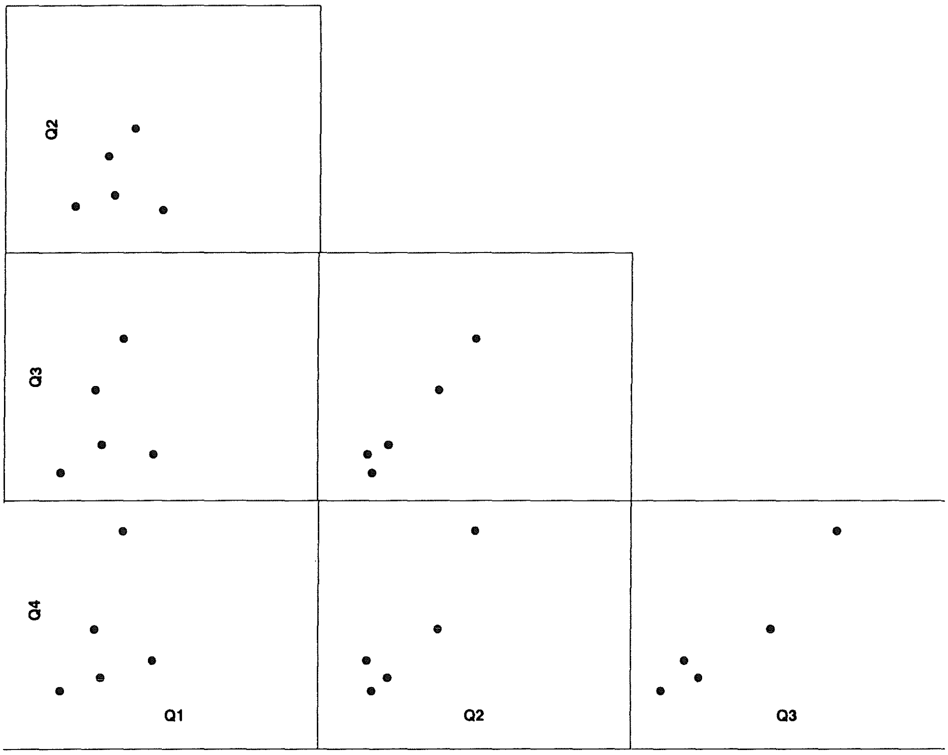


Figure 2.4.5 HADDOCK: Pairwise comparisons of the relative stock biomass estimates derived from quarterly analysis.

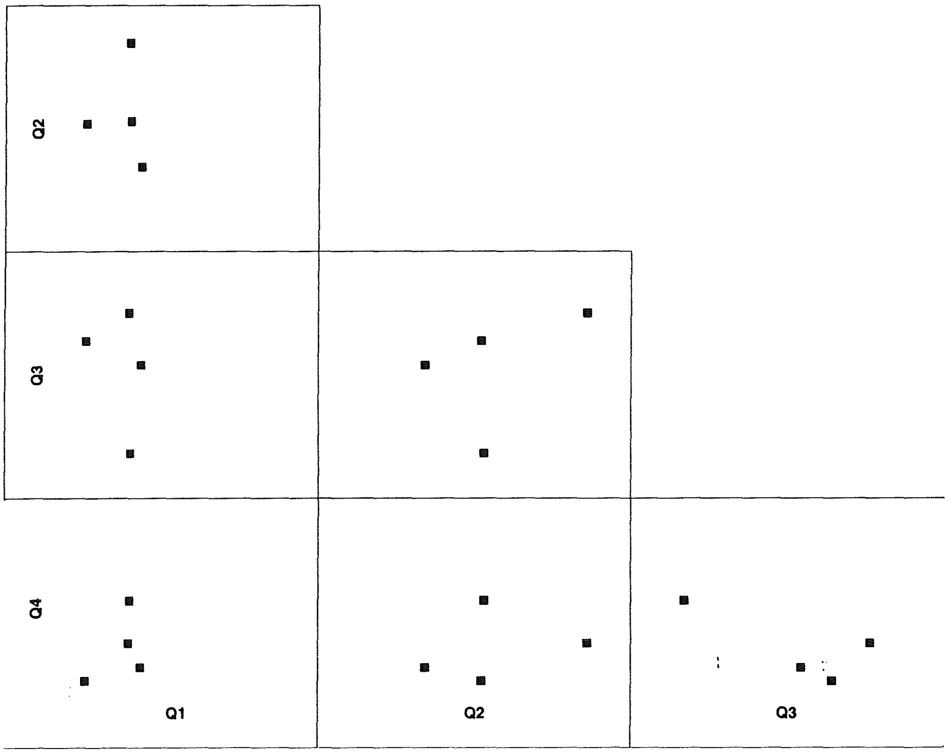


Figure 2.4.6 HADDOCK:Pairwise comparisons of the mean of the estimated fishing mortalities ages 2-4 ($Fbar_{2-4}$).

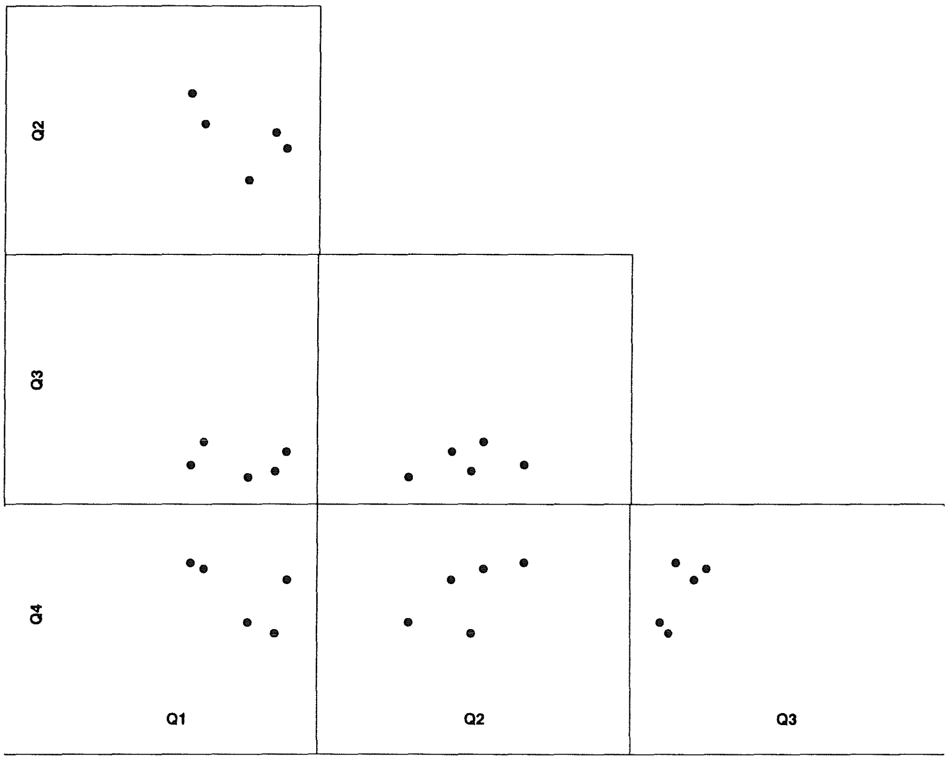


Figure 2.4.7 WHITING: Pairwise comparisons of the estimated recruitment indices derived from quarterly analysis.

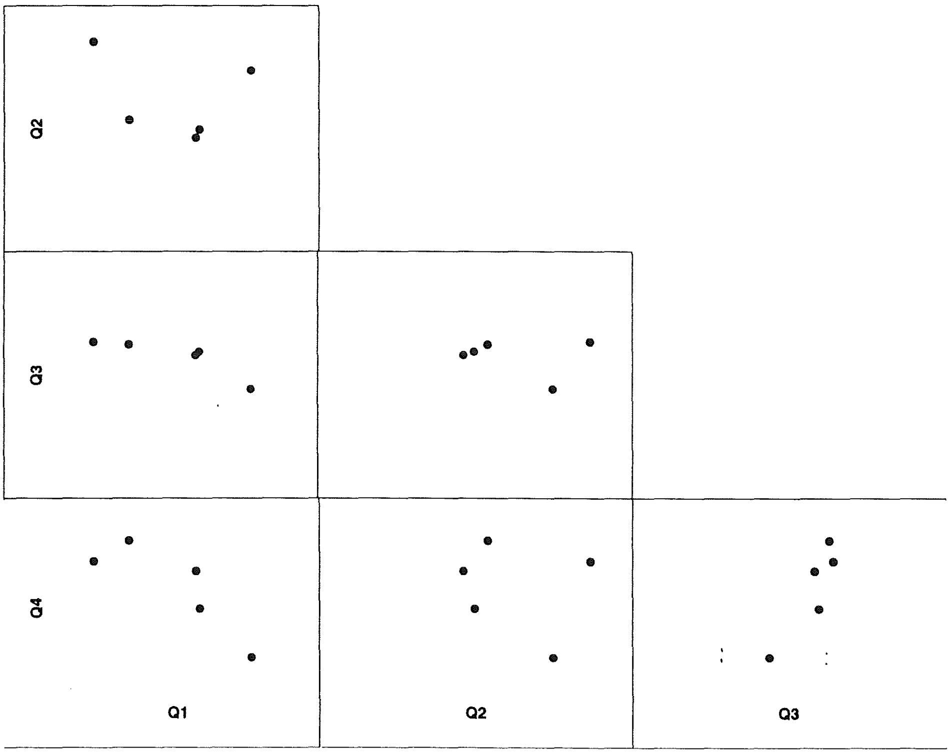


Figure 2.4.8 WHITING: Pairwise comparisons of the relative stock biomass estimates derived from quarterly analysis.

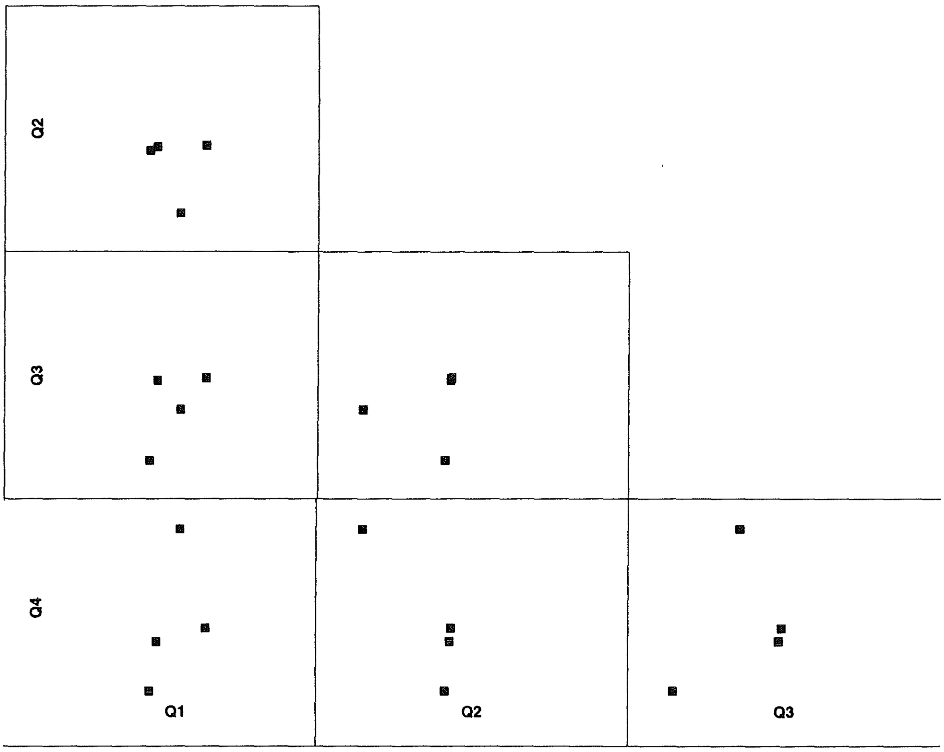


Figure 2.4.9 WHITING: Pairwise comparisons of the mean of the estimated fishing mortalities ages 2-4 ($Fbar_{2\text{-}4}$).

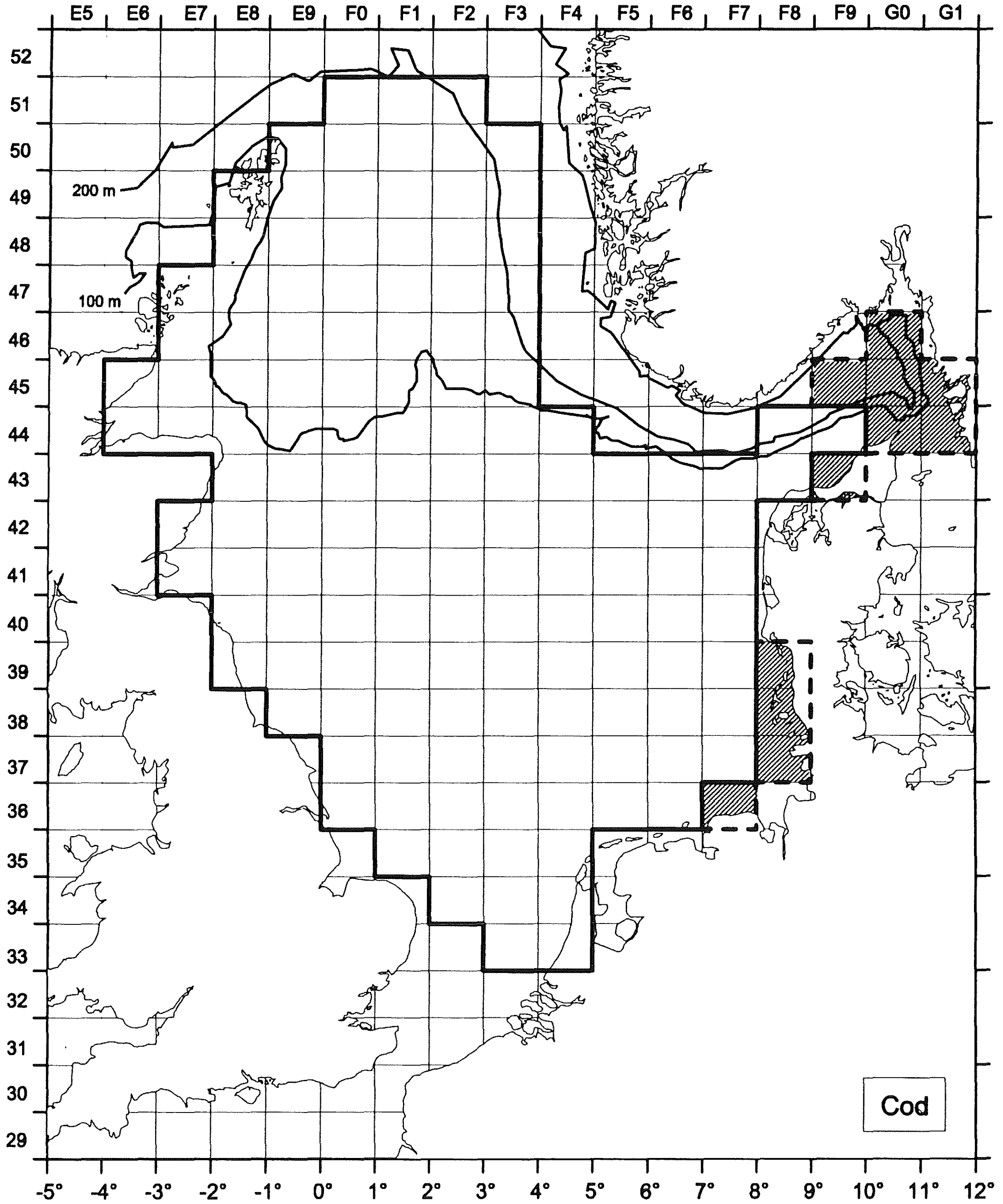


Figure 2.5.1: IBTS standard area for cod (bounded by solid lines) and extended area (shaded, bounded by dashed lines).

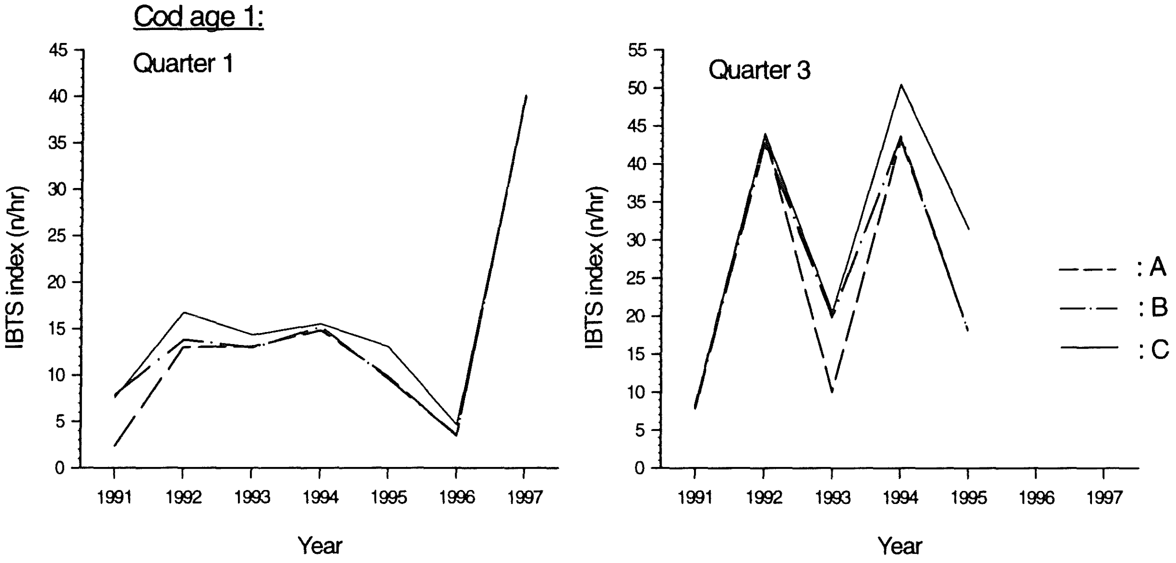


Figure 2.5.2: IBTS first and third quarter indices for cod age 1. A: species-specific standard area, B: including four squares from the coastal region of the German Bight, and C: including additionally the eastern Skagerrak.

3 THE ABILITY OF THE QUARTERLY SURVEYS TO DESCRIBE SPATIAL DISTRIBUTION AND ITS SEASONAL VARIABILITY

One of the reasons to conduct quarterly coordinated surveys for a period of at least 5 years (1991–1995), was to provide information on the seasonal distribution of North Sea fishes (ICES CM 1990/H:3). At that time the knowledge of quarterly distributions was almost completely lacking, but it was considered essential information for the development of new MSVPA models. In a new generation of such models, areas and migration were to be incorporated (Gislason, 1994). In addition to the use of the quarterly data in MSVPA models, the seasonal information was thought useful when the introduction of certain technical measures was to be considered. To address its specific term of reference b), the Study Group attempted to provide the following distinctions in spatial distribution:

- between years of one species-agegroup in one quarter
- between quarters of one species-agegroup in one year
- between age-groups of one species
- of the quarterly changes in overlap of different species-age groups

In order to determine to what extent the IBTS can meet these demands, the Study Group followed several approaches:

- maps were made showing the spatial distribution of each species-age group per quarter averaged over the five years for which quarterly data were available (1991–1995);
- tables were produced describing the contribution of each of the roundfish areas to the total catch of each of the species-age groups in each quarter and each year;
- tables were produced describing the spatial overlap between years and quarters for several of the species-age groups (within species);
- tables were produced describing the spatial overlap between all possible combinations of species-age groups per year and per quarter (between species).

3.1 General distribution patterns

Based on their maturity ogives (Knijn *et. al.* 1993) three (0,1,2+) or four (0,1,2,3+) relevant age groups were distinguished for each of the species for which catch-data were available: herring (CHAR), cod (GMOR), haddock (MAEG), whiting (MMNG), saithe (PVIR), mackerel (SSCO), sprat (SSPR) and Norway pout (TESM). For whiting and Norway pout a 2+ group was used which represents the mature fish, for the other species a 3+ group had been used. According to Knijn *et al.*, (1993) 60% or more of these plus-groups consist of mature fish. NB: for herring instead of age, the number of winter rings (= age - 1) has been used.

Mean number/haul was determined per ICES rectangle for each of the species-age groups and averaged for each quarter over the five year period. Annex 1 (Figures 1 - 30) provides maps of the quarterly distributions by age for cod, haddock, whiting, Norway pout, saithe, herring, sprat and mackerel based on these values.

3.2 Changes in distribution

3.2.1 Patterns by roundfish area

For each quarter and year the mean number/haul per ICES rectangle was averaged over all the rectangles that were part of a roundfish area (Figure 4.4.1).

3.2.1.1 Changes in percentage by age

Figures 3.2.1.1.1 to 3.2.1.1.8 show plots by species of the percentage contribution by roundfish area to the total number per hour caught, summed over all surveyed rectangles. For each plot 20 observations were used, starting with quarter 1 in 1991, up to quarter 4 in 1995.

For all species the plots for 0-group fish are rather irregular, since 0-groups start to being caught in the second and mostly third quarter of the year, and sometimes in small numbers only.

Cod (Figure 3.2.1.1.1): For 1-group cod a gradual decrease can be observed in the contribution of roundfish area (RFA) 6, whereas the percentage for RFA 9 was particularly high in 1995. In RFA 9 there was a high percentage of 2-group cod throughout 1991.

Haddock (Figure 3.2.1.1.2): A gradual decrease can be seen in the percentage of 2- and 3+ group in RFA 1 plus RFA 2, and at the same time an increase in RFA 3 for the same age-groups.

Whiting (Figure 3.2.1.1.3): For 1-group whiting the percentage was high in RFA 6 in 1991, and low in RFA 3 in the same year, but stable in both areas since then.

Norway pout (Figure 3.2.1.1.4): The 1-group of this species seems to be concentrated further North by the end of the period 1991–1995, shown by an increase in RFA 1 and a decrease in the other areas, especially in RFA 2.

Saithe (Figure 3.2.1.1.5): The numbers of saithe in the IBTS are usually low for the 0-, 1- and 2-group saithe, because of their inshore distribution. No clear changes are apparent for the 3+ group, which is almost exclusively found in RFA 1.

Herring (Figure 3.2.1.1.6): This species shows clear quarterly changes in distribution. For the 1-ringers a high percentage was observed in RFA 6 and 7 throughout 1991 and 1992, whereas this age group was almost absent in these areas in the second half of 1993. Also in 2-group herring clear changes can be seen, with a high contribution of RFA 4 in some periods. The proportional distribution of the 3+ ringers suggests a cyclic pattern.

Sprat (Figure 3.2.1.1.7): The contribution of RFA 6 to the total abundance of 1-group sprat was high until the second quarter of 1994, and at a much lower level since. For 2- and 3+ group sprat RFA 4 contributes only in some short periods (the summer half year) to the total abundance.

Mackerel (Figure 3.2.1.1.8): This species shows a clear seasonal migration pattern, with RFA 1 contributing to the total abundance mainly in winter, although in low numbers per rectangle, and a contribution of RFA 6 in quarters 2 and 3. Only in the fourth quarter of 1991 RFA 3 contributed significantly to the catches of 1-, 2- and 3+ mackerel.

From the above it can be concluded that for most species within-year changes in proportional distribution by area occur, whereas in some cases changes can be observed over the 5-year period for which quarterly data are available. No influence of strong (or weak) year classes was observed.

3.2.1.2 Within- and between-year differences in median catch rates

For each quarter in 1991–1995 the median catch rate (kg/hr) of all fish species was calculated for roundfish areas 1–9. Within- and between-year differences in median catch rates were tested for significance using a two-way ANOVA.

Over all years, there is a tendency for the highest catch rate to be made in the 4 th quarter. This is particularly apparent in RFA 1 and 3 (Figure 3.2.1.2.1). In RFA 8, the 3rd quarter consistently revealed high catch rates. These observations were confirmed by the results of the two-way ANOVA (Table 3.2.1.2.1). In general, the ANOVA indicates that there are significant differences in catch rates between quarters in most roundfish areas, but just a few between-year effects.

3.2.2 Differences in distribution

Spatial comparison techniques assume a relatively high level of precision in the estimate of abundance at each spatial reference point. The IBTS data set in general is assumed to provide the mean catch rate at the central point location of each ICES statistical rectangle, usually derived from two half hour trawls. Analysis of data collected at four small 10 x 10 NM boxes in the North Sea (Figure 3.2.2.1) suggests that two hauls are not sufficient to provide the level of precision required Thus spatial comparisons will be influenced by the random error at each location and tend to suggest lower spatial overlap, than may well be the case. Miss-matching levels of overlap will also be unduly high at a local spatial scale. Analysis of the small box data suggested that the mean catch rates of cod, haddock and whiting were estimated with high precision when the sample size reached 10 hauls or more (Figures 3.2.2.2 to 3.2.2.4).

Variography of IBTS data suggested a high level of spatial auto-correlation at the ICES statistical rectangle scale of 30 NM. Auto-correlation was negligible at a distance of approximately 100 NM (ICES CM 1992/D:6). This suggests that data can be combined from adjacent rectangles to increase the sample size in estimating mean catch rates. A spatial moving average technique was therefore employed to estimate mean catch rates at each rectangle's central position. The catch rate at each statistical rectangle was estimated from the mean of the hauls made in the focal rectangle as well as all the hauls in its eight immediately neighbouring rectangles. This value was then plotted. The degree of spatial concordance between spatial distributions, for example by species and age, was examined using a Spearman Rank analysis. The significance of the Spearman Rank analysis cannot be tested because spatial auto-correlation between neighbouring rectangles, as well as the moving average analysis itself, means that they are not independent. The true number of degrees of freedom cannot therefore be known. The correlation value itself, however, is a usable index of concordance.

For this exercise only the rectangles that are part of the roundfish areas were selected. For those of the selected rectangles in which no fish of a specific species-age group were caught an abundance of 0 was assumed for calculating the mean abundance in the neighbouring rectangles of that species-age group. This method will give a value between 1 (complete match between ranked distributions) and -1 (inverse match between ranked distributions).

3.2.2.1 Between-year and within-year differences in spatial distribution

For each species-age group the correlations between all combinations of year and quarter were determined (Annex 2). Within this section the age-groups 0, 1, 2 and 3+ of haddock and age-groups 0, 1 and 2+ of whiting were chosen as an example to show the correlations between the different temporal units. Figure 3.2.2.1.1 shows for 2-year old haddock the Spearman Rank Correlation values that occur in the Annex together with the spatial distributions on which these values were based for each quarter of the year 1991. The high Spearman Rank Correlation values confirm the known within-year consistency of the spatial distribution of haddock. These high correlations are confirmed by examination of the charts.

Similarly the spatial distributions of 2+ whiting during the first quarter were chosen to illustrate the between-year variation in spatial distribution (Figure 3.2.2.1.2). In this example the Spearman Rank Correlation values clearly show how the distribution of whiting in the first quarter changes over the years: the highest values are observed between subsequent years and the level of correlation decreased with increasing interval between the years. The distribution in 1995 was most closely correlated with that of 1992. The charts corroborate these data, suggesting a contraction in range over the period 1991 to 1994, followed by an expansion in 1995.

For most species-age groups presented in Annex 2 the between-year and within-year overlap are in the same range, showing a fairly consistent spatial distribution. Although minor differences can be observed between species and age groups in terms of the importance of between-year as compared to within-year variation, one clear exception emerges, which is the mackerel. This species shows a markedly higher difference between quarters than between years as can be expected from its migratory character. The low overlap values in the first two quarters observed for the 0-group of all species are caused by the low numbers caught.

3.2.2.2 Overlap between species-age groups

For each year and quarter the correlations between all species-age groups were determined (Annex 2). Changes in spatial overlap of this sort can be particularly relevant where predators and their potential prey are involved. This is illustrated in Figure 3.2.2.2.1 which shows the distribution of two predators, 2+ whiting and 3+ cod. and four potential prey, 0-group: whiting, cod, Norway pout and herring. The chart suggests that the degree of spatial overlap between the predator and prey distributions was relatively low, and this was confirmed by the Spearman rank correlation coefficients (Table 3.2.2.2.1), which ranged from -0.33 to 0.55. In this particular example, overlap ws greatest for 3+ cod and 0-group Norway pout. Table 3.2.2.2.2 suggests that, for this predator-prey combination, some annual variation in spatial overlap may have occurred. However, the group was unable to determine the significance of this level of between year variation.

3.2.3 Possible ship effects on abundance indices

The ability of IBTS indices to describe the spatial and seasonal distribution of fish may depend on the different catching powers of the many different vessels used for these surveys from 1991. Varying underwater noise could be an important factor (Mitson 1995) as could slight differences of trawling technique, e.g., in relation to sweep lengths, and whether trawling is carried out at night or not. Use of the same vessels in each rectangle in every quarter was known to be important but impractical to achieve due to national constraints. Charts (kindly prepared for the working group by M. Vinther) showing the different survey vessels fishing each ICES rectangle in each quarter from 1991 to 1995 indicate that many, possibly most rectangles were not fished by the same combination of vessels in any one quarter from one year to the next. Therefore both interannual and interquarterly comparisons of abundances must either assume between-vessel differences in catching power to be zero, or incorporate them in the index.

A simple intercalibration of the quarterly IBTS abundance indices for all age groups from 1991 to 1995 to assess the possible scale of the problem was carried out using the method described in section 5. This assumes that a common value of total mortality, Z, existed in the North Sea over all ages during those years. [It should be noted that one set of quarterly indices was inconsistent with those of other years, namely the 3rd quarter result for 1991 when the English GFS, one of several contributors to the IBTS indices, used a Granton trawl instead of the GOV trawl used subsequently. It was not feasible in the time available to apply the estimated correction factor for this change (see section 5) to the EGFS results and re-calculate the IBTS indices for that quarter in 1991. A second point to note is that the 3rd quarter Scottish GFS used the Aberdeen trawl instead of the standard GOV throughout the five year period. This may cause a difference between the 3rd quarter IBTS indices and the rest.]

The estimated values of Z and the adjustment factors for aligning whole North Sea indices from the first three quarters to those from the fourth (chosen arbitrarily as the standard) for cod, haddock, whiting, Norway pout, herring, mackerel, and sprat are given in Table 3.2.3.1. Several of the adjustment factors are substantially different from unity, warning that seasonal comparisons of abundances should be interpreted with caution. The differences may be due to seasonal changes of abundance or catchability, or to the use of different vessels in different geographic patterns in each quarter.

The adjusted indices (i.e., after dividing by the factors) and the fitted lines of slope -Z are shown for the 1990 *year class* (the longest available series) of these species in Fig. 3.2.3.1 - 3.2.3.7. Also shown are the residuals plotted by age, year, *year class*, and quarter. The linearity of the models appears reasonable and there is little indication of a need to add a factor to the model to alter Z with time or age for most species. Considerable variability is evident in the data, particularly for Norway pout, herring, mackerel, and sprat. Features of the residual plots worth noting are:

- 1 year-old cod appear to be under-estimated by the 1st quarter IBTS as has been noted elsewhere (ICES CM 1996/H:1 and WP1).
- Variance for Norway pout increased substantially with age. This is at least partly due to the rarity of occurrence of the oldest fish.
- A curvature in the pattern of residuals with age is evident for herring suggesting relative under-estimation of the 3 and 4 year-olds. The 1st and 2 nd quarter surveys appeared to be most efficient for estimating herring abundances.
- Variance of the youngest mackerel appears to be somewhat greater than for older fish. The 3rd and 4 th quarter IBTS appeared to be most efficient for this species.
- Young sprat appear to be under-estimated relative to other ages by the IBTS.

It should be emphasised that these findings are specific to the model used. The model was not fitted for saithe because there was inadequate age-dependent signal in the indices to estimate a decline in the abundance of *year class*es with age for the age-range used. A model without the age factor may be useful although estimation is likely to be poor.

In order for quarterly IBTS indices to be used for seasonal and regional comparisons of abundances with less concern about possible vessel effects on catches, application of the intercalibration method to results from individual catches matched for rectangle and season for each pair of vessels may be helpful. This is not as effective as parallel trawling for removing variability due to changing fish distributions over time and area and precision of estimation may therefore not be good. Also, there may be inadequate numbers of matched hauls for some of the comparisons due to a lack of overlap between some national survey areas.

3.3 Section summary

Within- and between-year changes in distribution can be seen from the 20 quarterly IBTS surveys conducted over the years 1991–1995. It is obvious that the results may be influenced by changes in catchability, vessel-effects, etc. The Study Group during its meeting could only touch upon some of the possible analyses, and fully realises that there is scope for further investigations.

Where the Spearman Rank correlation coefficients were high, the group was confident that a high level of spatial concordance existed between the two distributions being compared, particularly since the charts in the examples chosen appeared to corroborate this, i.e., in the between quarter distributions of 2+ haddock. In the case of between year variation in the whiting distributions, a short term trend was suggested by the correlation coefficients, the underlying features of which were also apparent in the charts. In this instance therefore, the group was fairly confident about drawing some tentative conclusions regarding the between year comparisons. This was helped by the correlation coefficients having relatively high values. Had a significance test been appropriate, they would quite possibly have been significant.

In regarding the predator prey overlap correlation coefficients, these were generally of relatively low numerical value. In any significance evaluation, they may well have indicated just a random association; neither concordance or avoidance. Under such circumstances, it is not possible to say whether the degree of overlap has changed or not between two different years. Given a longer time series, however, it would certainly be appropriate to examine the data for either short-term cycles, or longer term trends, or to look for underlying causes of variation. The five year duration of the quarterly IBTS data set is too short for such an investigation, however, analysis of the longer time-series quarter 1 and quarter 3 data sets may prove of interest.

Table 3.2.1.2.1: Between-quarter and between-year differences in median catch rates (kg/hr) of all fish species recorded in Roundfish Areas 1-9 in 1991-1995, as revealed by two-way ANOVA. * indicates p < 0.05, ** indicates p < 0.01.

Roundfish Area	Effect	
	Quarter	Year
1	0.004**	0.013*
2	0.087	0.255
3	0.001**	0.037*
4	0.137	0.573
5	0.007**	0.121
6	0.002**	0.978
7	0.018*	0.396
8	0.000**	0.011*
9	0.128	0.678

Table 3.2.2.2.1 Correlations between spatial overlap of a predator and prey combinations in quarter 4 for 1991

Prey	Predator Whiting 2+	Cod 3+
Whiting 0gp	-0.14	-0.03
Cod 0gp	-0.47	0.19
N pout 0gp	0.07	0.55
Herring 0gp	-0.24	-0.33

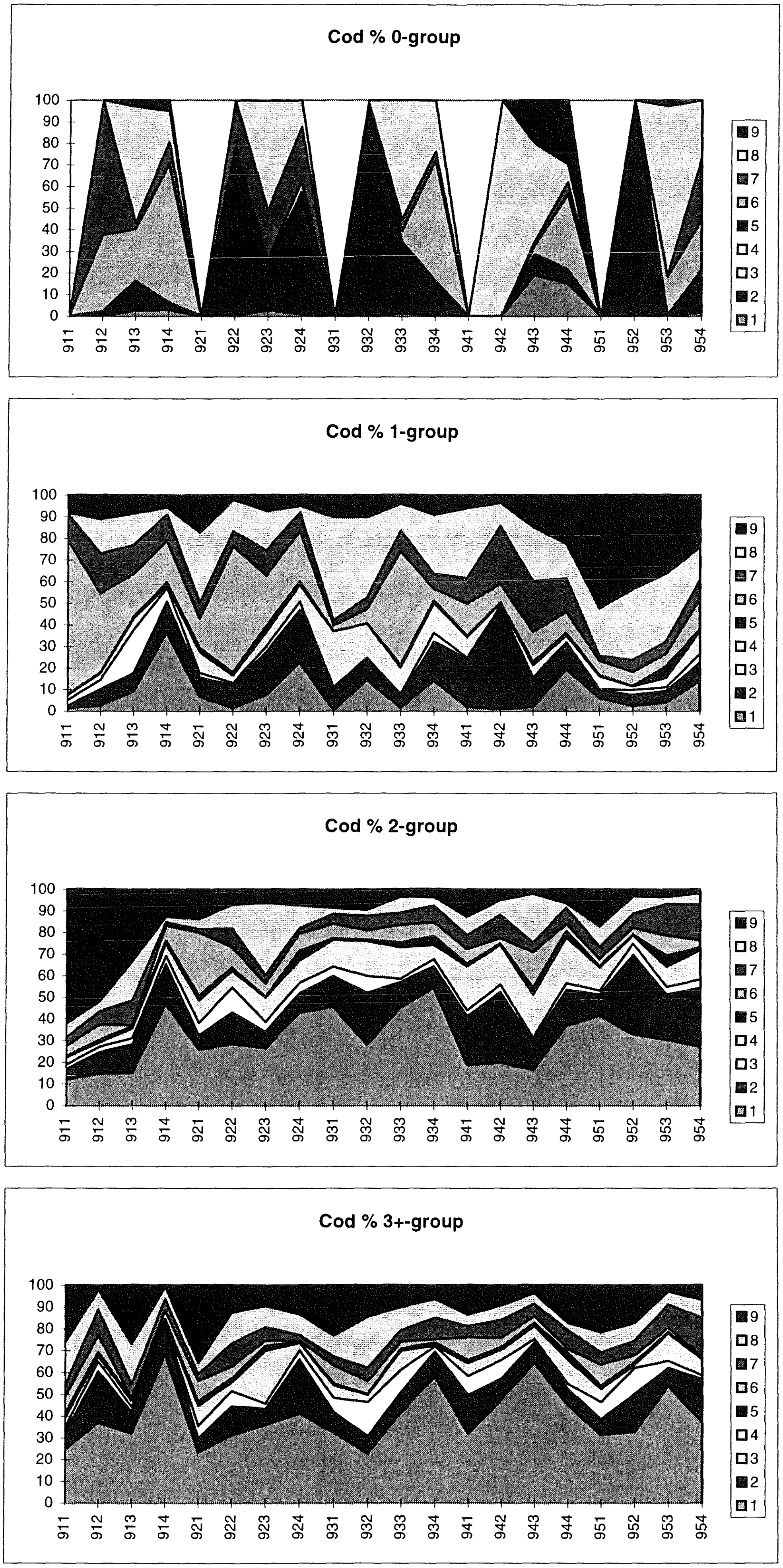
Table 3.2.2.2.2 Correlation between spatial overlap of 3+ cod and 0gp whiting in quarter 4 for 1991-1995

	1991 Cod 3+	1992	1993	1994	1995
N pout 0gp	0.55	0.70	0.67	0.40	0.37

Table 3.2.3.1

Estimates of *Z* and of the factors by which quarterly IBTS abundance indices must be divided in order to standardise them with the 4th quarter indices assuming a single value of *Z* for all ages and years. The age ranges measured in years from 1 January for indices used in the analysis are also shown.

Species	**Cod**	**Had-dock**	**Whiting**	**Norway pout**	**Herring**	**Mack-erel**	**Sprat**
Z	0.89	1.15	1.07	2.03	0.76	0.43	1.72
Quarter 1	0.93	0.90	0.73	0.63	2.08	0.04	0.07
Quarter 2	0.99	0.93	0.68	0.71	2.97	0.30	0.56
Quarter 3	0.74	0.56	0.47	0.65	2.97	1.84	0.43
Age- range	1.1 - 6.9	1.1 - 6.9	1.1 - 6.9	1.1 - 5.6	1.1 - 5.9	1.1 - 5.9	1.1 - 5.9


Cod % 0-group

Cod % 1-group

Cod % 2-group

Cod % 3+-group

Figure 3.2.1.1.1 Percentage contribution of each roundfish area to the total abundance of cod.

F-32111.XLS]

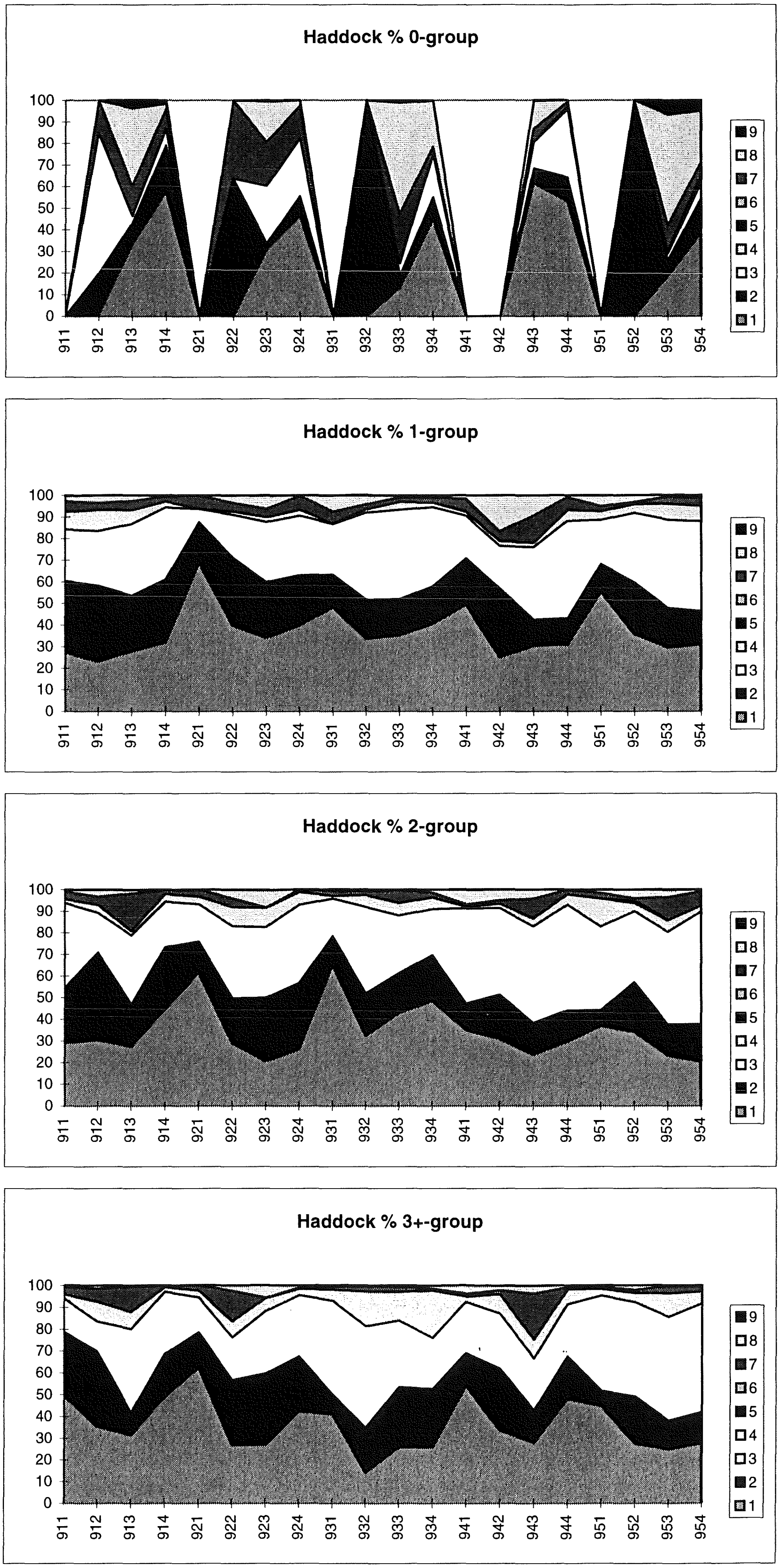


Figure 3.2.1.1.2 Percentage contribution of each roundfish area to the total abundance of haddock.

F-32112.XLS

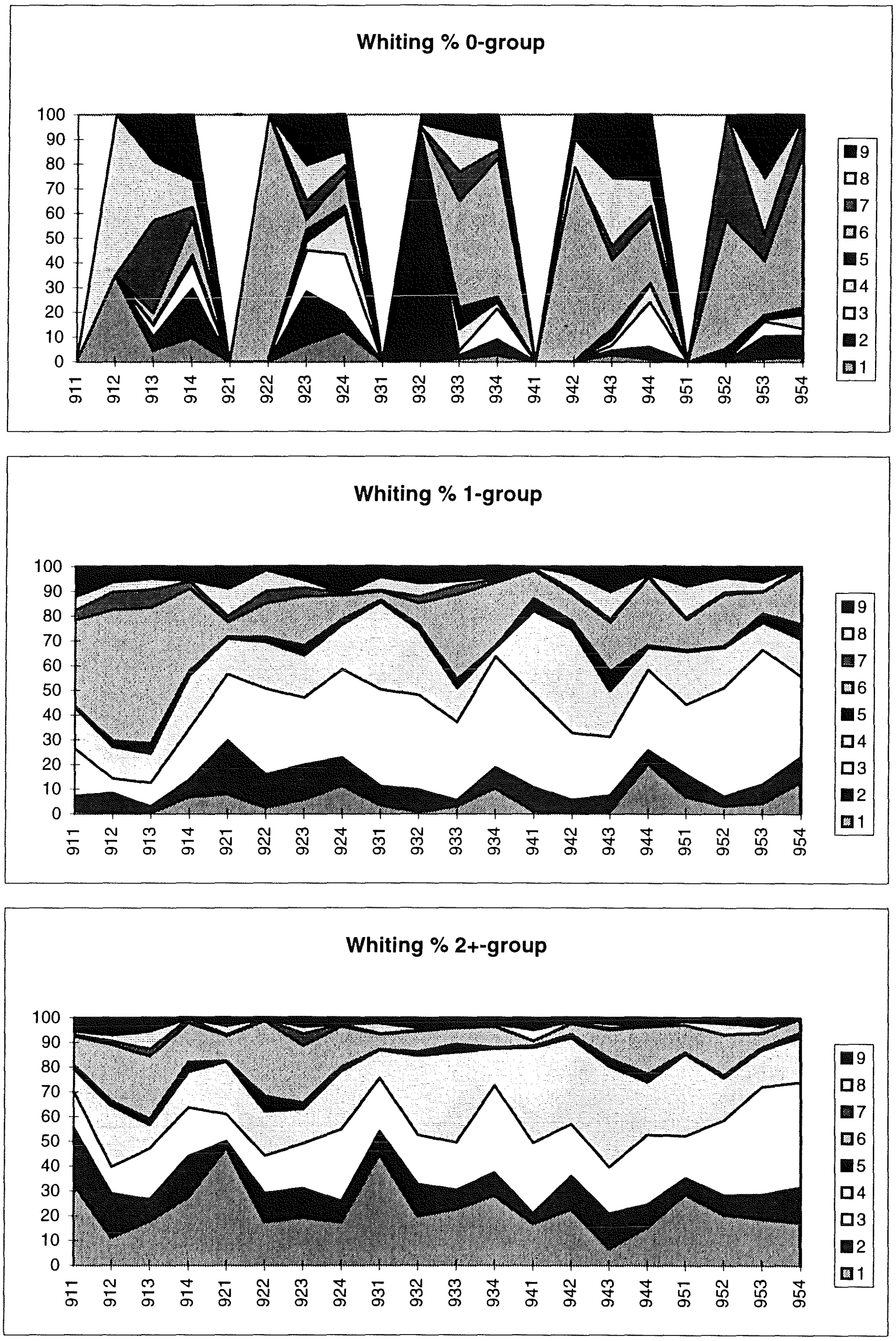
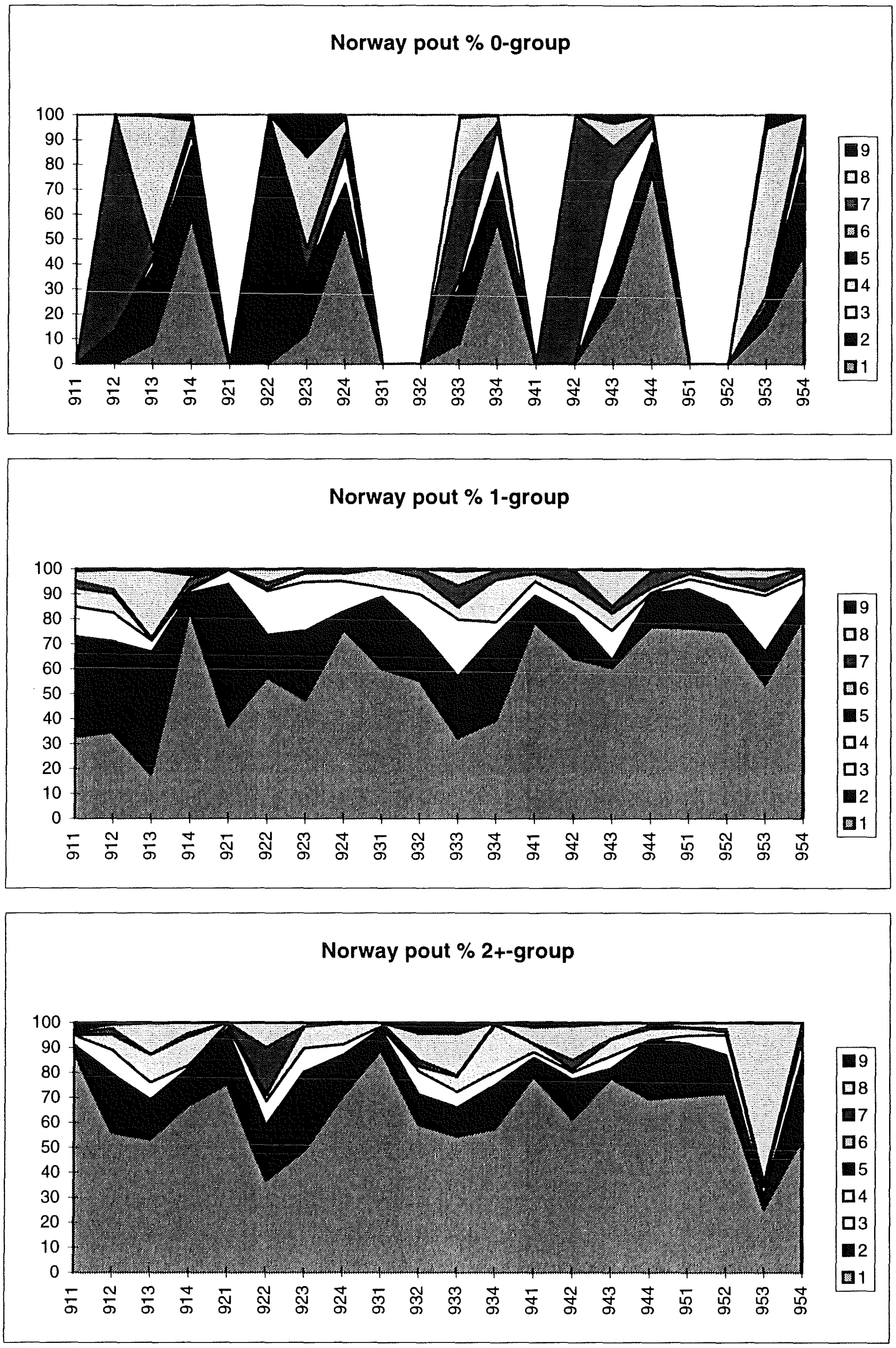


Figure 3.2.1.1.3 Percentage contribution of each roundfish area to the total abundance of whiting.


Norway pout % 0-group

Norway pout % 1-group

Norway pout % 2+-group

Figure 3.2.1.1.4 Percentage contribution of each roundfish area to the total abundance of whiting.

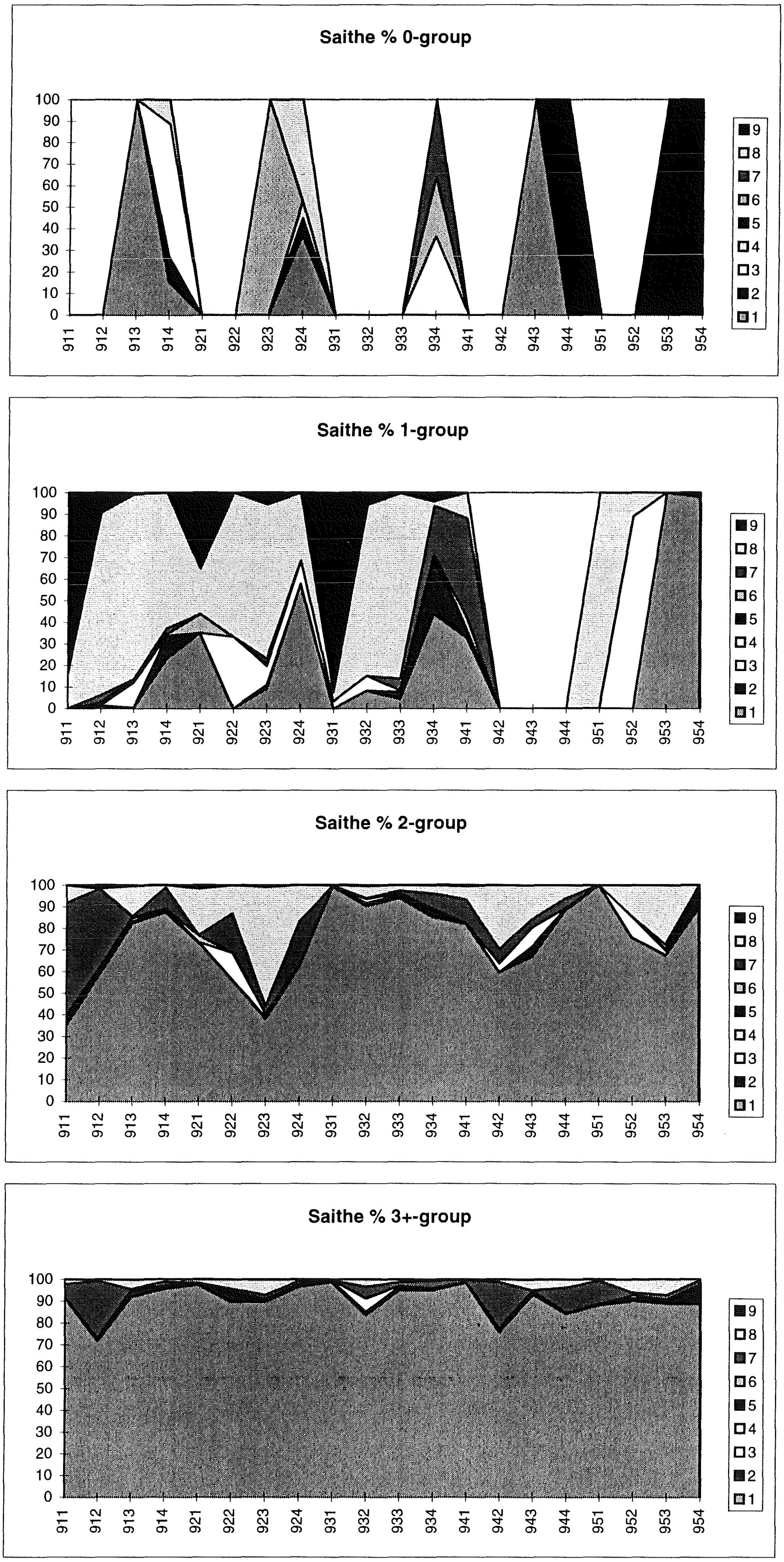
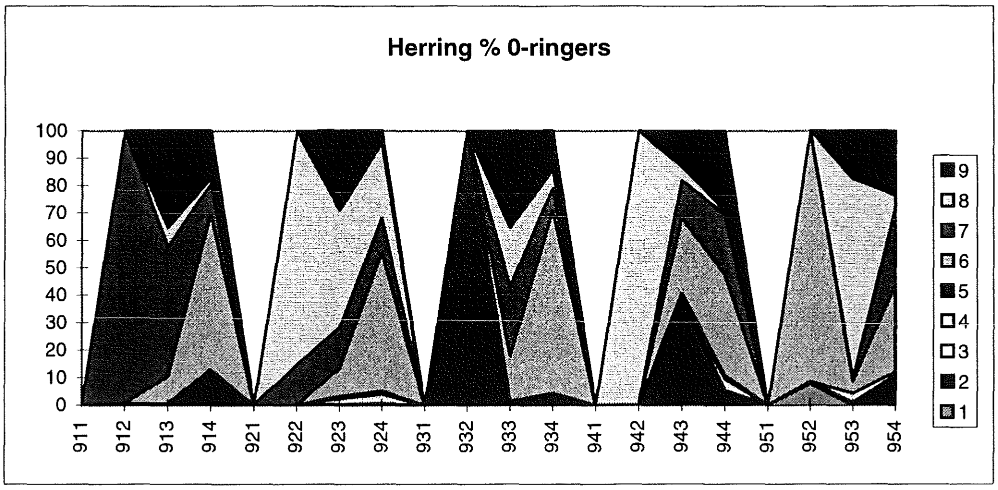
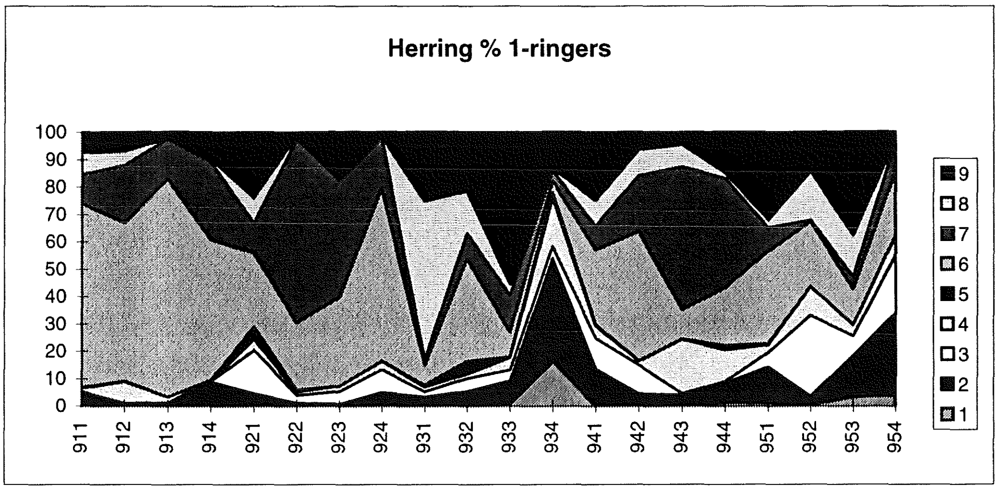
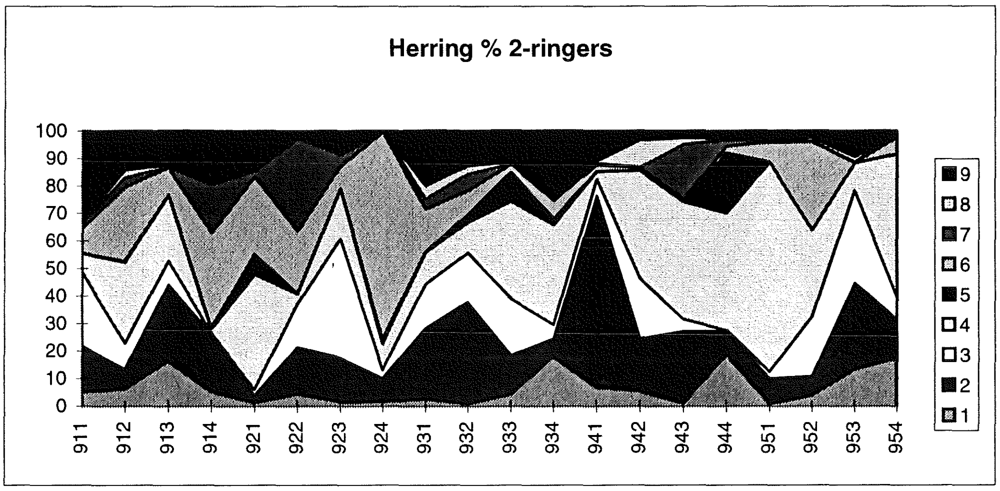


Figure 3.2.1.1.5 Percentage contribution of each roundfish area to the total abundance of saithe.

F-32115.XLS







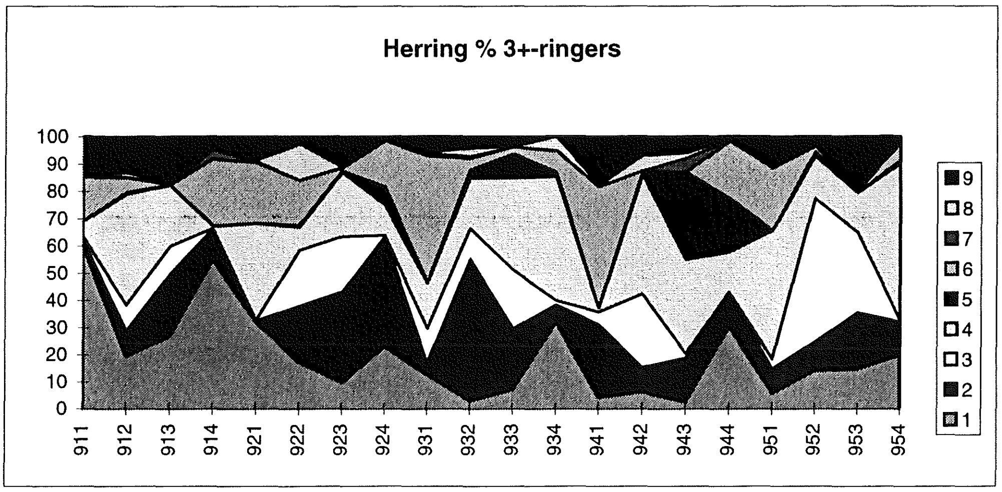


Figure 3.2.1.1.6 Percentage contribution of each roundfish area to the total abundance of herring. NB day- and night-hauls were used in the analysis.
F-32116.XLS

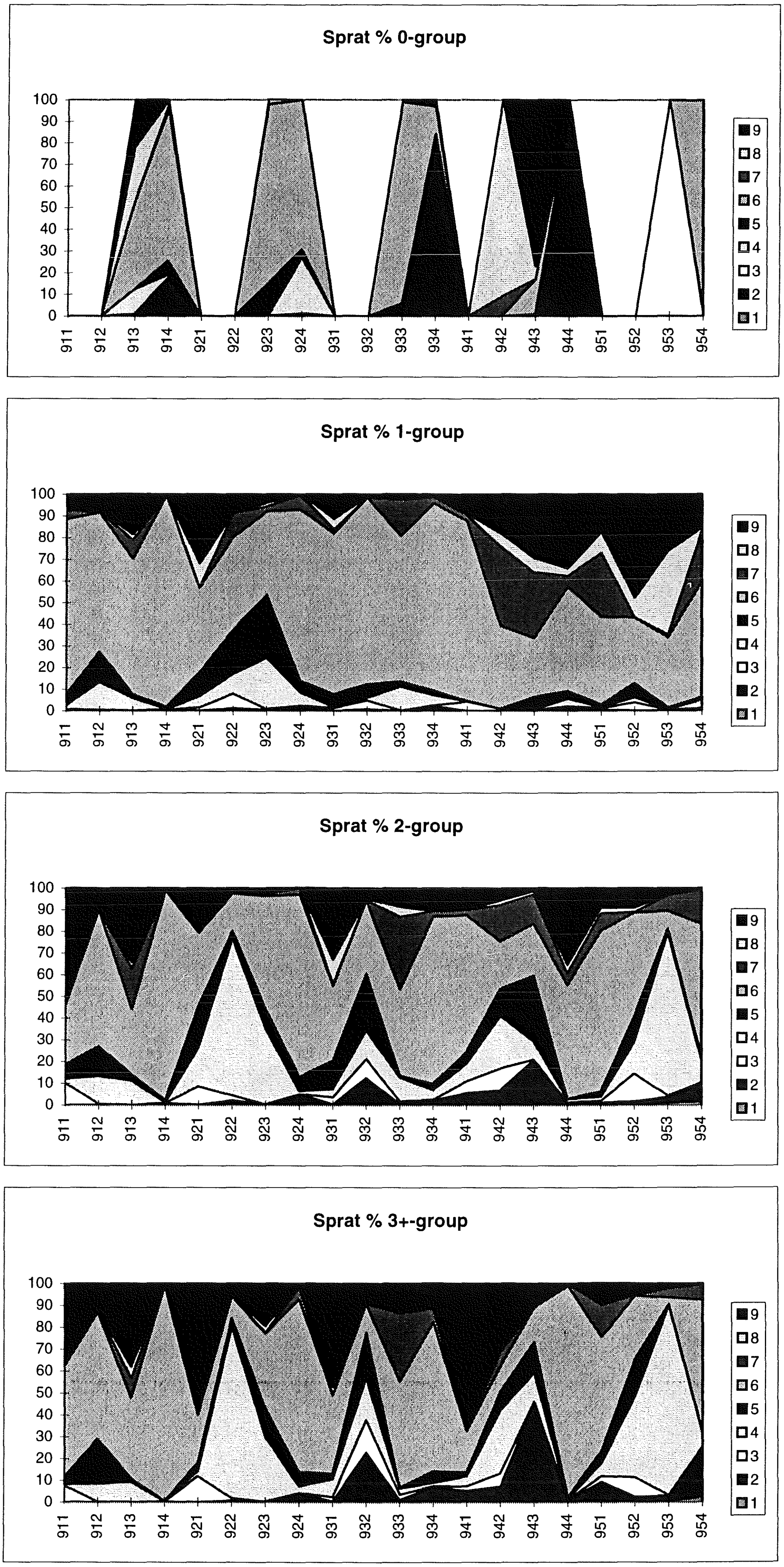


Figure 3.2.1.1.7 Percentage contribution of each roundfish area to the total abundance of sprat.

F-32117.XLS

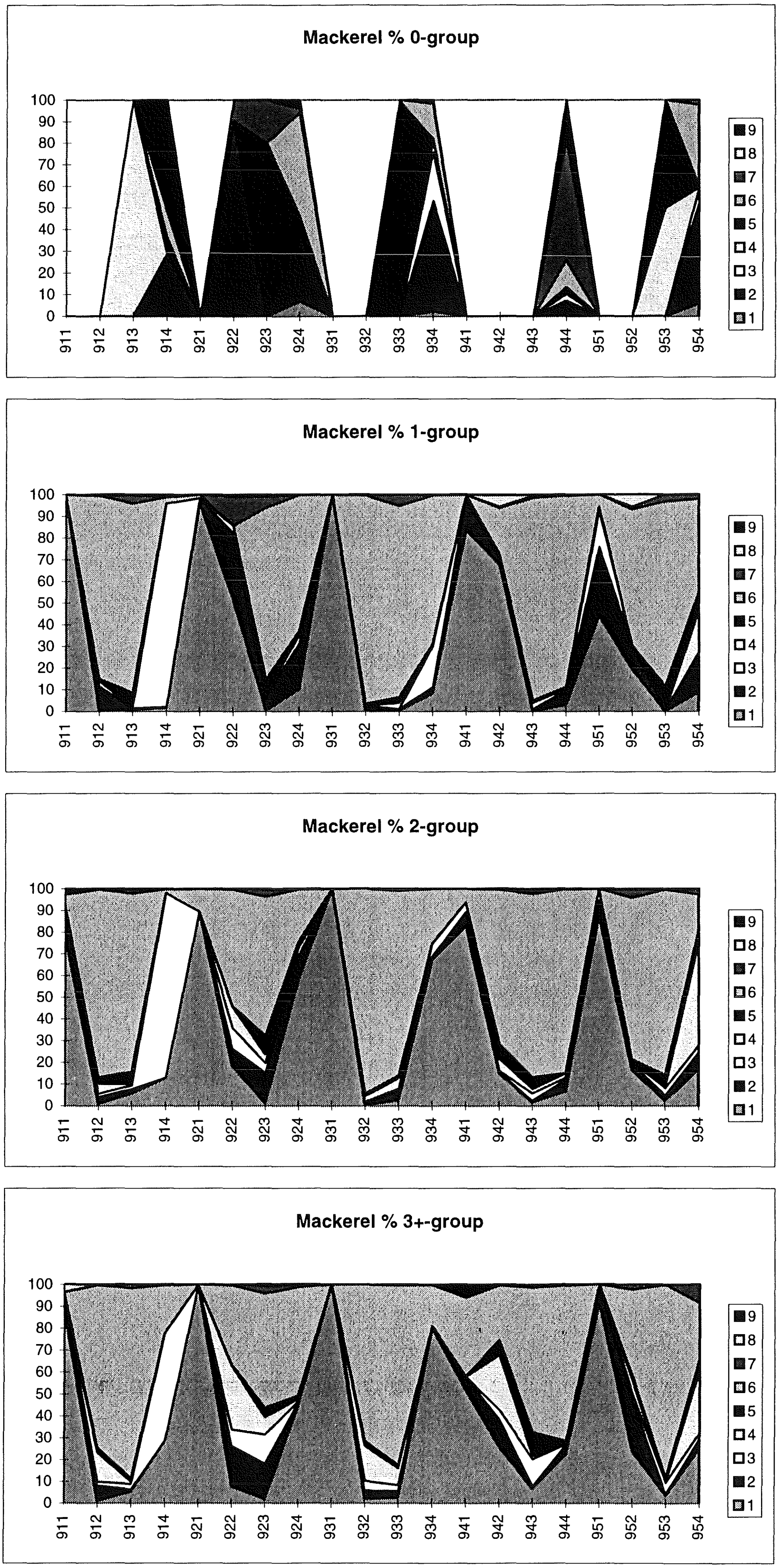


Figure 3.2.1.1.8 Percentage contribution of each roundfish area to the total abundance of mackerel.

F-32118.XLS

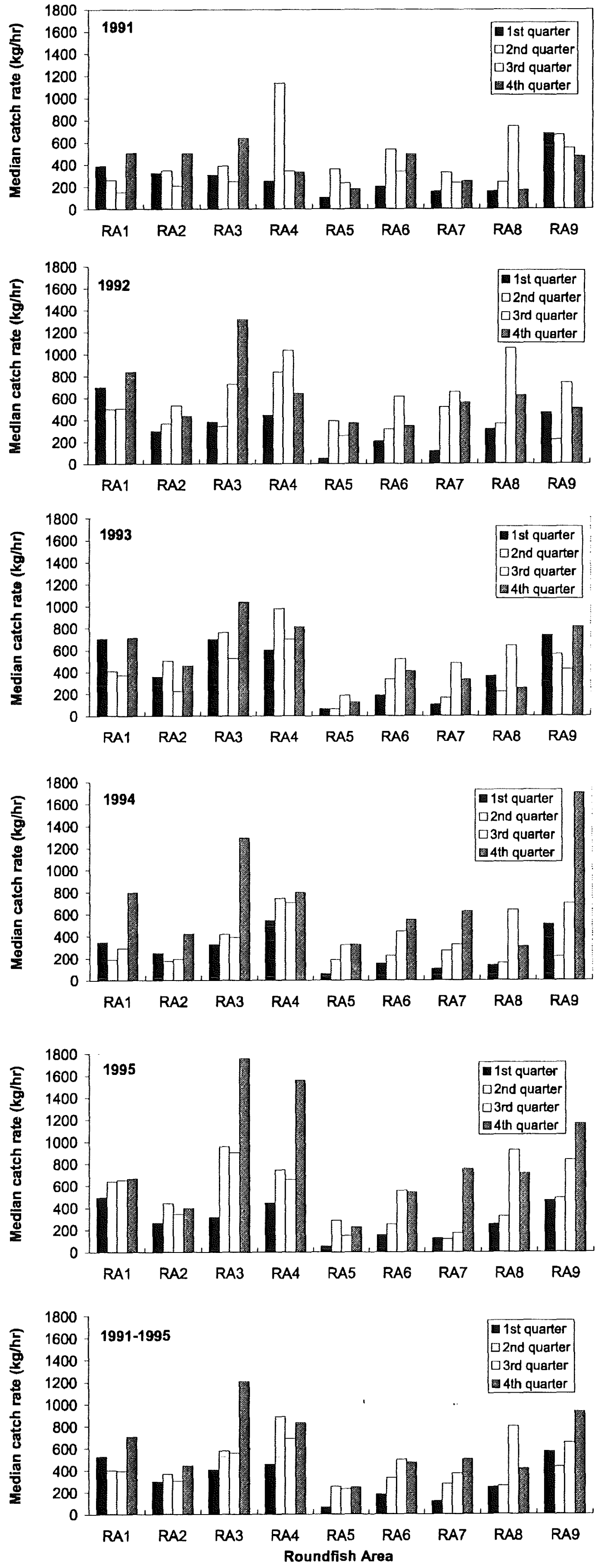


Figure 3.2.1.2.1

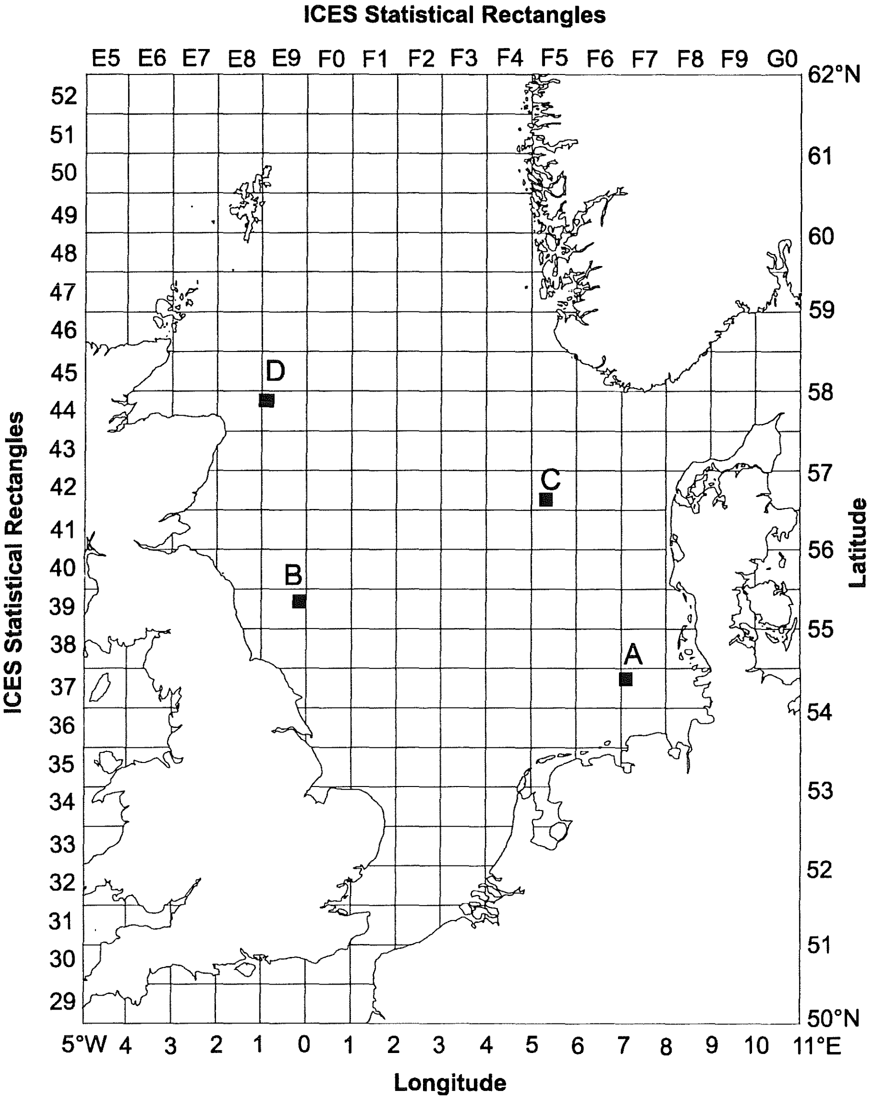


Figure 3.2.2.1: Location of four small 10x10 Nm boxes in the North Sea where intensive fishing exercises were carried out.

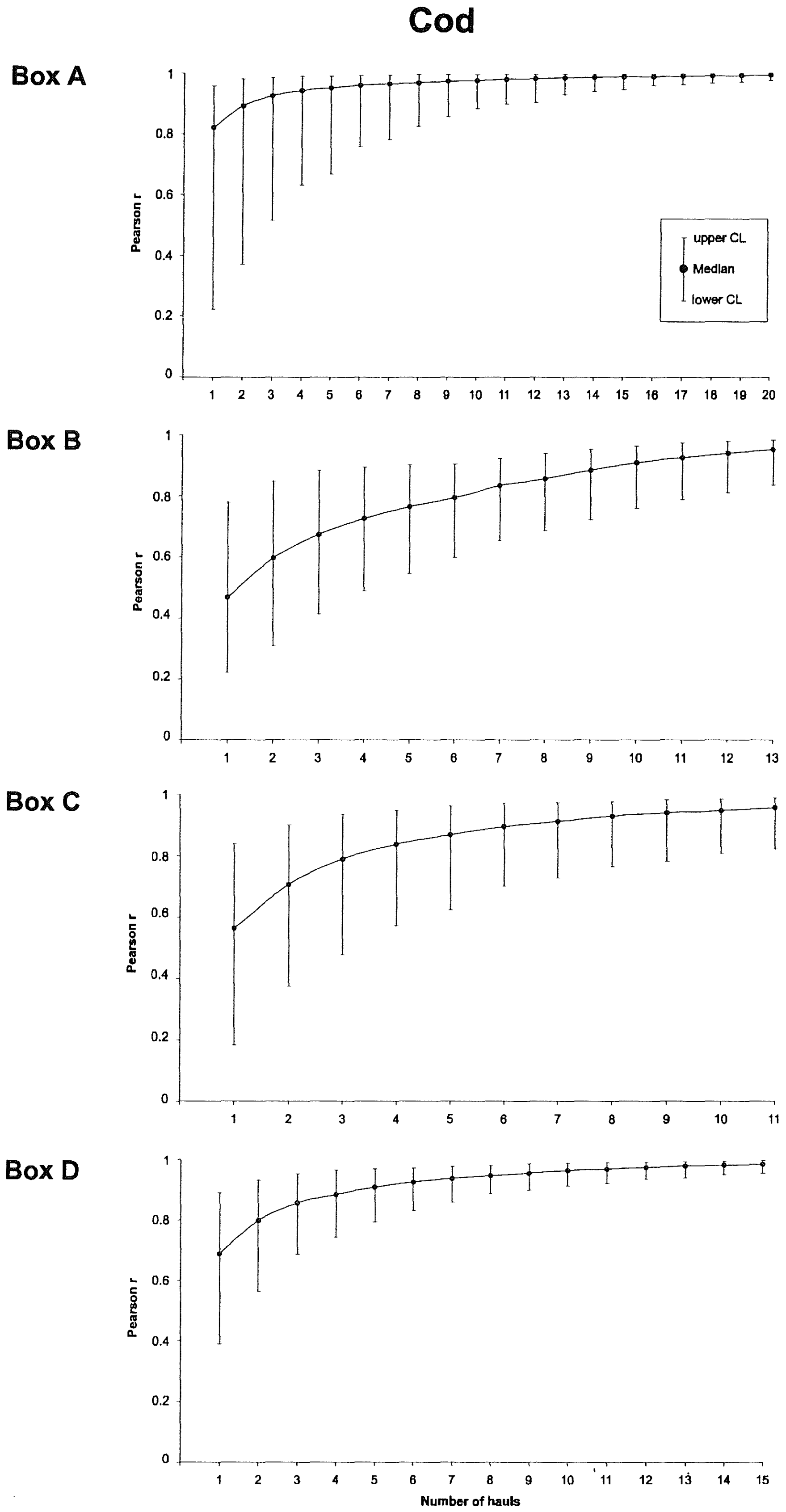


Fig. 3.2.2.2: Effect of increasing number of hauls on the correlation between the mean cod catch rate provided by the indicated number of hauls and the mean of all hauls (> 20 in all cases) made in the small box. The 95% confidence limits were estimated by bootstrapping.

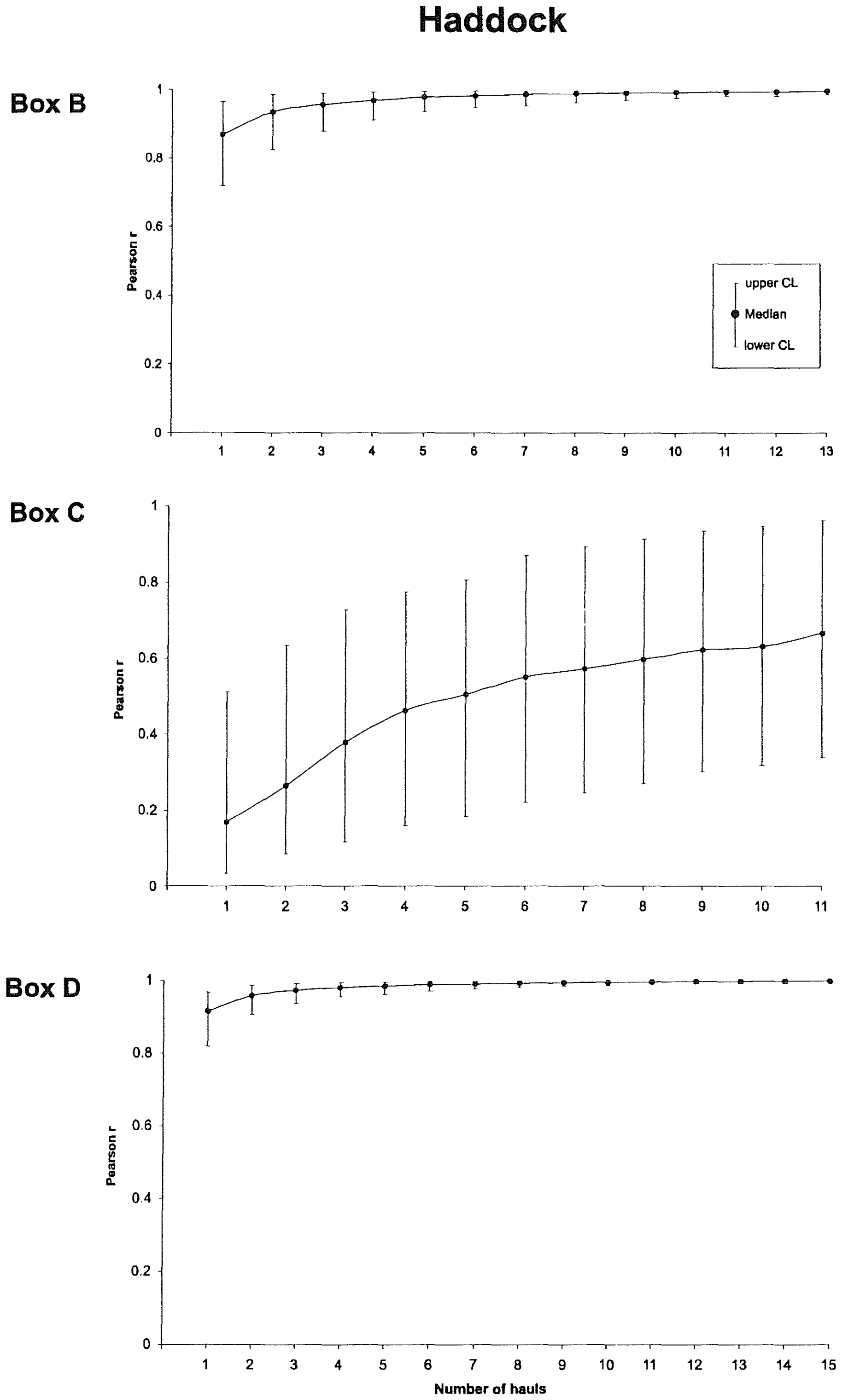


Fig. 3.2.2.3: Effect of increasing number of hauls on the correlation between the mean haddock catch rate provided by the indicated number of hauls and the mean of all hauls (> 20 in all cases) made in the small box. The 95% confidence limits were estimated by bootstrapping.

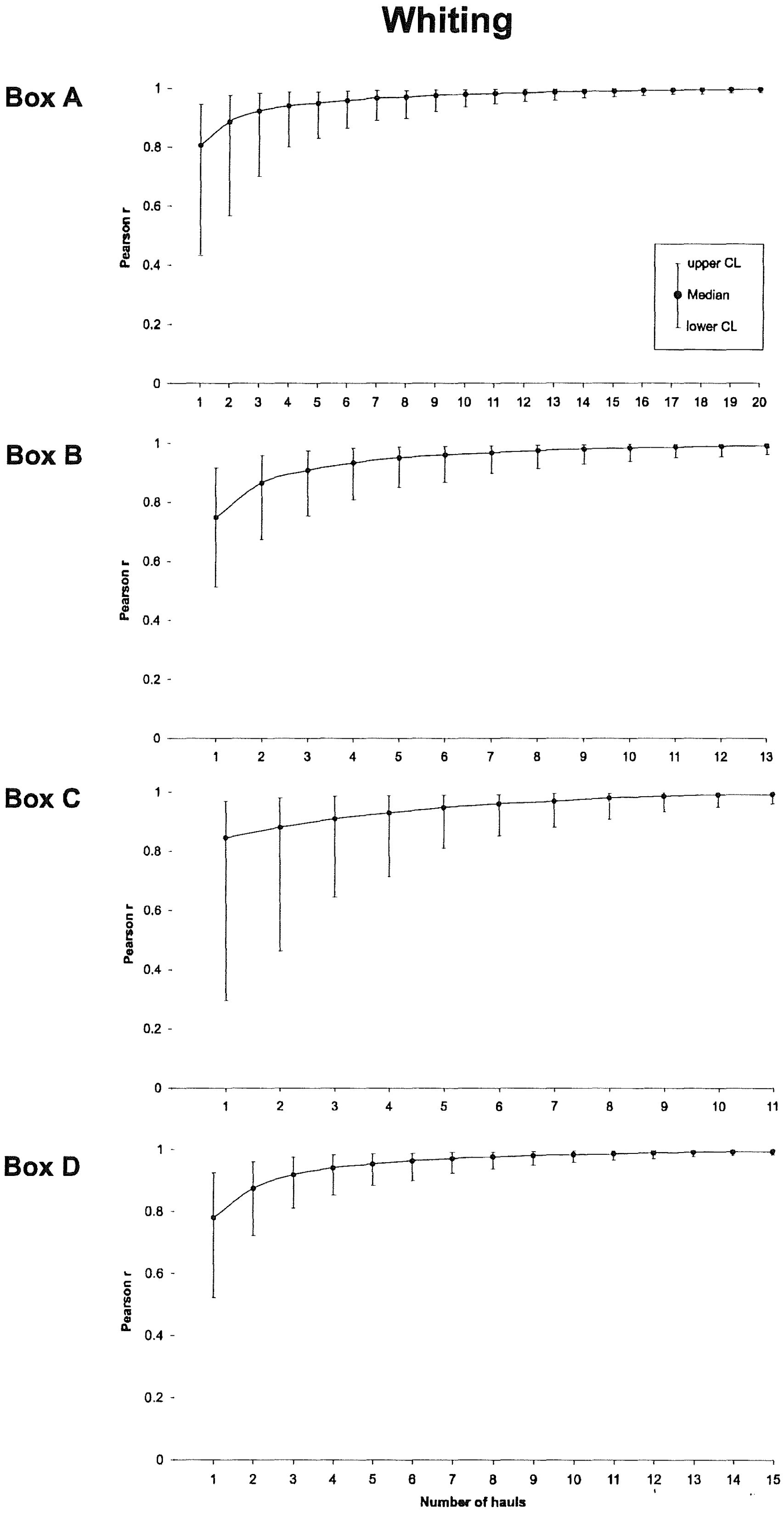
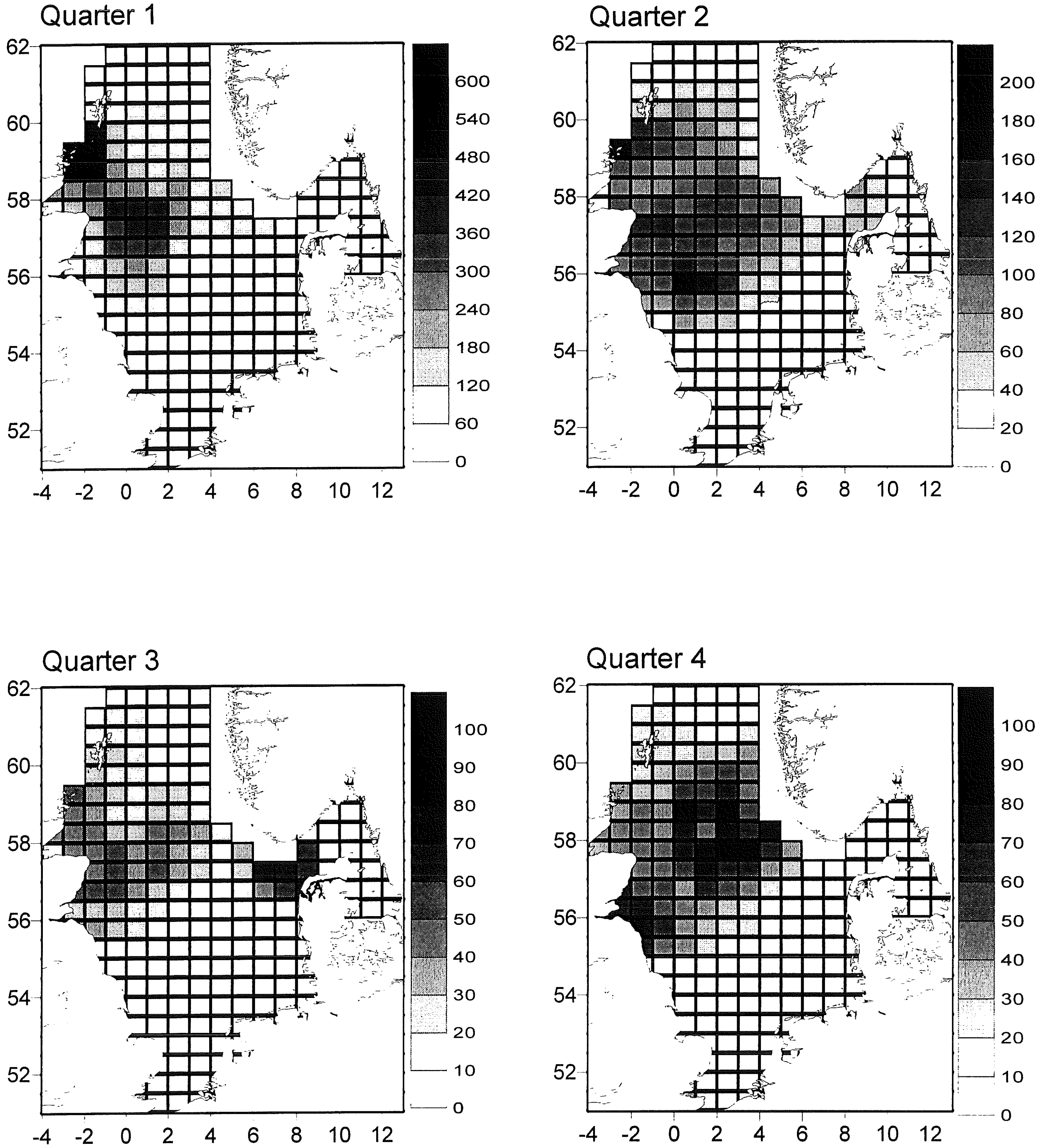


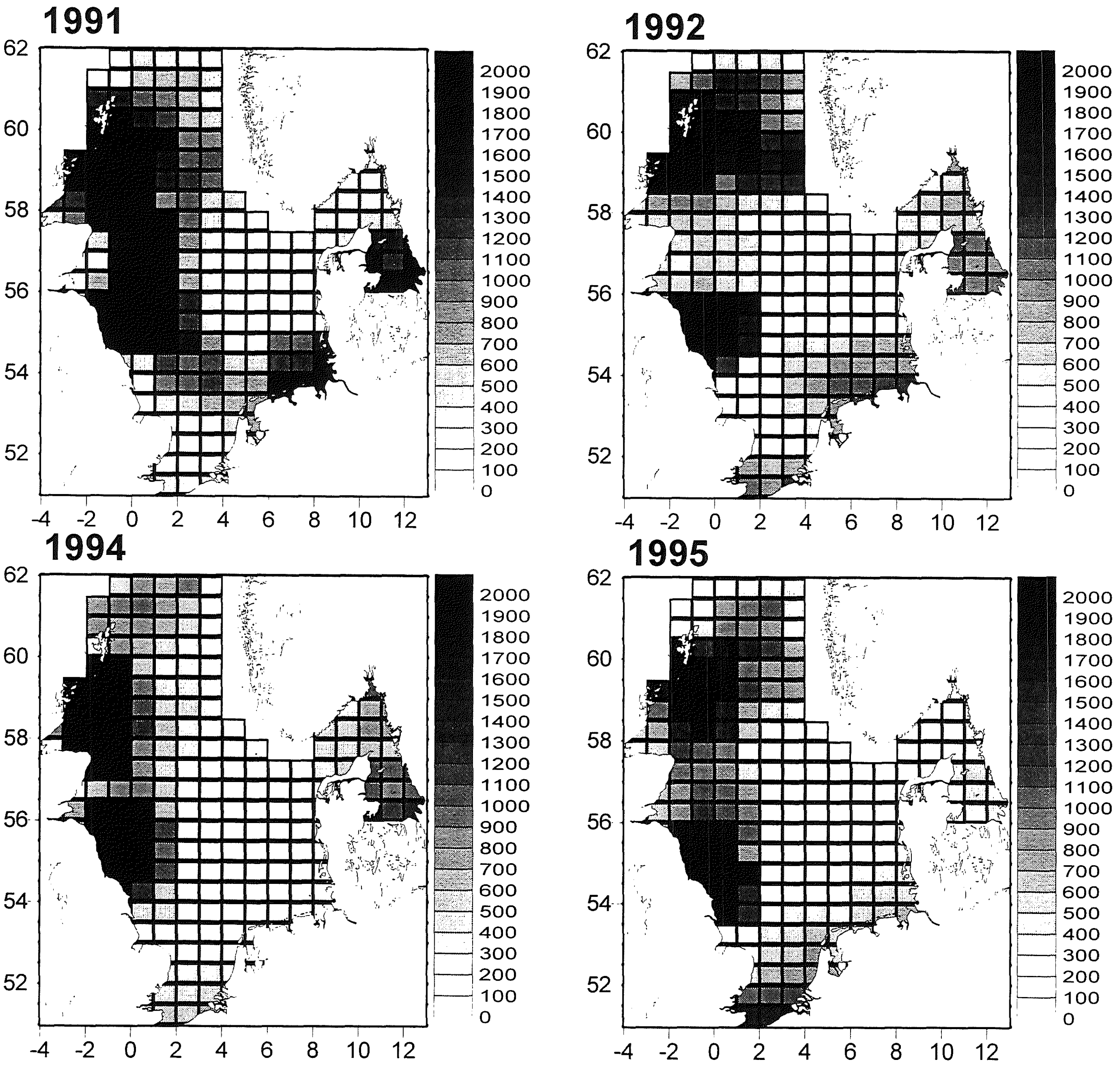
Fig. 3.2.2.4: Effect of increasing number of hauls on the correlation between the mean whiting catch rate provided by the indicated number of hauls and the mean of all hauls (> 20 in all cases) made in the small box. The 95% confidence limits were estimated by bootstrapping.



Spearman Rank Correlation

	1	2	3
2	.90		
3	.88	.86	
4	.86	.88	.84

Figure 3.2.2.1.1. Between quarter variation in the distribution of 2 gp haddock in 1991.



Spearman Rank Correlation

	91	92	93	94
92	.75			
93	.70	.75		
94	.59	.63	.78	
95	.66	.71	.69	.67

Figure 3.2.2.1.2. Between year variation in the distribution of 2+ age whiting in quarter 1.

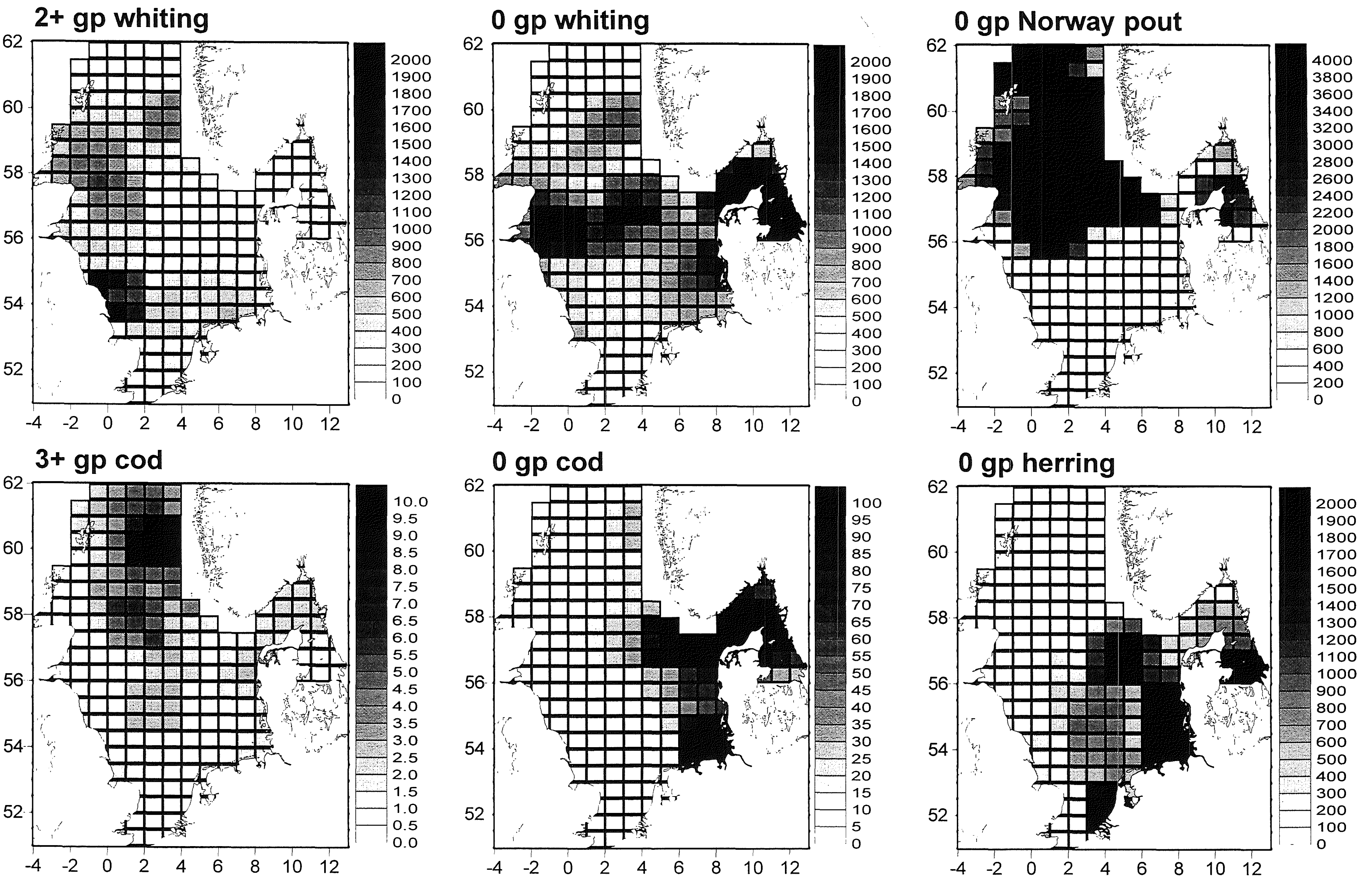
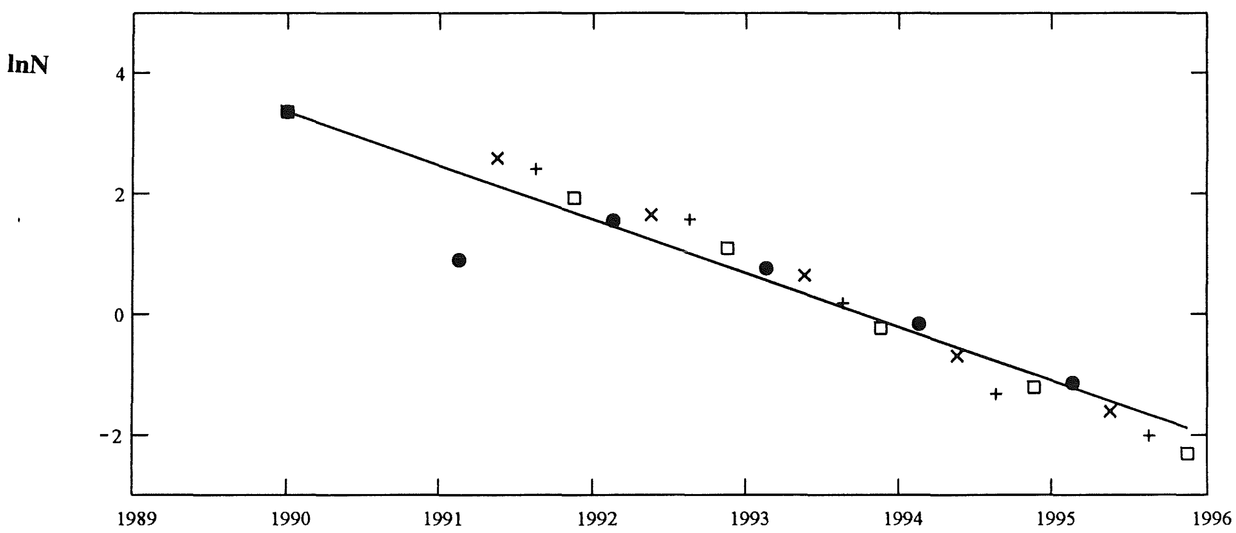


Figure 3.2.2.2.1. Comparison of the distributions of two predators (2+ gp whiting and 3+ gp cod) and four potential prey species (0 gp cod, whiting, Norway pout and herring) in quarter 4, 1991.

Figures 3.2.3.1 - 3.2.3.7: Quarterly IBTS abundance indices as natural logarithms for the 1990 year-class of cod, haddock, whiting, Norway pout, herring mackerel and sprat after adjustment to 4th quarter results, together with the ordinary least squares model fit with age. The top point on each regression line, shown as a black square, is the estimated number of 0 year-old recruits for each year-class. Key: quarter 1= hatched circles; quarter 2=crosses; quarter 3=plusses; quarter 4=squares. Below: model residuals by age, year, year-class, and quarter.

Figure 3.2.3.1



COD

Residuals

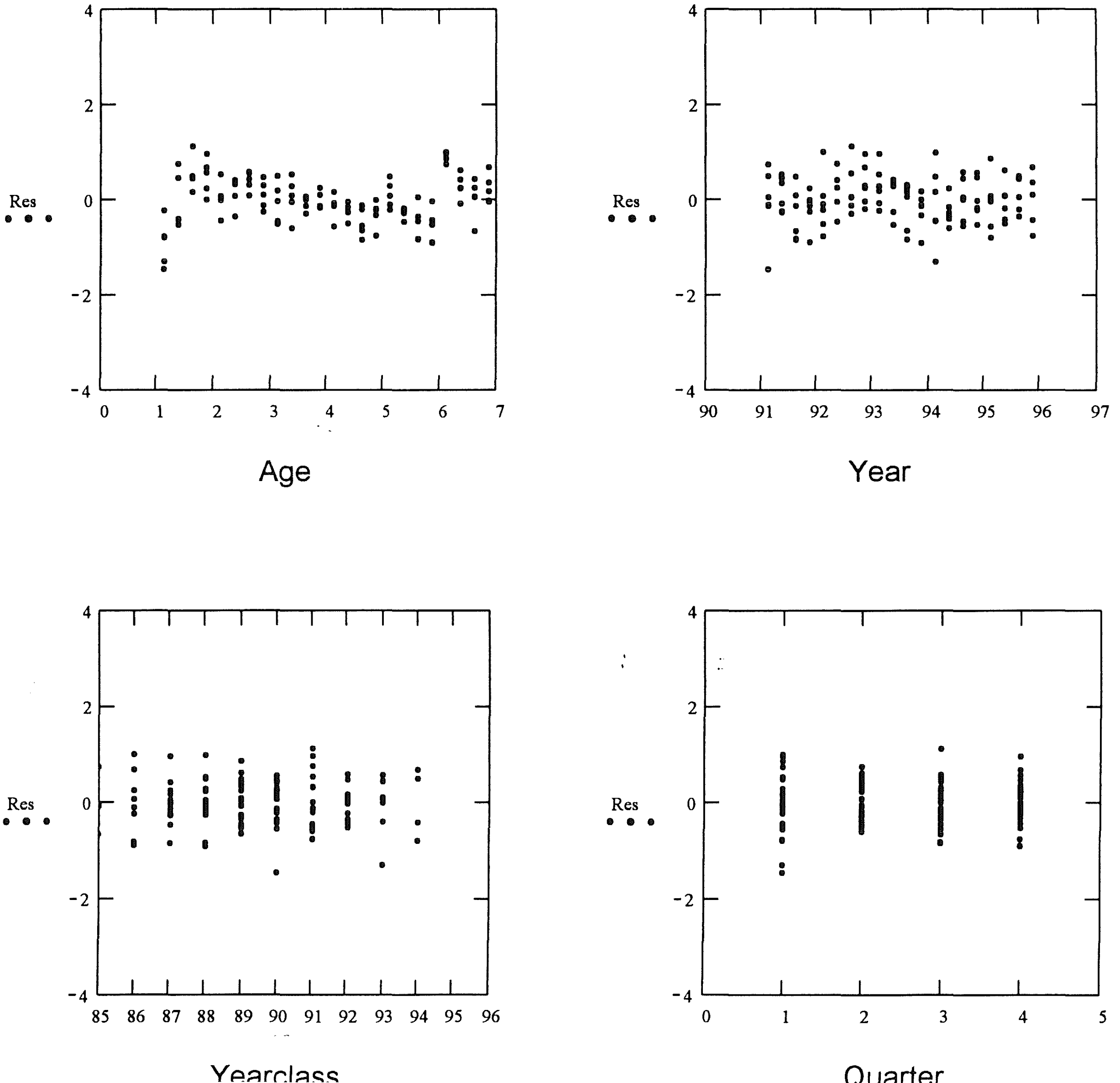
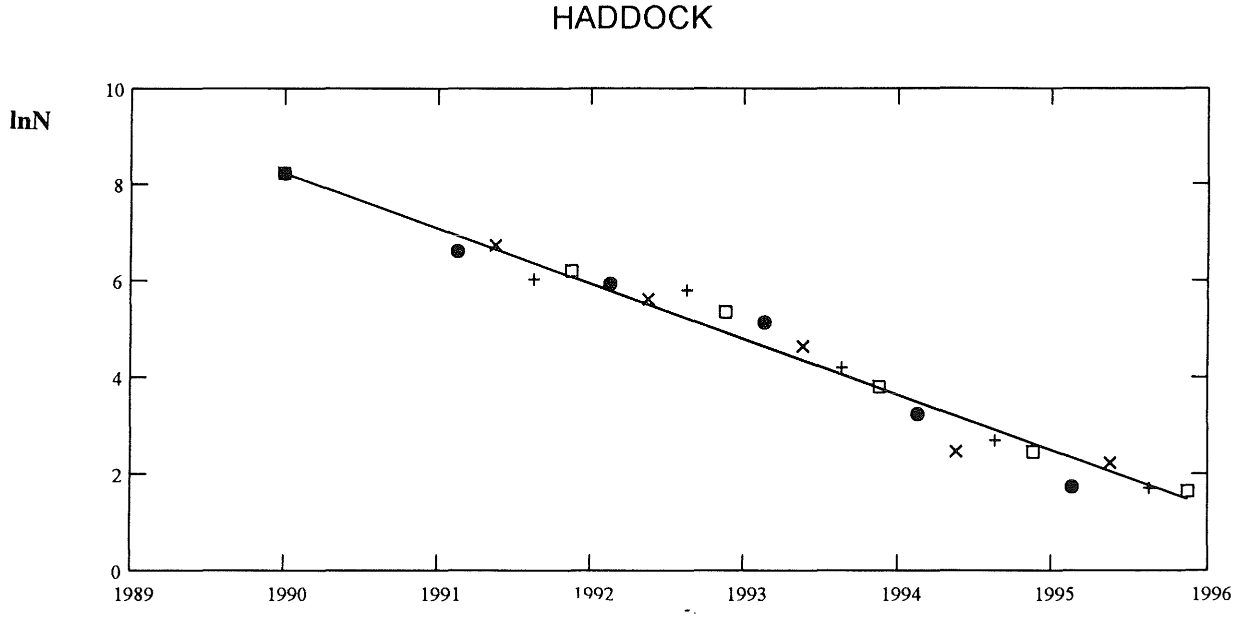


Figure 3.2.3.2



Residuals

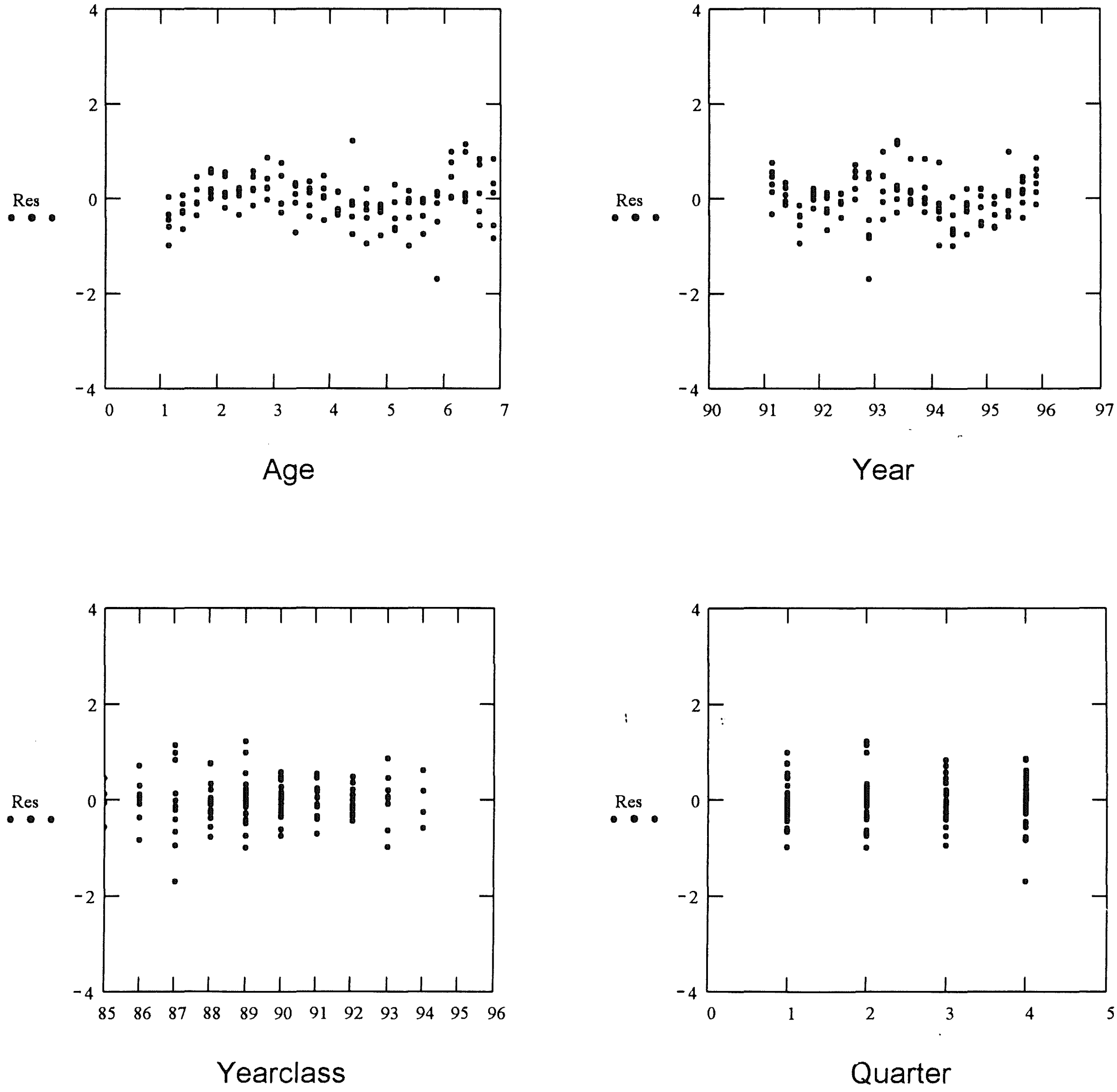
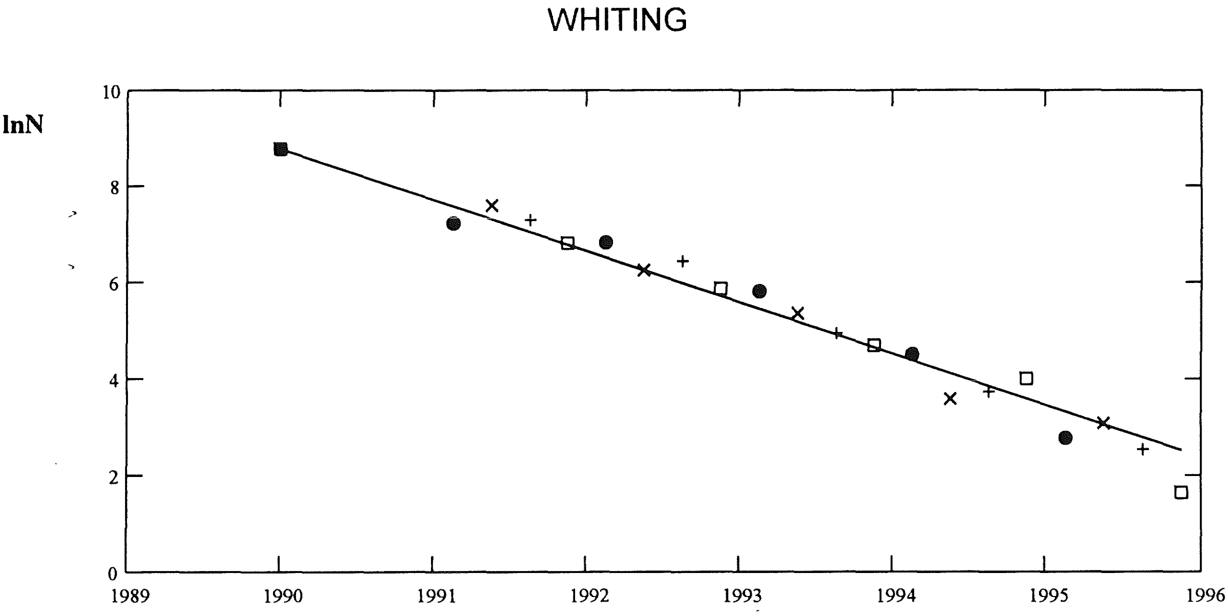


Figure 3.2.3.3


WHITING

Residuals

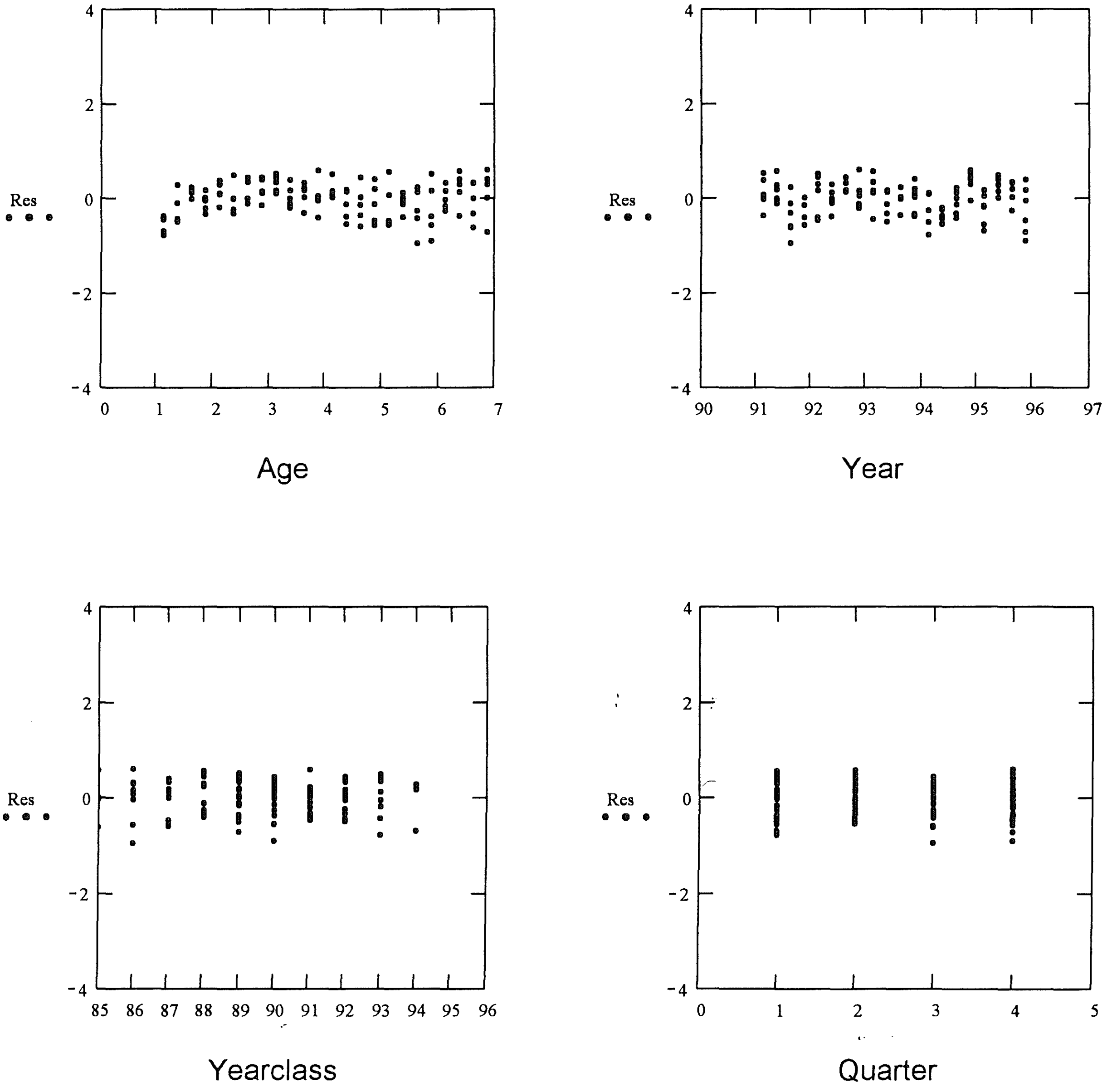
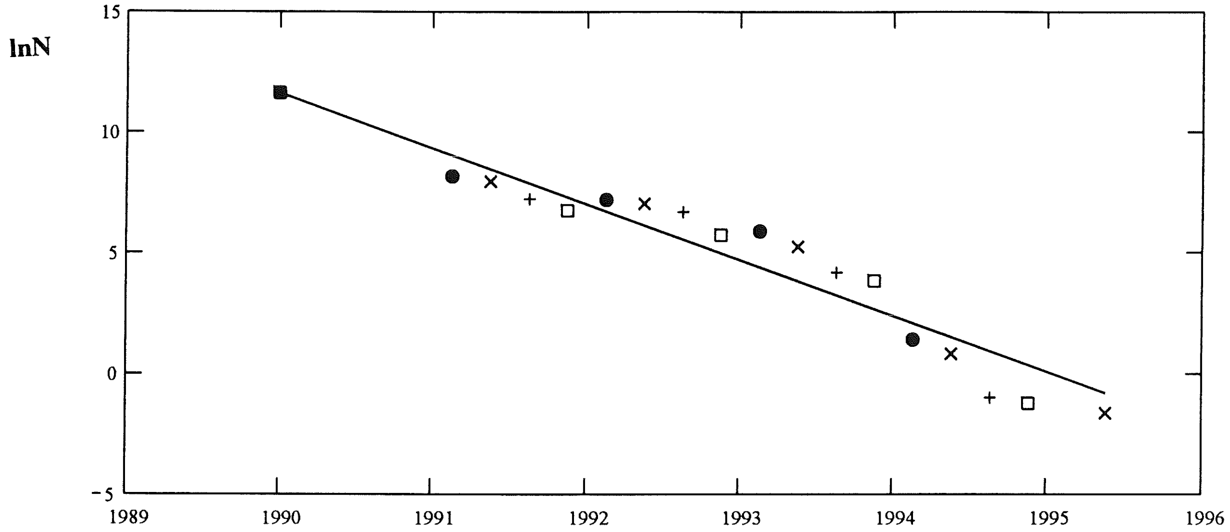


Figure 3.2.3.4

NORWAY POUT



Residuals

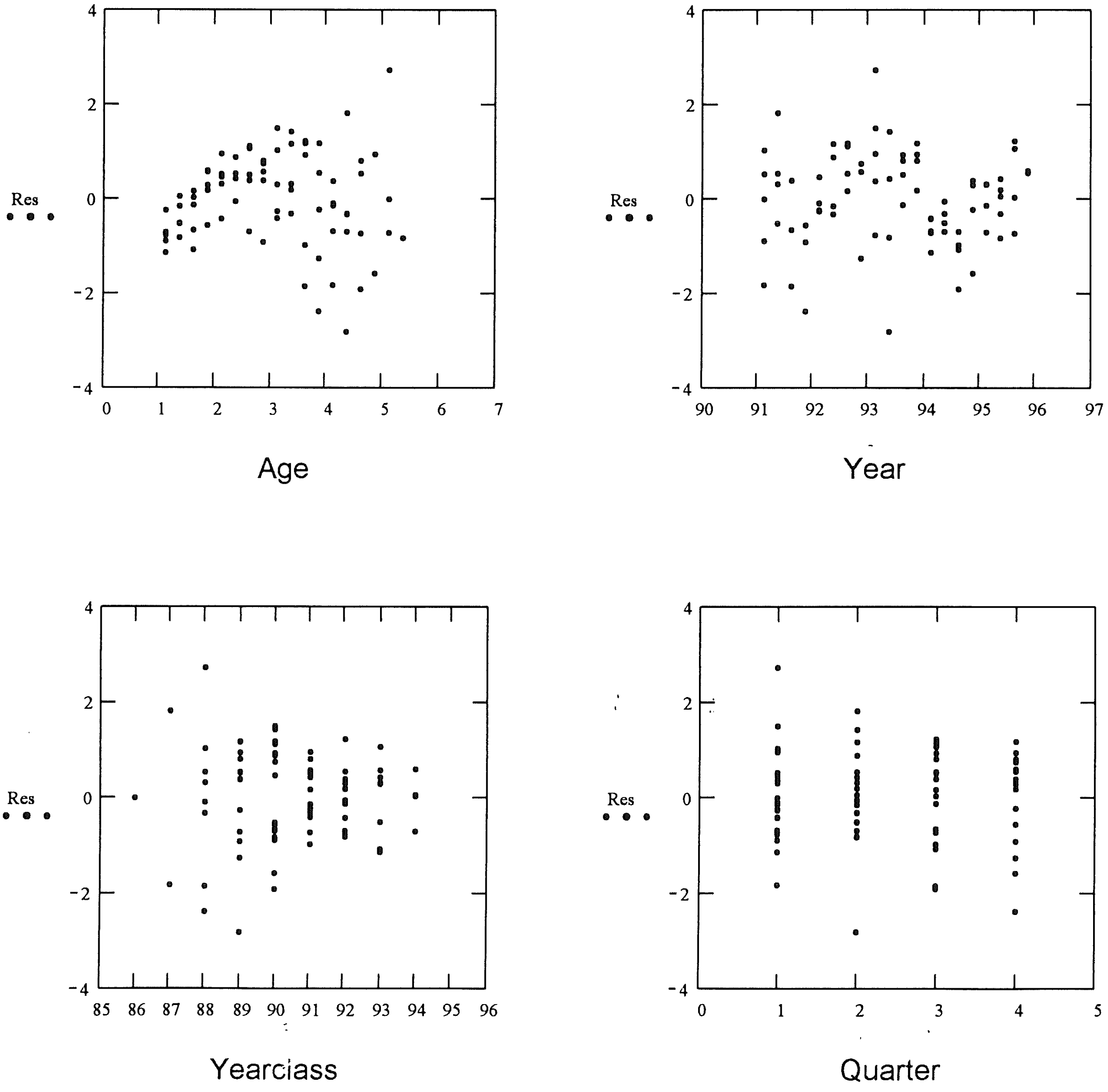
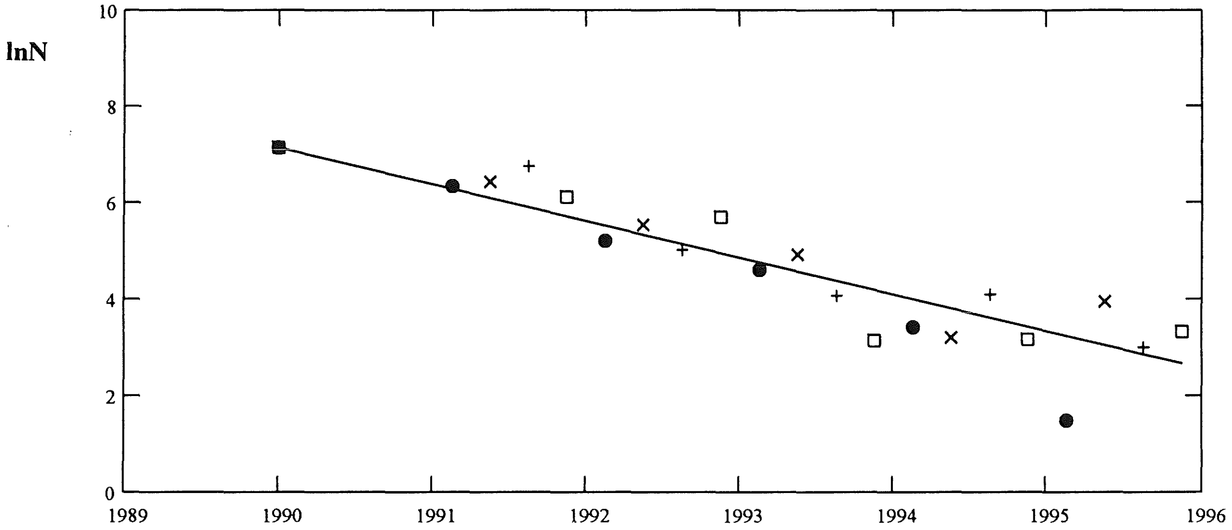


Figure 3.2.3.5


HERRING

Residuals

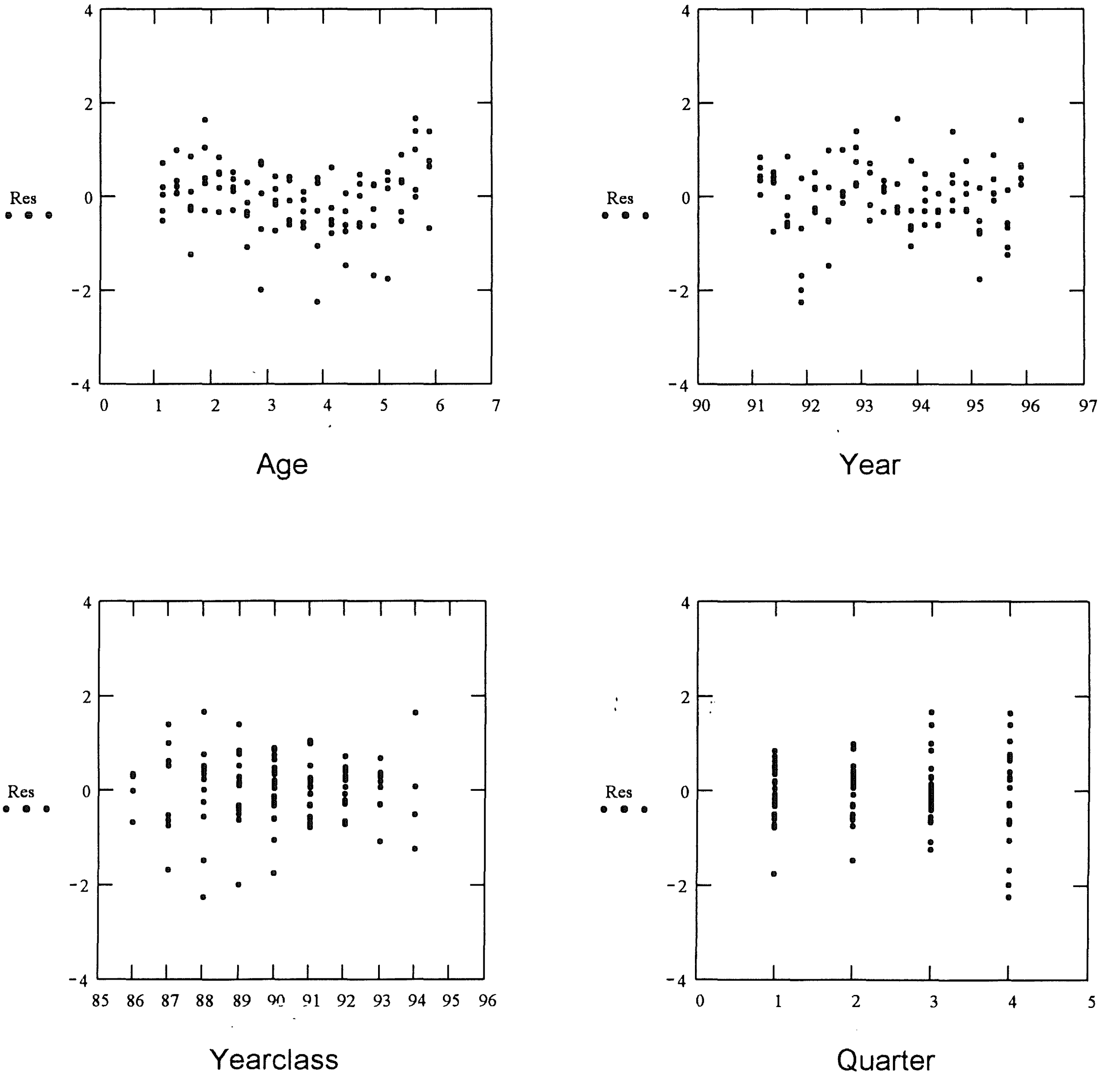
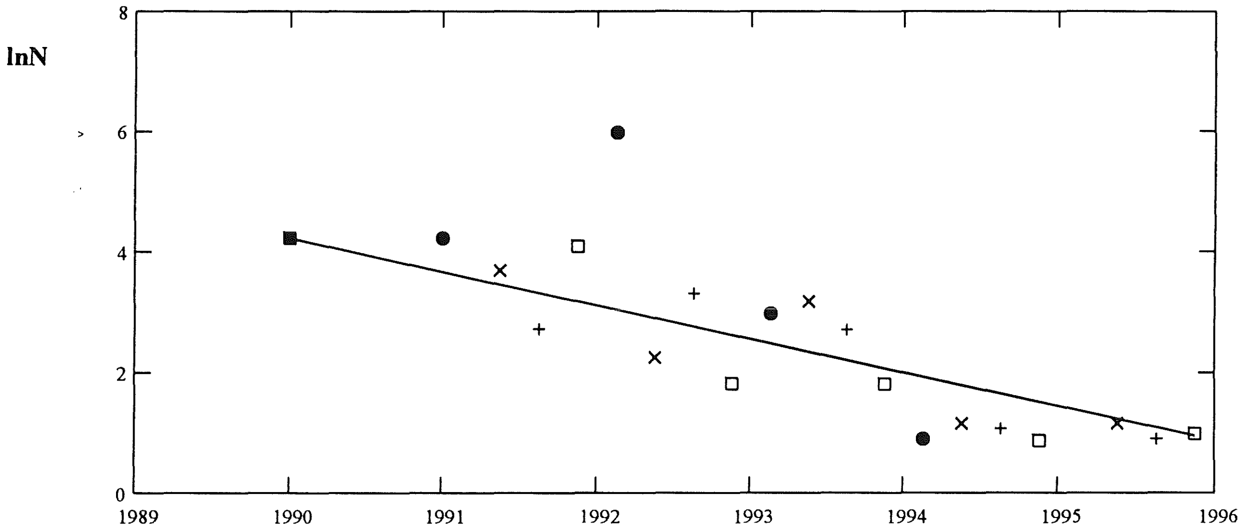


Figure 3.2.3.6

MACKEREL



Residuals

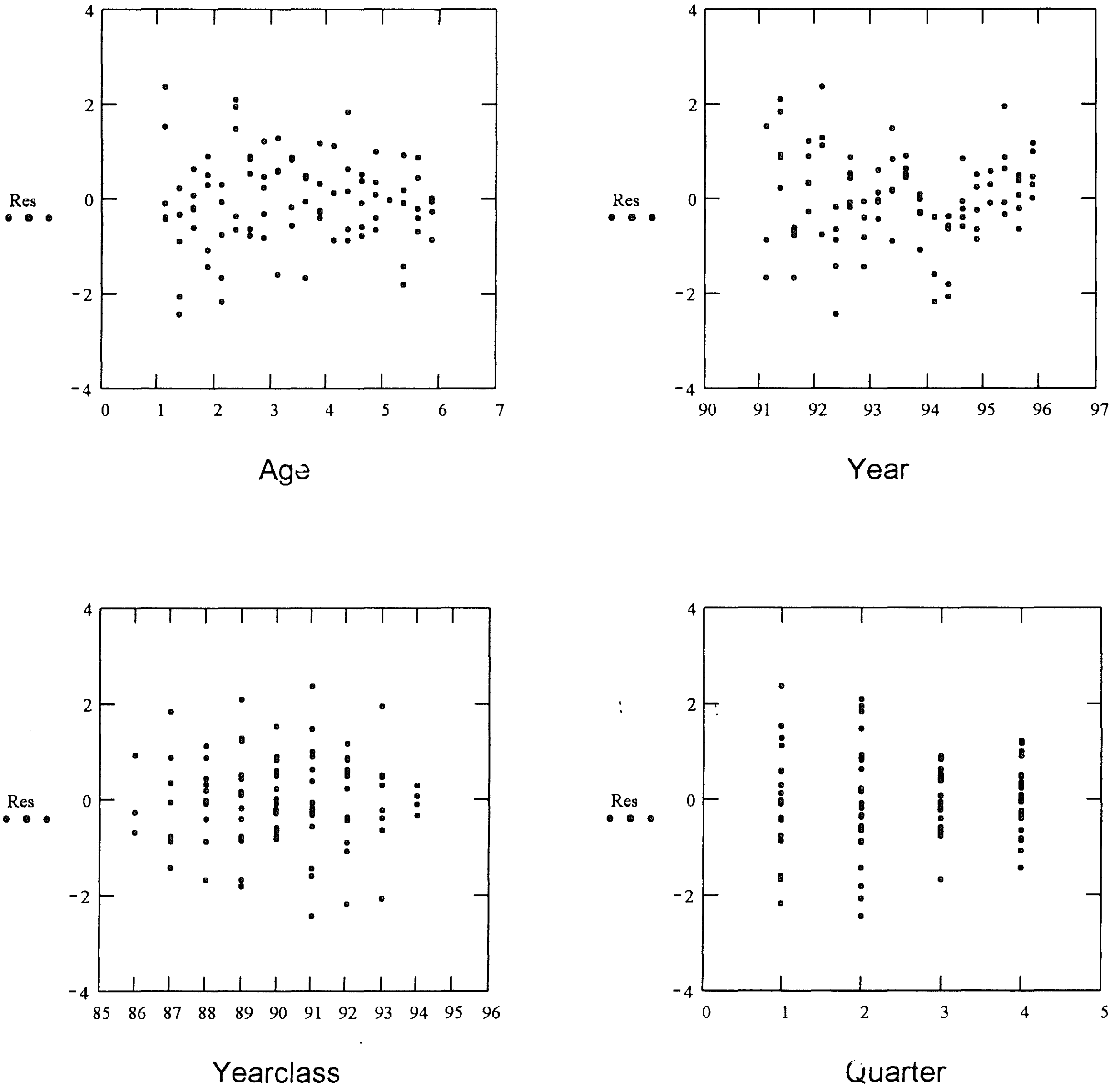
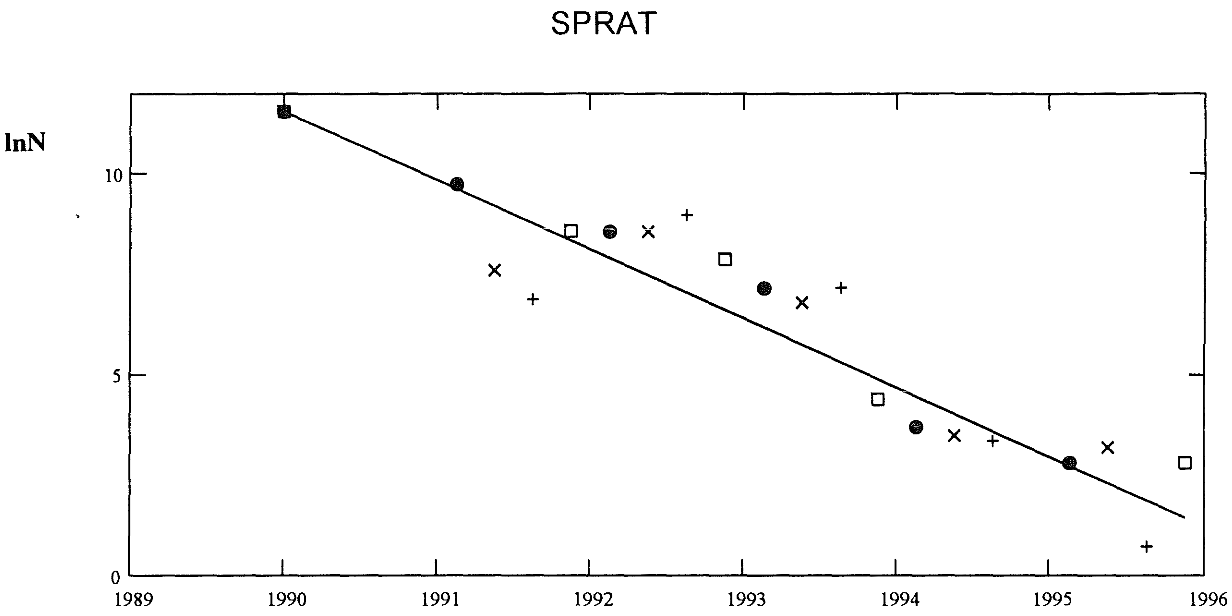
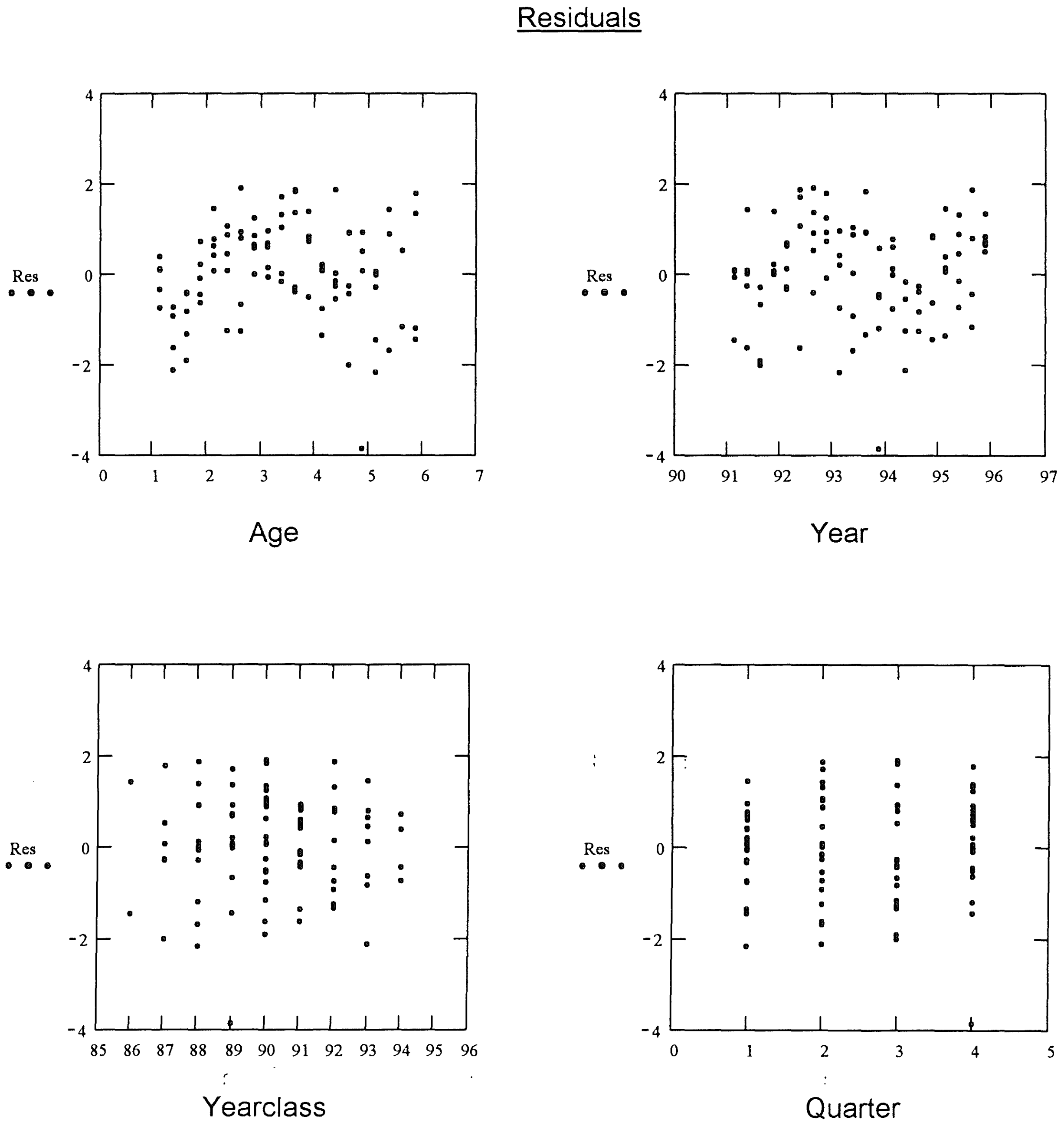


Figure 3.2.3.7


SPRAT


Residuals

4 IBTS AND ECOSYSTEM STUDIES

4.1 Background

Non-tropical shelf seas, such as the North Sea, are among the most heavily fished waters in the world, making up only 5% of the sea surface yet contributing 35% of the world's annual catch (Pauly and Christensen 1995). Approximately 36% of annual primary production is required to sustain such removals (Pauly and Christensen 1995), a level likely to cause substantial changes in the ecosystem (Beddington 1995). Comparing six continental shelf seas, Bax (1991) concluded that mortality due to fishing was highest in the North Sea. Annual landings from the North Sea currently stand at around 2.5 million tonnes (Daan *et al.* 1990; ICES 1995). Given a total fish biomass of 10 million tonnes (Yang 1982; Daan *et al.* 1990; Sparholt 1990), and taking into account the additional fish caught and discarded, this represents an annual removal of at least 25% of the fish standing stock biomass in the North Sea each year. Studies such as these suggest that the North Sea is one of the most heavily fished regions on earth, and this has given rise to considerable concern regarding the impact of fishing on the ecosystem (ICES 1995; Jennings and Kaiser 1998).

Since the United Nations Conference on Environment and Development, which included the Convention on Biological Diversity, convened in Rio de Janeiro in 1992, governments have been fully aware of the concept of biodiversity, and of their requirement to exploit natural resources in a manner which conserves biodiversity (British Ecological Society 1996). Not surprisingly therefore the question as to whether current patterns of fishing exploitation in the North Sea are having detrimental effects on biodiversity has been raised (ICES 1995; 1998). A further, and not totally unrelated concern, focuses on changes in species composition. Two issues are raised here. Firstly, that fishing may be having an impact on rare species, perhaps driving some towards possible extinction in the North Sea, particularly since some of these were more common in the past (e.g., North Sea rays, Walker and Heessen 1996), which, of course, would have direct consequences with respect to biodiversity. Secondly, there is the possibility that through fishing we might cause the ecosystem to "flip" from one stable state, dominated by one suite of species, to an alternative stable state dominated by different species (Beddington 1984; Pimm and Hymen 1987; Murawski and Idoine 1992; Fogarty and Murawski 1998). Not only is this of interest from an ecological perspective, but if the alternative stable state is dominated by species of reduced commercial value, it also becomes an economic issue (Sherman 1991). Additional ecological concerns focus on the possible disruption of ecosystem tropho-dynamics, both up and down the food web. Thus the removal of the fish prey of piscivorous predators, such as seabirds, has long been a point of debate (Wright *et al.* 1996), while, more recently, the possible effects of any reduction in the abundance of fish predators on their benthic prey populations has been examined (ICES 1998; Greenstreet *et al.* in review). In any predator-prey/food web type study, assessment of both predator and prey population biomass is an essential element (e.g., Greenstreet *et al.* 1997).

In this section we evaluate the usefulness of the IBTS in ecosystem studies, particularly those seeking to determine the ecological impact of fishing. We concentrate primarily on studies which use the IBTS to investigates changes in biodiversity, changes in species composition and changes in species population biomass. Because most of these types of study require relatively long time series of data, we have not restricted our considerations to just the 1991 - 1996 period of the quarterly IBTS, but have included studies which have utilised the groundfish survey data series on which the quarterly surveys were super-imposed. We briefly review a few case studies, highlight the advantages and drawbacks of the IBTS data in each situation and we discuss ways in which the data set can be improved, for example through changes in survey design or the way in which the samples are handled on the vessels. We also consider whether the value of the IBTS can be increased through the collection of additional information. Finally, we examine the necessity of maintaining a survey in each quarter and the consequences of reducing the number of surveys carried out in each year.

4.2 Biodiversity

The Rio de Janeiro Convention on Biological Diversity defined "biological diversity" as "*the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems*". Three levels of diversity are thus recognised; between and within ecosystems and habitats, diversity of species, and genetic variation within individual species (British Ecological Society 1996). Because the term encompasses such a broad concept, it is immediately apparent that we cannot use the IBTS to monitor changes in biodiversity *per se*. However, since the surveys collect data on species abundance, they can be used to determine temporal and spatial trends in the species diversity aspect of biodiversity. For example, Scottish 3rd quarter IBTS data have been used to examine long-term trends in species diversity (Figure 4.2.1) in four discrete regions (Figure 4.2.2) in the northwestern North Sea (e.g., Greenstreet and Hall 1996; Greenstreet *et al.* in press a). These areas were defined on a broad hydrographic basis, but they also differed in their fisheries exploitation patterns (Figure 4.2.3; Greenstreet *et al.* in press b; Jennings *et al.* in press).

The fact that only one country's data was used in this analysis introduces one of the difficulties in using the IBTS for such purposes. Although the length of the time series was the principal reason for choosing the Scottish 3rd quarter data set, the degree of heterogeneity in the more recent IBTS data was the reason for not including additional data gathered by the different countries involved in the survey towards the end of the time series. The use of four different Scottish research vessels varying in power during the 71 year period analysed resulted in between vessel variation in tow speed, however, fishing gear and trawl duration, the 48' Aberdeen trawl towed for one hour, were kept constant throughout. The 1st quarter IBTS (formally the International Young Fish Survey, IYFS) initially used several different herring trawls and tow duration was one hour. During the early 1970s haul duration was reduced to half an hour. In 1976 the GOV trawl was introduced and, by 1978, most countries had converted to this gear. In 1991 the quarterly IBTS was initiated. All countries used the GOV trawl and fished for half an hour with the exception of England and Scotland in the 3rd quarter. Both countries had already invested considerable effort in establishing a long time-series data sets at this time of year and were reluctant to change their methods. Both countries continued to trawl for one hour and to use their traditional gears. In 1992 England reduced their tow duration to half an hour and switching gear from the Granton trawl, similar to the Scottish 48' Aberdeen trawl, to the GOV (Heessen *et al.* 1997). Scotland, however, have continued to use the Aberdeen trawl and to fish for one hour to the present day. In 1998 though, coinciding with the replacement of FRV Scotia II by Scotia III, Scotland will use the GOV and trawl for half an hour. In addition to the variation in trawl duration and gear used incorporated in building up the complete IBTS data set, between five and seven different vessels have been used in each quarter's survey.

Species diversity incorporates two distinct components; the actual number of species present in an assemblage (species richness) and the distribution of individuals between these species (species evenness). Both components are sensitive to variation in sampling effort. To illustrate this point we have used Scottish 3rd quarter data collected in North Sea Task Force area 2b (Figure 4.2.4) in 1989 to estimate species richness and Hill's (1973) N1, an index which takes account of species evenness. Both species richness and Hill's N1 increase asymptotically with increasing aggregation of one hour hauls in the sample (Figure 4.2.5). The asymptote is reached at very much lower levels of sampling effort in Hill's N1 than for species richness. This highlights the problems involved in analysing data for trends in species diversity when the data set includes samples collected over varying swept area. Trawl duration, trawl speed and different trawls of varying width, all affect swept area and so affect these species diversity metrics. In an ideal world all samples should be collected over the same swept area.

Standardisation of sampling procedures is fundamental to almost any scientific programme and it has long been a goal in the management of the IBTS. From 1998, as mentioned above, the sampling procedures should be as standardised as possible. Out of necessity different vessels will continue to be involved, but they will all tow the same gear, at the same speed, and for the same length of time. Despite this level of standardisation, systematic variation in swept area will still be present in the data. Like many otter trawls, the width of the GOV trawl is greater in deeper water than in shallow. In water of 40 m in depth, the distance between the otter doors is approximately 70 m, at 120 m depth this distance exceeds 100 m. Such systematic variation should have little impact on our interpretation of temporal trends in species diversity, but it should certainly be taken into account in any analysis of spatial trends.

For practical reasons a trawl duration of half an hour was the agreed standard. While this may be adequate with respect to the assessment of commercial species for management purposes, settling on a half hour trawl duration has important implications with respect to the detection of trends in species diversity. Figure 4.2.5 suggests that a sample obtained over 5–6 hours of fishing is required to achieve a reliable estimate for Hill's N1. Considering the Scottish 3rd quarter one hour trawls for example, this means that, since normally only one haul per statistical rectangle was made in each survey, data for at least five ICES statistical rectangles in any one year need to be aggregated to assess trends over time, while at least five years of data in any one rectangle need to be aggregated to assess trends over space. Leaving aside the effects of any gear change, reducing trawl duration to half an hour means that temporal and spatial resolution will be greatly reduced; aggregation of at least ten hauls will be required. Where species richness measures are involved, Figure 4.2.5 would suggest that this problem is even worse. Unfortunately, one of the consequences of this standardisation process is that one of the longest time series of data available for species diversity analyses, the Scottish 3rd quarter data set, will effectively stop at 1997.

While correction factors might be considered in an effort to circumvent vessel, gear and tow duration variation when estimating the abundance of commercial species, often among the most abundant species in the IBTS data set, there is relatively little scope for such an approach with respect to species diversity studies. Both components of species diversity, but especially species richness, are affected by factors which affect the probability of sampling rare species. Thus, for example, reducing tow duration from one hour to thirty minutes effectively halves the chances of catching rare species and zero abundance counts cannot be satisfactorily raised. For these reasons, the sampling and sorting procedures on the various vessels involved in the IBTS also need to be standardised. In particular, how large catches, often dominated by a single exceptionally numerous species, are handled. The entire catch needs to be checked so that every rare fish caught in the standard duration tow is detected and counted. Sub-sampling and, for example, sorting only one third of the total catch would reduce the chances of detecting the rarest species. This highlights an advantage of half hour tows over one hour tows. In general the total catches will be smaller, greatly easing the task of checking through the entire catch for rare species, presumably making total species count data per tow of fixed duration more reliable.

The catchability of different species in a particular gear, such as the GOV, varies considerably. Less than 10% of whiting, haddock and Norway pout in the path of a GOV trawl escape beneath the ground gear, but 50% to 85% of the various flatfish species may escape this way (Dahm and Weinbeck 1996; Working Paper 3). These species catchabilities also vary considerably between gears. Beam trawls would have much higher catchability for flatfish, and lower for the roundfish species. Thus the species diversity indices calculated on IBTS data are highly specific to the gear used; it is the species diversity of the GOV (or 48' Aberdeen trawl) trawled groundfish species assemblage. While this is a point which should always be considered when interpreting the results of any analysis, it in no way invalidates the approach. The same is true of any method used to sample multi-species assemblages, be it a groundfish survey using different trawls, a census of woodland birds using binoculars or a tape recorder, or a census of insects using light or baited traps.

So far we have only considered fish species diversity, however, the groundfish assemblage is just one component of the North Sea ecosystem. The IBTS offers an opportunity to sample other guilds across the whole North Sea. The epi-benthic bycatch is sorted and species abundance data are recorded by some countries, but it is generally acknowledged that this does not provide information of any great value with respect to monitoring epi-benthic biodiversity. Too many epi-benthic species known to be present in an area in reasonable numbers are not adequately sampled by the GOV trawl (Anon. 1997), which is after all, designed to catch fish. A European Commission project was initiated in 1996 to examine the potential for using the IBTS to sample epi-benthos with a view to monitoring changes in epi-benthic species diversity. A 2 m beam trawl has been developed which collects adequate epi-benthos samples and requires only 20 to 30 minutes to deploy and retrieve. The project has concluded that complete coverage of the North Sea, with one epi-benthic sample collected from each ICES statistical rectangle in each year, is achievable without compromising the current IBTS survey design (Anon 1998). This raises the question as to whether other North Sea guilds, such as seabirds, marine mammals and zooplankton might not also be routinely monitored using the IBTS.

The group considered the question as to whether four quarterly surveys provided additional information which was useful over and above that provided by two surveys in quarters 1 and 3. Species rarefaction curves were plotted for two NSTF areas, 2b and 4, in two years, 1991 and 1995, for all four quarters. Curves of higher elevation indicate higher species richness. Between year differences in each area for each quarter (Figure 4.2.6), between area differences in each year for each quarter (Figure 4.2.7) and between quarter differences for each year and area (Figure 4.2.8) were all compared. Exponent and intercept values are given in Table 4.2.1. No obvious consistent patterns could be discerned in any of these comparisons. There was however, a suggestion that between quarter differences in each year and area (Figure 4.2.8) were greater than any between year (Figure 4.2.6) or between area (Figure 4.2.7) differences. There is little to suggest that quarterly surveys would help to distinguish spatial or annual changes in species diversity, so unless there was specific reason to be interested in between quarter variation in species diversity, as a response to seasonal changes in production for example, then there seems little requirement to maintain four quarterly surveys for species diversity studies. Indeed the level of between quarter variation suggests that aggregation of the data across quarters may be unwise as it may actually reduce one's ability to detect small between area or between year effects, although, because of the greater number of hauls taken in each year, total annual species counts may be higher.

4.3 Species Composition

Recently several studies have been published which use the IBTS data to determine trends in the abundance of species not normally covered in the assessments (Corten and van de Kamp 1996; Heessen 1996; Heessen and Daan 1996; Walker and Heessen 1996). Although some commercially exploited species have been included in these analyses, these studies have tended to be principally concerned with trends in the abundance of non-target species. Whilst in many cases illustrating trends, these studies have generally been unable to attribute cause. In most instances they have tended to suggest that environmental variation is as likely to have caused the observed changes in abundance, as any change in fishing pressure. However, in the case of skates and rays, with the exception of the starry ray, most species have shown marked reductions in their population size, particularly in the southern North Sea, and fishing is generally assumed to have been the cause (Walker and Heessen 1996). These studies certainly do not indicate the sort of stable state flip suggested on the Georges Bank in the northwestern Atlantic where the heavily exploited gadoid species have largely been replaced by elasmobranch species (Murawski and Idoine 1992; Fogarty and Murawski 1998).

These studies have attempted to examine data over as long a time period as possible, consequently they have used the IBTS 1st quarter data which, originally in the guise of the IYFS, has run since 1970. As indicated above, this would have minimised the use of different trawls since the GOV trawl has been used by all vessels involved in the IYFS since

1978. However, different gears were used at the start of the survey. Given the variable catchability of each species in different gears discussed above, this does not help interpretation of the recorded changes in abundance.

For this sort of study, the use of simple correction factors to control for the effect of differences in tow speed or tow duration on catch rates may be appropriate. However, correction factors are likely to be most useful in the case of species which are relatively abundant and consequently occur in reasonable numbers in most catches. Since these studies often tend to be primarily concerned with changes in the abundance of rare species, or in documenting the increasing rarity of certain species (Walker & Heessen 1996), the use of correction factors may not be the solution. As with our earlier discussion regarding biodiversity, varying survey methodological protocols in a way which reduces the probability of sampling rare species is likely to reduce the effectiveness of the IBTS as a means of monitoring the abundance of rare species.

The purpose of the IBTS is to collect commercial species abundance data. The current constraints on the survey make it difficult to improve it specifically to enhance its ability to monitor trends in species composition in a broader ecological context, not withstanding earlier discussions. It should be pointed out, however, that some very abundant species, such as sandeels are rarely caught in the GOV trawl, thus their relative abundance, as indicated by the IBTS, is seriously underestimated compared to their relative abundance in the sea (Knijn *et al.* 1993). The same is true, albeit to a lesser degree, for most of the pelagic species, such as herring, sprats, mackerel and scad (Yang 1982; Sparholt 1990). The need for four quarterly surveys is also not clear, surveys in quarters 1 and 3 would probably provide sufficient information to monitor changes in species composition. However, some migratory species, such as mackerel and scad may not be surveyed when they are at their annual peak in abundance in the North Sea.

4.4 Biomass

In this section we are concerned primarily in the use of IBTS data to directly estimate fish species biomass in a given localised area, rather than the use of catch rates as an abundance index to calibrate catch at age analyses used to estimate the biomass of only commercial species over the whole North Sea. We may, for example, need to estimate the biomass of fish predators competing with seabirds for a prey species, such as sandeels, in a well defined area, such as the Moray Firth or "Wee Bankie". Catch rate data are not sufficient for resource partitioning studies of this sort, actual density estimates are required. To estimate fish densities from trawl catch data, estimates of the area swept by the gear are needed. Reliable catchability estimates for each species of interest in the GOV trawl are also necessary. We need to know the proportion of the individuals of relevant species in the swept path (doors or wing) which end up caught in the net. Achieving this latter objective is likely to be major undertaking.

The use of equipment to measure gear geometry is now routinely deployed on the GOV by most vessels involved in the IBTS. These data are reported to ICES, but have not yet been used in routine analyses. Two swept area measures are usually available, the area swept by the net wings and the area swept by the doors. The choice of swept area measure will have a considerable effect on the resulting density estimates. It is generally assumed that the sediment plume raised by the doors and sweeps directs fish into the path of the net. If so, then the area swept by the doors would give the more accurate density estimates. Estimates obtained using the wing swept area would be too high. If this is not the case however, then using the area swept by the doors, which may be up to five times larger than the area swept by the wings, will give estimates which are too low.

To demonstrate the use of swept areas to estimate fish biomass, the biomass of fish in each North Sea roundfish region (Figure 4.4.1) was estimated. Table 4.4.1 presents these data based on both the area swept between the otter doors and the area swept between the trawl wings. Dividing median total catch weights in each area by these swept area estimates provided two density estimates, which when raised by the total area of each roundfish region, provided estimates of biomass. The quarterly trends in each roundfish region are also illustrated in Figure 4.4.2. Summing across all roundfish regions provided total North Sea demersal fish biomass estimates (Table 4.4.1; Figure 4.4.3). It was immediately apparent that the estimate obtained using the area swept between the otter doors was extremely low. Estimates for total North Sea fish biomass used by Greenstreet *et al.* (1997) ranged from 8.6 million tonnes in quarter 1 to 13 million tonnes in quarter 4. However, catch rates of pelagic fish in the GOV are much lower than, for example, gadoid catch rates (Yang 1982; Sparholt 1990) and we have already mentioned that 15 to 50% of flatfish species escape beneath the ground gear. If we assume that GOV catches virtually none of the pelagic planktivore and pelagic piscivore groups, only 30% of the demersal benthivore group and all of the demersal piscivore group considered by Greenstreet *et al.* (1997), then the expected trawlable biomass estimates are 2.8 million tonnes in quarter 1, 3.0 million tonnes in quarter 2, 3.2 million tonnes in quarter 3 and 3.3 million tonnes in quarter 4. The seasonal trend in GOV trawlable fish biomass (Figure 4.4.3) shows a similar trend to that indicated by these Figures, although the actual values are lower by a factor of approximately 2. Given all the potentially confounding factors present, this crude initial analysis suggests that wing-spread measures may provide useful information which would enable catch rate data to be converted directly to density estimates. These could then be used to provide local estimates of biomass. Measures of the distance between the otter doors did not appear to be so useful. It is important, however, to attempt such analyses for species which are reasonably well caught by the fishing gear used. Further investigation of the behaviour of fish before trawl gears would greatly help to improve the reliability of such a method.

4.5 Summary

Most ecosystem studies have focused on long-term trends, for example, to examine the effects of fishing on the ecosystem. As such the quarterly surveys carried out between 1991 and 1996 are of relatively little use in this respect. However, the quarter 1 and quarter 3 surveys, which formed the basis on which the quarterly IBTS was developed, extend back over a much longer period. These data sets have been used to document changes in species diversity and species composition. Continuing to collect such data is essential if the effect of future changes in fisheries exploitation patterns are to be assessed. The additional value of having surveys in each quarter over just two surveys in quarters 1 and 3 is unclear. The group could see little to be gained by examining between quarter variation in these parameters, and it would take many years of data collection before the quarter 2 and quarter 4 time series could be used to provide any insight regarding long-term changes. The need for standardisation in the survey protocols for these sorts of analyses was seen as being of paramount importance. The group felt that there was an opportunity for increasing the value of the IBTS by routinely collecting species abundance data on other biota, such as epi-benthos or seabirds, providing that this had little impact of the survey's ability to adequately survey the groundfish assemblage.

Estimates of biomass of the whole North Sea fish biota using groundfish survey data have been made previously. These have raised the catch rate ratios of assessed and non-assessed fish species, within different catchability groups, by the VPA biomass estimates of the assessed species (e.g., Yang 1982; Sparholt 1990). We have demonstrated how the IBTS can be used to directly estimate the biomass of fish in a particular region using estimates of the area swept by different parts of the gear. We are not aware of the IBTS have been used in this way to date. While this technique may have promise, problems do exist in the selection of the correct swept area measure to use and also in determining the proportion of each species present in the swept path which is actually caught. It is also possible that unless biomass estimates in relatively large areas are required, the IBTS may not have sufficient spatial resolution. Surveys in each quarter of the year may be useful since examining season change in biomass in a region could be of scientific interest (e.g., Greenstreet *et al.* 1997).

Table 4.2.1: Slopes and intercepts of species rarefaction curves (Figures 4.2.6 – 4.2.8).

NSTF area	Year	Slope				Intercept			
		Q. 1	Q. 2	Q. 3	Q. 4	Q. 1	Q. 2	Q. 3	Q. 4
2b	1991	0.346	0.282	0.168	0.415	10.290	12.151	19.628	9.371
	1995	0.320	0.286	0.181	0.308	13.032	10.957	15.150	10.751
4	1991	0.384	0.241	0.221	0.251	12.298	13.442	16.617	15.771
	1995	0.286	0.460	0.430	0.357	15.433	6.262	8.695	11.636

Table 4.4.1: Mean trawlable biomass (1000t) per Roundfish Area (RA) and quarter. Calculations were based on **a.** wing spread and **b.** door spread.

a.

RA	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1	585.62	443.38	438.74	783.34
2	150.32	184.40	151.82	223.72
3	156.05	220.82	214.17	463.91
4	98.89	192.13	148.56	179.58
5	12.13	47.23	42.25	45.28
6	135.00	248.01	367.42	346.98
7	33.42	75.43	101.09	136.11
Total North Sea	**1171.43**	**1411.42**	**1464.05**	**2178.92**

b.

RA	Quarter 1	Quarter 2	Quarter 3	Quarter 4
1	106.94	80.97	80.12	143.04
2	27.86	34.17	28.13	41.46
3	30.45	43.09	41.80	90.53
4	18.33	35.61	27.53	33.28
5	3.03	11.81	10.56	11.32
6	35.89	65.94	97.69	92.26
7	8.36	18.86	25.27	34.03
Total North Sea	**230.86**	**290.44**	**311.10**	**445.92**

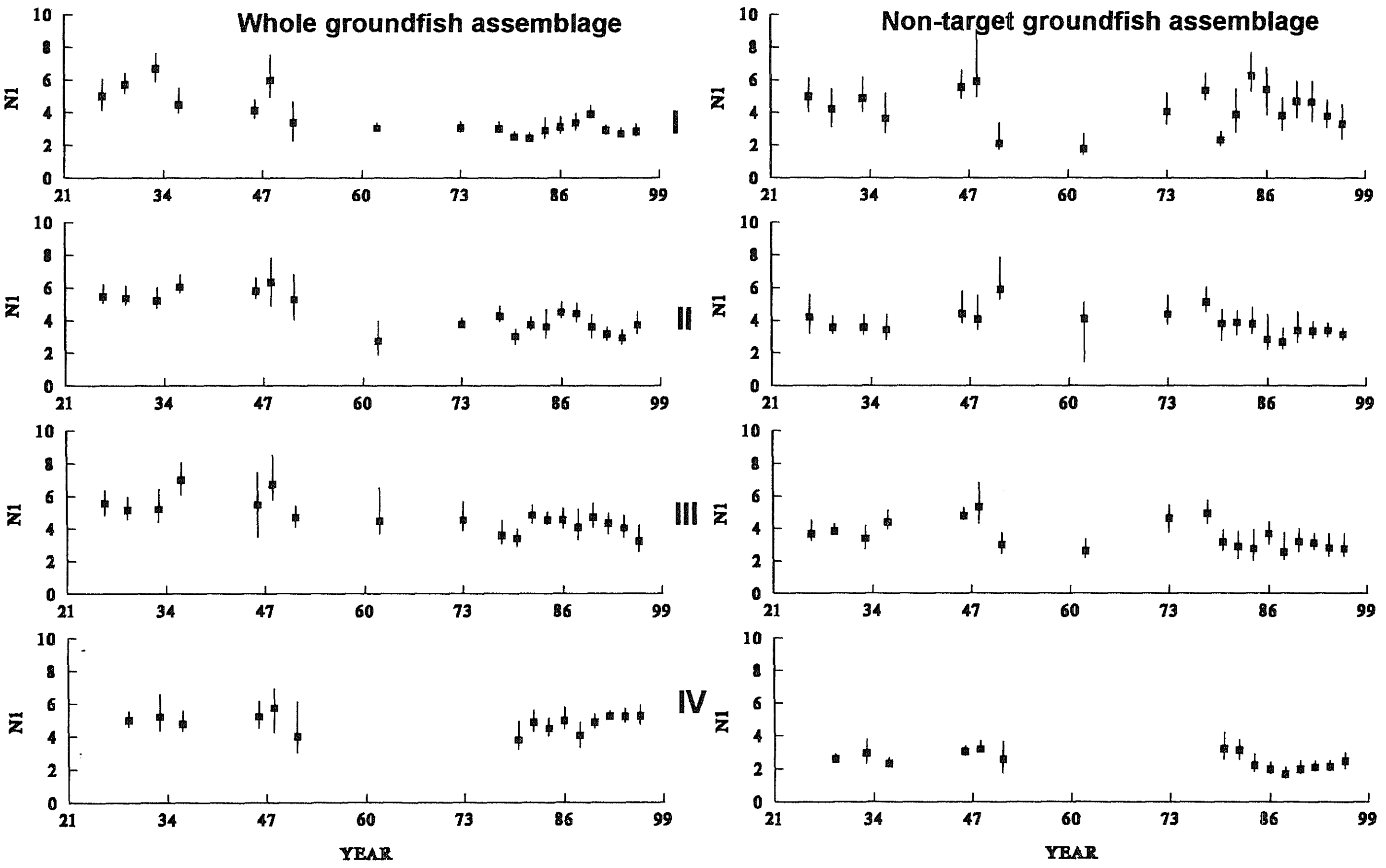
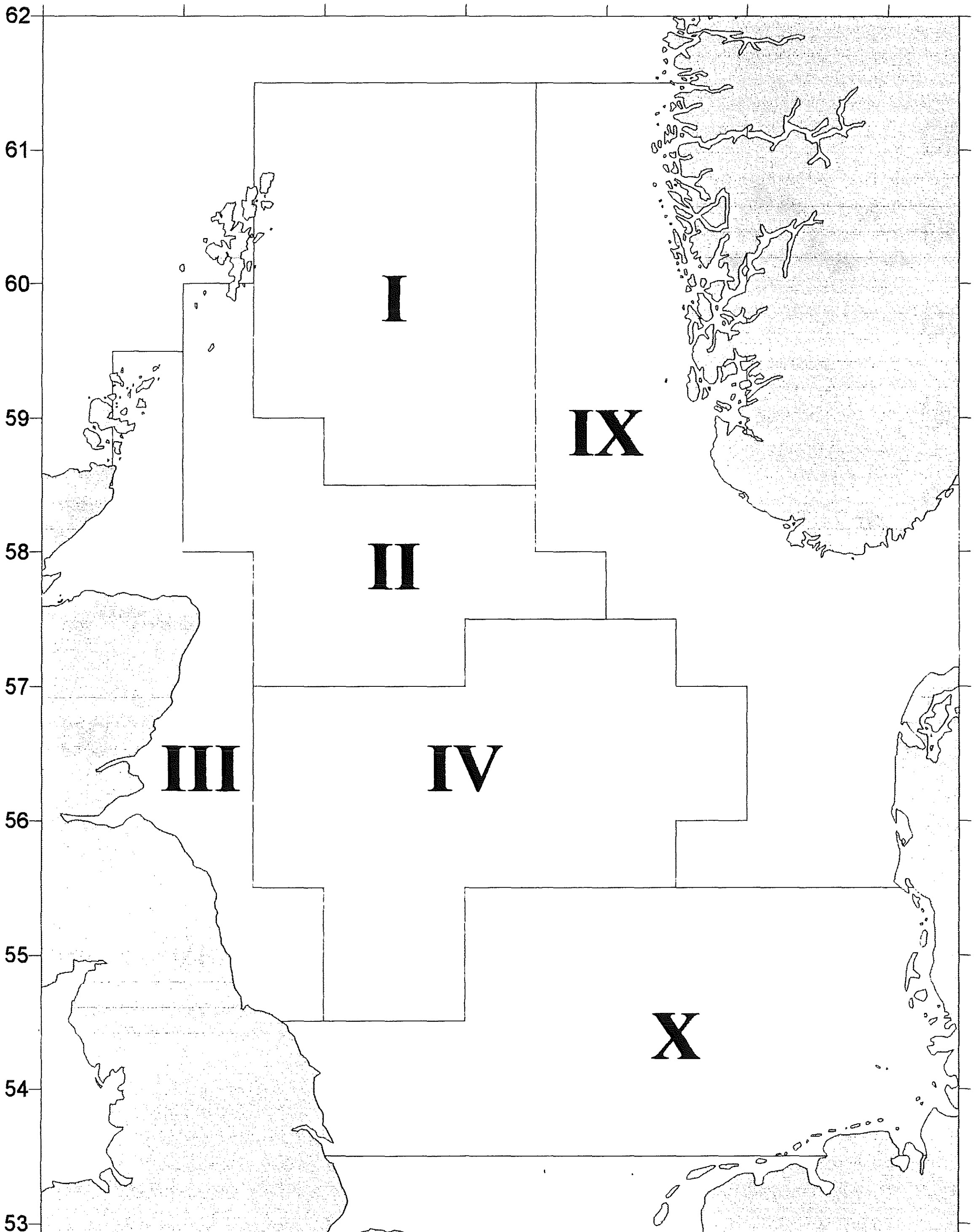


Figure 4.2.1 Trends in Hill's N1 species diversity index in four areas of the North Sea for both the whole groundfish species assemblage and for a sub-set of the assemblage which excludes target species.

Figure 4.2.2. Chart showing area boundaries for North Sea Species diversity study. Analysis was carried for areas I to IV only.



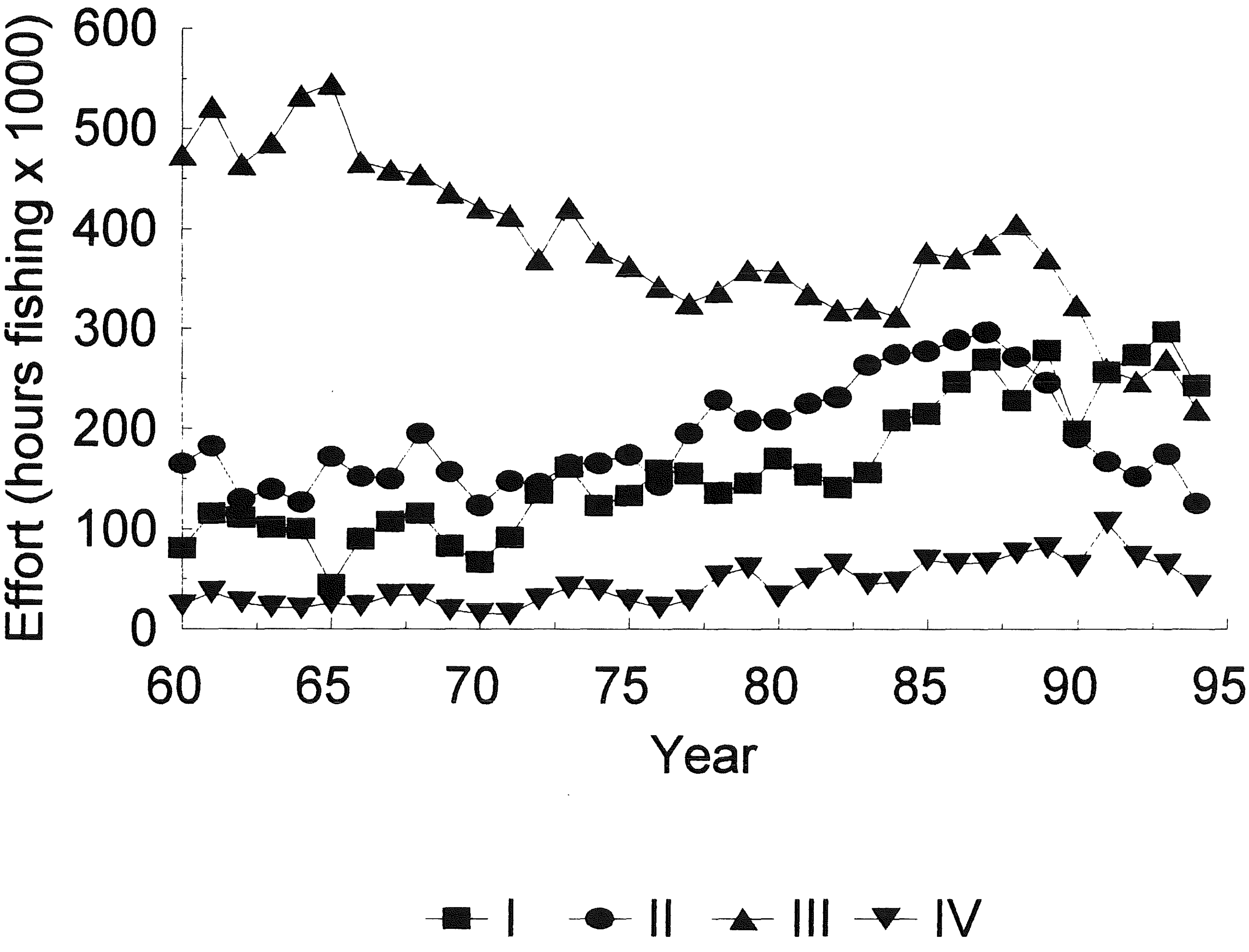


Figure 4.2.3 Trends in fishing effort, measured as hours fishing, in four areas of the North Sea in which species diversity trends were examined.

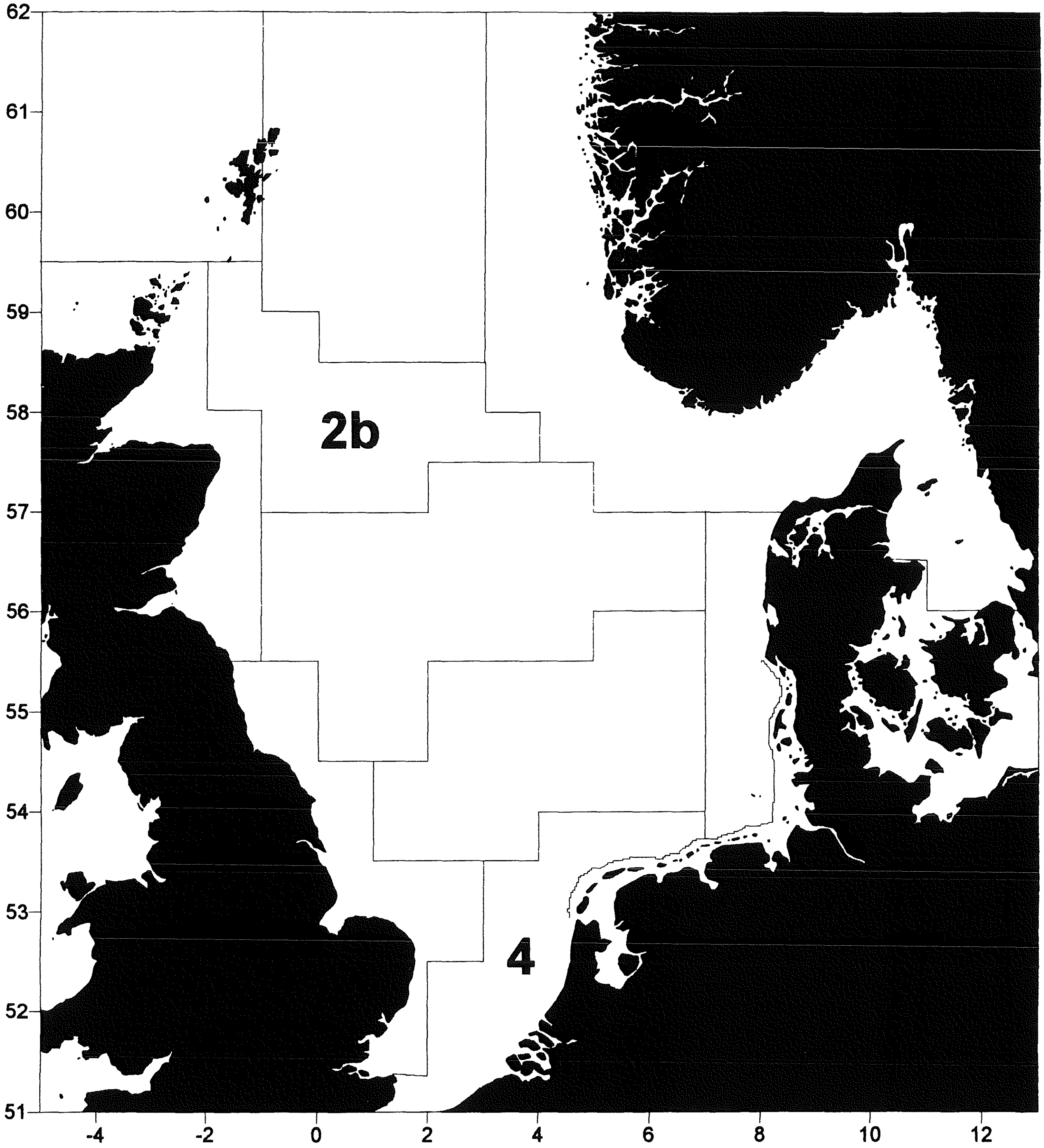
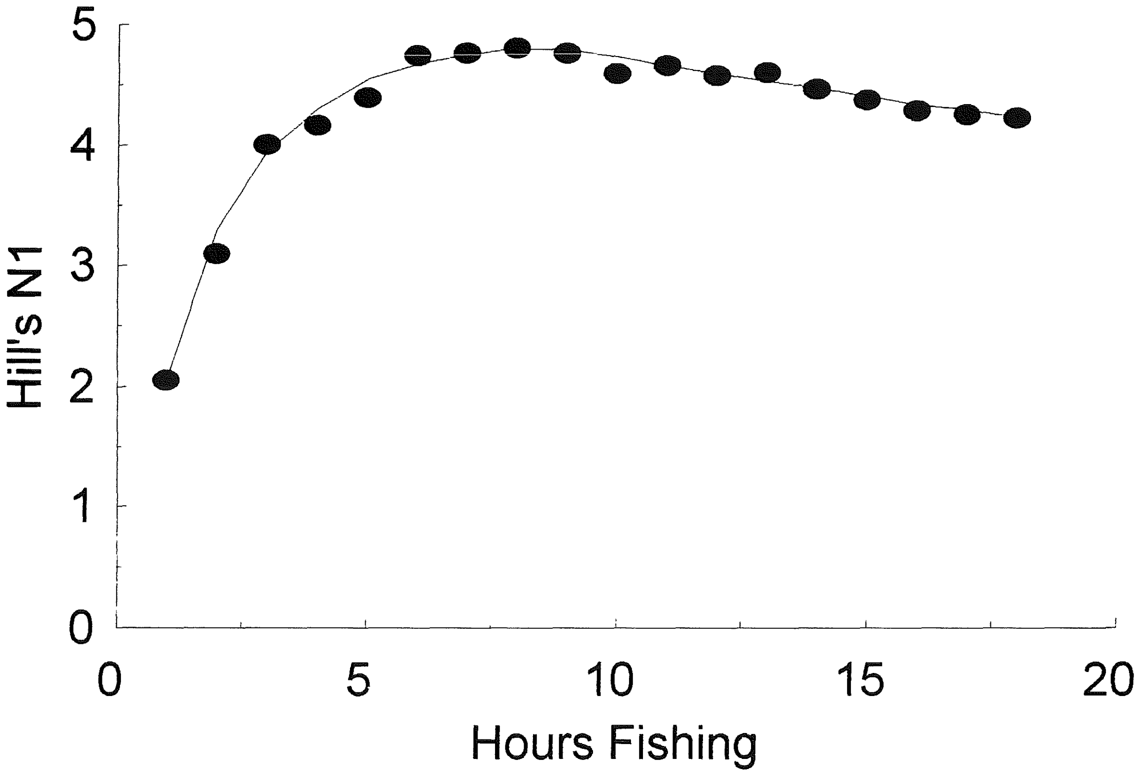
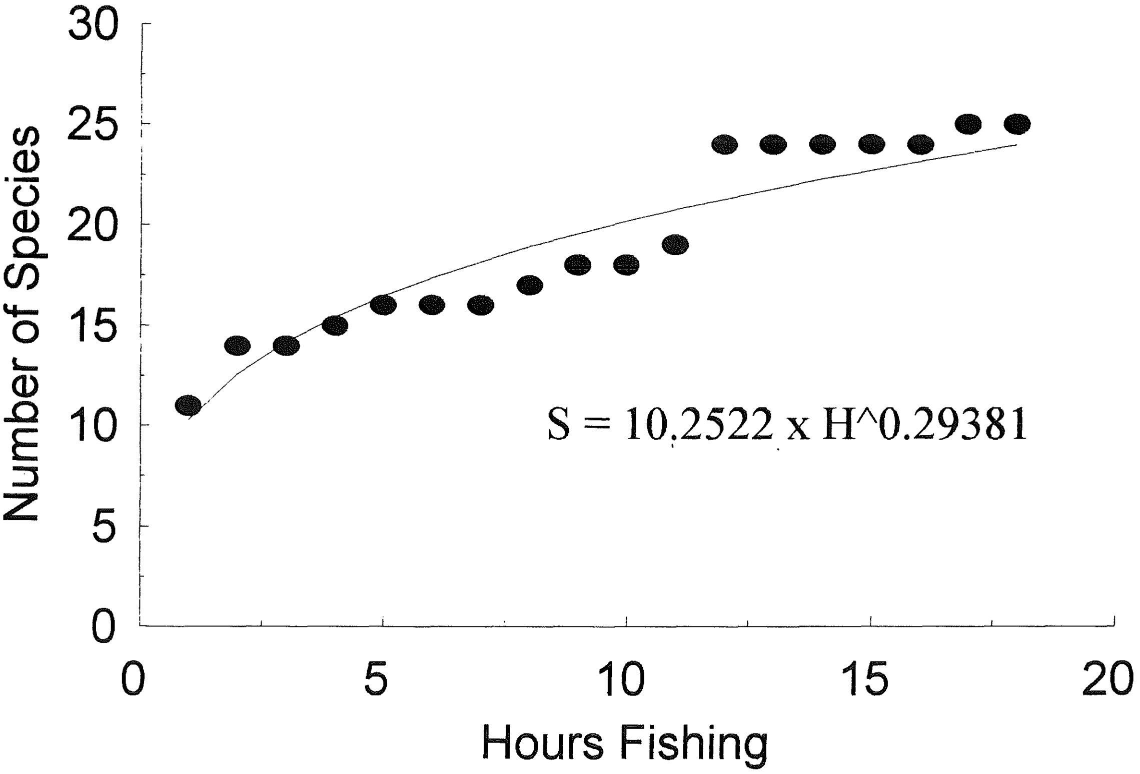


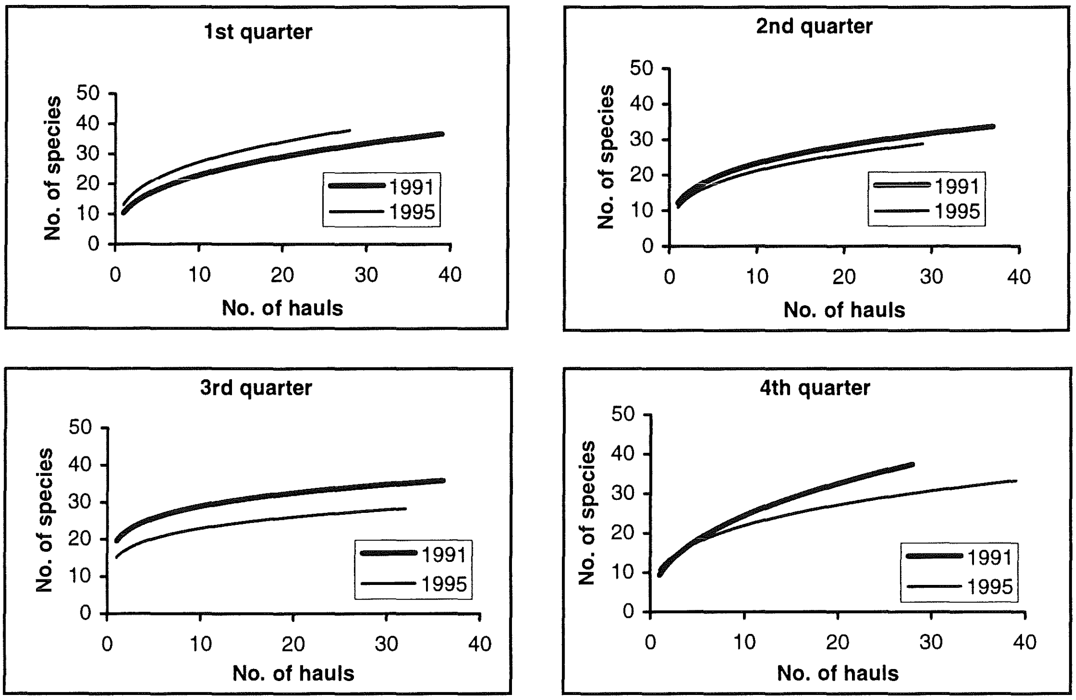
Figure 4.2.4. Sub-area boundaries within the North Sea as defined by the North Sea Task Force. Areas 2b and 4 are indicated. (North Sea Quality Status Report, 1993).

Figure 4.2.5 Rarefaction curves for Hill's N1 and Species Richness for data collected in NSTF area 2b in 1989.





NSTF area 2b



NSTF area 4

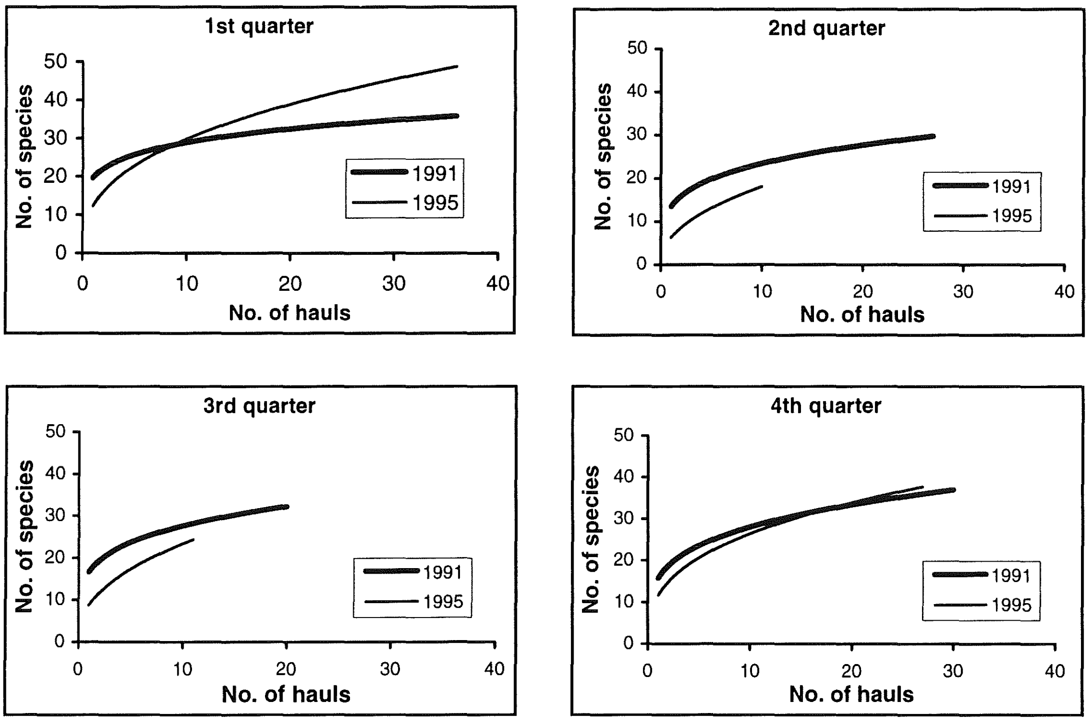
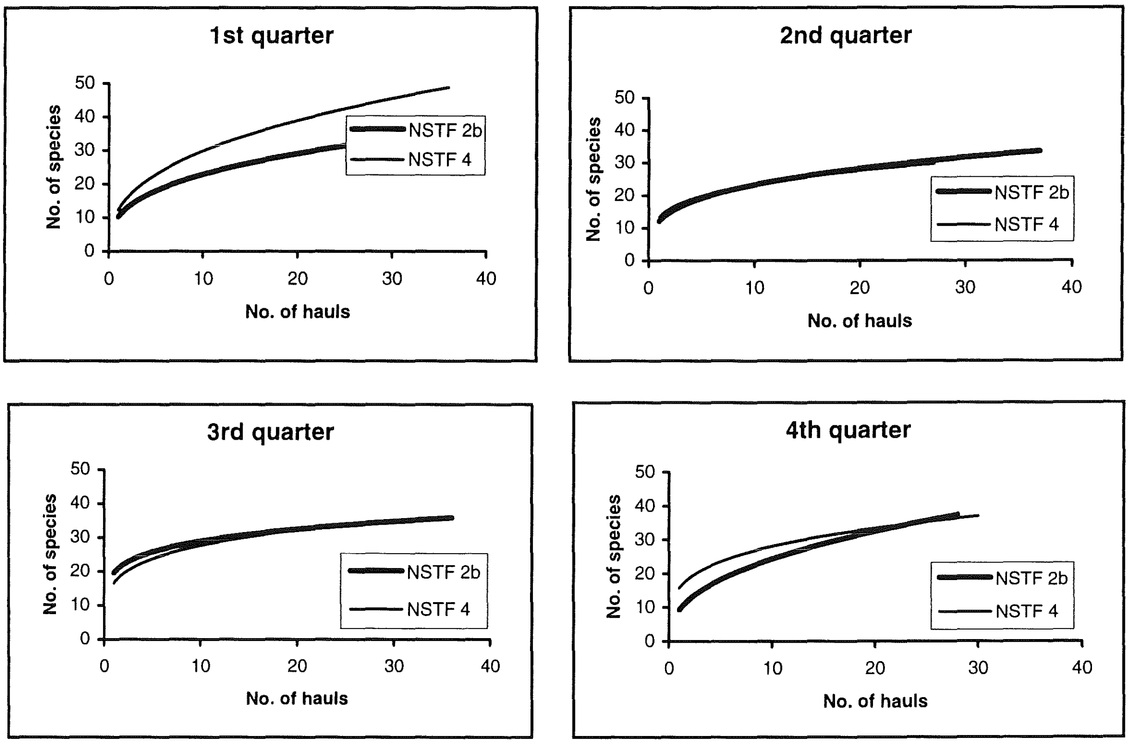


Figure 4.2.6: Species rarefraction curves to demonstrate between-year differences in species richness in each quarter in NSTF areas 2b and 4

1991



1995

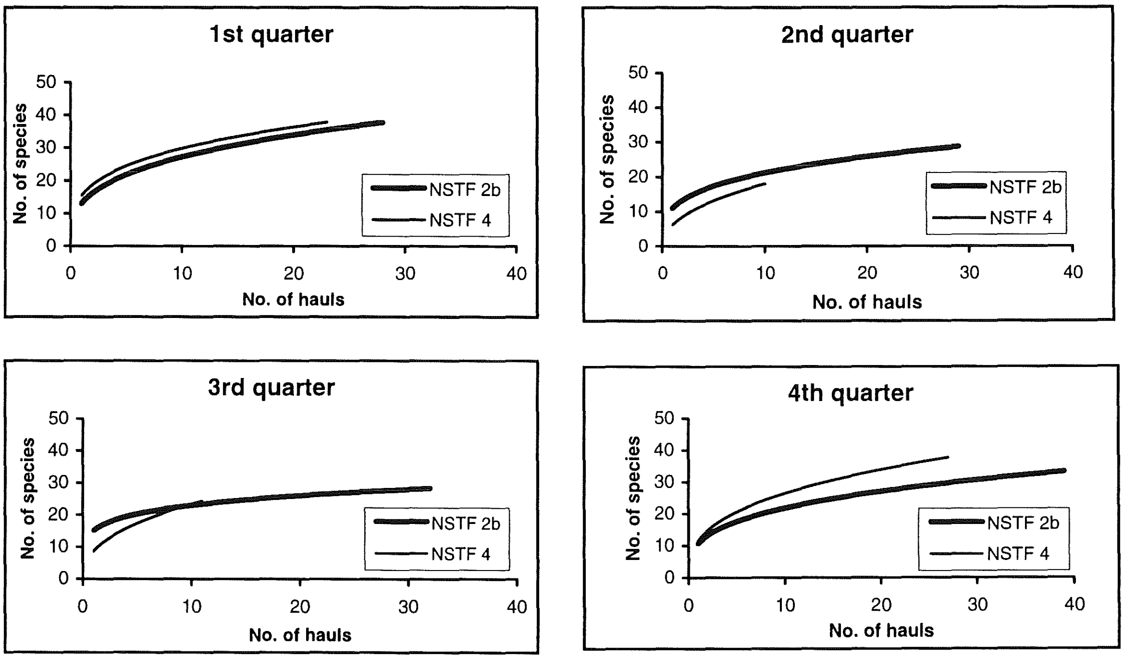
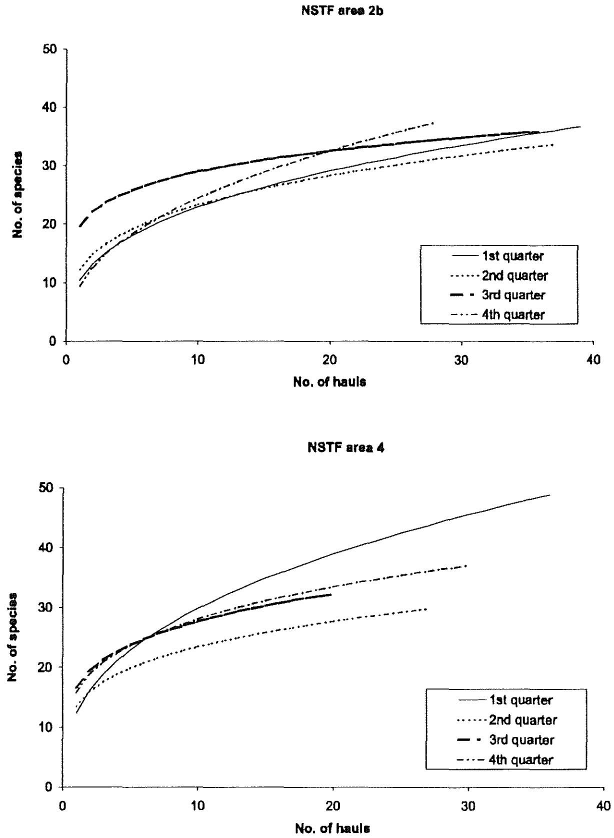


Figure 4.2.7: Species rarefaction curves to demonstrate between-area differences in species richness in each quarter in 1991 and 1995.

1991



1995

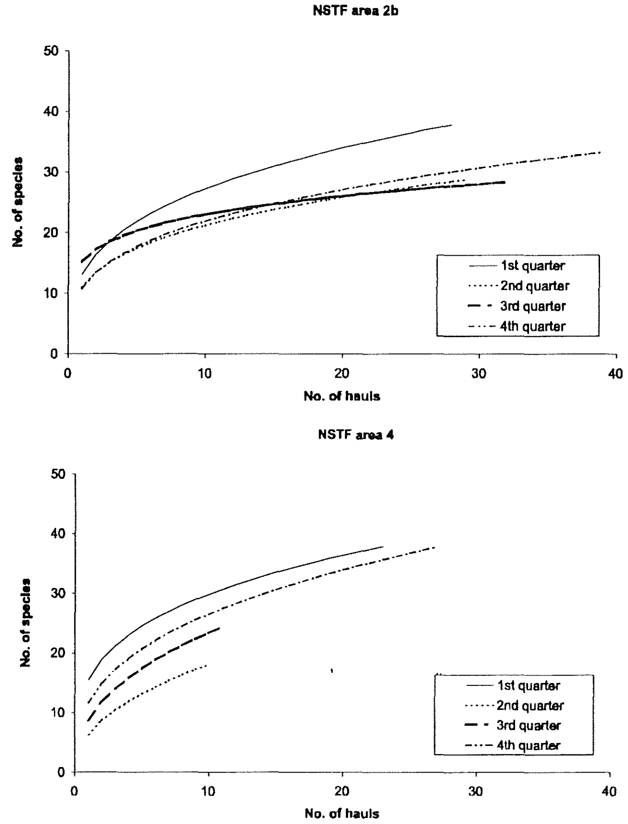


Figure 4.2.8: Species rarefraction curves to demonstrate between-area differences in species richness in each quarter in 1991 and 1995.

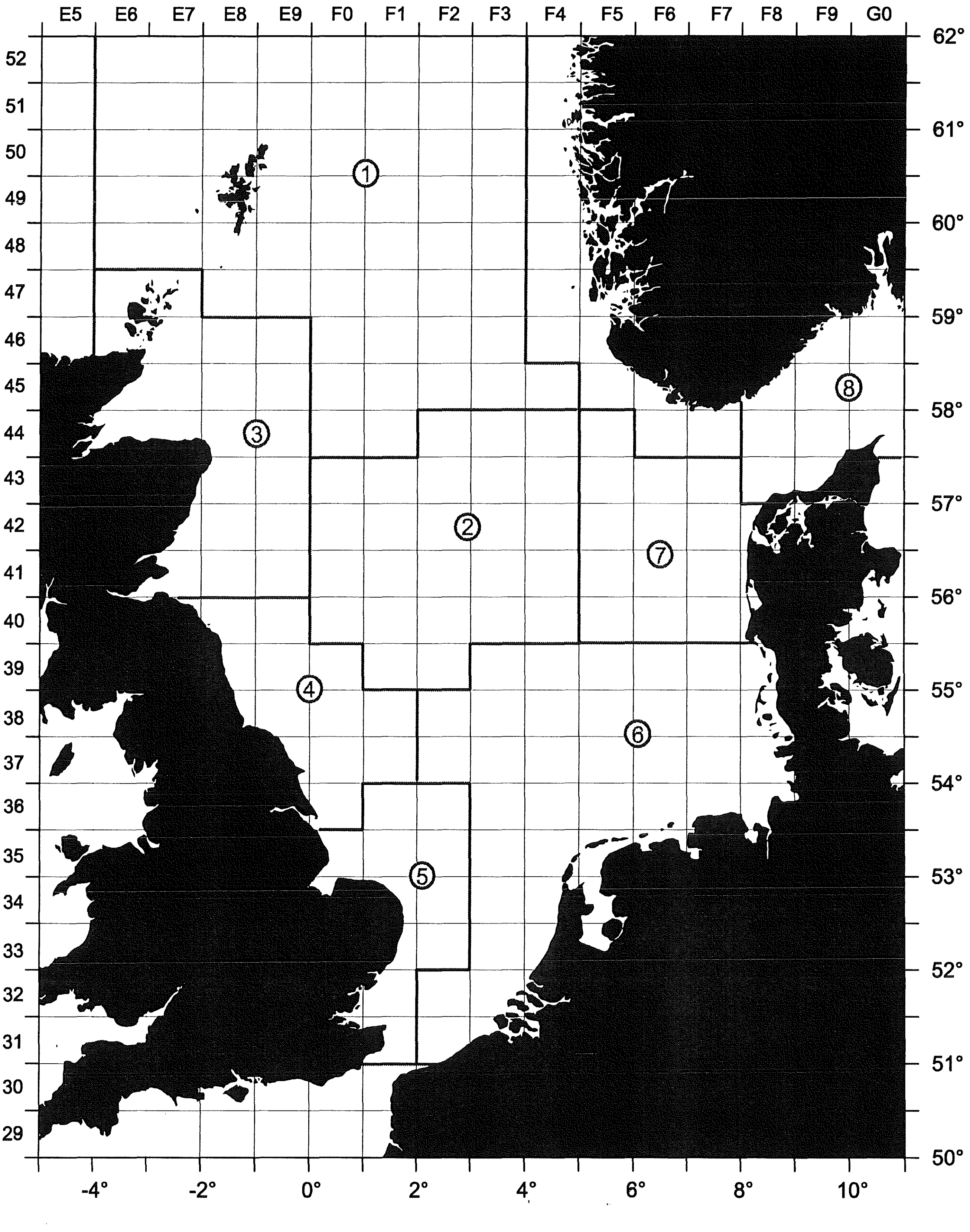


Figure 4.4.1 : ICES roundfish areas in the North Sea.

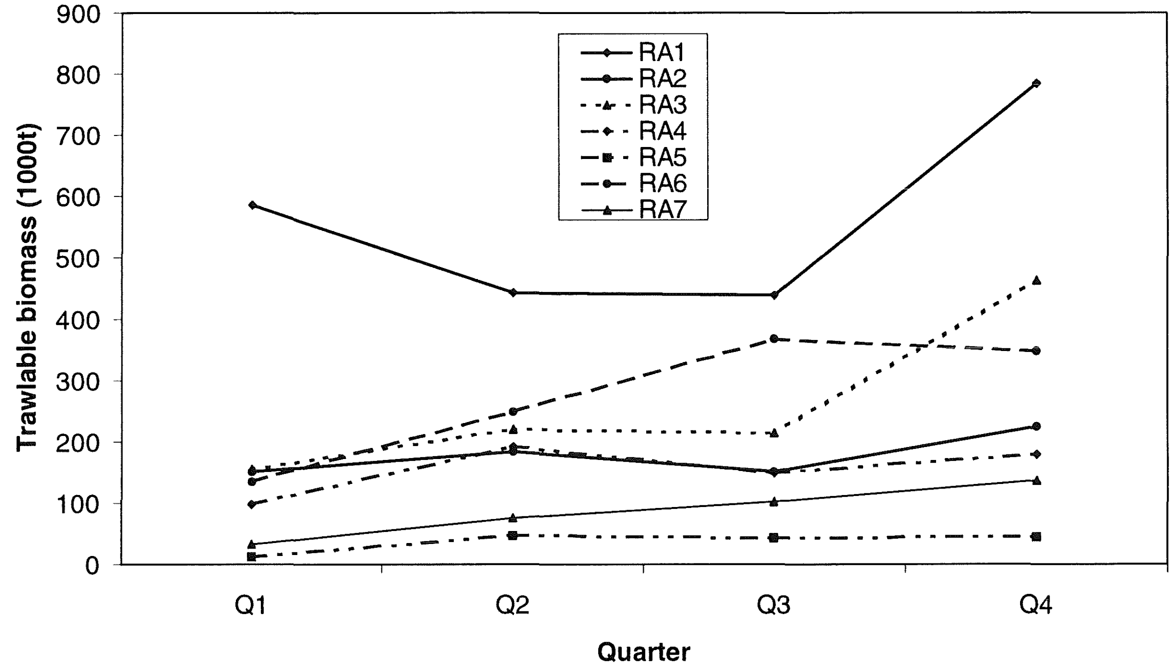


Fig. 4.4.2: Mean trawlable biomass (1000t) per Roundfish Area (RA) and quarter.

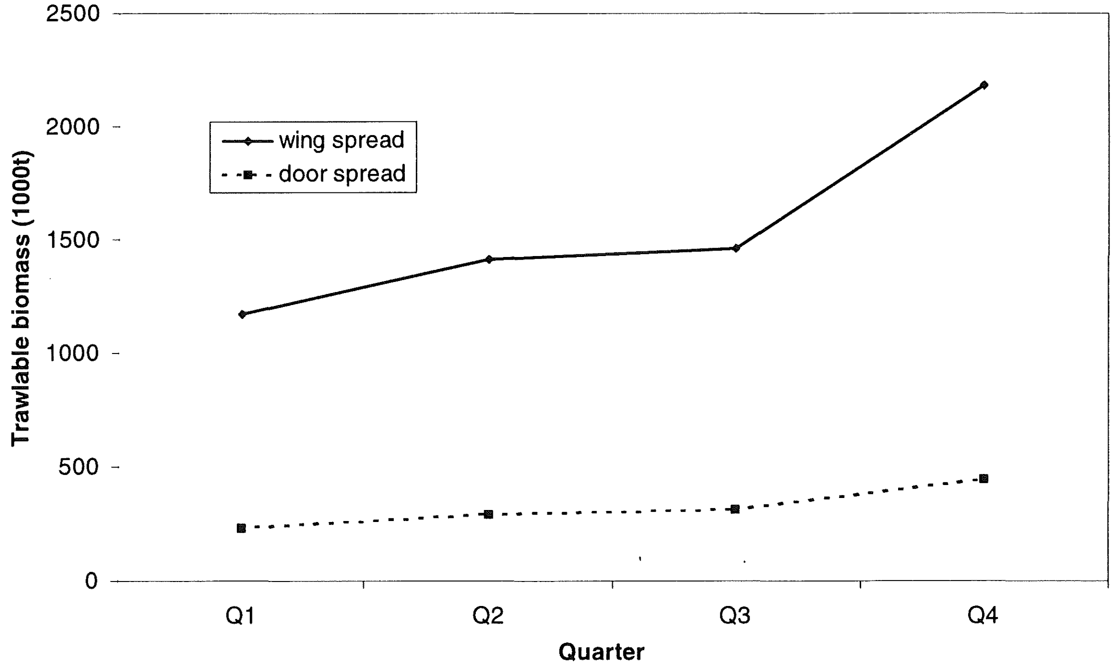


Fig. 4.4.3: Mean total trawlable biomass (1000t) for the North Sea, based on wing spread and door spread.

5 CORRECTION FACTORS FOR CATCHES MADE WITH GEARS OTHER THAN THE GOV TRAWL.

5.1 Background

Intercalibration of two series of ground fish surveys (GFS) results obtained with different ships, gears or trawling techniques may be attempted practically by parallel trawling experiments but experience indicates that many comparative tows in the order of tens (Ehrich 1991) or hundreds (Gunderson 1993; Warren 1996) are necessary for confidence in the estimated intercalibration factors. This is mainly because two vessels can encounter very different aggregations of fish in their trawl paths even if they are as close as safety permits. Parallel trawling is obviously not possible when a factor is needed to intercalibrate GFS results obtained with different gears used by one vessel. A less efficient experimental design with that single vessel must then be used leading to a requirement for lengthier, even more numerous trials. The expense of so much RV time would be considerable, and whenever the factor was used in conditions different to the trawling trials, e.g., at different depths or over different substrates, doubts would arise over the applicability of the factor.

A cheaper, possibly more satisfactory alternative is to apply statistical modelling (Sparholt 1990, ICES CM 1992/D:6, Cotter 1993). Some earlier models did not recognise the mutual dependence of GFS results arising mainly because fish are caught in clusters (trawl nets), not randomly. The content of each catch reflects the behaviour of the fish, the environmental conditions, and the manner of trawling (direction to tide, etc.). As a result, estimates of numbers-at-age for different *year class*es and species covary within each haul, and thus within each survey of each year. Changes of catchability between years (Pennington and Gødo 1995) appear to be a similar phenomenon. One implication of covariance is that degrees of freedom are less than indicated by the count of observations minus fitted parameters, and therefore to over-fitted models.

The following account reports the fitting of a deliberately simple model to GFS abundance indices by *year class* in order, firstly, to estimate intercalibration factors for cod, haddock, whiting and Norway pout. The factors of most interest were the factors to correct for the change of trawl from a Granton to a GOV on the English GFS from 1992, and the factor to align Scottish GFS results obtained with an Aberdeen trawl to other 3rd quarter survey results by other nations obtained with the GOV trawl. However, other available survey results were included to obtain best precision and a fuller analysis. An implicit assumption is that the different surveys are estimating the same *Z*. This is an approximation if certain age-groups are not be equally catchable by surveys covering different geographic areas. A second purpose of the modelling was to permit the measurement errors associated with each survey to be assessed without comparisons with VPA. This may be useful given doubts about the accuracy and completeness of landings data (Cook 1997). Within-year covariances were also considered.

5.2 Method

Details of North Sea groundfish surveys and abundance indices by age and species used in the analyses are shown along with survey abbreviations in Table 5.2.1. English data were from the CEFAS laboratory, Lowestoft. Those for Norway pout were the mean indices for the whole North Sea (Round fish areas (RFA) 1 to 5), not the '22 selected rectangles within RFA 1–3' sometimes used. German data for cod were taken from ICES CM 1996/Assess:6, and for other species from tuning files supplied by S. Reeves of FRS Marine Laboratory, Aberdeen. Other data were taken from tuning fleet tables in ICES CM 1998/Assess:7 with corrections to the dates of certain surveys which the working group had adjusted in the tables for their own purposes. Indices for 0-group fish were excluded from the analyses because this age tends to be poorly catchable by surveys (Cotter 1993; ICES 1996/H:1). Older, scarce age-groups, and plus-groups were also excluded. Indices were arbitrarily scaled to exclude decimal points from the data file. This can be assessed from example indices given in Table 5.2.1.

The least squares model was:

$$\ln N_{a,y} = \ln N_{0,y-a} - Za + S_s + \varepsilon_{a,y,s} \qquad (5.2.1)$$

where *a* is age in years and months from 1 January of the birth year of the *year class*, and S_s is a factor (as the natural logarithm) for survey *s* relative to one of the others, here taken arbitrarily as EGOV3. To allow for within-year covariances between age-groups of each species, $\varepsilon_{a,y,s}$ is the random error for age a, survey *s*, in year *y* where

$$\varepsilon_{a,y,s} \sim N(0,\Sigma_s),\ \Sigma_s = \begin{bmatrix} \sigma_{1,1,s} \cdots \sigma_{1,A,s} \\ \cdots\cdots\cdots\cdots\cdots \\ \sigma_{A,1,s} \cdots \sigma_{A,A,s} \end{bmatrix}$$ and A is the age of the oldest group. Age is here counted in integer years.

This error structure ignores between-survey covariances on the grounds that estimates of abundance indices, obtained by different vessels, at different stations, on different dates, and at different times of day, are relatively independent. Between-year covariances are ignored because stations are fished in differing orders in each year, at slightly different dates, at different times of day, with different weather, etc. Lack of dependence between years may nevertheless be an approximation.

An ordinary least squares fit was used. The few zero abundance indices left in the data after rejection of 0-groups and fish of age greater than A were omitted to permit transformation to natural logarithms (ln). Σ_s was then estimated as a measure of survey precision from

$$\hat{\sigma}_{a,a',s} = \sum\nolimits_y \varepsilon_{a,y,s}\varepsilon_{a',y,s}\ .$$

Estimation of a covariance matrix for A age-groups in a survey requires at least A years of data. Since some of the survey series were short, covariance matrices for error analysis were only estimated for ages 1, 2 and 3 years. For the same reason, no attempt was made to estimate covariances between species.

Comparisons of covariance matrices of the same dimension without considering dependence between the variables may be made with the trace, i.e., the sum of the variances on the diagonal. Comparisons with a consideration of dependence may be made by first converting to the correlation matrices, then looking at the determinant. Its magnitude indexes the volume of the standardised error cloud so a flattening caused by dependence between two or more variables reduces its magnitude.

5.3 Results

Estimated Z and survey adjustment factors, S_s, for cod, haddock, whiting, and Norway pout are shown in Table 5.3.1, along with the number of years of data from each survey used in the estimation. Abundance indices which have been adjusted to the EGOV3 standard will be referred to as 'adjusted'. The adjusted indices for four *year class*es of cod, haddock, whiting and Norway pout are shown in Figure 5.3.1.

The covariance matrices, their traces, and the correlation matrices and their determinants for numbers of the four species at age 1, 2 and 3 years old are shown in Table 5.3.2. For cod, haddock, and whiting, survey DGOV2 showed an appreciably larger trace than the other surveys, suggesting that it measures abundances of these species with least precision. Survey SGOV2 showed noticeably large variance for 1-year old cod. Of the five surveys giving results for Norway pout, EGOV4 was the least precise with highest variance for 2 and 3 year-olds. The lowest determinants were shown by SGOV2 for cod, haddock, and whiting. EGOV4 also showed a relatively low determinant for haddock, and DGOV2 for whiting. High positive correlations between numbers at the three ages were evident for these surveys. EGOV3 showed the lowest determinant for Norway pout with high correlations between numbers at all three ages.

5.4 Discussion

For all four species, eq. 5.2.1, appeared to fit the data well. Much noise was present but there were sufficient data to suggest quite strongly that the slope, Z, changed very little, if at all, during the 1980s and 1990s, or even during the 1970s when fewer data were available. See Figure 5.3.1. Wieland (Working Paper 1) and ICES CM 1996/H:1 reported that 1 year-old cod are poorly caught by the first quarter IBTS. This can be seen in Figure 5.3.1 by finding the + symbols (= IGOV1) for 1 year-olds in each of the illustrated year classes. They all fall below the fitted line. A comparison of values for Z estimated here may be made with those found by Cook (1997) with a different model and assumptions.

The factors listed in Table 5.3.1 may be used to adjust the abundance indices from the different surveys to a common standard for comparative purposes. The ratio of EGRT3 to EGOV3 specifically relates to the change of trawl gear made in 1992 since no other factors were changed. The ratio of SABD3 to EGOV3 relates to the different fishing powers of the Aberdeen and the GOV trawls, to the different fishing powers of Scotia II and Cirolana, as well as to the different geographic coverages of these two surveys which both take place in the third quarter. Given that these two vessels are of similar design and that considerable geographic overlap exists between these two surveys, this factor may serve to adjust past SABD3 results approximately to estimates of what would have been obtained if Scotia had fished a GOV trawl. This would be useful to adjust all past IBTS results to the GOV standard gear. [It would be necessary also to adjust EGRT3 in 1991.]

The adjustment factors listed in Table 5.3.1 could be used to create combined international indices from the point on the estimated trend line for each age and season. Better accuracy should be available from such an international index than from any single national index because of the greater numbers of stations fished in aggregate, but its model-dependence must be acknowledged.

The estimated adjustment factors do not support comparisons of regional results because they confound the relative fishing powers of the vessels, i.e., their ability to catch a certain proportion of the fish in the path of the trawl, with the effects of the different places and times trawled by the various surveys. Better factors for this purpose could be derived by analysing only those catches taken from common regions and time periods. One possible IBTS strategy in future is to implement pairwise/parallel trawling by different countries in each seasonal set of surveys, permitting comparison of fishing power as data sets are accumulated over the years (ICES CM 1992/D:6). This need does not involve much extra expense.

The frequency of IBTS surveys is also of interest. If abundance indices are based on fitting eq. 5.2.1, and no other results are important, it is not essential for surveys to occur more than annually because one point per year is adequate to set the slope(s) of the *year class* curves. However, extra points within each year assist with the precision of estimation. Alternatively, if there is continuing interest in seasonal distribution patterns, surveys will be needed either biannually or quarterly. In this case there is a need to make each seasonal set of surveys comparable from season to season, both in geographic pattern and with regard to ships employed. Otherwise, the between-season comparisons are confounded with possible regional and ship effects.

The value of the covariance and correlation matrices presented in Table 5.3.2 depends on the validity of the model, eq. 5.2.1. Given acceptance of it, a possible reason for the major differences in precision by different surveys is the size of the area surveyed. Sampling variability of the estimated abundance index will have one component related to the number of stations fished within the area, and another related to variability of the proportion of stock contained by the area from year to year. Very large areas may reliably contain entire stocks so that the latter component is zero, making the index more precise. Low determinants caused by positive correlations between age-groups, e.g., as found by SGOV2, are the result of fish of different ages being caught or not-caught together under the conditions of the survey. This could also be dependent on the size of the survey area. Consistently low determinants for correlation matrices imply that the survey is collecting less information than the number of age-determinations made would suggest.

Table 5.2.1. Details of North Sea groundfish surveys (GFS), the survey codes used in this paper, and the species and age-groups whose abundance indices were analysed. Examples of indices for 3 year-olds in certain years (in brackets) are given to permit a check on the decimal scaling of other presentations of the same data.

Survey and code	Qtr.	Years	Trawl gear	Coverage	Species and age groups	Index for 3 yr-olds
English EGRT3	3	1977-1991	Granton	All North Sea	Cod 1-7 yrs	60
					Haddock 1-7	386
					Whiting 1-7	3854
					Norw. pout 1-4	543
						(1990)
Scottish qtr 3 SABD3	3	1982-1996	Aberdeen	Shetland Viking Moray Firth Buchan Forties Central Humber	Cod 1-7 yrs	59
					Haddock 1-7	320
					Whiting 1-7	2480
					Norw. pout 1-4	15
						(1990)
International IGOV1	1	1983-1997	GOV	All North Sea+ Skagerrak+ Kattegat	Cod 1-6 (not '97)	200
					Haddock 1-6	3100
					Whiting 1-6	20200
					N. pout 1-3 (not '97)	46
						(1990)
German DGOV2	2	1983-1995	GOV	Central and northern North Sea	Cod 1-6 (not '93, '95)	250
					Haddock 1-5 (not '93, '95)	1830
					Whiting 1-6 (not '95)	8600
						(1990)
Scottish qtr 2 SGOV2	2	1991-1996	GOV	Central and northern North Sea	Cod 1-6	138
					Haddock 1-6	1770
					Whiting 1-6	11420
						(1992)
English qtr 4 EGOV4	4	1991-1996	GOV	All North Sea	Cod 1-6	83
					Haddock 1-6	1052
					Whiting 1-6	5379
					Nor. pout 1-4	9
						(1992)
English qtr 3 EGOV3	3	1992-1997	GOV	All North Sea	Cod 1-7 yrs	71
					Haddock 1-7	1736
					Whiting 1-7	5604
					Norw. pout 1-4	20227
						(1992)

Table 5.3.1. Estimated Z and survey factors S_s as natural logs (above) and factors (below) for adjusting abundance indices to an EGOV3 standard for cod, haddock, whiting, and Norway pout. Decimal places in the survey factors relate to the scaling of analysed data, see table 5.2.1. The number of years of data from each survey used in the estimation are shown in brackets. Survey codes are given in table 5.2.1.

Species	Z	EGRT3	SABD3	IGOV1	DGOV2	SGOV2	EGOV4	EGOV3
Cod	0.918	-0.379	-0.088	0.406	0.359	-0.068	-0.139	0
		0.68	0.92	1.50	1.43	0.93	0.87	1
		(15)	(15)	(14)	(11)	(6)	(6)	(6)
Haddock	1.305	-0.609	-0.451	0.358	-0.390	-0.301	0.360	0
		0.54	0.64	1.43	0.68	0.74	1.43	1
		(15)	(15)	(15)	(11)	(6)	(6)	(6)
Whiting	1.049	-0.449	-0.390	0.531	-0.971	0.441	0.347	0
		0.64	0.68	1.70	0.38	1.55	1.41	1
		(15)	(15)	(15)	(12)	(6)	(6)	(6)
Norway pout	2.314	-1.431	-3.237	-4.761	-	-	-5.196	0
		0.24	0.039	0.0086			0.0055	1
		(15)	(15)	(14)			(5)	(6)

Table 5.3.2. Covariance matrices with correlation coefficients (*italicised*) substituted in the lower left triangle for deviations of abundance indices from model-based predicted values for fish aged 1, 2 and 3 years estimated using data from seven North Sea groundfish surveys adjusted to an EGOV3 standard. The trace of the covariance matrix, and the determinant of the correlation matrix are also shown for each survey. (a) Cod (b) haddock (c) whiting (d) Norway pout.

(a) Cod

EGRT3
trace=0.395
determinant=0.771

1	2	3
0.115	-0.012	0.058
-0.10	0.130	0.018
0.44	*0.13*	0.150

SABD3
trace=0.350
determinant=0.608

1	2	3
0.157	-0.054	0.059
-0.47	0.085	-0.009
0.46	*-0.1*	0.108

IGOV1
trace=0.436
determinant=0.561

1	2	3
0.271	0.049	0.043
0.32	0.090	0.049
0.30	*0.60*	0.075

DGOV2
trace=2.356
determinant=0.426

1	2	3
1.198	0.466	0.391
0.65	0.423	0.273
0.42	*0.49*	0.735

SGOV2
trace=1.172
determinant=0.087

1	2	3
0.844	0.289	0.250
0.89	0.124	0.118
0.60	*0.74*	0.205

EGOV4
trace=0.429
determinant=0.751

1	2	3
0.102	0.017	-0.073
0.18	0.090	0.000
-0.47	*0.00*	0.237

EGOV3
trace=0.418
determinant=0.557

1	2	3
0.132	-0.074	0.043
-0.63	0.105	-0.021
0.28	*-0.15*	0.182

(b) Haddock

EGRT3
trace=0.525
determinant=0.181

1	2	3
0.199	0.098	0.139
0.58	0.143	0.127
0.73	*0.78*	0.183

SABD3
trace=0.304
determinant=0.206

1	2	3
0.114	0.044	0.054
0.64	0.042	0.063
0.42	*0.80*	0.147

IGOV1
trace=0.304
determinant=0.226

1	2	3
0.128	0.079	0.043
0.70	0.100	0.064
0.44	*0.74*	0.076

DGOV2
trace=1.230
determinant=0.221

1	2	3
0.356	0.253	0.301
0.76	0.315	0.260
0.67	*0.62*	0.559

SGOV2
trace=0.384
determinant=0.044

1	2	3
0.196	0.069	0.143
0.93	0.028	0.048
0.81	*0.71*	0.160

EGOV4
trace=0.274
determinant=0.050

1	2	3
0.099	0.087	0.044
0.78	0.125	0.073
0.63	*0.92*	0.050

EGOV3
trace=0.310
determinant=0.310

1	2	3
0.051	0.040	0.053
0.54	0.105	0.090
0.59	*0.70*	0.154

(c) Whiting **[Table 5.3.2 continued]**

EGRT3
trace=0.843
determinant=0.372

1	2	3
0.319	0.191	0.066
-0.62	0.297	0.157
0.25	*0.61*	0.226

SABD3
trace=0.461
determinant=0.287

1	2	3
0.168	0.065	0.079
0.45	0.125	0.114
0.47	*0.79*	0.167

IGOV1
trace=0.232
determinant=0.600

1	2	3
0.075	0.028	-0.002
0.40	0.066	0.037
-0.02	*0.48*	0.091

DGOV2
trace=2.405
determinant=0.082

1	2	3
1.662	0.691	0.482
0.78	0.475	0.317
0.72	*0.89*	0.268

SGOV2
trace=0.363
determinant=0.015

1	2	3
0.164	0.108	0.057
0.96	0.077	0.061
0.41	*0.63*	0.121

EGOV4
trace=0.207
determinant=0.450

1	2	3
0.077	0.039	0.035
0.66	0.045	0.014
0.43	*0.22*	0.086

EGOV3
trace=0.396
determinant=0.217

1	2	3
0.111	0.089	0.085
0.71	0.141	0.101
0.67	*0.71*	0.144

(c) Norway pout [Table 5.3.2 continued]

EGRT3
trace=1.873
determinant=0.941

1	2	3
0.455	0.025	0.100
0.05	0.480	-0.115
0.15	*-0.17*	0.938

SABD3
trace=1.219
determinant=0.739

1	2	3
0.407	0.081	0.153
0.23	0.296	0.155
0.33	*0.40*	0.516

IGOV1
trace=1.304
determinant=0.729

1	2	3
0.397	0.066	0.024
0.30	0.124	0.137
0.04	*0.44*	0.782

DGOV2
trace= -
determinant= -

1	2	3
-	-	-
-	-	-
-	-	-

SGOV2
trace= -
determinant= -

1	2	3
-	-	-
-	-	-
-	-	-

EGOV4
trace=4.846
determinant=0.470

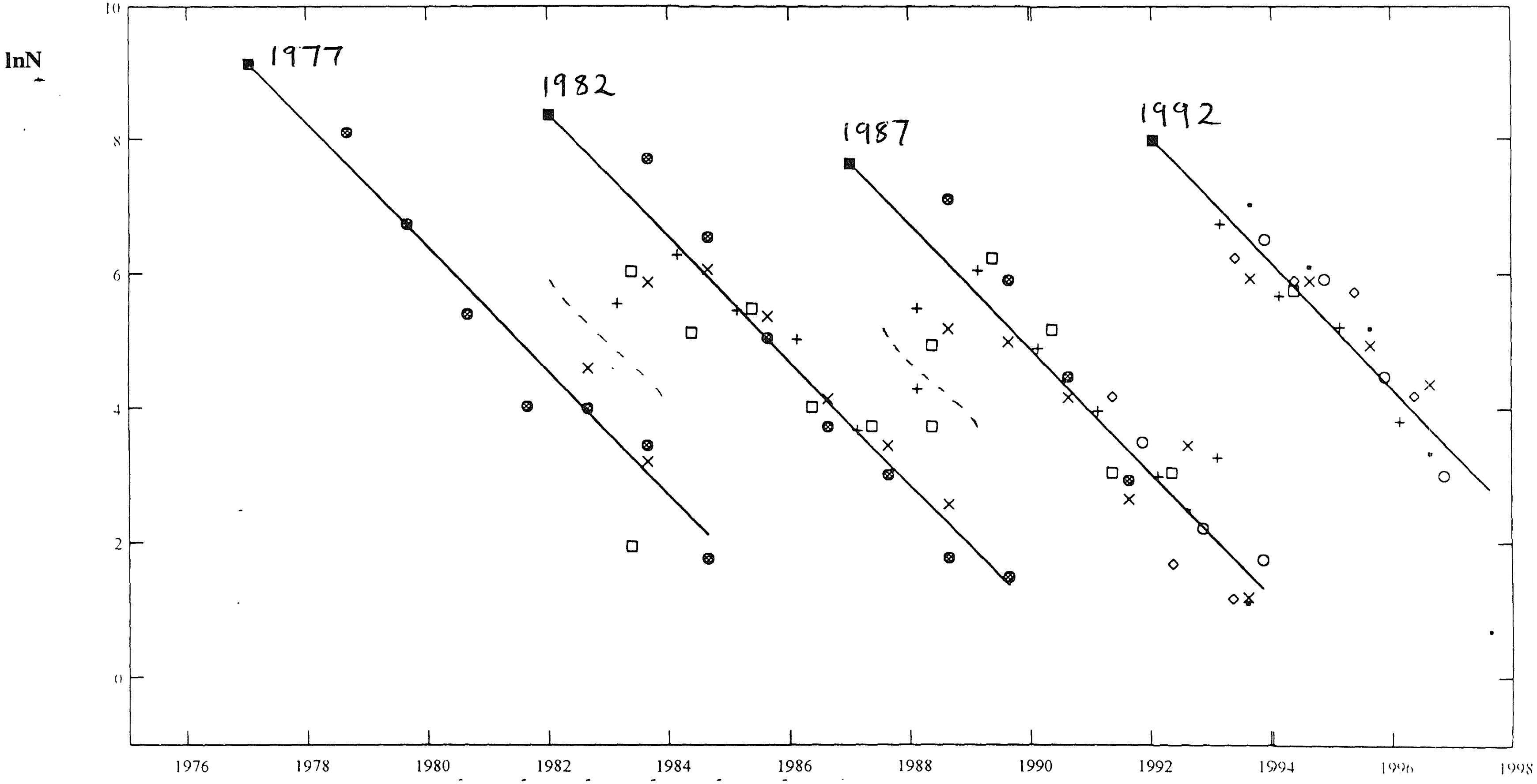
1	2	3
0.402	0.733	-0.023
0.71	2.623	-0.349
-0.03	*-0.16*	1.821

EGOV3
trace=2.463
determinant=0.137

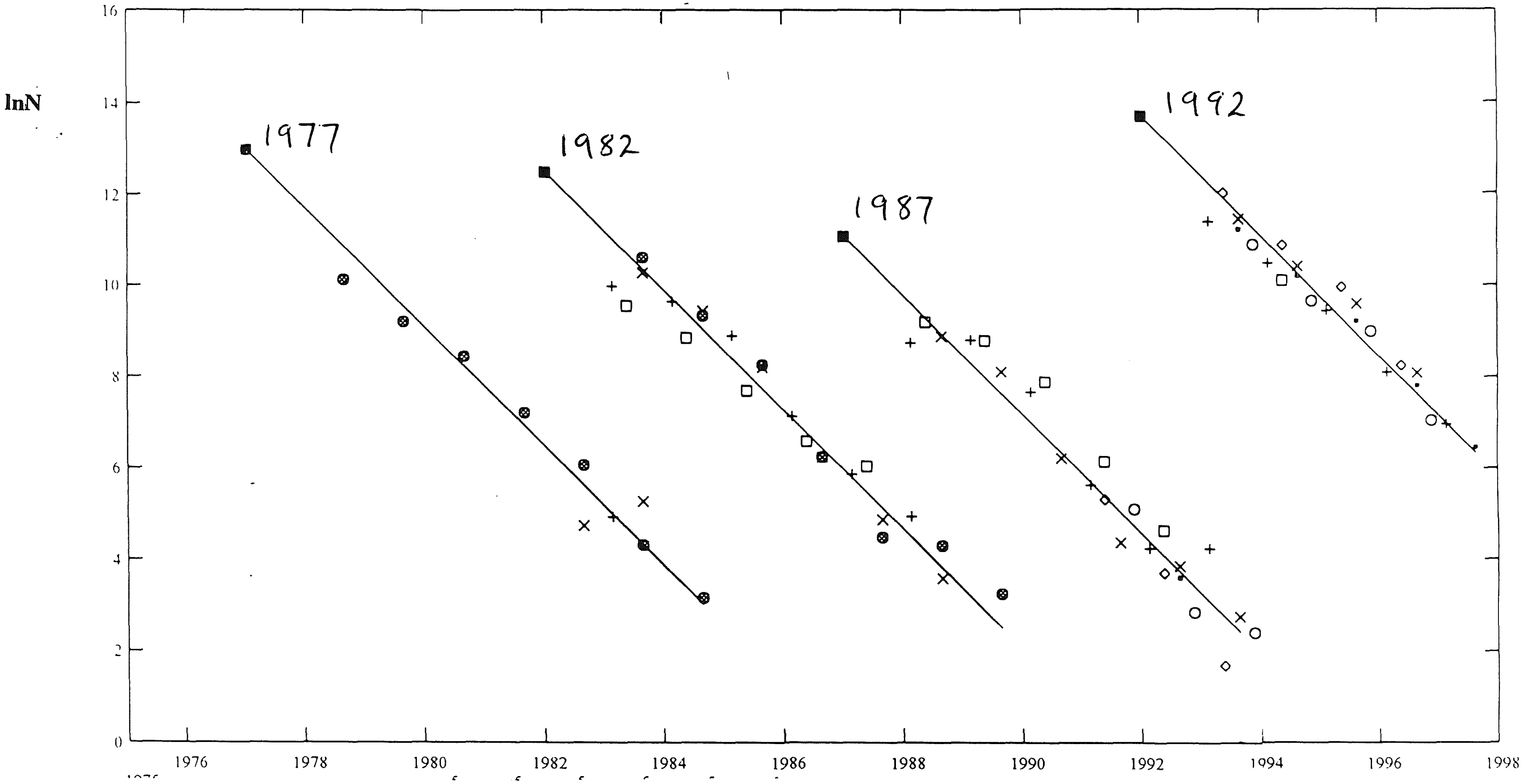
1	2	3
0.150	0.193	0.318
0.60	0.691	0.925
0.64	*0.87*	1.623

Figure 5.3.1. North Sea abundance indices as natural logarithms for four year-classes of cod from seven groundfish surveys after adjustment to an EGOV3 standard, together with the ordinary least squares model fit over time. The top point on each regression line, shown as a black square, is the estimated number of 0 year-old recruits for each year-class. a) Cod b) haddock c) whiting d) Norway pout. Key: EGRT3=hatched circles; SABD3=crosses; IGOV1=plusses; DGOV2=squares; SGOV2=diamonds; EGOV4=open circles; EGOV3=dots.

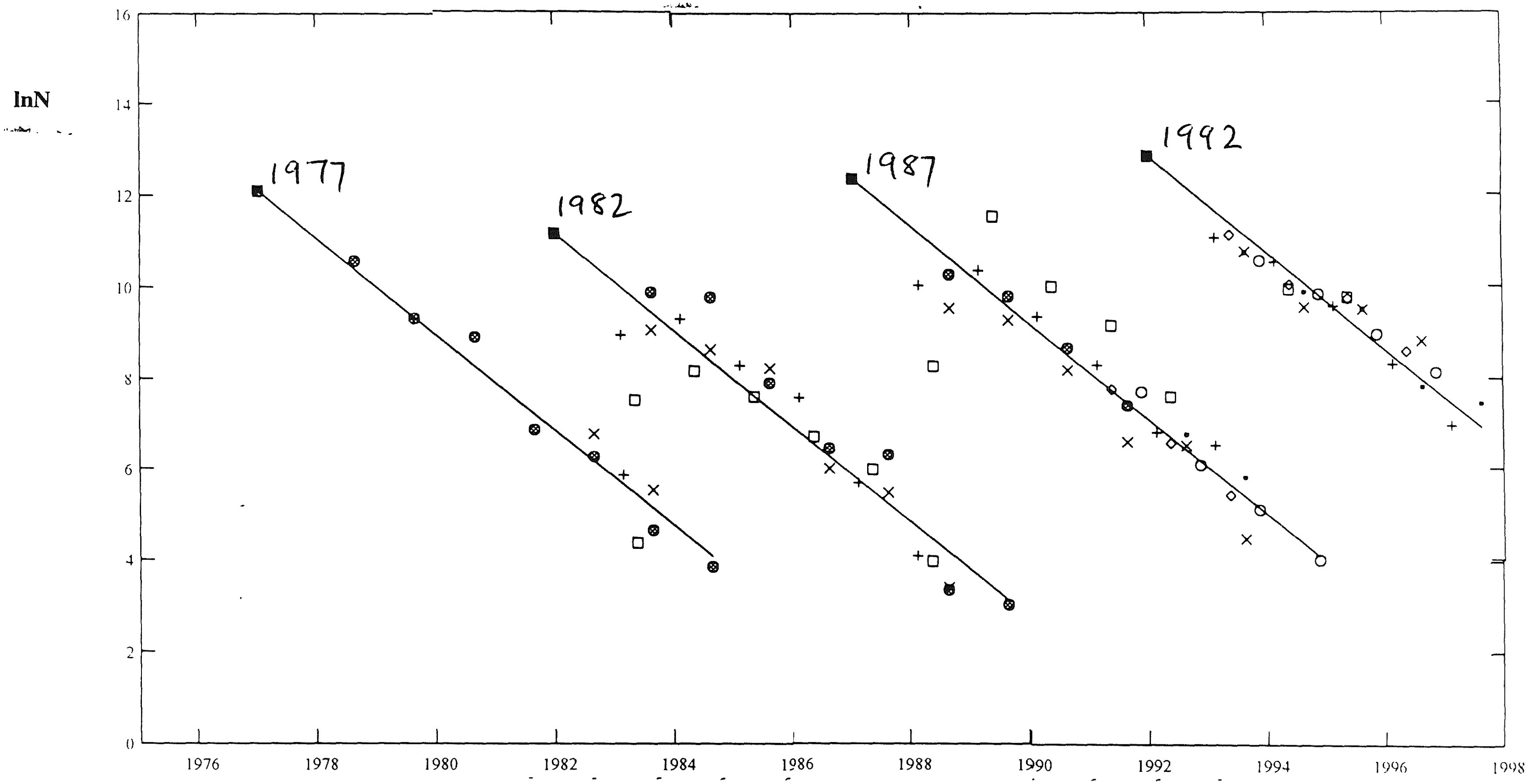
1a COD


lnN
10
8
6
4
2
0
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
1977
1982
1987
1992

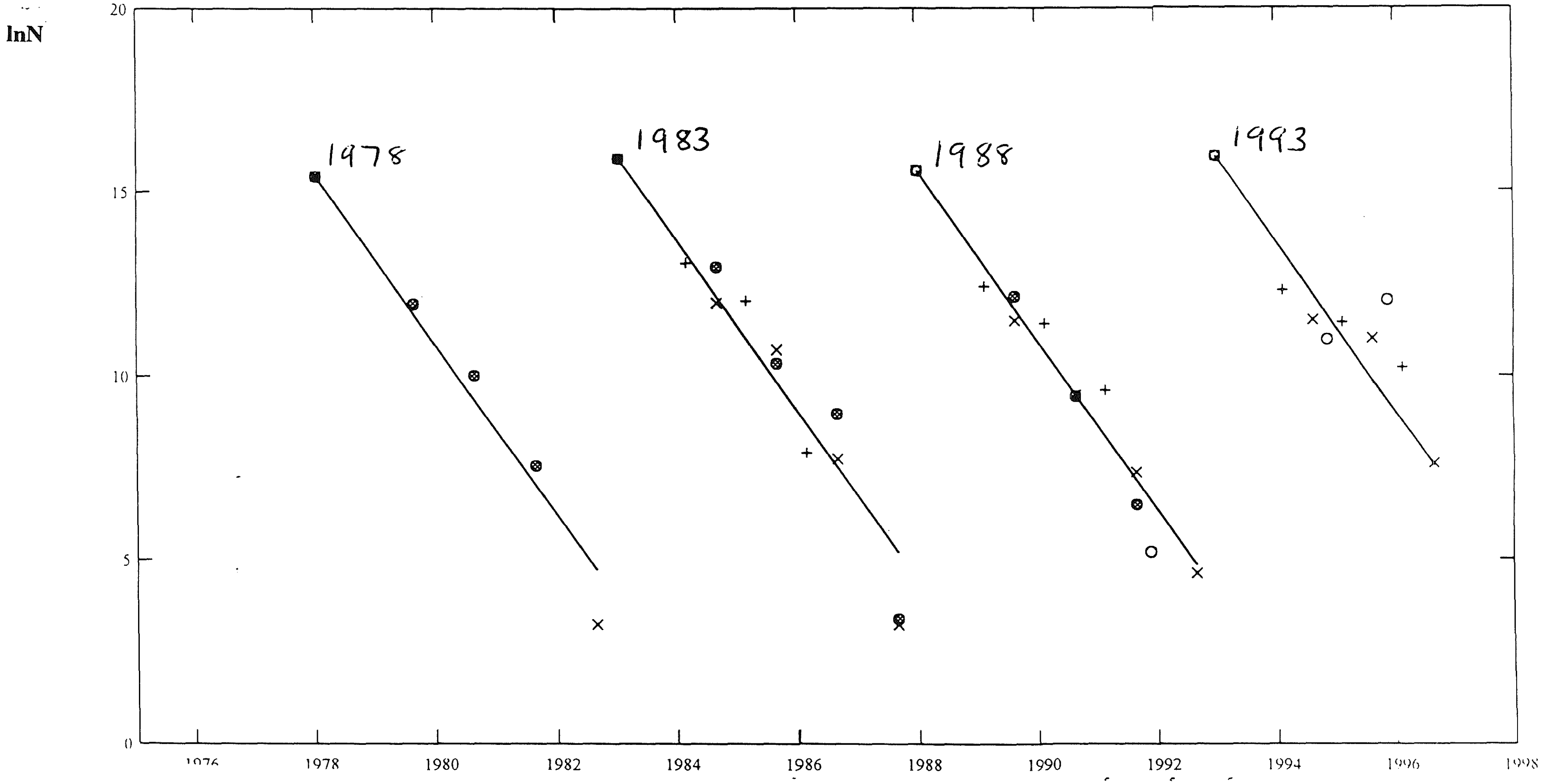
1b HADDOCK


lnN
16
14
12
10
8
6
4
2
0
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
1977
1982
1987
1992

1c WHITING


lnN
16
14
12
10
8
6
4
2
0
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
1977
1982
1987
1992

1d NORWAY POUT



6 REDUCTION IN SURVEY EFFORT - CONCENTRATION OF EFFORT IN QUARTERS 1 AND 3

6.1 Exclusion of Quarter 2 and Quarter 4 Surveys from Assessments

Assessments were done for cod, haddock, whiting and saithe. IBTS indices were not available for 1996 so the Working Group decided to run the assessments with 1995 as the final year. Three files with tuning fleets were made (Acronyms are explained in section 2.2):

1. WG. The Working Group files (see Table 2.2.1). These were used unchanged except for some revised IBTSQ1 indices for the period 1991 to 1995. The file contains information from quarter 3 (EGFS and SGFS) for cod and saithe, and for all quarters for haddock and whiting.

2. Q1234. These contain the commercial fleets from the WG files in addition to the four IBTS indices. All national surveys that are included in the IBTS indices were excluded. This means that the long series of EGFS and SGFS are taken out.

3. Q13. These files were the same as Q1234 with quarter 2 and quarter 4 removed.

XSA runs were performed with the same settings as used by the Working Group (ICES CM 1998/Assess: 7). Some of the results from the assessments and tunings are given in Tables 6.1.1–6.1.3

Cod

All three assessments gave very similar results. The Q1234 run gave some lower values for recruits, TSB, SSB and survivors, while the WG run and Q13 run were very similar. The Q1234 run has slightly lover standard errors than the other two. The differences between the Q1234 run and the Q13 run are very small (0–3%), and the WG run and the Q13 run are very similar.

Haddock

These assessments showed bigger differences, especially on the recruitment and TSB. The Q13 run has slightly higher standard errors than the other two. The differences between the Q1234 run and the Q13 run is somewhat larger than for cod (5–10%).

Whiting

All three assessments are similar. The Q13 run gives slightly lower values for all except for FBAR and standard errors. The differences between the Q1234 run and the Q13 run varies from 1% for FBAR and SSB to 15% for recruits.

Saithe

All assessments are very similar, however the survivors from the Q1234 run differ a lot from the WG run. The Q1234 run have the lowest standard errors. The differences between the Q1234 run and the Q13 run are small (1–4%) except for FBAR (10%).

6.2 Summary

The three assessments are similar for all species and exclusion of quarter 2 and quarter 4 have minor effects on the assessments, although the length of the combined IBTS data series used are very short for assessment purposes. It has not been possible to fully gauge the potential impact effects had the time series been longer.

Table 6.1.1. Assessment results for 1995 (recruits in millions, stock sizes in 1000 tonnes) and relative differences between the Q1234 tuning results and the others. (see sect. 6.1)

	Cod			Haddock			Whiting			Saithe		
Tun.file	WG	Q1234	Q13	WG	Q1234	Q13	WG	Q1234	Q13	WG	Q1234	Q13
Recruits	252	245	253	16120	13528	14227	37932	40630	34579	121	122	124
TSB	498	478	484	1200	1142	1032	895	863	787	502	490	508
SSB	78.4	75.5	77.6	162	162	154	318	293	290	131	136	138
FBAR	0.76	0.765	0.768	0.737	0.693	0.744	0.532	0.567	0.561	0.493	0.528	0.477
Recruits	1.03	1.00	1.03	1.19	1.00	1.05	0.93	1.00	0.85	0.99	1.00	1.02
TSB	1.04	1.00	1.01	1.05	1.00	0.90	1.04	1.00	0.91	1.02	1.00	1.04
SSB	1.04	1.00	1.03	1.00	1.00	0.95	1.09	1.00	0.99	0.96	1.00	1.01
FBAR	0.99	1.00	1.00	1.06	1.00	1.07	0.94	1.00	0.99	0.93	1.00	0.90

Table 6.1.2. Survivors at the end of 1995 in millions.

	Cod			Haddock			Whiting			Saithe		
Age	WG	Q1234	Q13	WG	Q1234	Q13	WG	Q1234	Q13	WG	Q1234	Q13
0				1977	1643	1733	2523	2733	2261			
1	102.8	99.6	103.4	1267	1218	1019	841	676	621	99.1	99.4	101.3
2	70.5	63.8	60.7	100.8	106.6	94.1	424	368	353	78	98.4	94.1
3	10.2	9.7	9.9	125.5	117.4	104.1	173.3	162	164	100	74.5	85.1
4	5.3	4.6	5.3	16.3	18.9	18.2	45.6	42.5	44.4	20.9	18	21.1
5	0.67	0.7	0.7	6.1	7	6	14.2	13.4	13.4	15.3	13.3	15.5
6	0.18	0.22	0.18	0.42	0.5	0.45	3.6	3.2	3.3	5.1	6.1	6.6
7	0.15	0.13	0.15	0.1	0.11	0.11	3.5	3.3	3.6	4.1	4.9	4.6
8	0.02	0.02	0.02	0.05	0.05	0.05				1	1.3	1.1
9	0.01	0.01	0.01	0.06	0.06	0.06				0.5	0.6	0.6
10	0.01	0.01	0.01									

Table 6.1.3 Standard errors of the survivors at the end of 1995.

	Cod			Haddock			Whiting			Saithe		
Age	WG	Q1234	Q13	WG	Q1234	Q13	WG	Q1234	Q13	WG	Q1234	Q13
0				0.2	0.23	0.31	0.24	0.2	0.27			
1	0.14	0.12	0.15	0.11	0.11	0.14	0.11	0.1	0.12	11.52	11.52	11.54
2	0.1	0.09	0.11	0.08	0.09	0.11	0.08	0.07	0.09	0.46	0.21	0.32
3	0.09	0.08	0.09	0.07	0.08	0.11	0.06	0.06	0.07	0.18	0.14	0.18
4	0.09	0.08	0.09	0.08	0.09	0.11	0.06	0.06	0.07	0.17	0.12	0.16
5	0.1	0.08	0.09	0.09	0.1	0.12	0.07	0.07	0.08	0.16	0.12	0.14
6	0.1	0.08	0.1	0.11	0.11	0.13	0.09	0.09	0.1	0.17	0.11	0.14
7	0.11	0.09	0.11	0.14	0.14	0.14	0.1	0.11	0.11	0.17	0.12	0.15
8	0.16	0.14	0.15	0.13	0.14	0.14				0.21	0.15	0.19
9	0.2	0.19	0.2	0.21	0.21	0.22				0.21	0.17	0.2
10	0.21	0.21	0.21									

7 LITERATURE CITED

7.1 Working Papers

WP1 Comparison of first and third quarter IBTS abundance indices for ages 1 and 2 whiting and cod. K. Wieland.

WP2 Intercalibration and comparative analysis of North Sea groundfish survey indices for cod. J. Cotter.

WP3 Quarterly and annual effects of biodiversity indices derived from the 1991–1995 IBTS data. S. Ehrich and C. Stransky.

7.2 References

Anon (1997) Monitoring Biodiversity in the North Sea Using Groundfish Surveys. Report to the European Commission. Available from CEFAS, Lowestoft.

Anon (1998) A Proposal to Monitor Fish and Epibenthic Biodiversity in the North Sea and Skagerrak Using 3rd Quarter IBTS Groundfish Surveys. Report of a meeting held at Hirtshals, Denmark, April 1998, EC Project: FAIR-CT-0817. Available from CEFAS, Lowestoft.

Bax, N.J. (1991) A comparison of the fish biomass flow to fish, fisheries, and mammals in six marine ecosystems. *ICES Marine Science Symposia*, 193, 217-224.

Beddington, J.R. (1984) The responses of multi-species systems to perturbations. *Exploitation of Marine Communities* (ed. R.M. May). Life Sciences Research Report 32. Springer Verlag, New York, pp 209-225.

Beddington, J.R. (1995) The primary requirements. Nature, 374, 213–214.

British Ecological Society (1996).

Burd, A.C. and W.G. Parnell (1982). Further studies on North Sea cod recruitment. ICES CM 1982/G:11.

Cook, R.M. 1997. Stock trends in six North Sea stocks as revealed by an analysis of research vessel surveys. ICES J. Marine Sci., 54: 924–933.

Corten, A. & van den Kamp, G. (1996) Variation in the abundance of southern fish species in the southern North sea in relation to hydrography and wind. ICES Journal of Marine Science, 53, 1113–1119.

Cotter, A.J.R. (1993). Intercalibration of groundfish surveys using regression analysis of *year class* mortalities. ICES CM 1993/G:21

Daan, N., Bromley, P.J., Hislop, J.R.G. & Nielsen, N.A. (1990) Ecology of North Sea fish. Netherlands Journal of Sea Research, 26, 343-386.

Dahm E and Wienbeck H (1996) New facts on the efficiency or total gear selectivity of German survey bottom trawls - possible effects on stock assessment and stock protection. ICES CM 1996/B:8, 6pp.

Ehrich, S. (1991). Comparative fishing experiments by research trawlers for cod and haddock in the North Sea. J. Cons. int. Explor. Mer 47: 275–283.

Fogarty, M.J. & Murawski, S.A. (1998) Large scale disturbance and the structure of marine systems: fishery impacts on Georges Bank. Ecological Applications, 8 (Supplement), 6–22.

Gislason, H, and P. Sparre (1994). Some thoughts on the incorporation of areas and migrations in MSVPA. ICES CM 1994/Mini: 15.

Greenstreet, S.P.R. & Hall, S.J. (1996) Fishing and the ground-fish assemblage structure in the north-western North Sea: an analysis of long-term and spatial trends. Journal of Animal Ecology, 65, 577–598.

Greenstreet, S.P.R., Bryant, A.D., Broekhuizen, N., Hall, S.J. & Heath, M.R. (1997) Seasonal variation in the consumption of food by fish in the North Sea and implications for foodweb dynamics. ICES Journal of Marine Science, 54, 243–266.

Greenstreet, S.P.R., Reeves, S.A. & Hislop, J.R.G. (in review) Long-term changes in the impact on the benthos caused by four gadoid predators in the North Sea. ICES Journal of Marine Science.

Greenstreet, S.P.R., Spence, F.E. & McMillan, J.A. (in press a) Fishing effects in northeast Atlantic shelf seas: patterns in fishing effort, diversity and community structure. V. Changes in structure of the North Sea groundfish assemblage between 1925 and 1996. Fisheries Research.

Greenstreet, S.P.R., Spence, F.E., Shanks, A.M. & McMillan, J.A. (in press b) Fishing effects in northeast Atlantic shelf seas: patterns in fishing effort, diversity and community structure. II. Trends in fishing effort in the North Sea by U.K. registered vessels landing in Scotland. Fisheries Research.

Gunderson, D.R. (1993). Surveys of Fisheries Resources. J.Wiley & Sons, New York, 248 pp.

Heessen, H.J.L, Dalskov, J. and Cook R.M. (1997) The International Bottom Trawl Survey In the North Sea, the Skagerrak and the Kattegat. ICES CM 1997/Y:31.

Heessen, H.J.L. & Daan, N. (1996) Long-term trends in ten non-target North Sea fish species. ICES Journal of Marine Science, 53, 1063–1078.

Heessen, H.J.L. (1996) Time series data for a selection of forty fish species caught during the International Beam Trawl Survey. ICES Journal of Marine Science, 53, 1079–1084.

Heessen, H.J.L., J. Dalskoy and R.M. Cook (1997). The International Bottom Trawl Survey in the North Sea, the Skagerrak and Kattegatt. ICES CM 1997/Y:31.

Hill, M.O. (1973) Diversity and evenness: a unifying notation and its consequences. Ecology, 54, 427-432.

Hutchings, J.A. (1996). Spatial and temporal variation in the density of northern cod and a review of hypotheses for the stock's collapse. Can. J. Aquat. Sci. 53:943–962.

ICES (1995). Report of the study group on ecosystem effects of fishing activities. ICES Co-operative Research Report, 200, 120pp.

ICES (1998). Report of the working group on ecosystem effects of fishing activities.

ICES CM 1979/G:35. Report of the International Gadoid Survey Working Group.

ICES CM 1981/H:10. Report of the joint meeting of the International Young Herring Survey Working Group and the International Gadoid Survey Working Group.

ICES CM 1983/G:62. Report of the International Gadoid Survey Working Group.

ICES CM 1985/G:62. Report of the Working Group on the International Young Fish Survey in the North Sea, Skagerrak and Kattegat.

ICES CM 1985/H:2. Report of Working Group on International Young Fish surveys in the North Sea, Skagerrak and Kattegat.

ICES CM 1990/H:3. Report of the International North Sea, Skagerrak, and Kattegat Bottom Trawl Survey Working Group.

ICES CM 1992/D:6. Report of the Workshop on the analysis of trawl survey data.

ICES CM 1993/Assess:8. Report of the Planning Group for the Development of Multispecies, Multifleet Assessment Tools.

ICES CM 1995/Assess:11. Report of the Working Group on Methods of Fish Stock Assessment.

ICES CM 1996/Assess:6. Report of the Working Group on the assessment of demersal stocks in the North Sea and Skagerrak.

ICES CM 1996/H:1. Report of the International Bottom Trawl Survey Working Group.

ICES CM 1998/ACFM:14 Report of the Herring Assessment Working Group for the Area South of 62°N

ICES CM 1998/Assess:7 Report of the Assessment Working Group of Demersal Stocks Stocks in the North Sea and Skaggerak.

ICES CM 1998/D:6. Report of the International Bottom Trawl Survey in the North Sea, Skagerrak and Kattegat in 1997: Quarter 1.

ICES CM 1998/D:6. Report of the International Bottom Trawl Survey in the North Sea, Skagerrak and Kattegat in 1997: Quarter 1.

ICES CM 1998/D:8. Report of the International Bottom Trawl Survey in the North Sea, Skagerrak and Kattegat in 1991: Quarters 2, 3 and 4.

ICES CM 1998/D:9. Report of the International Bottom Trawl Survey in the North Sea, Skagerrak and Kattegat in 1992: Quarters 2, 3 and 4.

ICES CM 1998/D:10. Report of the International Bottom Trawl Survey in the North Sea, Skagerrak and Kattegat in 1993: Quarters 2, 3 and 4.

ICES CM 1998/D:11. Report of the International Bottom Trawl Survey in the North Sea, Skagerrak and Kattegat in 1994: Quarters 2, 3 and 4.

ICES CM 1998/D:12. Report of the International Bottom Trawl Survey in the North Sea, Skagerrak and Kattegat in 1995: Quarters 2, 3 and 4.

International Bottom Trawl Surveys Working Group Report 1995.

Jennings, S & Kaiser, M.J. (1998) The effects of fishing on marine ecosystems. Advances in Marine Biology, 34, 201–351.

Jennings, S., Alvsvåg, J., Cotter, A.J., Ehrich, S., Greenstreet, S.P.R. Jarre-Teichmann, A., Mergardt, N., Rijnsdorp A.D., and Smedstad, O., (in press) Fishing effects in northeast Atlantic shelf seas: patterns in fishing effort, diversity and community structure. III. International fishing effort in the North Sea: an analysis of spatial and temporal trends. Fisheries Research.

Knijn R.J., T. W. Boon, H.J.L. Heessen & J.R.G. Hislop (1993). Atlas of North Sea fishes. ICES Cooperative Research Report 194, 268 pp.

Mitson, R.B. (1995). Underwater noise of research vessels - review and recommendations. ICES Cooperative Research Report 209, 61 pp.

Munk, P., P.O. Larsson, D. Danielsen and E. Moksness (1995). Larval and small juvenile cod Gadus morhua concentrated in the highly productive areas of a shelf break front. Mar. Ecol. Prog. Ser. 125: 21–30.

Murawski, S.A. & Idoine, J.S. (1992) Multi species size composition: a conservative property of exploited fishery systems. Journal of Northwest Atlantic Fisheries Science, 14, 79–85.

Pauly, D. & Christensen, V. (1995) Primary production required to sustain global fisheries. Nature, 374, 255–257.

Pennington, M. and Gødo, O.R. (1995). Measuring the effect of changes in catchability on the variance of marine survey abundance indices. Fisheries Res. 23: 301–310.

Pimm, S.L. & Hyman, J.B. (1987) Ecological stability in the context of multi species fisheries. Canadian Journal of Fisheries and Aquatic Science, 44 (Suppl 2), 84-94.

Pope, J.G. and Stokes, T.K. (1989). The use of multiplicative models for separable VPA, integrated analyses and the general VPA tuning problem. American Fisheries Society Symposium. 6: 92–101.

Shepherd, J.G. and Nicholson, M.D. (1986). Use and abuse of multiplicative models in the analysis of fish catch-at-age data. The Statistician, 35: 221–228.

Sherman, K. (1991) The large marine ecosystem concept: research and management strategy for living marine resources. Ecological Applications, 1, 349-360.

Sparholt, H. (1990) An estimate of the total biomass of fish in the North Sea. Journal du Conseil International pour l'Exploration de la Mer, 46, 200-210.

Sparholt, H. (1990). Using GLM analysis on the IYFS herring data for the North Sea. ICES CM 1990/H:6.

Stefánsson, G. (1996). Analysis of groundfish survey abundance data: combining the GLM and delta approaches ICES J. mar. Sci. 53:577–588.

Walker, P.A. & Heessen, H.J.L. (1996) Long-term changes in ray populations in the North Sea. ICES Journal of Marine Science, 53, 1085–1093.

Warren, W.G. (1996). Report on the comparative fishing trial between the Gadus Atlantica and Teleost. Northwest Atlantic Fisheries Organization SCRdoc.96/28.

Wieland, K., L. Foldager, R. Holst and A. Jarre-Teichmann (1998). Spatial distribution and variability of abundance estimates of juvenile (age 1 and 2) whiting and cod in the North Sea. ICES CM 1998/J:7.

Wright, P., Barrett, R.T., Greenstreet, S.P.R., Olsen, B. & Tasker, M.L. (1996) Effect of fisheries for small fish on seabirds in the eastern Atlantic. ICES Cooperative Research Report (Ed G.L.Hunt and R.W. Furness), 216, 44-55.

Yang, J. (1982) An estimate of the fish biomass in the North Sea. Journal du Conseil International pour l'Exploration de la Mer, 40, 161-172.

ANNEX 1

Figure 1 Quarterly distribution of 0-group cod in numbers per hour fishing averaged over 1991-1995.

Figure 2 Quarterly distribution of 1-group cod in numbers per hour fishing averaged over 1991-1995.

Figure 3 Quarterly distribution of 2-group cod in numbers per hour fishing averaged over 1991-1995.

Figure 4 Quarterly distribution of 3+-group cod in numbers per hour fishing averaged over 1991-1995.

Figure 5 Quarterly distribution of 0-group haddock in numbers per hour fishing averaged over 1991-1995.

Figure 6 Quarterly distribution of 1-group haddock in numbers per hour fishing averaged over 1991-1995.

Figure 7 Quarterly distribution of 2-group haddock in numbers per hour fishing averaged over 1991-1995.

Figure 8 Quarterly distribution of 3+-group haddock in numbers per hour fishing averaged over 1991-1995.

Figure 9 Quarterly distribution of 0-group whiting in numbers per hour fishing averaged over 1991-1995.

Figure 10 Quarterly distribution of 1-group whiting in numbers per hour fishing averaged over 1991-1995.

Figure 11 Quarterly distribution of 2+-group whiting in numbers per hour fishing averaged over 1991-1995.

Figure 12 Quarterly distribution of 0-group Norway pout in numbers per hour fishing averaged over 1991-1995.

Figure 13 Quarterly distribution of 1-group Norway pout in numbers per hour fishing averaged over 1991-1995.

Figure 14 Quarterly distribution of 2+-group Norway pout in numbers per hour fishing averaged over 1991-1995.

Figure 15 Quarterly distribution of 0-group saithe in numbers per hour fishing averaged over 1991-1995.

Figure 16 Quarterly distribution of 1-group saithe in numbers per hour fishing averaged over 1991-1995.

Figure 17 Quarterly distribution of 2-group saithe in numbers per hour fishing averaged over 1991-1995.

Figure 18 Quarterly distribution of 3+-group saithe in numbers per hour fishing averaged over 1991-1995.

Figure 19 Quarterly distribution of 0-ringed herring in numbers per hour fishing averaged over 1991-1995.

Figure 20 Quarterly distribution of 1-ringed herring in numbers per hour fishing averaged over 1991-1995.

Figure 21 Quarterly distribution of 2-ringed herring in numbers per hour fishing averaged over 1991-1995.

Figure 22 Quarterly distribution of 3+-ringed herring in numbers per hour fishing averaged over 1991-1995.

Figure 23 Quarterly distribution of 0-group sprat in numbers per hour fishing averaged over 1991-1995.

Figure 24 Quarterly distribution of 1-group sprat in numbers per hour fishing averaged over 1991-1995.

Figure 25 Quarterly distribution of 2-group sprat in numbers per hour fishing averaged over 1991-1995.

Figure 26 Quarterly distribution of 3+-group sprat in numbers per hour fishing averaged over 1991-1995.

Figure 27 Quarterly distribution of 0-group mackerel in numbers per hour fishing averaged over 1991-1995.

Figure 28 Quarterly distribution of 1-group mackerel in numbers per hour fishing averaged over 1991-1995.

Figure 29 Quarterly distribution of 2-group mackerel in numbers per hour fishing averaged over 1991-1995.

Figure 30 Quarterly distribution of 3+-group mackerel in numbers per hour fishing averaged over 1991-1995.

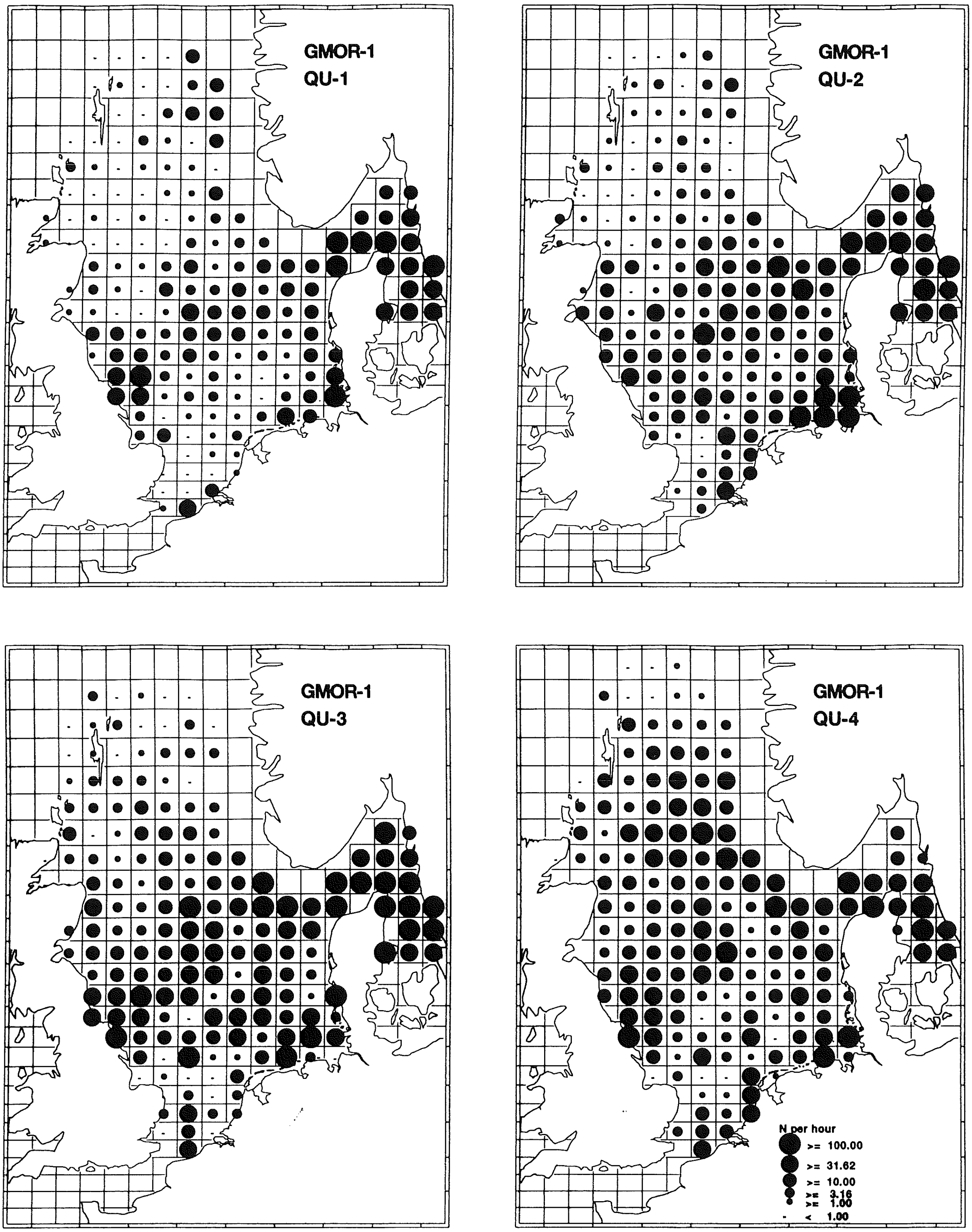

GMOR-1
QU-1
GMOR-1
QU-2
GMOR-1
QU-3
GMOR-1
QU-4
N per hour
>= 100.00
>= 31.62
>= 10.00
>= 3.16
>= 1.00
< 1.00

Figure 1

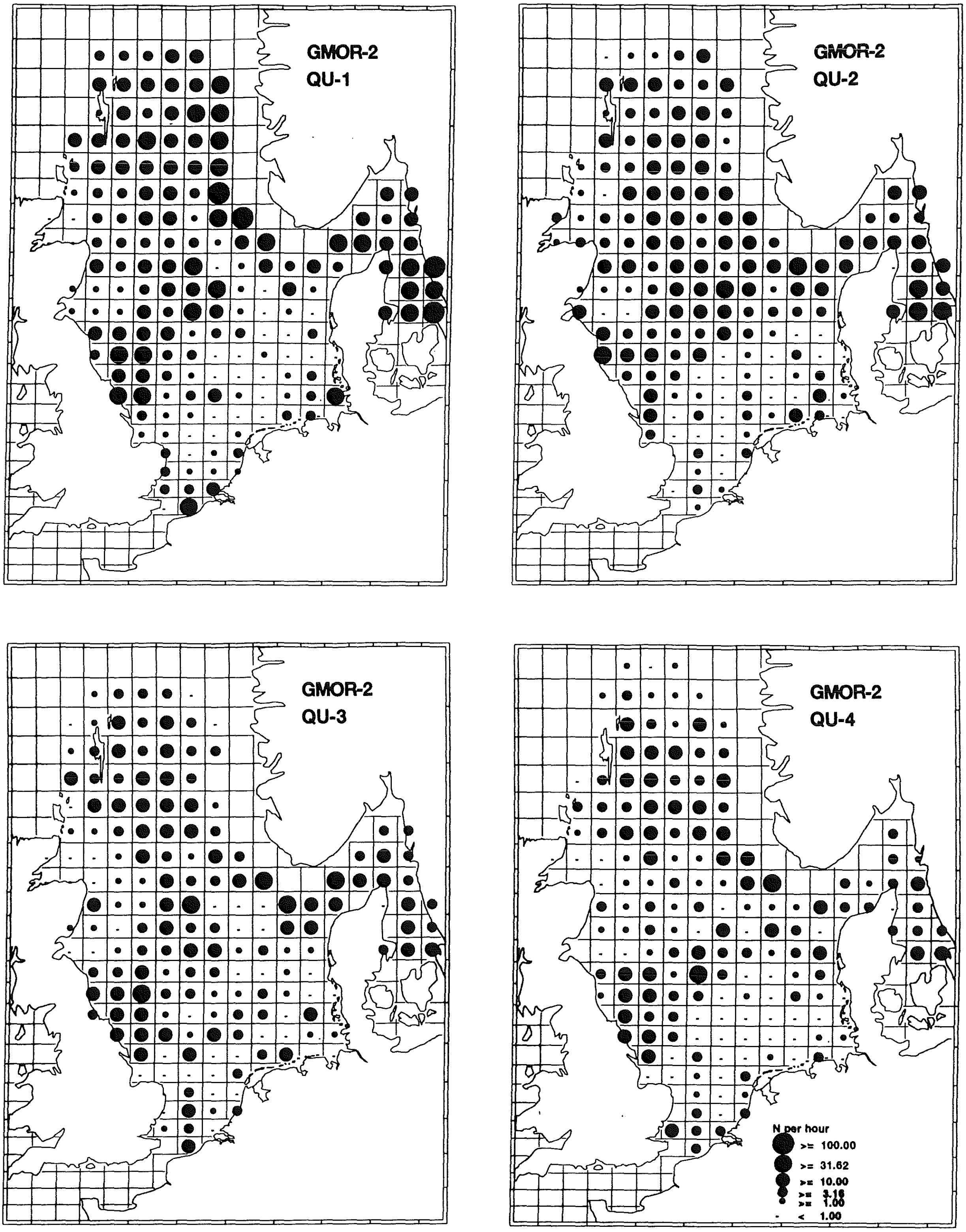

GMOR-2
QU-1
GMOR-2
QU-2
GMOR-2
QU-3
GMOR-2
QU-4
N per hour
>= 100.00
>= 31.62
>= 10.00
>= 3.16
>= 1.00
< 1.00

Figure 2

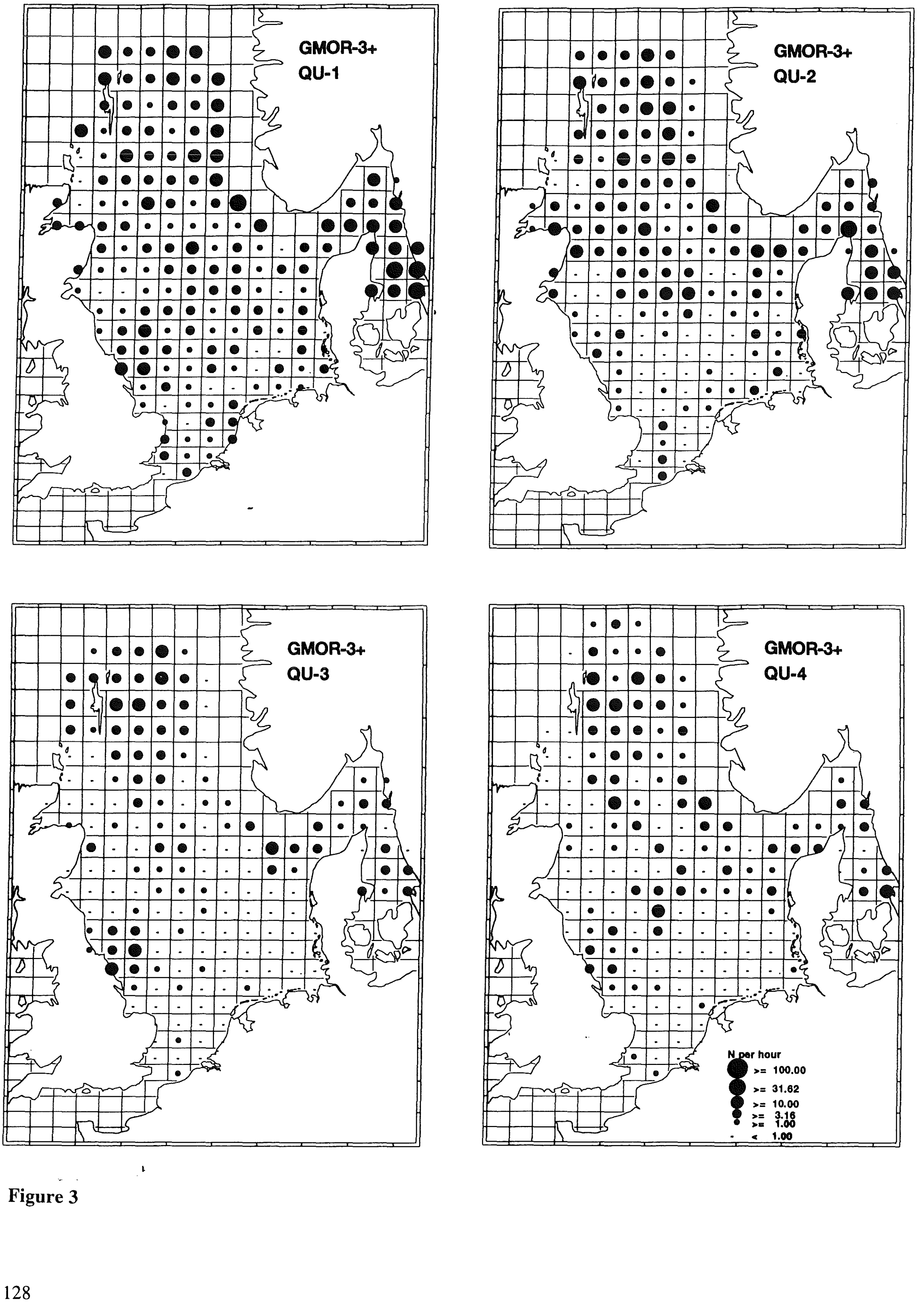

GMOR-3+
QU-1
GMOR-3+
QU-2
GMOR-3+
QU-3
GMOR-3+
QU-4
N per hour
>= 100.00
>= 31.62
>= 10.00
>= 3.16
>= 1.00
< 1.00

Figure 3

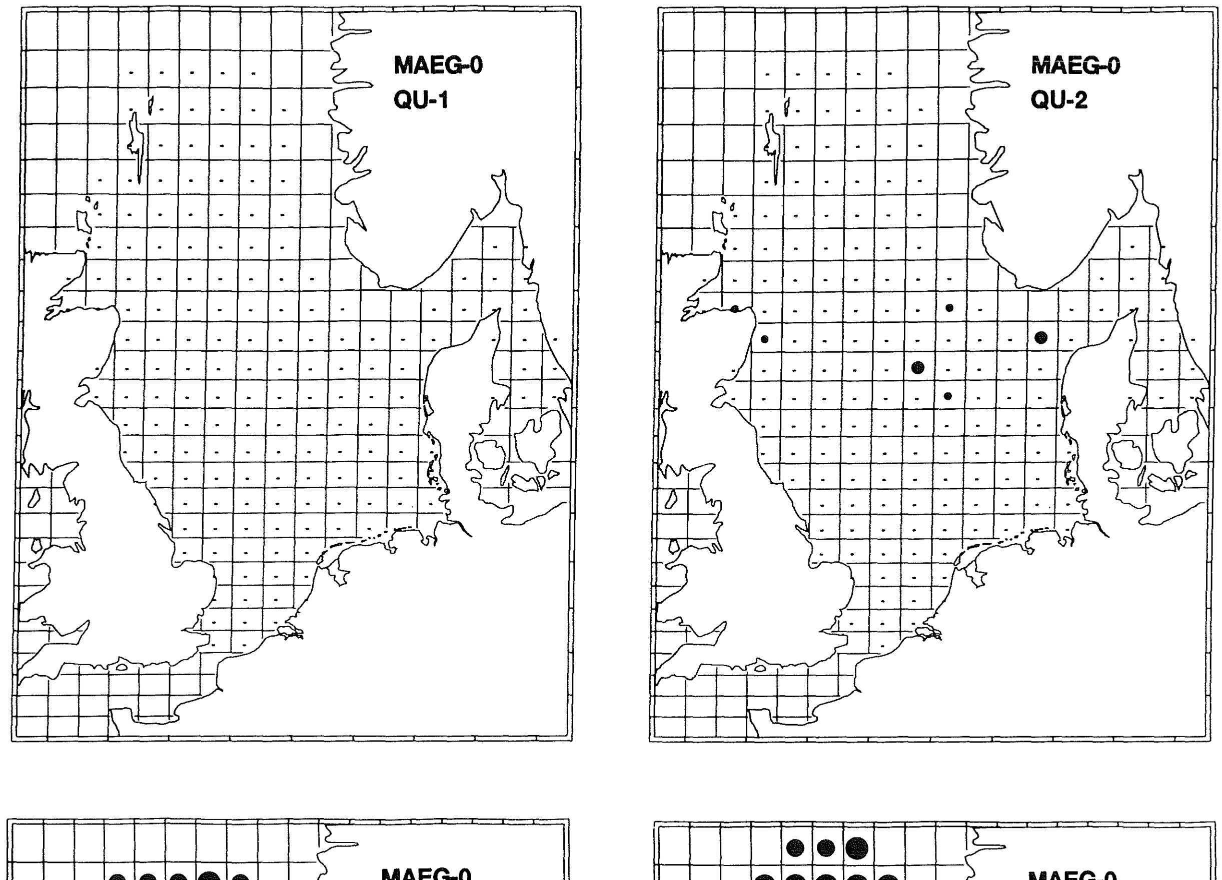

MAEG-0
QU-1
MAEG-0
QU-2
MAEG-0
QU-3
MAEG-0
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 4

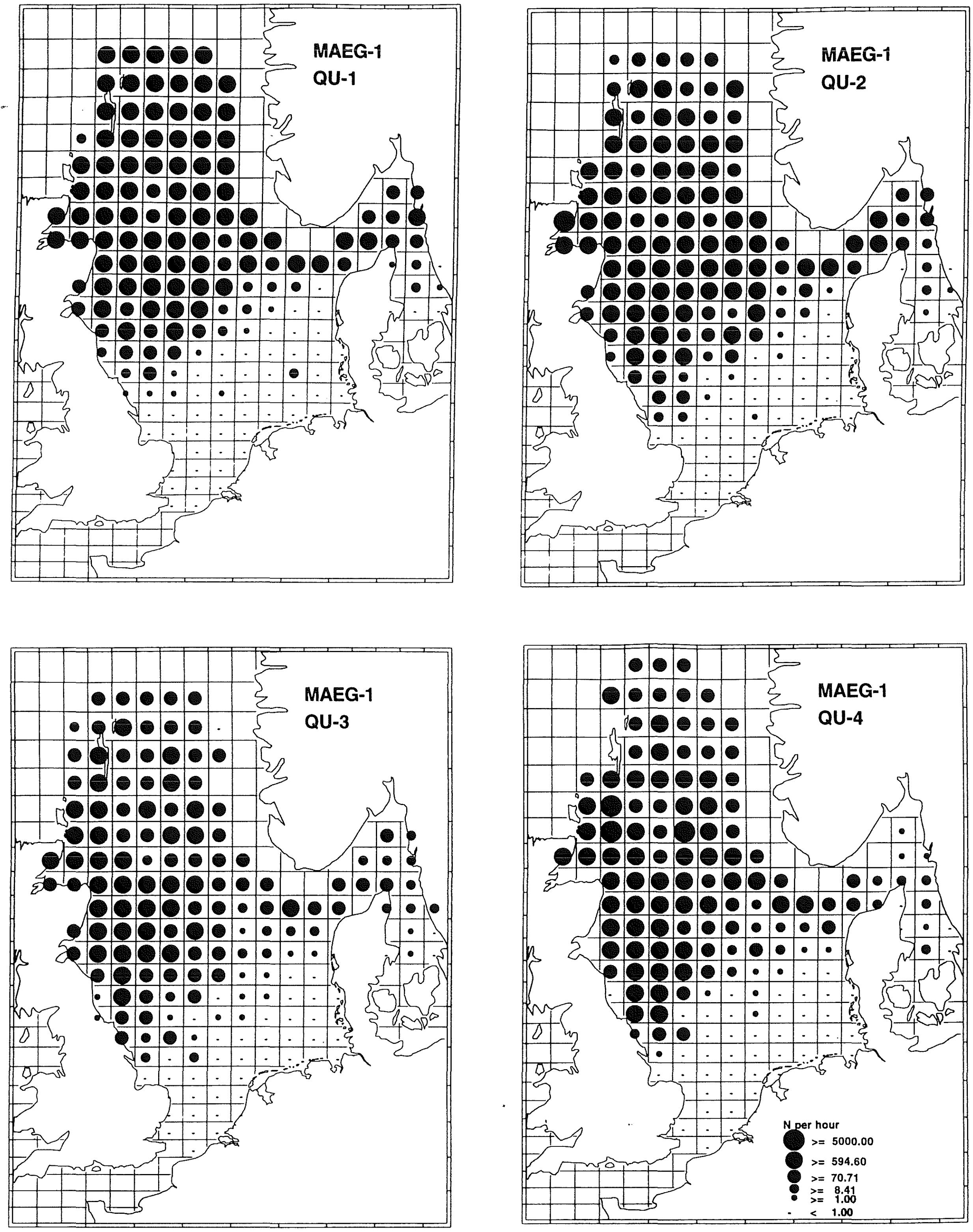

MAEG-1
QU-1
MAEG-1
QU-2
MAEG-1
QU-3
MAEG-1
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 5

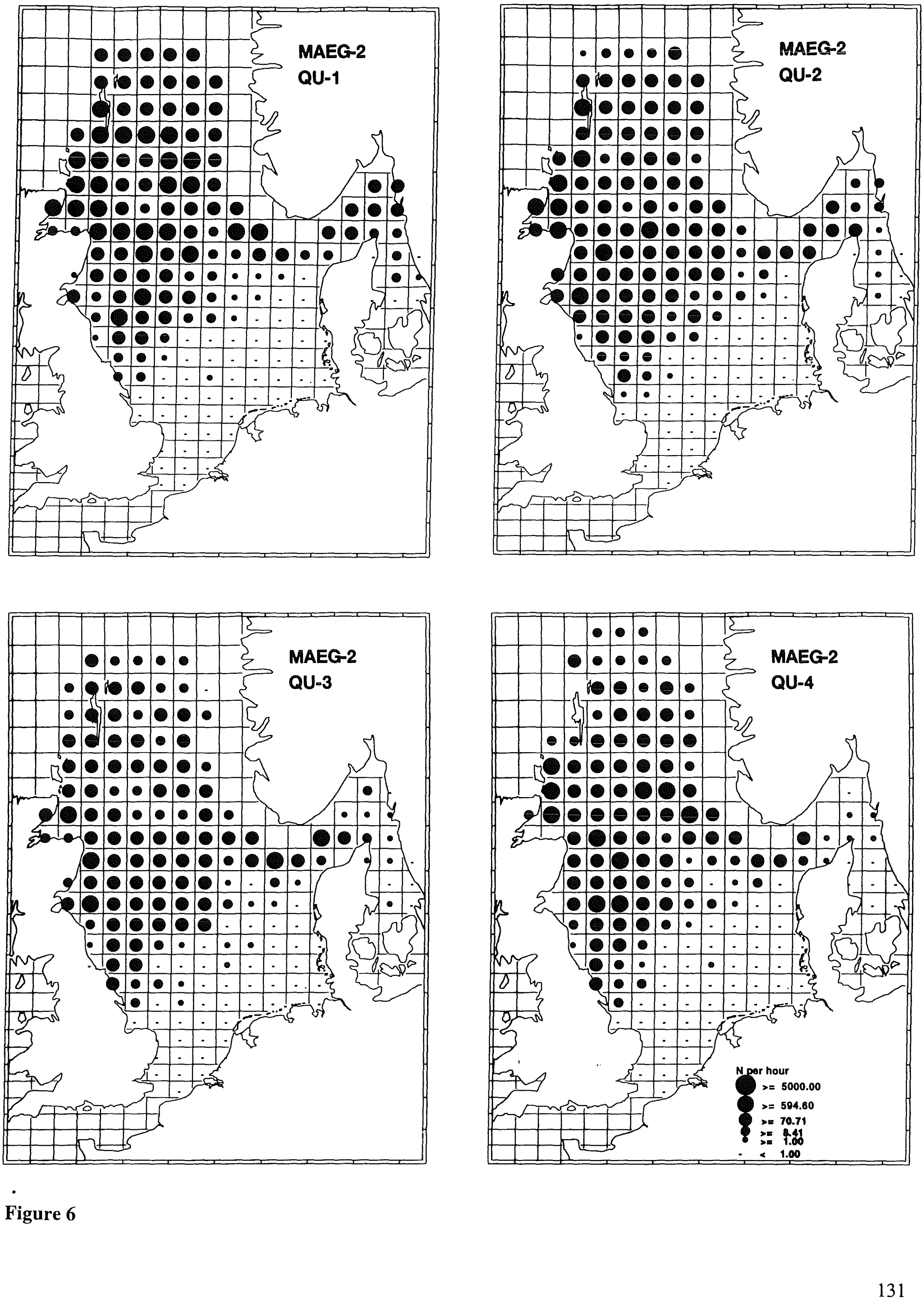

MAEG-2
QU-1
MAEG-2
QU-2
MAEG-2
QU-3
MAEG-2
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 6

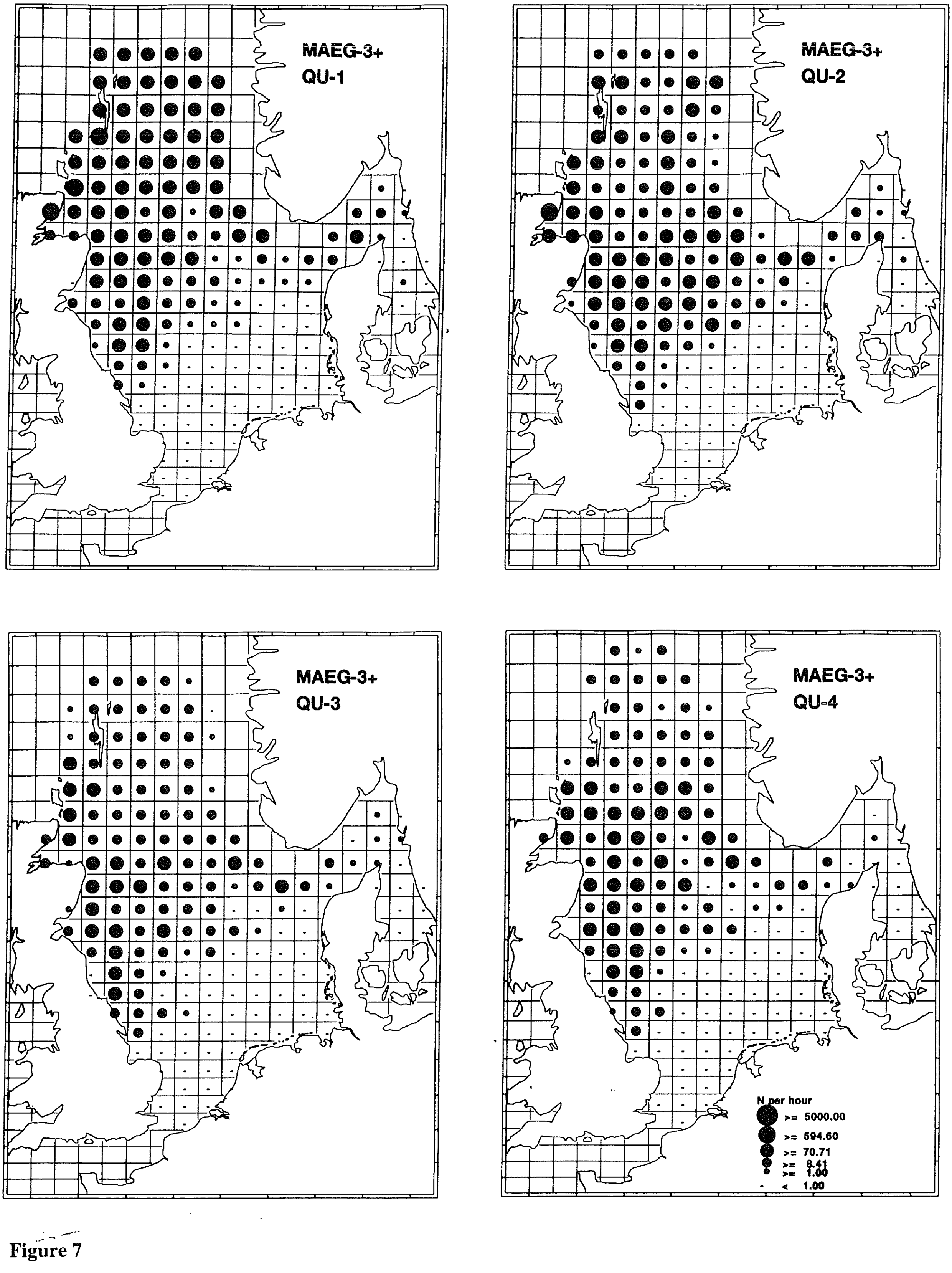

MAEG-3+
QU-1
MAEG-3+
QU-2
MAEG-3+
QU-3
MAEG-3+
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 7

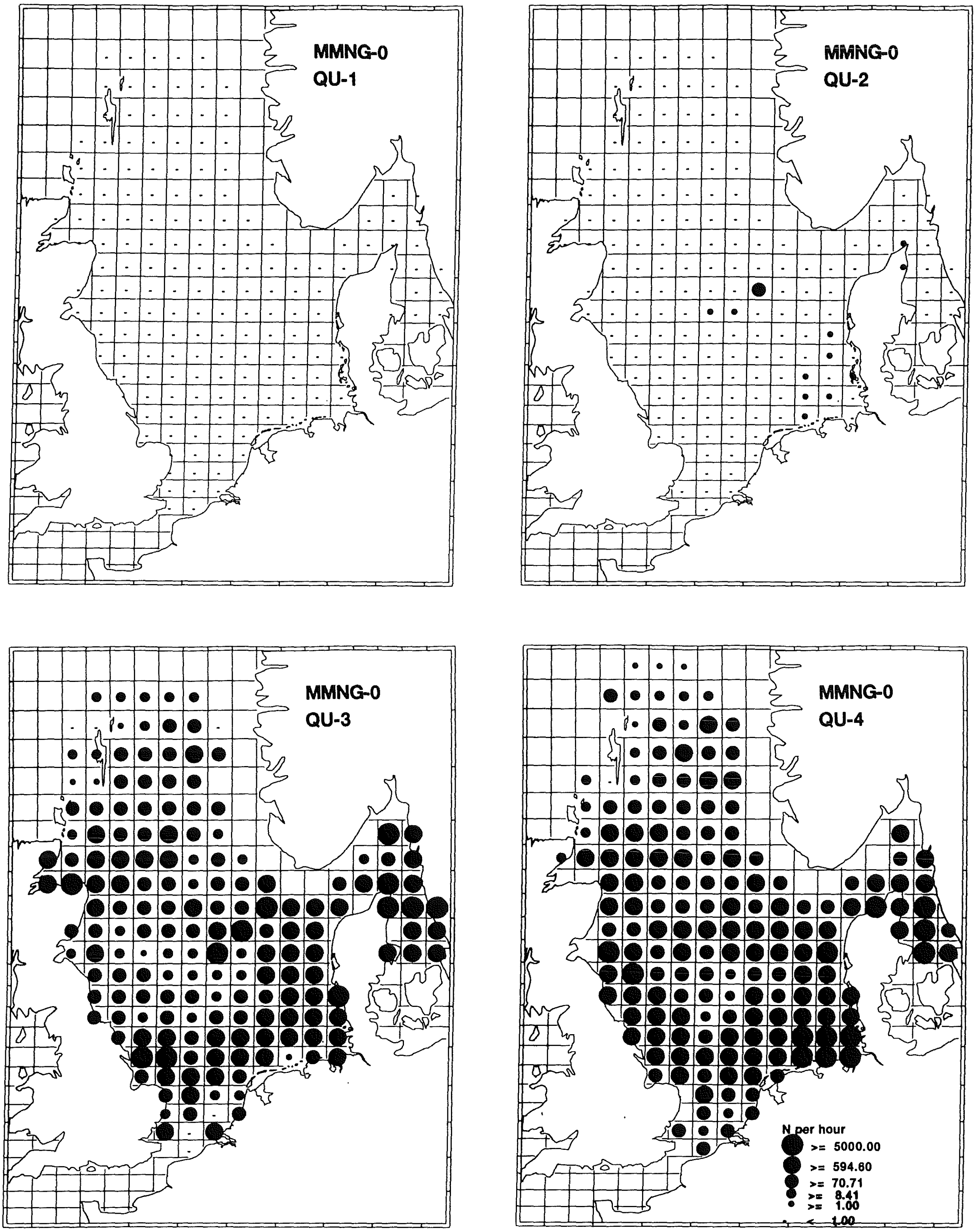

MMNG-0
QU-1
MMNG-0
QU-2
MMNG-0
QU-3
MMNG-0
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 8

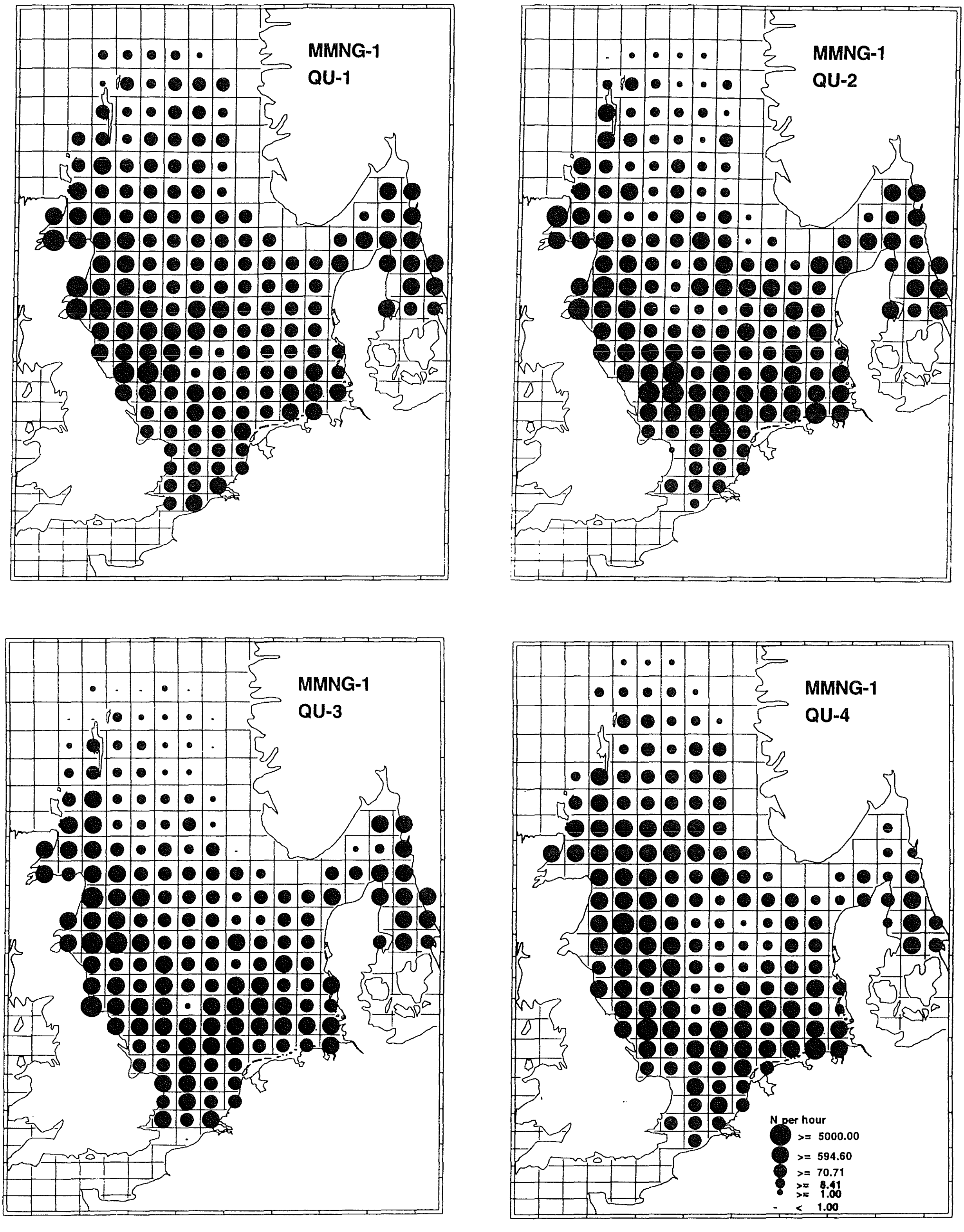

MMNG-1
QU-1
MMNG-1
QU-2
MMNG-1
QU-3
MMNG-1
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 9

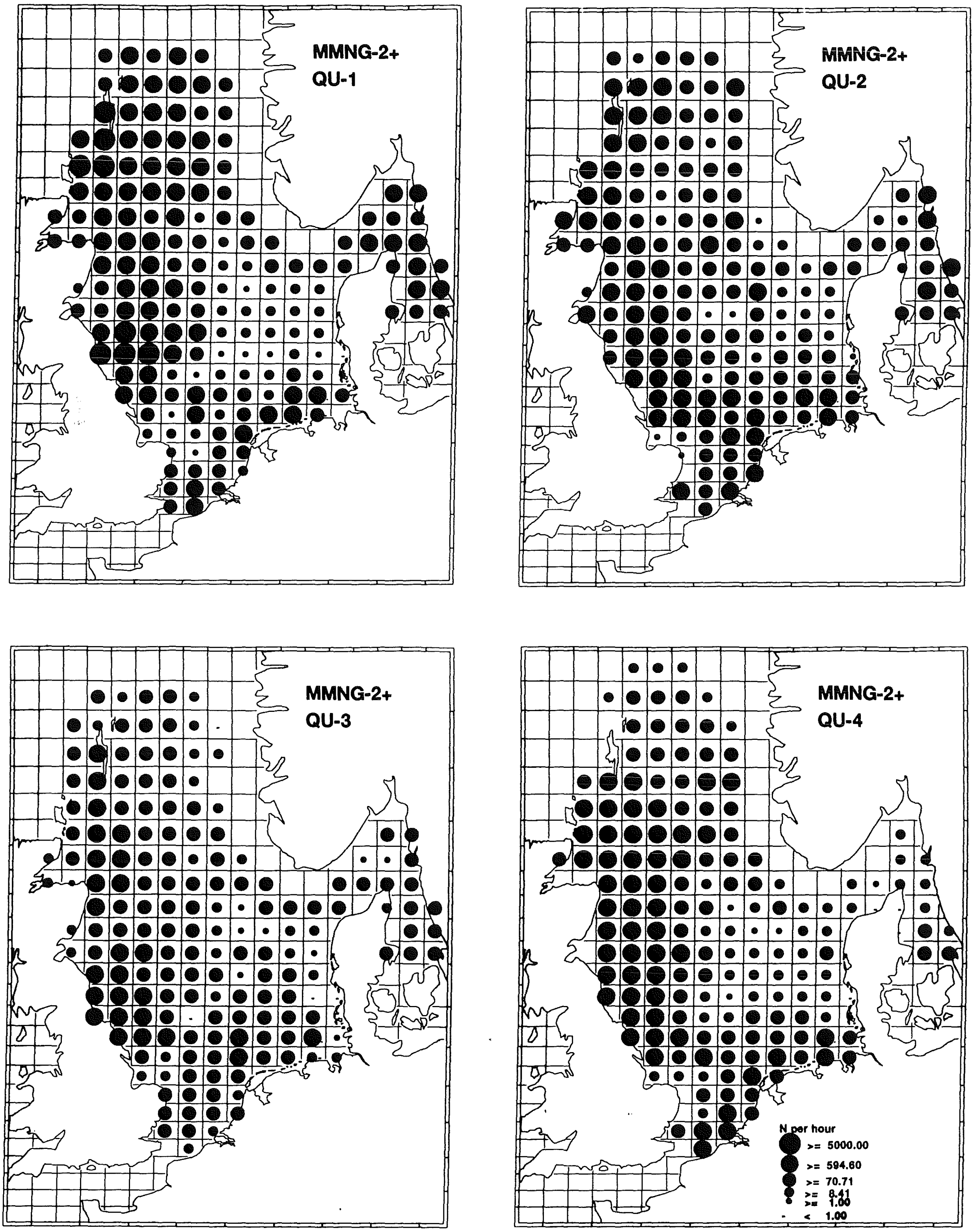

MMNG-2+
QU-1
MMNG-2+
QU-2
MMNG-2+
QU-3
MMNG-2+
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 10

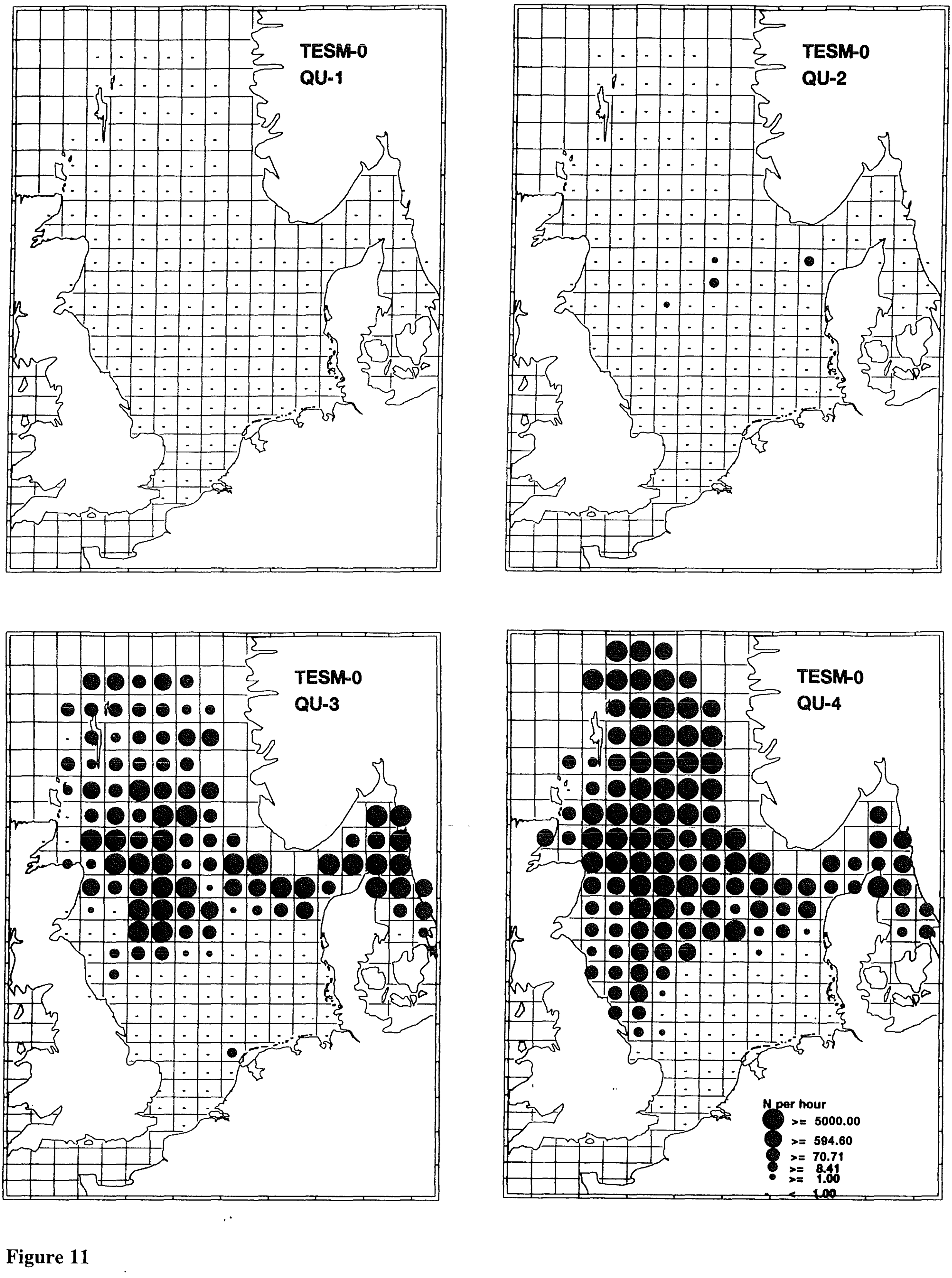

TESM-0
QU-1
TESM-0
QU-2
TESM-0
QU-3
TESM-0
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 11

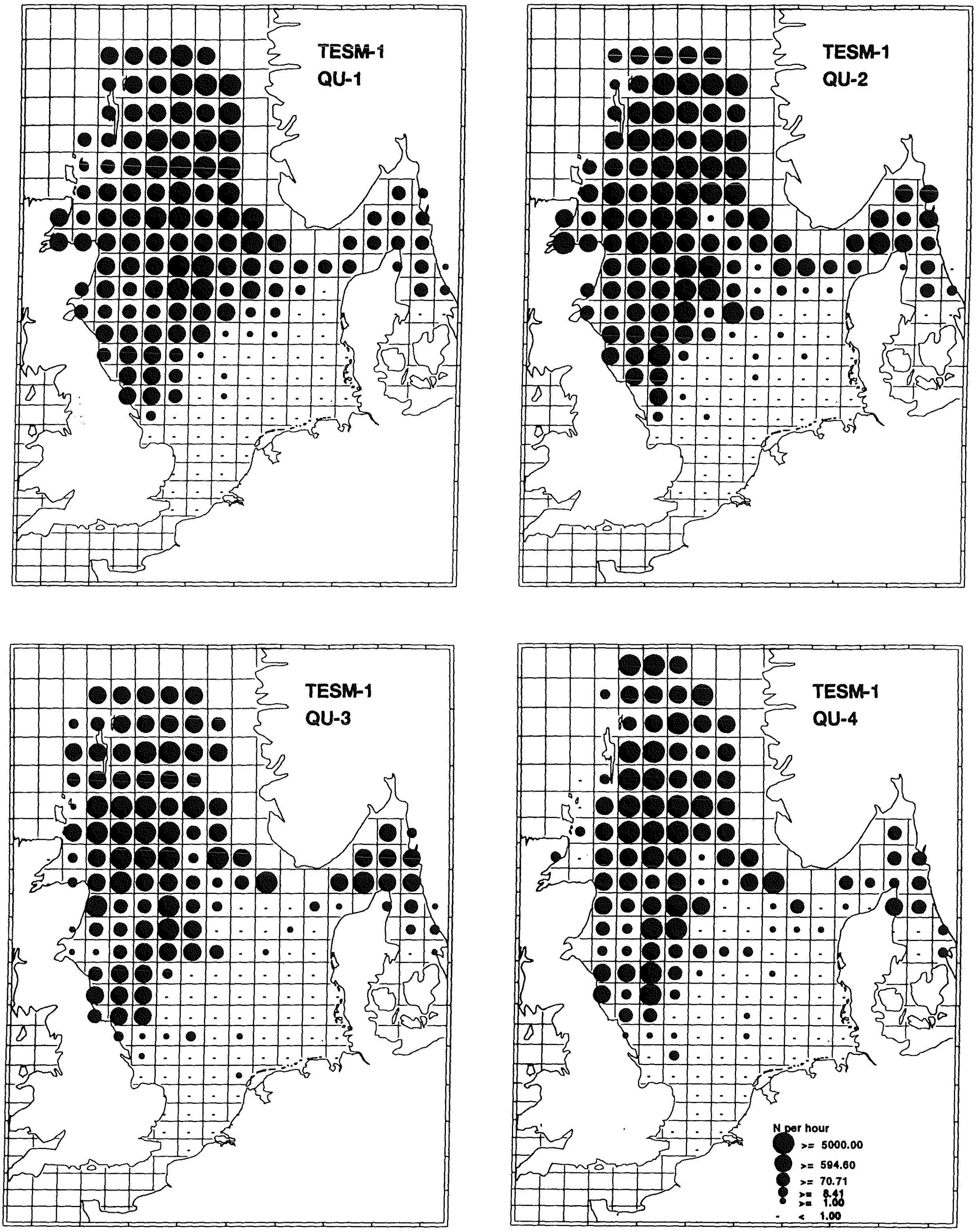

TESM-1
QU-1
TESM-1
QU-2
TESM-1
QU-3
TESM-1
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 12

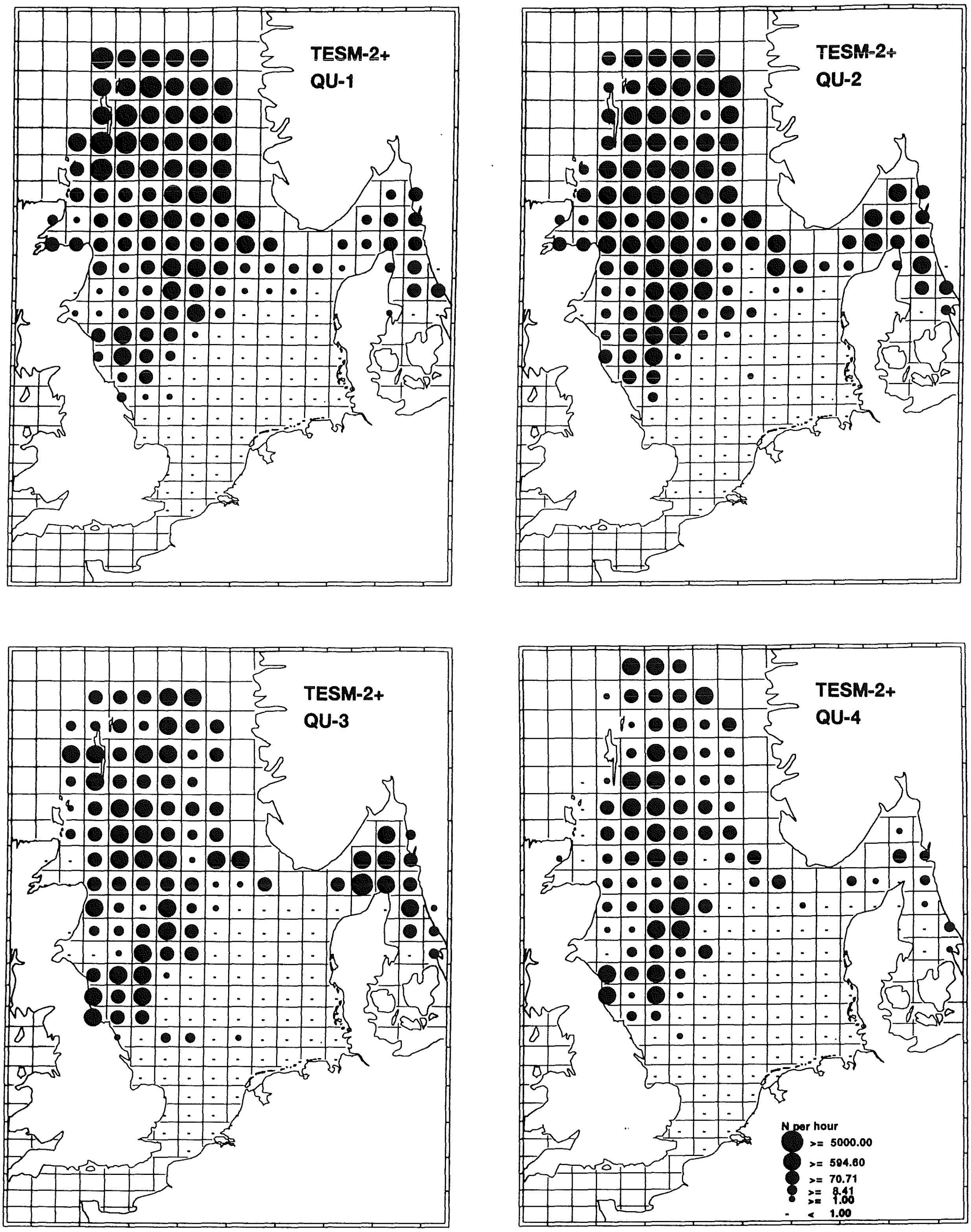

TESM-2+
QU-1
TESM-2+
QU-2
TESM-2+
QU-3
TESM-2+
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
- < 1.00

Figure 13

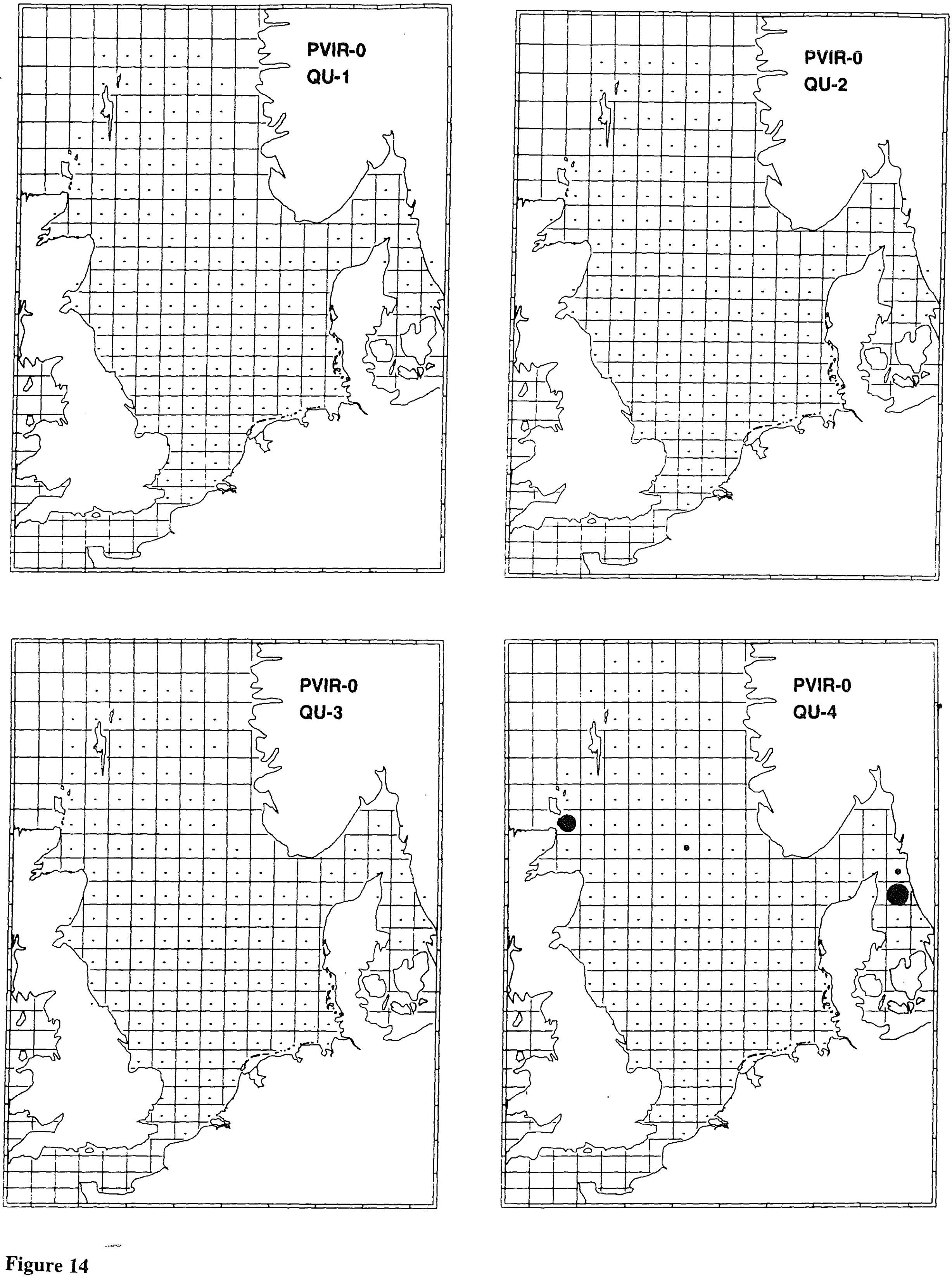


Figure 14

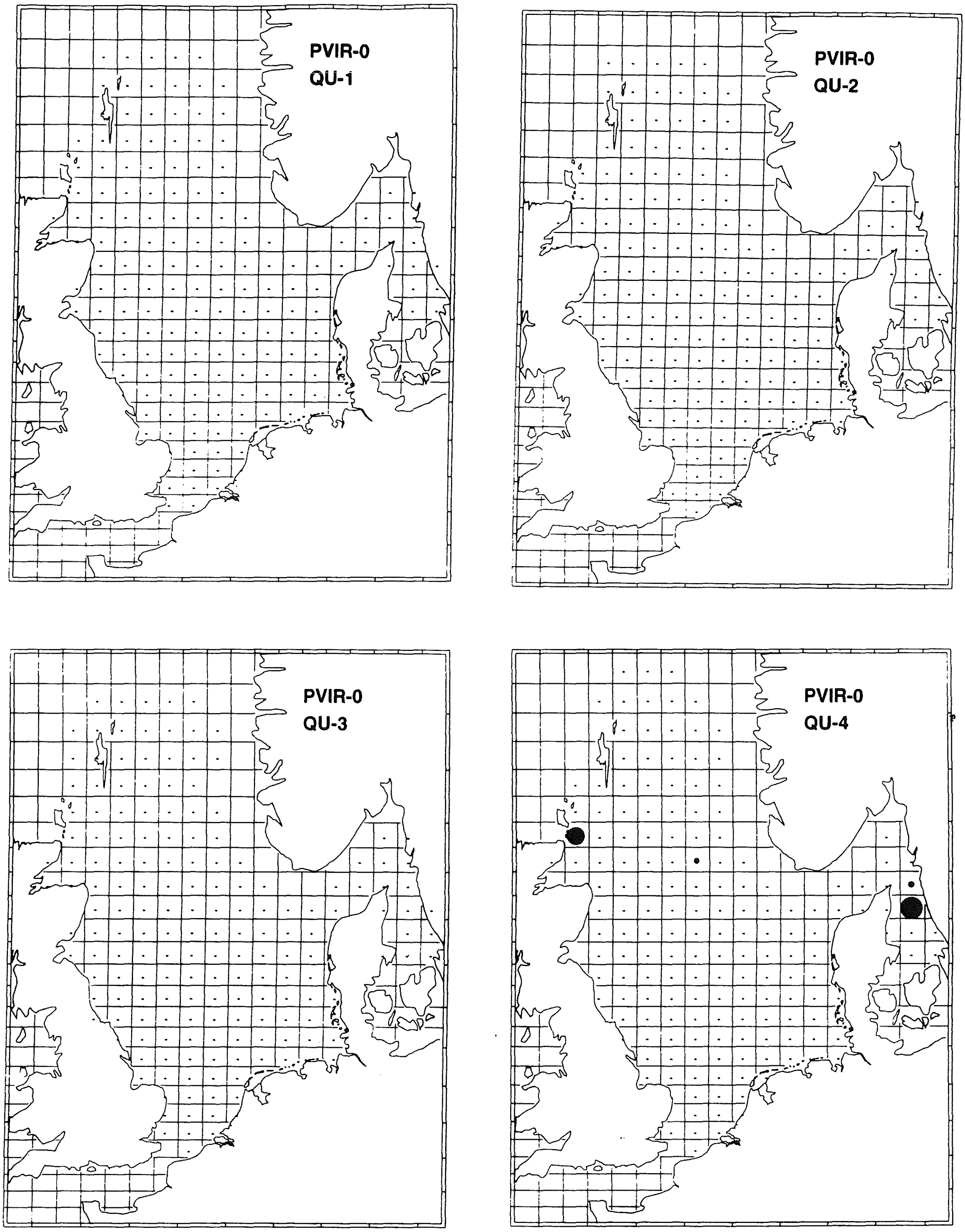


Figure 15

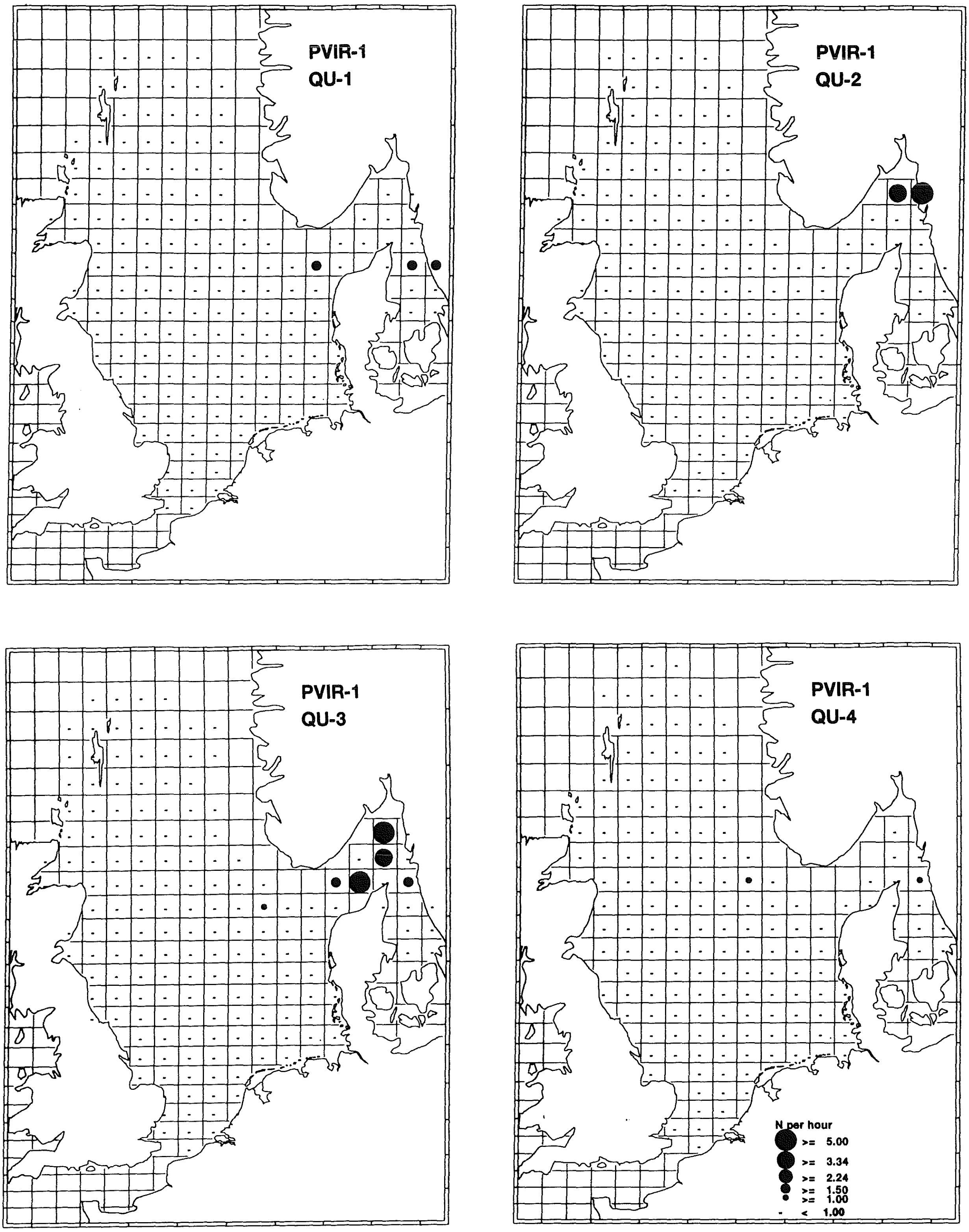

PVIR-1
QU-1
PVIR-1
QU-2
PVIR-1
QU-3
PVIR-1
QU-4
N per hour
>= 5.00
>= 3.34
>= 2.24
>= 1.50
>= 1.00
< 1.00

Figure 16

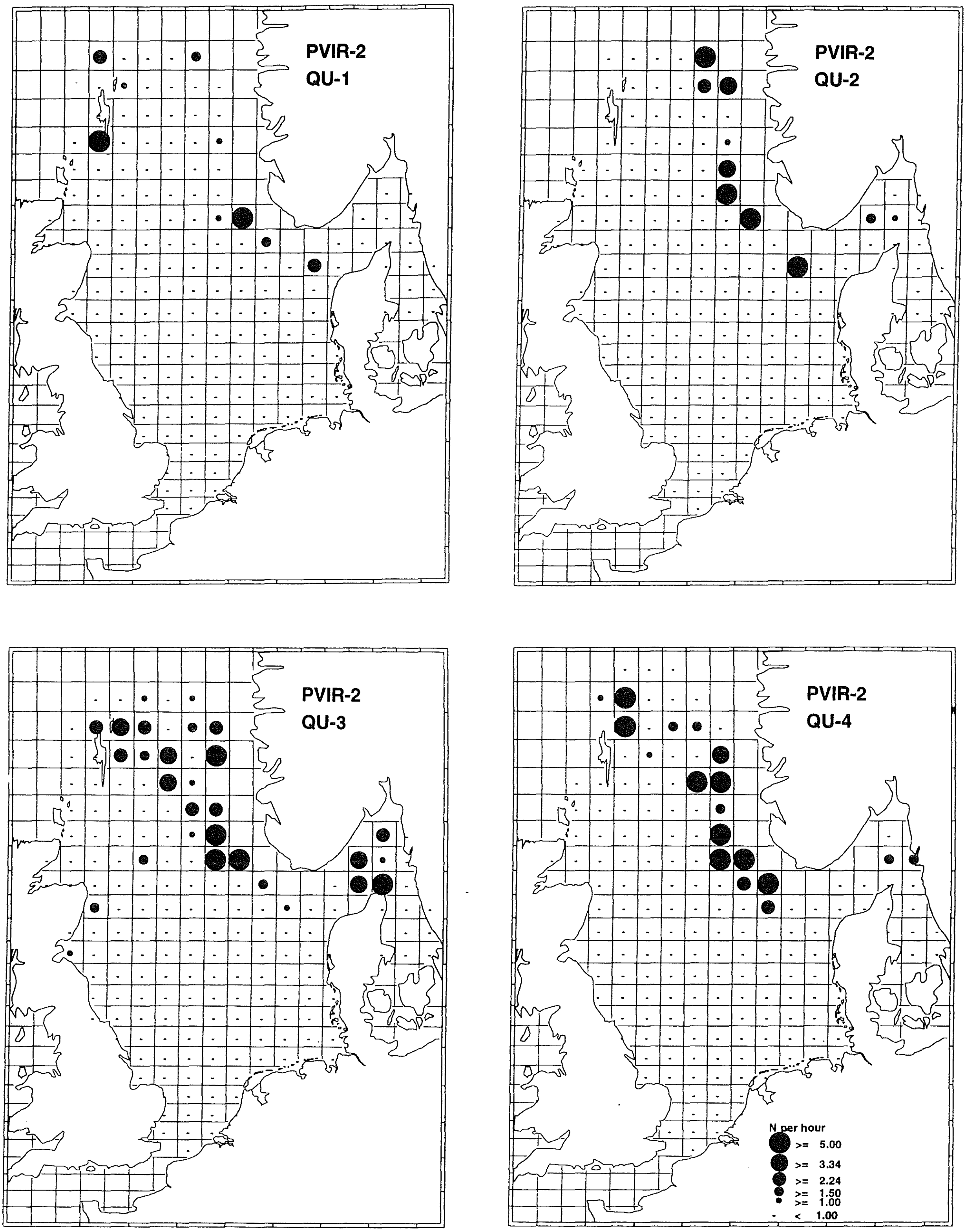

PVIR-2
QU-1
PVIR-2
QU-2
PVIR-2
QU-3
PVIR-2
QU-4
N per hour
>= 5.00
>= 3.34
>= 2.24
>= 1.50
>= 1.00
- < 1.00

Figure 17

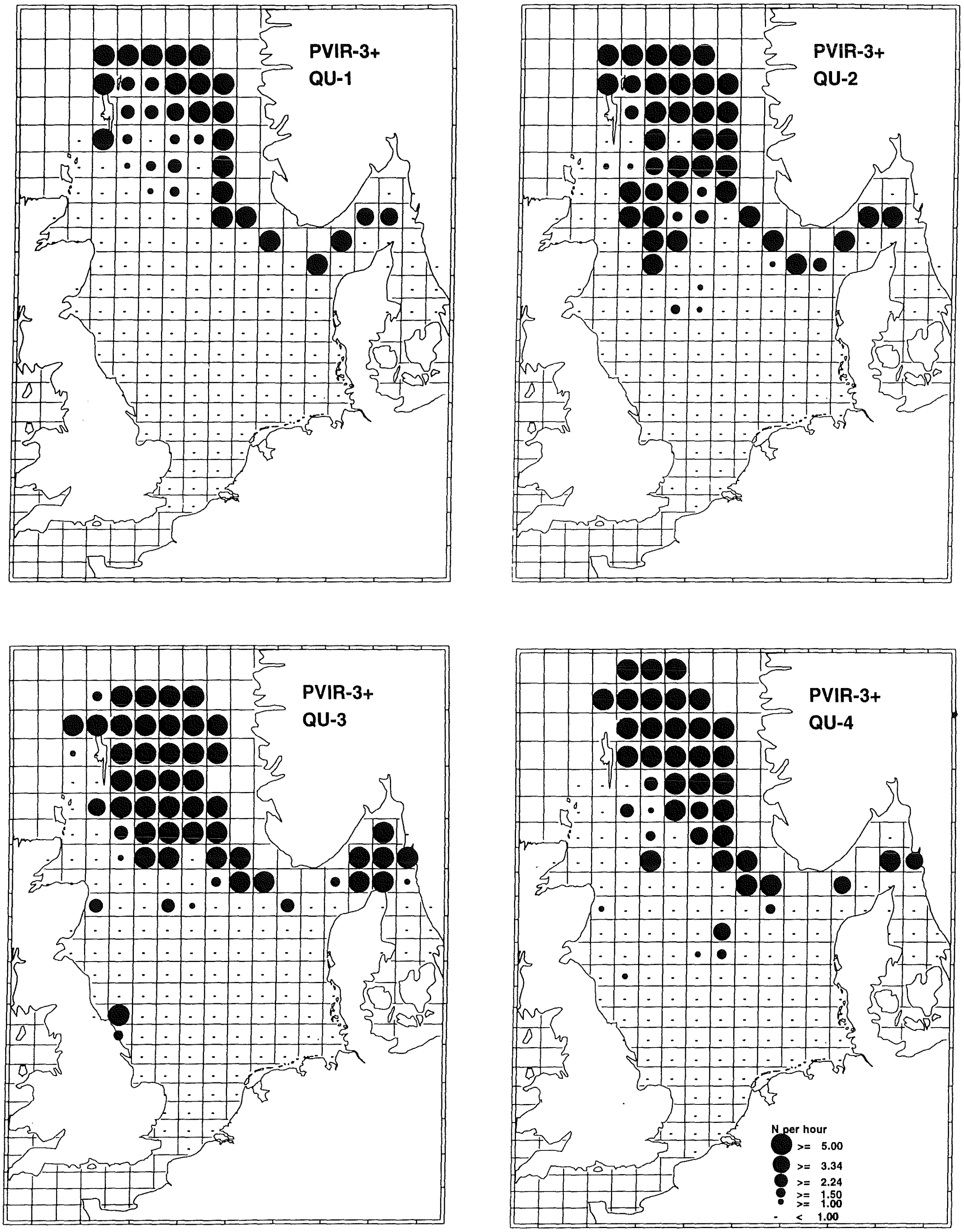

PVIR-3+
QU-1
PVIR-3+
QU-2
PVIR-3+
QU-3
PVIR-3+
QU-4
N per hour
>= 5.00
>= 3.34
>= 2.24
>= 1.50
>= 1.00
- < 1.00

Figure 18

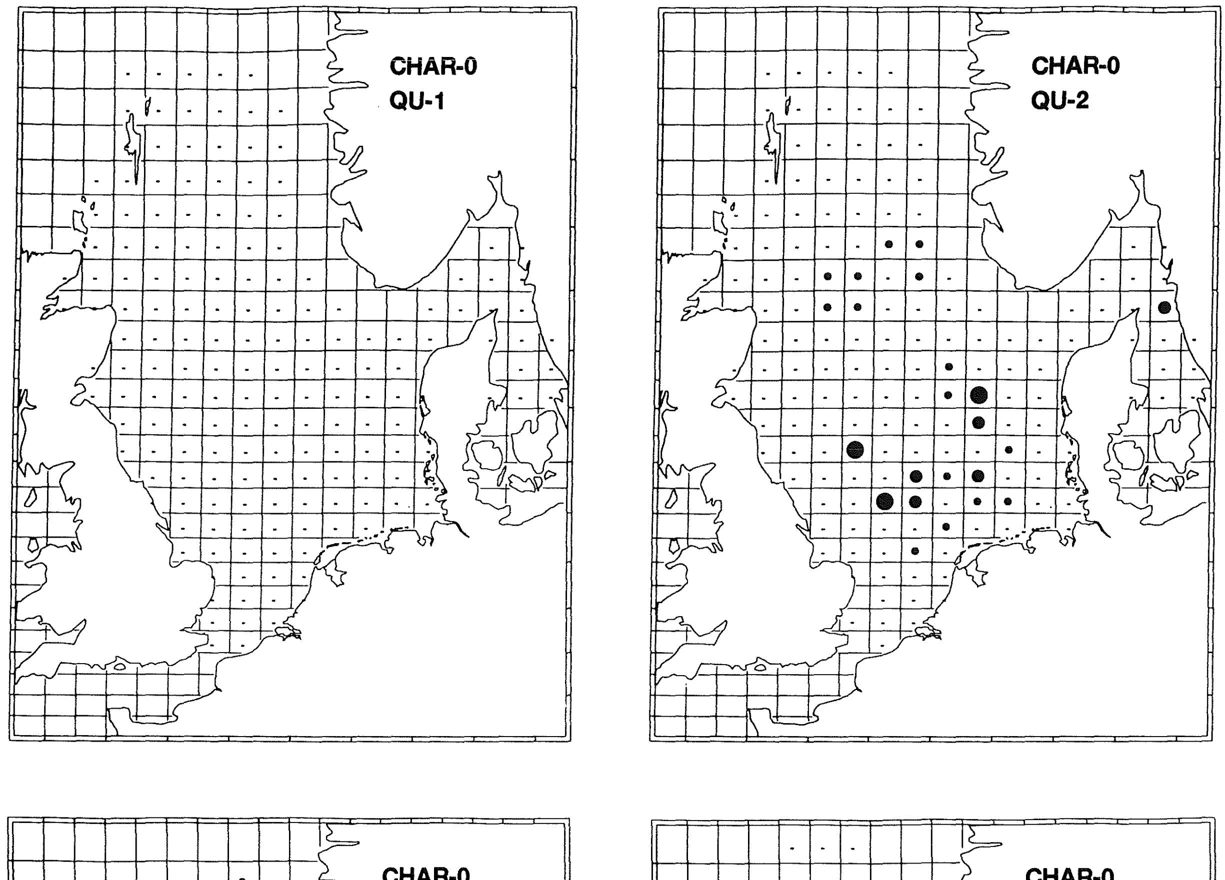

CHAR-0
QU-1
CHAR-0
QU-2
CHAR-0
QU-3
CHAR-0
QU-4
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 19

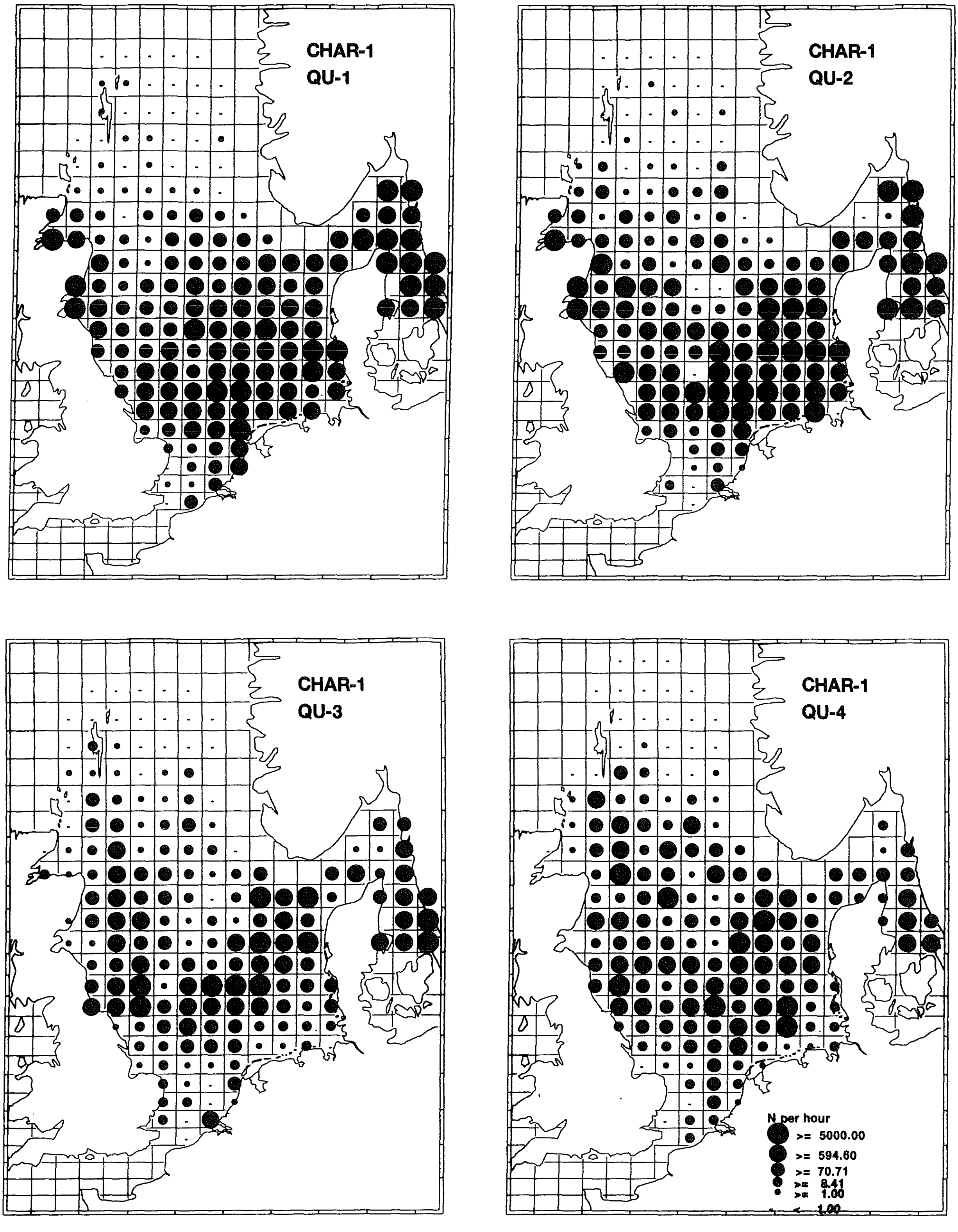

CHAR-1
QU-1
CHAR-1
QU-2
CHAR-1
QU-3
CHAR-1
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 20

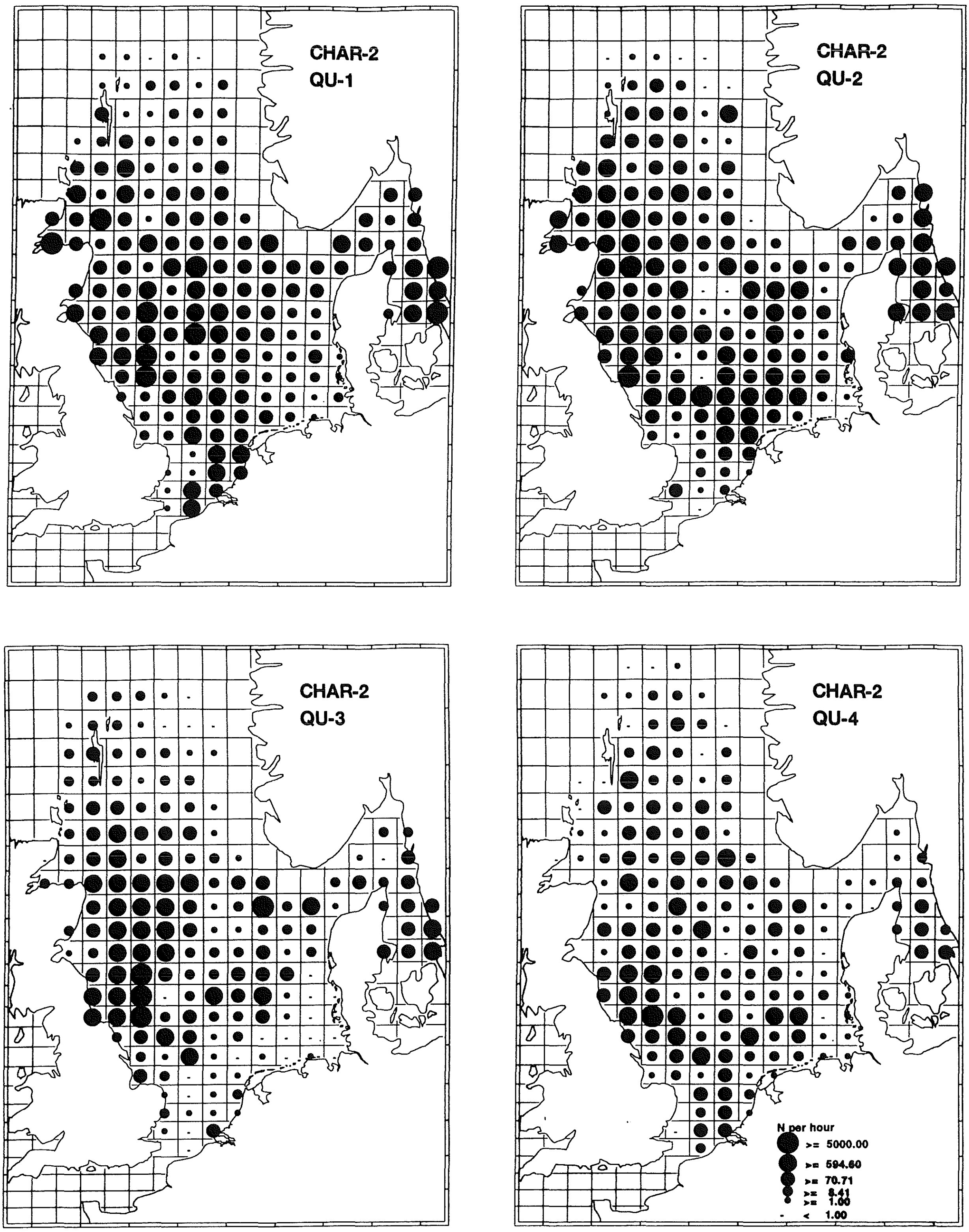

CHAR-2
QU-1
CHAR-2
QU-2
CHAR-2
QU-3
CHAR-2
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 21

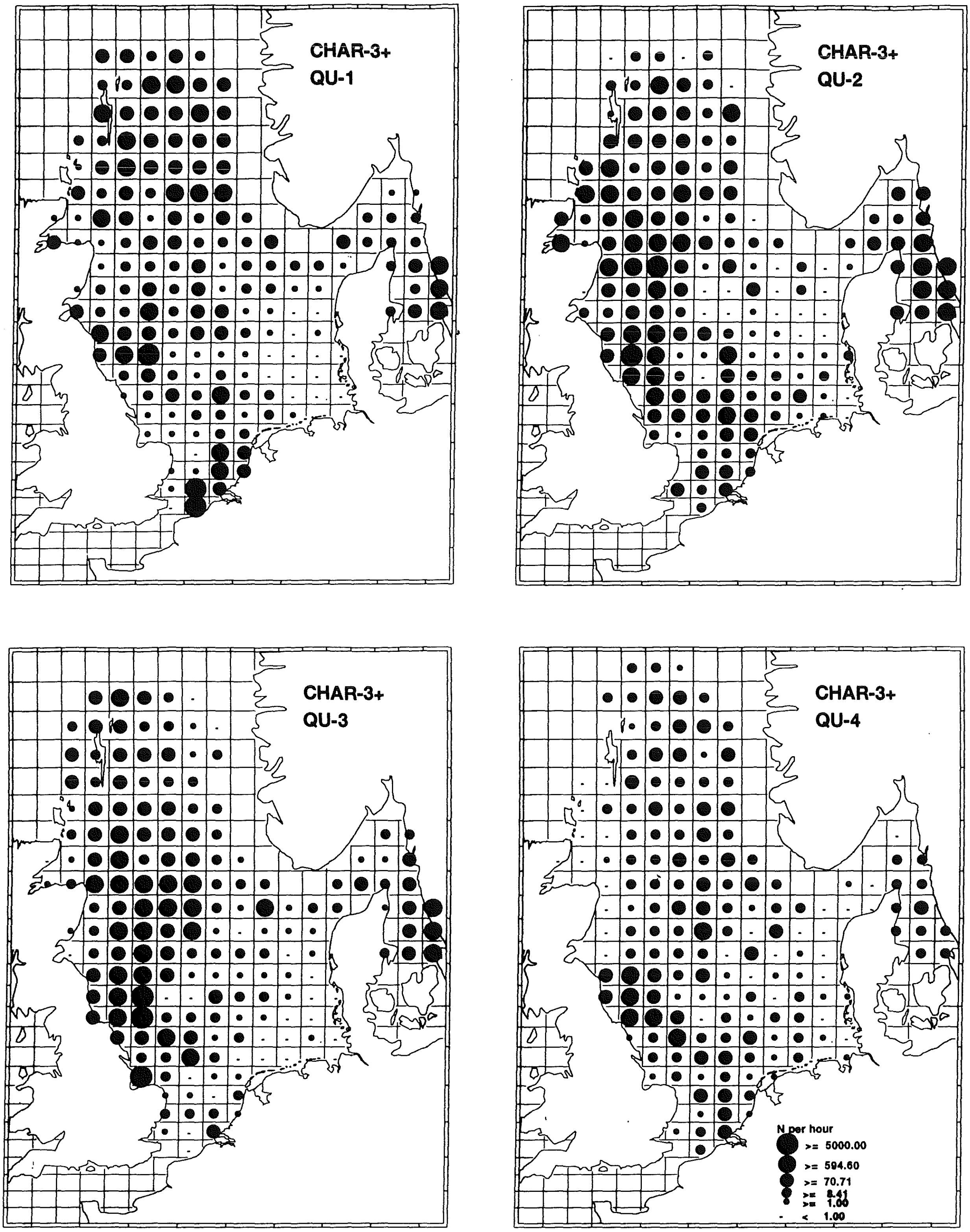

CHAR-3+
QU-1
CHAR-3+
QU-2
CHAR-3+
QU-3
CHAR-3+
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 22

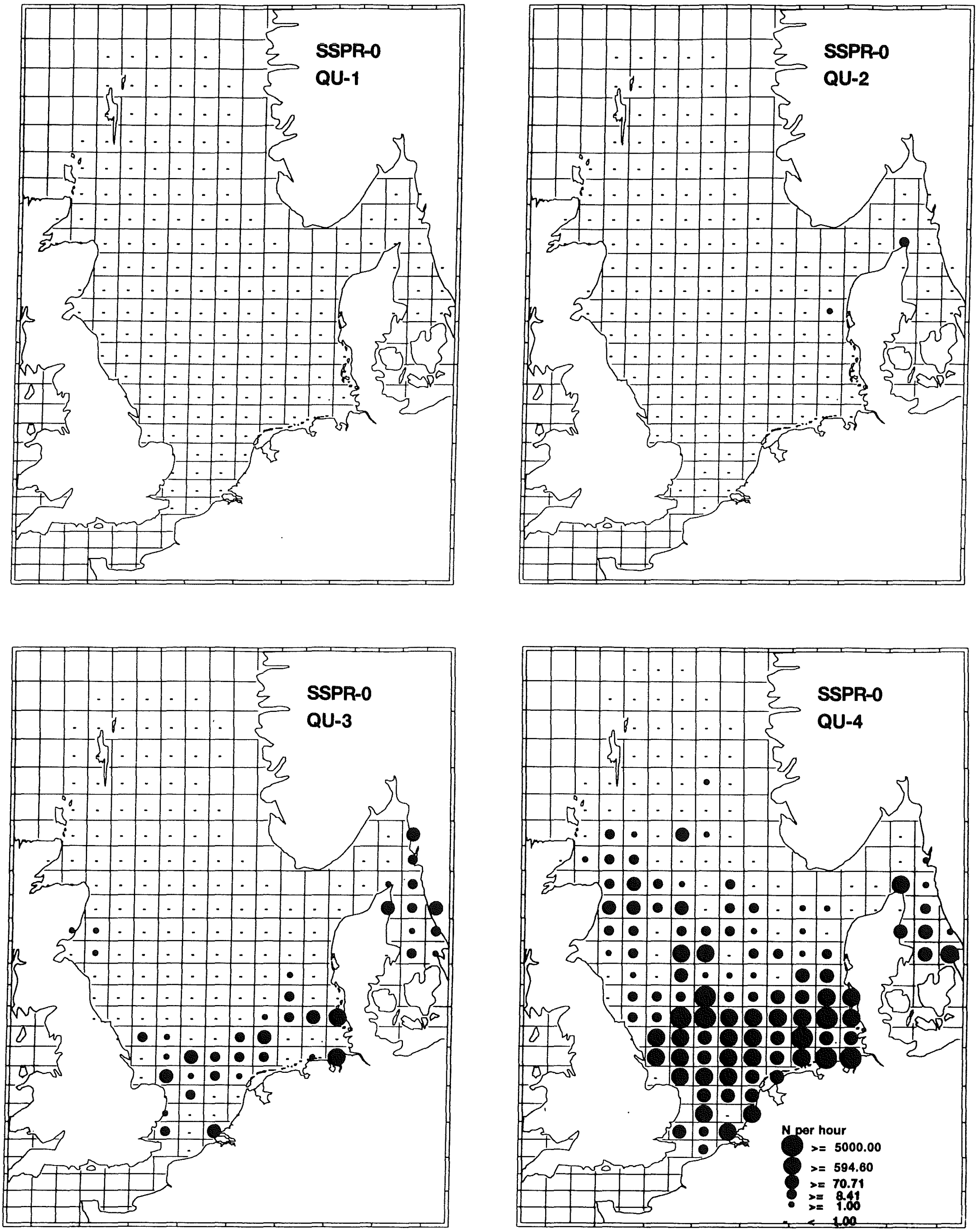

SSPR-0
QU-1
SSPR-0
QU-2
SSPR-0
QU-3
SSPR-0
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 23

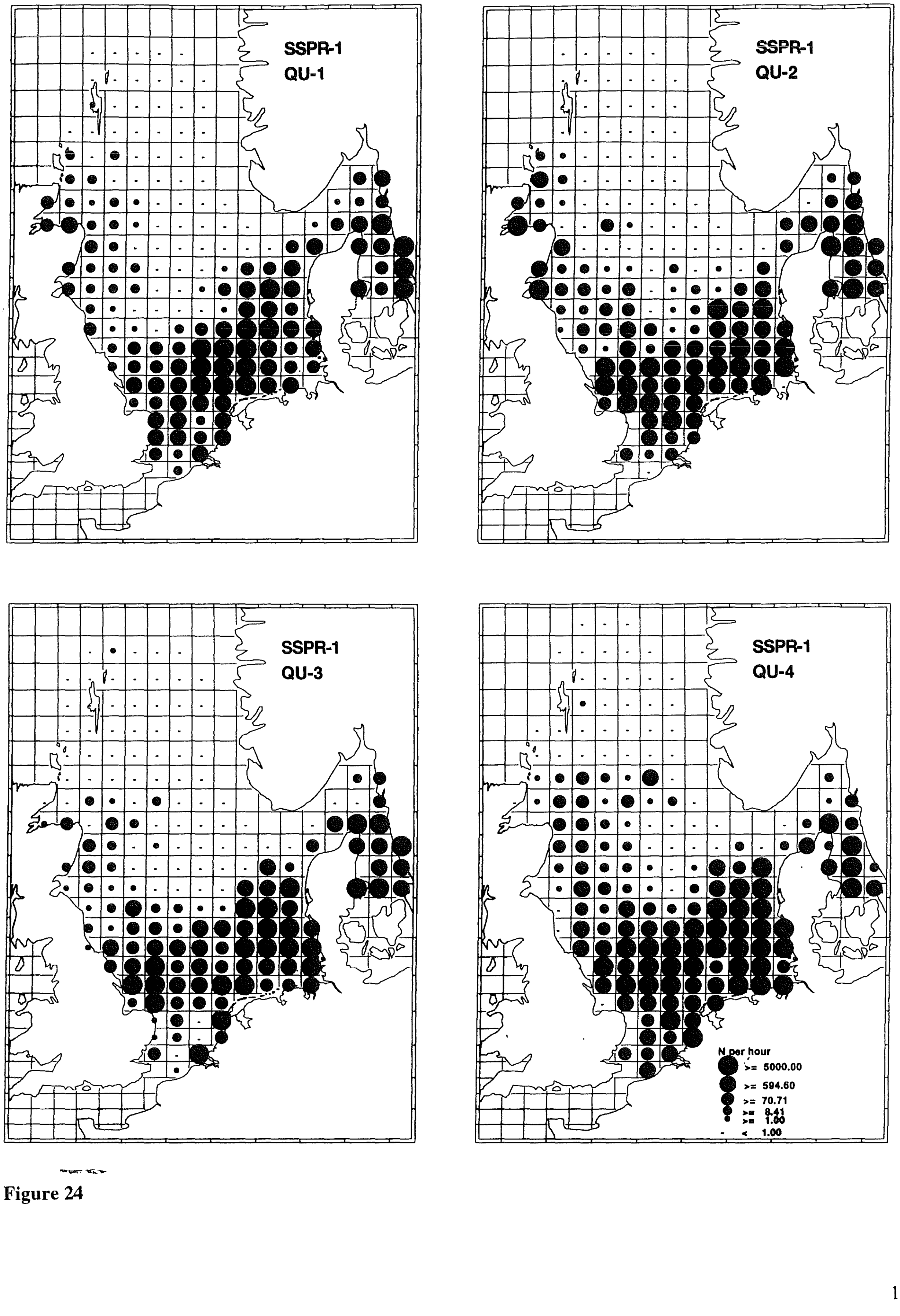

SSPR-1
QU-1
SSPR-1
QU-2
SSPR-1
QU-3
SSPR-1
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 24

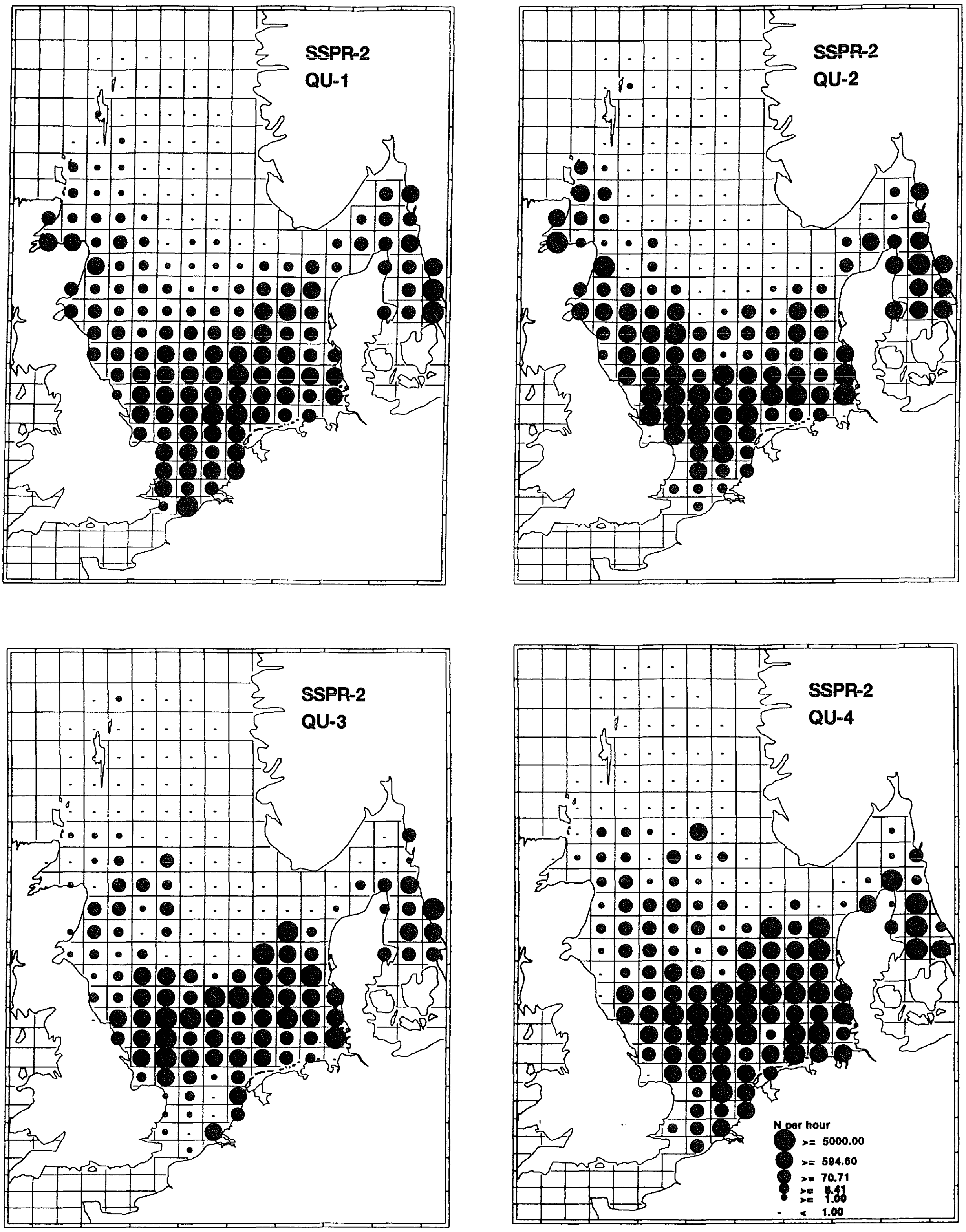

SSPR-2
QU-1
SSPR-2
QU-2
SSPR-2
QU-3
SSPR-2
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 25

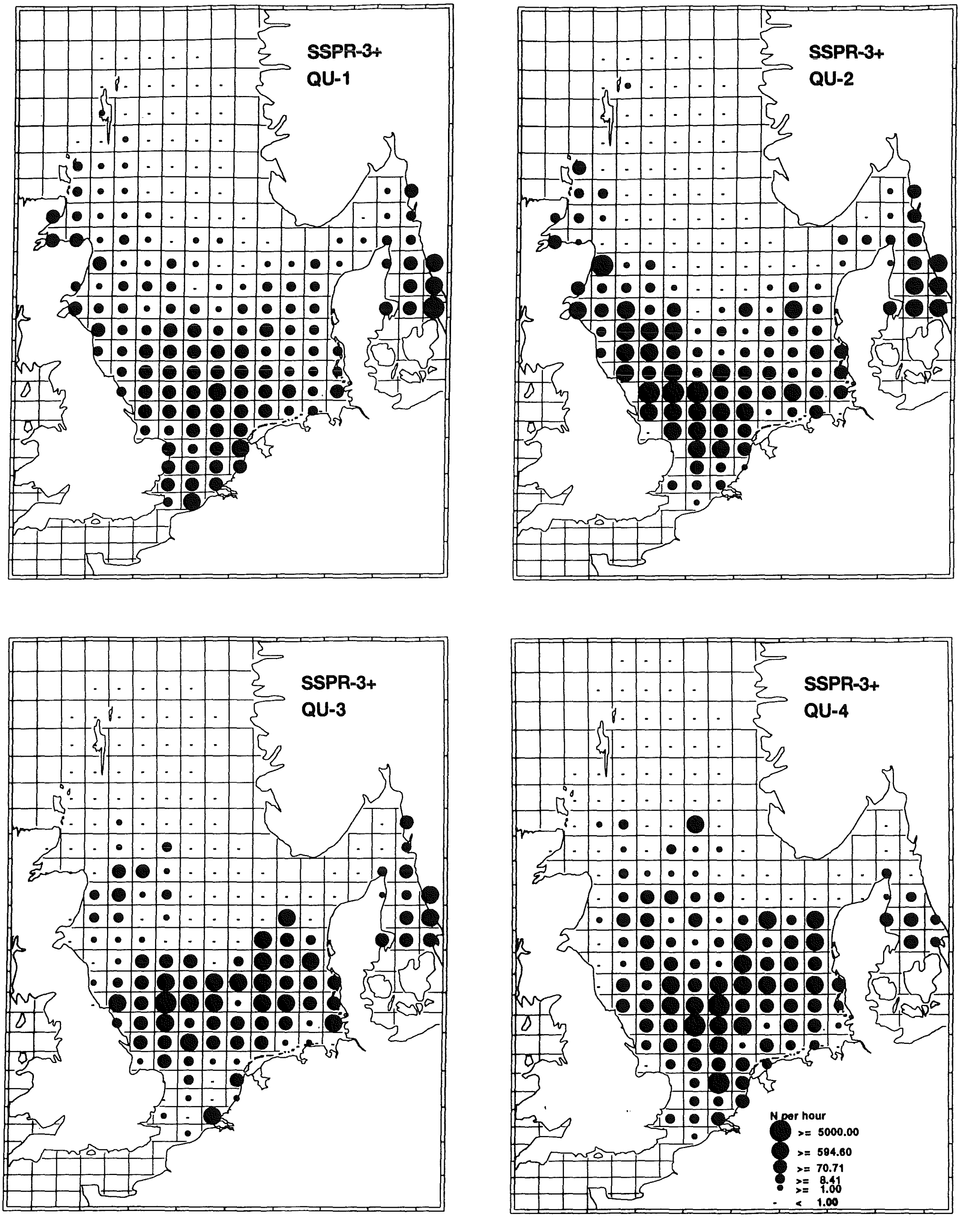

SSPR-3+
QU-1
SSPR-3+
QU-2
SSPR-3+
QU-3
SSPR-3+
QU-4
N per hour
>= 5000.00
>= 594.60
>= 70.71
>= 8.41
>= 1.00
< 1.00

Figure 26

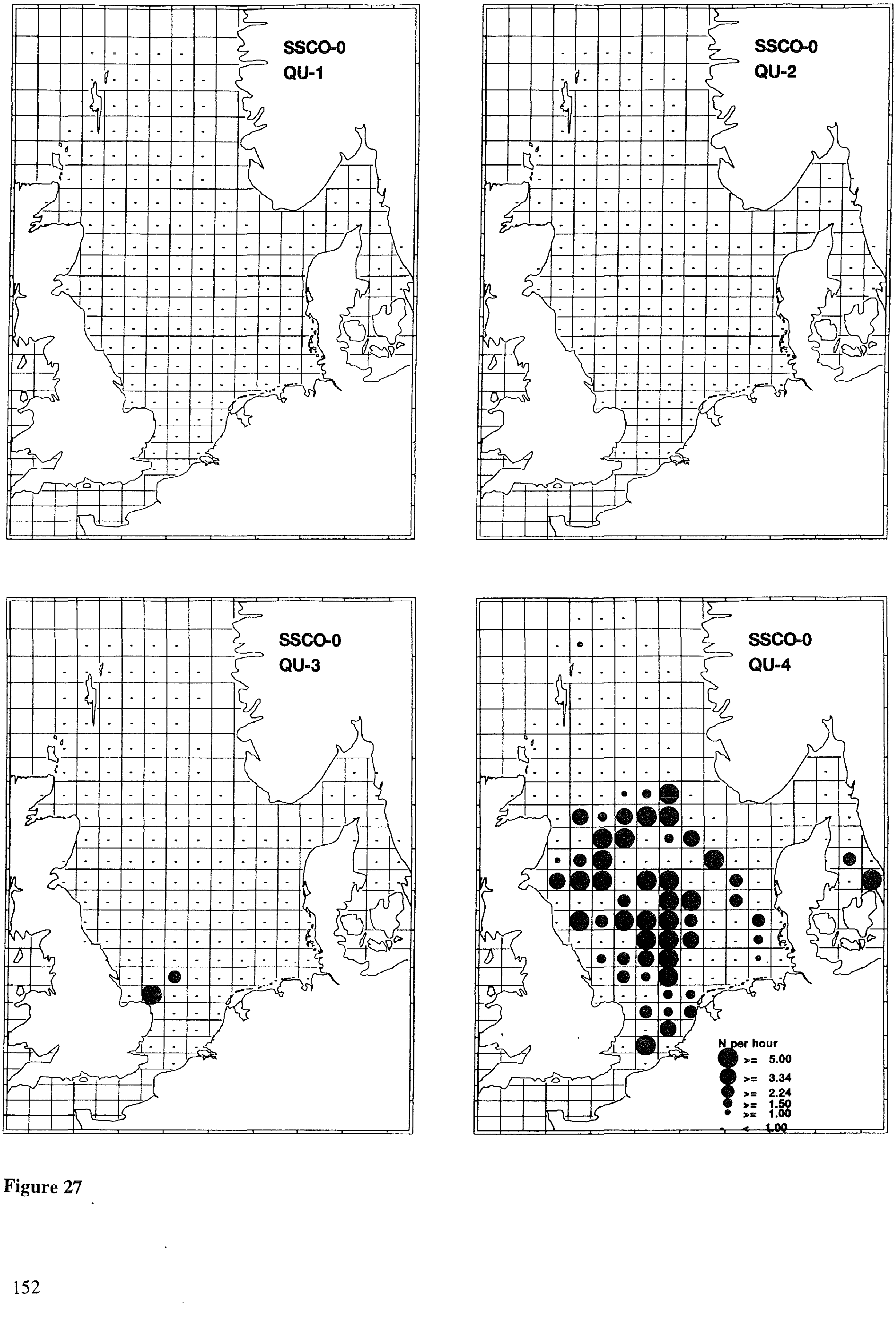

SSCO-0
QU-1
SSCO-0
QU-2
SSCO-0
QU-3
SSCO-0
QU-4
N per hour
>= 5.00
>= 3.34
>= 2.24
>= 1.50
>= 1.00
< 1.00

Figure 27

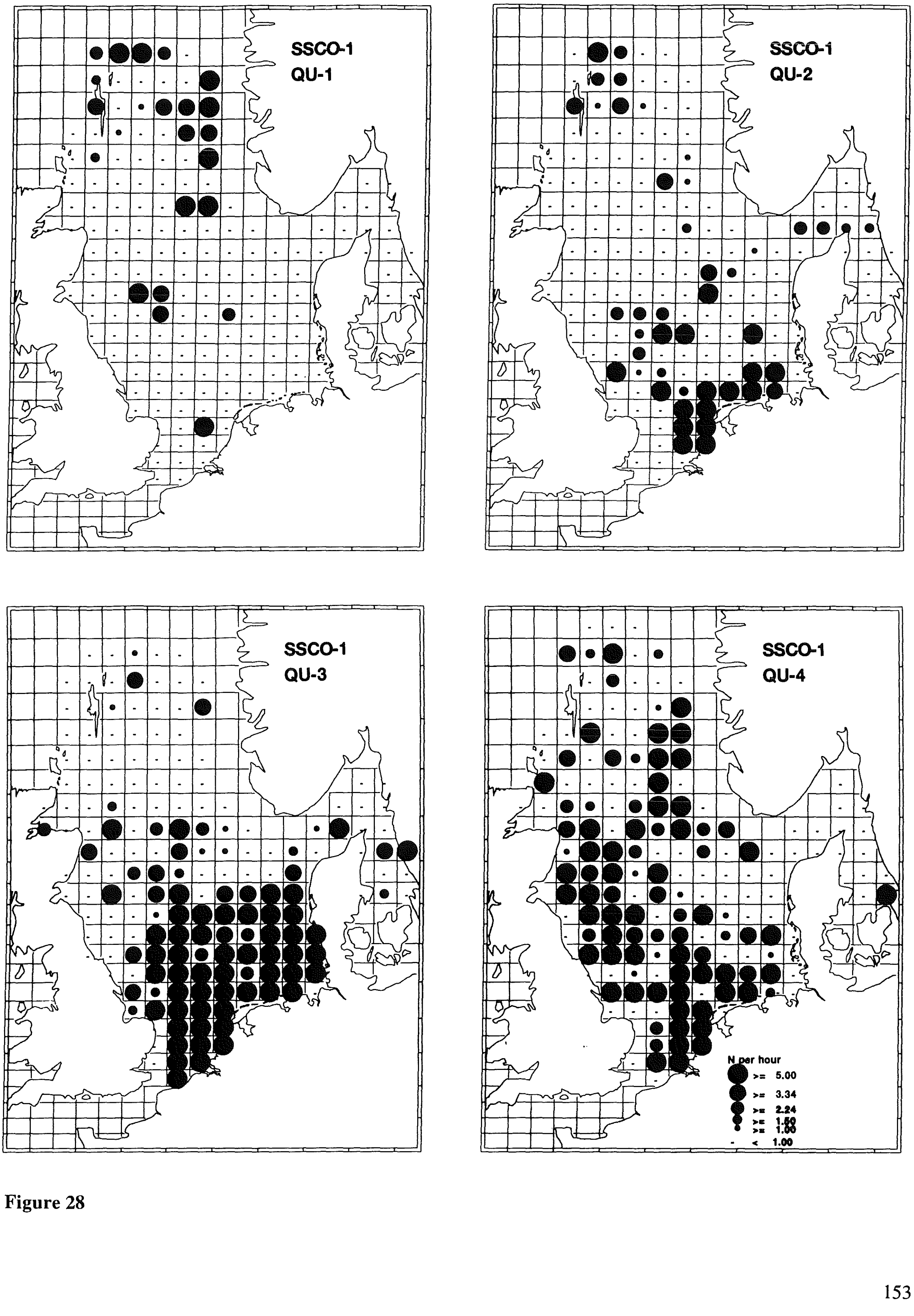

SSCO-1
QU-1
SSCO-1
QU-2
SSCO-1
QU-3
SSCO-1
QU-4
N per hour
>= 5.00
>= 3.34
>= 2.24
>= 1.50
>= 1.00
< 1.00

Figure 28

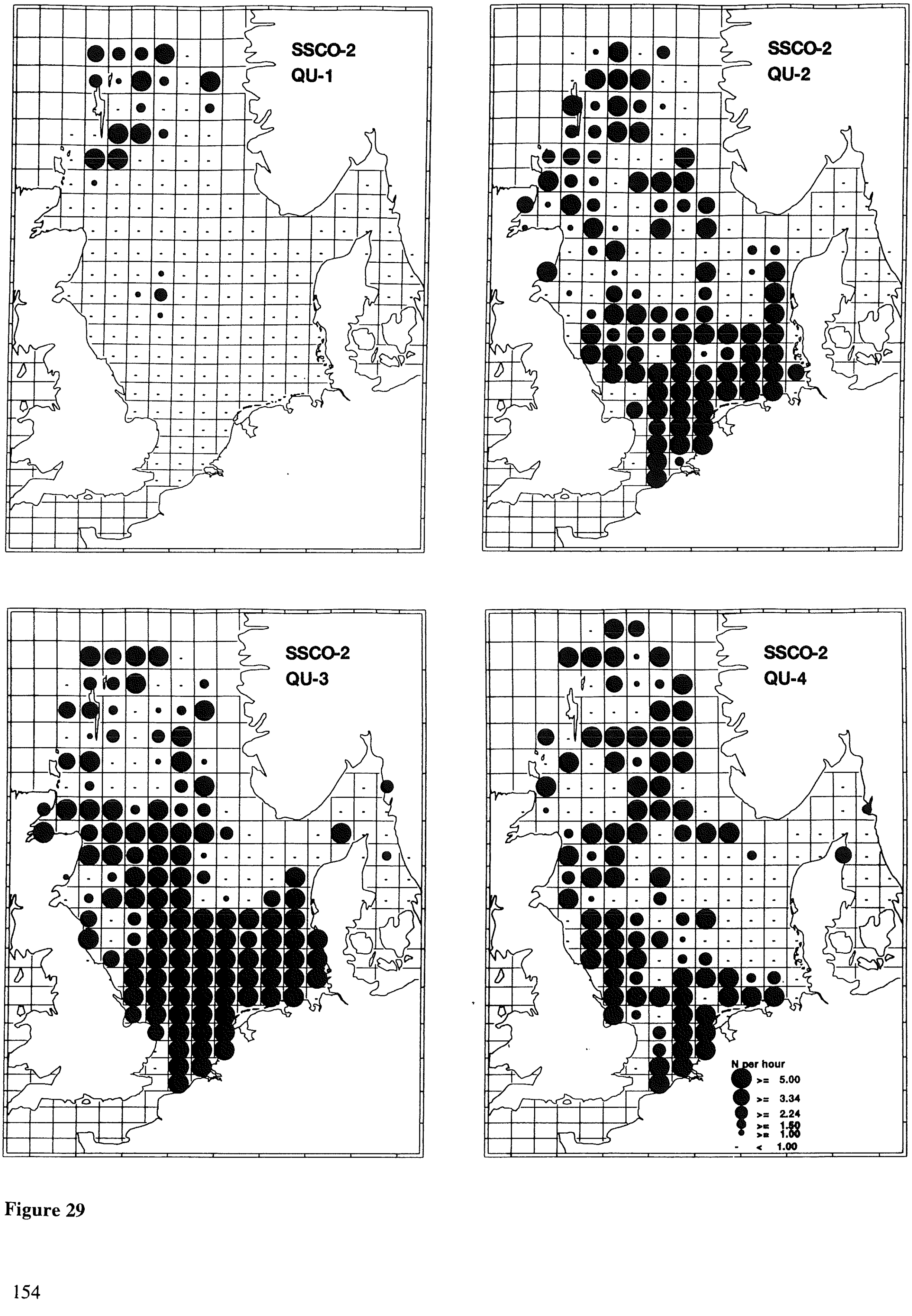

SSCO-2
QU-1
SSCO-2
QU-2
SSCO-2
QU-3
SSCO-2
QU-4
N per hour
>= 5.00
>= 3.34
>= 2.24
>= 1.50
>= 1.00
< 1.00

Figure 29

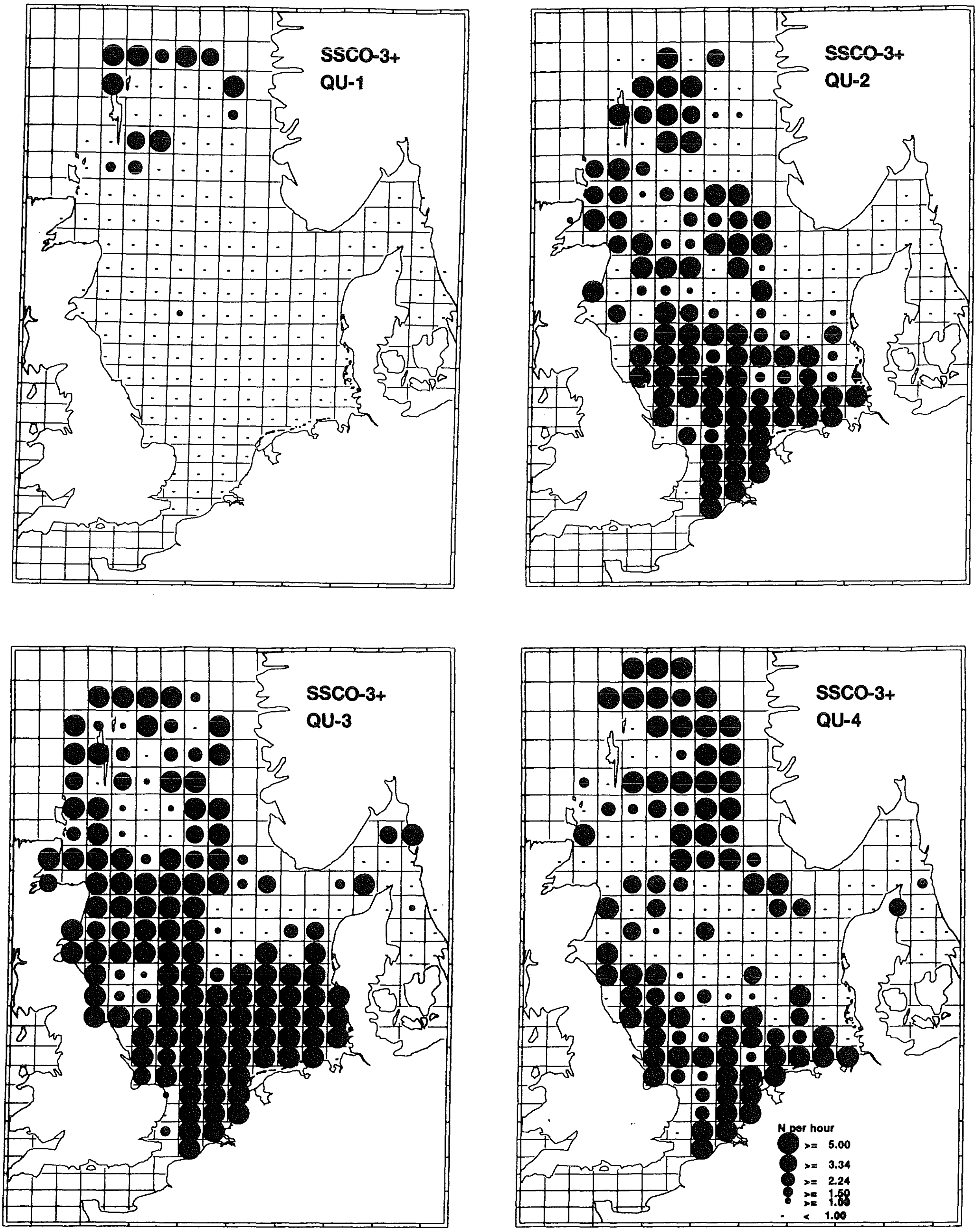

SSCO-3+
QU-1
SSCO-3+
QU-2
SSCO-3+
QU-3
SSCO-3+
QU-4
N per hour
>= 5.00
>= 3.34
>= 2.24
>= 1.50
>= 1.00
< 1.00

Figure 30

ANNEX 2

Spearmen Rank Correlation values showing the overlap between temporal units (year, quarter) per species, per age-group. (YEARQU.XLS)

Spearman Rank Correlation values showing the overlap between species and age-groups per year and per quarter. (SPECAGE.XLS)

Herring

Age 0	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1991Q2	.	1	0.19	0.27	.	0.38	0.21	0.2	.	0.34	0.3	0.2	.	-0.05	0.17	0.25	.	0.2	0.06	0.32
Y1991Q3	.	0.19	1	0.75	.	0.38	0.79	0.72	.	0.08	0.76	0.77	.	0.24	0.66	0.72	.	0.21	0.65	0.85
Y1991Q4	.	0.27	0.75	1	.	0.26	0.75	0.83	.	0.24	0.79	0.89	.	0.06	0.76	0.84	.	0.38	0.54	0.85
Y1992Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1992Q2	.	0.38	0.38	0.26	.	1	0.43	0.44	.	0.02	0.45	0.36	.	0.46	0.33	0.34	.	0	0.32	0.43
Y1992Q3	.	0.21	0.79	0.75	.	0.43	1	0.75	.	0.07	0.9	0.82	.	0.31	0.78	0.79	.	0.2	0.71	0.8
Y1992Q4	.	0.2	0.72	0.83	.	0.44	0.75	1	.	0.18	0.77	0.82	.	0.14	0.67	0.81	.	0.32	0.54	0.8
Y1993Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1993Q2	.	0.34	0.08	0.24	.	0.02	0.07	0.18	.	1	0.13	0.15	.	-0.06	-0.02	0.13	.	0.09	0.15	0.17
Y1993Q3	.	0.3	0.76	0.79	.	0.45	0.9	0.77	.	0.13	1	0.86	.	0.29	0.77	0.84	.	0.23	0.71	0.82
Y1993Q4	.	0.2	0.77	0.89	.	0.36	0.82	0.82	.	0.15	0.86	1	.	0.12	0.78	0.85	.	0.37	0.65	0.85
Y1994Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1994Q2	.	-0.05	0.24	0.06	.	0.46	0.31	0.14	.	-0.06	0.29	0.12	.	1	0.21	0.05	.	-0.18	0.31	0.18
Y1994Q3	.	0.17	0.66	0.76	.	0.33	0.78	0.67	.	-0.02	0.77	0.78	.	0.21	1	0.75	.	0.3	0.54	0.69
Y1994Q4	.	0.25	0.72	0.84	.	0.34	0.79	0.81	.	0.13	0.84	0.85	.	0.05	0.75	1	.	0.35	0.58	0.84
Y1995Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1995Q2	.	0.2	0.21	0.38	.	0	0.2	0.32	.	0.09	0.23	0.37	.	-0.18	0.3	0.35	.	1	0.03	0.33
Y1995Q3	.	0.06	0.65	0.54	.	0.32	0.71	0.54	.	0.15	0.71	0.65	.	0.31	0.54	0.58	.	0.03	1	0.65
Y1995Q4	.	0.32	0.85	0.85	.	0.43	0.8	0.8	.	0.17	0.82	0.85	.	0.18	0.69	0.84	.	0.33	0.65	1

Herring

Age 1	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.8	0.66	0.81	0.81	0.83	0.6	0.57	0.81	0.81	0.59	0.18	0.82	0.81	0.63	0.57	0.83	0.58	0.36	0.38
Y1991Q2	0.8	1	0.75	0.75	0.75	0.77	0.62	0.51	0.77	0.76	0.7	0.27	0.75	0.73	0.71	0.7	0.7	0.65	0.42	0.36
Y1991Q3	0.66	0.75	1	0.65	0.61	0.65	0.76	0.71	0.68	0.61	0.75	0.49	0.65	0.7	0.8	0.77	0.69	0.68	0.63	0.64
Y1991Q4	0.81	0.75	0.65	1	0.7	0.75	0.71	0.67	0.67	0.59	0.63	0.35	0.74	0.58	0.71	0.66	0.69	0.47	0.43	0.38
Y1992Q1	0.81	0.75	0.61	0.7	1	0.75	0.58	0.5	0.85	0.79	0.61	0.17	0.88	0.77	0.61	0.48	0.73	0.74	0.46	0.35
Y1992Q2	0.83	0.77	0.65	0.75	0.75	1	0.69	0.65	0.67	0.71	0.52	0.17	0.79	0.76	0.62	0.56	0.74	0.56	0.32	0.43
Y1992Q3	0.6	0.62	0.76	0.71	0.58	0.69	1	0.76	0.55	0.46	0.7	0.53	0.69	0.6	0.79	0.72	0.63	0.58	0.68	0.66
Y1992Q4	0.57	0.51	0.71	0.67	0.5	0.65	0.76	1	0.49	0.47	0.55	0.56	0.62	0.56	0.64	0.59	0.62	0.54	0.56	0.67
Y1993Q1	0.81	0.77	0.68	0.67	0.85	0.67	0.55	0.49	1	0.9	0.71	0.23	0.89	0.81	0.7	0.61	0.81	0.71	0.55	0.39
Y1993Q2	0.81	0.76	0.61	0.59	0.79	0.71	0.46	0.47	0.9	1	0.66	0.24	0.82	0.82	0.61	0.57	0.81	0.68	0.48	0.35
Y1993Q3	0.59	0.7	0.75	0.63	0.61	0.52	0.7	0.55	0.71	0.66	1	0.52	0.68	0.58	0.75	0.75	0.6	0.63	0.71	0.58
Y1993Q4	0.18	0.27	0.49	0.35	0.17	0.17	0.53	0.56	0.23	0.24	0.52	1	0.28	0.18	0.51	0.62	0.34	0.38	0.55	0.53
Y1994Q1	0.82	0.75	0.65	0.74	0.88	0.79	0.69	0.62	0.89	0.82	0.68	0.28	1	0.81	0.7	0.6	0.85	0.75	0.59	0.47
Y1994Q2	0.81	0.73	0.7	0.58	0.77	0.76	0.6	0.56	0.81	0.82	0.58	0.18	0.81	1	0.67	0.55	0.84	0.7	0.43	0.45
Y1994Q3	0.63	0.71	0.8	0.71	0.61	0.62	0.79	0.64	0.7	0.61	0.75	0.51	0.7	0.67	1	0.77	0.65	0.61	0.67	0.56
Y1994Q4	0.57	0.7	0.77	0.66	0.48	0.56	0.72	0.59	0.61	0.57	0.75	0.62	0.6	0.55	0.77	1	0.63	0.51	0.65	0.6
Y1995Q1	0.83	0.7	0.69	0.69	0.73	0.74	0.63	0.62	0.81	0.81	0.6	0.34	0.85	0.84	0.65	0.63	1	0.65	0.48	0.52
Y1995Q2	0.58	0.65	0.68	0.47	0.74	0.56	0.58	0.54	0.71	0.68	0.63	0.38	0.75	0.7	0.61	0.51	0.65	1	0.62	0.48
Y1995Q3	0.36	0.42	0.63	0.43	0.46	0.32	0.68	0.56	0.55	0.48	0.71	0.55	0.59	0.43	0.67	0.65	0.48	0.62	1	0.66
Y1995Q4	0.38	0.36	0.64	0.38	0.35	0.43	0.66	0.67	0.39	0.35	0.58	0.53	0.47	0.45	0.56	0.6	0.52	0.48	0.66	1

Herring

Age 2	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.44	0.28	0.44	0.58	0.41	0.33	0.37	0.54	0.36	0.42	0.41	0.53	0.31	0.27	0.27	0.5	0.33	0.18	0.16
Y1991Q2	0.44	1	0.5	0.07	0.29	0.4	0.5	0.19	0.52	0.58	0.65	0.52	0.51	0.49	0.56	0.45	0.36	0.56	0.39	0.32
Y1991Q3	0.28	0.5	1	0.29	0.07	0.3	0.75	0.2	0.48	0.54	0.64	0.54	0.61	0.7	0.73	0.4	0.49	0.49	0.77	0.55
Y1991Q4	0.44	0.07	0.29	1	0.3	0.13	0.2	0.14	0.33	0.15	0.2	0.36	0.38	0.1	0.25	0.36	0.54	-0.01	0.21	0.18
Y1992Q1	0.58	0.29	0.07	0.3	1	0.37	0.1	0.35	0.4	0.22	0.2	0.25	0.21	0.11	0.15	0.2	0.4	0.2	-0.08	0.06
Y1992Q2	0.41	0.4	0.3	0.13	0.37	1	0.47	0.44	0.39	0.61	0.22	0.04	0.33	0.24	0.37	0.13	0.41	0.51	0.13	0.3
Y1992Q3	0.33	0.5	0.75	0.2	0.1	0.47	1	0.31	0.44	0.6	0.6	0.42	0.56	0.58	0.69	0.42	0.47	0.54	0.69	0.58
Y1992Q4	0.37	0.19	0.2	0.14	0.35	0.44	0.31	1	0.29	0.2	0.3	0.31	0.19	0.12	0.1	0.26	0.37	0.51	0.07	0.48
Y1993Q1	0.54	0.52	0.48	0.33	0.4	0.39	0.44	0.29	1	0.58	0.53	0.51	0.62	0.51	0.44	0.22	0.62	0.49	0.37	0.23
Y1993Q2	0.36	0.58	0.54	0.15	0.22	0.61	0.6	0.2	0.58	1	0.55	0.35	0.61	0.63	0.53	0.28	0.43	0.53	0.49	0.37
Y1993Q3	0.42	0.65	0.64	0.2	0.2	0.22	0.6	0.3	0.53	0.55	1	0.73	0.63	0.69	0.56	0.53	0.44	0.61	0.67	0.51
Y1993Q4	0.41	0.52	0.54	0.36	0.25	0.04	0.42	0.31	0.51	0.35	0.73	1	0.6	0.47	0.49	0.55	0.49	0.42	0.57	0.46
Y1994Q1	0.53	0.51	0.61	0.38	0.21	0.33	0.56	0.19	0.62	0.61	0.63	0.6	1	0.59	0.53	0.33	0.65	0.42	0.65	0.34
Y1994Q2	0.31	0.49	0.7	0.1	0.11	0.24	0.58	0.12	0.51	0.63	0.69	0.47	0.59	1	0.67	0.17	0.3	0.54	0.67	0.39
Y1994Q3	0.27	0.56	0.73	0.25	0.15	0.37	0.69	0.1	0.44	0.53	0.56	0.49	0.53	0.67	1	0.33	0.41	0.4	0.62	0.42
Y1994Q4	0.27	0.45	0.4	0.36	0.2	0.13	0.42	0.26	0.22	0.28	0.53	0.55	0.33	0.17	0.33	1	0.46	0.32	0.36	0.58
Y1995Q1	0.5	0.36	0.49	0.54	0.4	0.41	0.47	0.37	0.62	0.43	0.44	0.49	0.65	0.3	0.41	0.46	1	0.39	0.34	0.43
Y1995Q2	0.33	0.56	0.49	-0.01	0.2	0.51	0.54	0.51	0.49	0.53	0.61	0.42	0.42	0.54	0.4	0.32	0.39	1	0.45	0.57
Y1995Q3	0.18	0.39	0.77	0.21	-0.08	0.13	0.69	0.07	0.37	0.49	0.67	0.57	0.65	0.67	0.62	0.36	0.34	0.45	1	0.58
Y1995Q4	0.16	0.32	0.55	0.18	0.06	0.3	0.58	0.48	0.23	0.37	0.51	0.46	0.34	0.39	0.42	0.58	0.43	0.57	0.58	1

Herring

Age 3+	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.31	0.2	0.54	0.66	0.11	0.28	0.36	0.47	0.08	0.32	0.44	0.42	0.13	0.07	0.48	0.5	0.38	0.26	0.37
Y1991Q2	0.31	1	0.64	0	0.25	0.52	0.52	0	0.3	0.65	0.66	0.51	0.56	0.68	0.5	0.42	0.3	0.62	0.52	0.32
Y1991Q3	0.2	0.64	1	0.11	0.35	0.38	0.72	0.02	0.29	0.58	0.73	0.39	0.52	0.83	0.72	0.23	0.47	0.72	0.76	0.36
Y1991Q4	0.54	0	0.11	1	0.53	-0.09	0.24	0.5	0.41	-0.05	0.11	0.31	0.23	-0.08	0.13	0.49	0.55	0.17	0.21	0.37
Y1992Q1	0.66	0.25	0.35	0.53	1	0.12	0.29	0.32	0.55	0.17	0.35	0.52	0.46	0.29	0.28	0.49	0.59	0.39	0.43	0.47
Y1992Q2	0.11	0.52	0.38	-0.09	0.12	1	0.29	-0.1	0.33	0.54	0.48	0.32	0.52	0.53	0.21	0.21	0.28	0.49	0.5	0.06
Y1992Q3	0.28	0.52	0.72	0.24	0.29	0.29	1	0.33	0.45	0.51	0.76	0.4	0.33	0.65	0.58	0.32	0.45	0.59	0.71	0.55
Y1992Q4	0.36	0	0.02	0.5	0.32	-0.1	0.33	1	0.37	0.05	0.3	0.34	0	-0.07	0.02	0.49	0.39	0.17	0.13	0.57
Y1993Q1	0.47	0.3	0.29	0.41	0.55	0.33	0.45	0.37	1	0.35	0.5	0.48	0.48	0.37	0.27	0.42	0.59	0.45	0.42	0.29
Y1993Q2	0.08	0.65	0.58	-0.05	0.17	0.54	0.51	0.05	0.35	1	0.64	0.42	0.52	0.72	0.52	0.34	0.34	0.52	0.47	0.33
Y1993Q3	0.32	0.66	0.73	0.11	0.35	0.48	0.76	0.3	0.5	0.64	1	0.51	0.46	0.73	0.56	0.45	0.46	0.69	0.64	0.51
Y1993Q4	0.44	0.51	0.39	0.31	0.52	0.32	0.4	0.34	0.48	0.42	0.51	1	0.37	0.42	0.36	0.61	0.45	0.53	0.4	0.49
Y1994Q1	0.42	0.56	0.52	0.23	0.46	0.52	0.33	0	0.48	0.52	0.46	0.37	1	0.55	0.31	0.35	0.62	0.56	0.46	0.04
Y1994Q2	0.13	0.68	0.83	-0.08	0.29	0.53	0.65	-0.07	0.37	0.72	0.73	0.42	0.55	1	0.66	0.18	0.37	0.73	0.7	0.24
Y1994Q3	0.07	0.5	0.72	0.13	0.28	0.21	0.58	0.02	0.27	0.52	0.56	0.36	0.31	0.66	1	0.21	0.35	0.49	0.51	0.32
Y1994Q4	0.48	0.42	0.23	0.49	0.49	0.21	0.32	0.49	0.42	0.34	0.45	0.61	0.35	0.18	0.21	1	0.5	0.39	0.22	0.55
Y1995Q1	0.5	0.3	0.47	0.55	0.59	0.28	0.45	0.39	0.59	0.34	0.46	0.45	0.62	0.37	0.35	0.5	1	0.43	0.49	0.39
Y1995Q2	0.38	0.62	0.72	0.17	0.39	0.49	0.59	0.17	0.45	0.52	0.69	0.53	0.56	0.73	0.49	0.39	0.43	1	0.66	0.33
Y1995Q3	0.26	0.52	0.76	0.21	0.43	0.5	0.71	0.13	0.42	0.47	0.64	0.4	0.46	0.7	0.51	0.22	0.49	0.66	1	0.42
Y1995Q4	0.37	0.32	0.36	0.37	0.47	0.06	0.55	0.57	0.29	0.33	0.51	0.49	0.04	0.24	0.32	0.55	0.39	0.33	0.42	1

Cod

Age 0	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1991Q2	.	1	0.19	0.17	.	0.44	0.35	0.45	.	0.3	0.31	0.39	.	-0.1	-0.01	0.09	.	0.31	0.23	0.26
Y1991Q3	.	0.19	1	0.89	.	0.34	0.63	0.62	.	0.33	0.75	0.7	.	0.3	0.78	0.62	.	0.07	0.73	0.44
Y1991Q4	.	0.17	0.89	1	.	0.3	0.6	0.59	.	0.24	0.69	0.76	.	0.25	0.61	0.64	.	-0.06	0.73	0.53
Y1992Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1992Q2	.	0.44	0.34	0.3	.	1	0.4	0.42	.	0.25	0.4	0.37	.	-0.06	0.16	0.16	.	0.15	0.3	0.25
Y1992Q3	.	0.35	0.63	0.6	.	0.4	1	0.83	.	0.38	0.76	0.72	.	0.29	0.44	0.32	.	0.05	0.55	0.44
Y1992Q4	.	0.45	0.62	0.59	.	0.42	0.83	1	.	0.47	0.7	0.84	.	0.23	0.32	0.22	.	0.08	0.56	0.46
Y1993Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1993Q2	.	0.3	0.33	0.24	.	0.25	0.38	0.47	.	1	0.37	0.37	.	0.26	0.22	0.08	.	0.27	0.28	0.14
Y1993Q3	.	0.31	0.75	0.69	.	0.4	0.76	0.7	.	0.37	1	0.77	.	0.26	0.53	0.5	.	0.12	0.58	0.58
Y1993Q4	.	0.39	0.7	0.76	.	0.37	0.72	0.84	.	0.37	0.77	1	.	0.22	0.37	0.44	.	0.05	0.65	0.61
Y1994Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1994Q2	.	-0.1	0.3	0.25	.	-0.06	0.29	0.23	.	0.26	0.26	0.22	.	1	0.3	0.15	.	-0.06	0.31	0.14
Y1994Q3	.	-0.01	0.78	0.61	.	0.16	0.44	0.32	.	0.22	0.53	0.37	.	0.3	1	0.72	.	0.04	0.5	0.1
Y1994Q4	.	0.09	0.62	0.64	.	0.16	0.32	0.22	.	0.08	0.5	0.44	.	0.15	0.72	1	.	0.05	0.5	0.38
Y1995Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1995Q2	.	0.31	0.07	-0.06	.	0.15	0.05	0.08	.	0.27	0.12	0.05	.	-0.06	0.04	0.05	.	1	-0.01	0.07
Y1995Q3	.	0.23	0.73	0.73	.	0.3	0.55	0.56	.	0.28	0.58	0.65	.	0.31	0.5	0.5	.	-0.01	1	0.54
Y1995Q4	.	0.26	0.44	0.53	.	0.25	0.44	0.46	.	0.14	0.58	0.61	.	0.14	0.1	0.38	.	0.07	0.54	1

Cod

Age 1	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.78	0.6	0.24	0.48	0.55	0.58	0.4	0.6	0.16	0.65	0.36	0.62	0.57	0.63	0.54	0.35	0.58	0.44	0.42
Y1991Q2	0.78	1	0.7	0.24	0.54	0.7	0.68	0.52	0.63	0.23	0.72	0.46	0.68	0.66	0.73	0.52	0.46	0.71	0.6	0.48
Y1991Q3	0.6	0.7	1	0.41	0.34	0.37	0.53	0.43	0.41	0.23	0.46	0.49	0.36	0.39	0.56	0.39	0.25	0.51	0.46	0.42
Y1991Q4	0.24	0.24	0.41	1	-0.04	-0.03	0.22	0.44	-0.11	0.07	0.03	0.36	0.05	0.1	0.09	0.43	0.01	0.02	0.06	0.18
Y1992Q1	0.48	0.54	0.34	-0.04	1	0.57	0.56	0.35	0.67	0.56	0.6	0.34	0.69	0.57	0.65	0.49	0.76	0.69	0.54	0.44
Y1992Q2	0.55	0.7	0.37	-0.03	0.57	1	0.68	0.26	0.58	0.25	0.68	0.26	0.63	0.64	0.73	0.36	0.52	0.57	0.57	0.38
Y1992Q3	0.58	0.68	0.53	0.22	0.56	0.68	1	0.58	0.74	0.53	0.77	0.65	0.76	0.83	0.88	0.7	0.51	0.67	0.71	0.47
Y1992Q4	0.4	0.52	0.43	0.44	0.35	0.26	0.58	1	0.5	0.45	0.47	0.58	0.57	0.58	0.52	0.6	0.42	0.43	0.5	0.51
Y1993Q1	0.6	0.63	0.41	-0.11	0.67	0.58	0.74	0.5	1	0.61	0.84	0.66	0.84	0.79	0.83	0.59	0.61	0.72	0.71	0.66
Y1993Q2	0.16	0.23	0.23	0.07	0.56	0.25	0.53	0.45	0.61	1	0.5	0.63	0.42	0.42	0.49	0.52	0.68	0.52	0.48	0.5
Y1993Q3	0.65	0.72	0.46	0.03	0.6	0.68	0.77	0.47	0.84	0.5	1	0.59	0.76	0.73	0.81	0.6	0.55	0.66	0.73	0.53
Y1993Q4	0.36	0.46	0.49	0.36	0.34	0.26	0.65	0.58	0.66	0.63	0.59	1	0.49	0.58	0.62	0.72	0.4	0.49	0.58	0.62
Y1994Q1	0.62	0.68	0.36	0.05	0.69	0.63	0.76	0.57	0.84	0.42	0.76	0.49	1	0.88	0.84	0.61	0.6	0.69	0.68	0.58
Y1994Q2	0.57	0.66	0.39	0.1	0.57	0.64	0.83	0.58	0.79	0.42	0.73	0.58	0.88	1	0.88	0.65	0.46	0.68	0.71	0.44
Y1994Q3	0.63	0.73	0.56	0.09	0.65	0.73	0.88	0.52	0.83	0.49	0.81	0.62	0.84	0.88	1	0.69	0.56	0.76	0.82	0.54
Y1994Q4	0.54	0.52	0.39	0.43	0.49	0.36	0.7	0.6	0.59	0.52	0.6	0.72	0.61	0.65	0.69	1	0.46	0.53	0.57	0.56
Y1995Q1	0.35	0.46	0.25	0.01	0.76	0.52	0.51	0.42	0.61	0.68	0.55	0.4	0.6	0.46	0.56	0.46	1	0.71	0.54	0.59
Y1995Q2	0.58	0.71	0.51	0.02	0.69	0.57	0.67	0.43	0.72	0.52	0.66	0.49	0.69	0.68	0.76	0.53	0.71	1	0.59	0.46
Y1995Q3	0.44	0.6	0.46	0.06	0.54	0.57	0.71	0.5	0.71	0.48	0.73	0.58	0.68	0.71	0.82	0.57	0.54	0.59	1	0.56
Y1995Q4	0.42	0.48	0.42	0.18	0.44	0.38	0.47	0.51	0.66	0.5	0.53	0.62	0.58	0.44	0.54	0.56	0.59	0.46	0.56	1

Cod

Age 2	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.54	0.67	0.4	0.53	0.54	0.47	0.53	0.49	0.49	0.51	0.4	0.65	0.61	0.45	0.39	0.73	0.51	0.42	0.49
Y1991Q2	0.54	1	0.68	0.35	0.28	0.56	0.31	0.35	0.16	0.33	0.28	0.26	0.37	0.51	0.29	0.38	0.44	0.51	0.45	0.46
Y1991Q3	0.67	0.68	1	0.35	0.22	0.65	0.55	0.56	0.42	0.46	0.45	0.47	0.66	0.69	0.41	0.5	0.68	0.6	0.49	0.67
Y1991Q4	0.4	0.35	0.35	1	0.54	0.42	0.33	0.49	0.56	0.56	0.45	0.49	0.53	0.39	0.21	0.57	0.55	0.47	0.35	0.41
Y1992Q1	0.53	0.28	0.22	0.54	1	0.3	0.15	0.49	0.51	0.38	0.35	0.39	0.32	0.15	0.22	0.21	0.52	0.08	0.14	0.15
Y1992Q2	0.54	0.56	0.65	0.42	0.3	1	0.48	0.45	0.44	0.5	0.42	0.46	0.42	0.5	0.16	0.29	0.59	0.57	0.19	0.42
Y1992Q3	0.47	0.31	0.55	0.33	0.15	0.48	1	0.54	0.33	0.34	0.51	0.43	0.54	0.41	0.36	0.34	0.52	0.36	0.11	0.47
Y1992Q4	0.53	0.35	0.56	0.49	0.49	0.45	0.54	1	0.44	0.33	0.48	0.54	0.46	0.41	0.42	0.36	0.64	0.34	0.24	0.53
Y1993Q1	0.49	0.16	0.42	0.56	0.51	0.44	0.33	0.44	1	0.71	0.6	0.68	0.57	0.46	0.08	0.38	0.74	0.5	0.37	0.47
Y1993Q2	0.49	0.33	0.46	0.56	0.38	0.5	0.34	0.33	0.71	1	0.54	0.5	0.58	0.62	0.17	0.48	0.62	0.57	0.35	0.46
Y1993Q3	0.51	0.28	0.45	0.45	0.35	0.42	0.51	0.48	0.6	0.54	1	0.66	0.57	0.45	0.36	0.44	0.66	0.45	0.38	0.55
Y1993Q4	0.4	0.26	0.47	0.49	0.39	0.46	0.43	0.54	0.68	0.5	0.66	1	0.39	0.35	0.13	0.34	0.67	0.5	0.35	0.47
Y1994Q1	0.65	0.37	0.66	0.53	0.32	0.42	0.54	0.46	0.57	0.58	0.57	0.39	1	0.72	0.58	0.56	0.74	0.47	0.46	0.68
Y1994Q2	0.61	0.51	0.69	0.39	0.15	0.5	0.41	0.41	0.46	0.62	0.45	0.35	0.72	1	0.44	0.54	0.63	0.66	0.54	0.76
Y1994Q3	0.45	0.29	0.41	0.21	0.22	0.16	0.36	0.42	0.08	0.17	0.36	0.13	0.58	0.44	1	0.31	0.4	0.16	0.39	0.49
Y1994Q4	0.39	0.38	0.5	0.57	0.21	0.29	0.34	0.36	0.38	0.48	0.44	0.34	0.56	0.54	0.31	1	0.43	0.38	0.42	0.61
Y1995Q1	0.73	0.44	0.68	0.55	0.52	0.59	0.52	0.64	0.74	0.62	0.66	0.67	0.74	0.63	0.4	0.43	1	0.62	0.38	0.64
Y1995Q2	0.51	0.51	0.6	0.47	0.08	0.57	0.36	0.34	0.5	0.57	0.45	0.5	0.47	0.66	0.16	0.38	0.62	1	0.38	0.54
Y1995Q3	0.42	0.45	0.49	0.35	0.14	0.19	0.11	0.24	0.37	0.35	0.38	0.35	0.46	0.54	0.39	0.42	0.38	0.38	1	0.47
Y1995Q4	0.49	0.46	0.67	0.41	0.15	0.42	0.47	0.53	0.47	0.46	0.55	0.47	0.68	0.76	0.49	0.61	0.64	0.54	0.47	1

Cod

Age 3+	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.45	0.74	0.45	0.57	0.52	0.6	0.58	0.67	0.56	0.51	0.56	0.47	0.58	0.69	0.51	0.57	0.56	0.53	0.59
Y1991Q2	0.45	1	0.63	0.62	0.23	0.59	0.33	0.63	0.39	0.43	0.44	0.66	0.43	0.64	0.56	0.31	0.31	0.6	0.5	0.51
Y1991Q3	0.74	0.63	1	0.49	0.46	0.74	0.66	0.8	0.64	0.7	0.77	0.64	0.58	0.78	0.71	0.54	0.57	0.74	0.7	0.74
Y1991Q4	0.45	0.62	0.49	1	0.33	0.46	0.32	0.52	0.37	0.36	0.37	0.58	0.45	0.55	0.56	0.46	0.31	0.47	0.58	0.45
Y1992Q1	0.57	0.23	0.46	0.33	1	0.32	0.44	0.43	0.59	0.46	0.51	0.39	0.54	0.55	0.47	0.37	0.68	0.45	0.38	0.32
Y1992Q2	0.52	0.59	0.74	0.46	0.32	1	0.47	0.68	0.58	0.61	0.56	0.6	0.53	0.67	0.52	0.45	0.49	0.7	0.59	0.64
Y1992Q3	0.6	0.33	0.66	0.32	0.44	0.47	1	0.51	0.57	0.36	0.63	0.45	0.48	0.58	0.74	0.59	0.41	0.43	0.67	0.65
Y1992Q4	0.58	0.63	0.8	0.52	0.43	0.68	0.51	1	0.63	0.65	0.69	0.61	0.65	0.79	0.64	0.52	0.57	0.74	0.63	0.73
Y1993Q1	0.67	0.39	0.64	0.37	0.59	0.58	0.57	0.63	1	0.57	0.63	0.56	0.64	0.67	0.62	0.41	0.71	0.68	0.53	0.55
Y1993Q2	0.56	0.43	0.7	0.36	0.46	0.61	0.36	0.65	0.57	1	0.69	0.46	0.44	0.72	0.41	0.3	0.65	0.69	0.44	0.43
Y1993Q3	0.51	0.44	0.77	0.37	0.51	0.56	0.63	0.69	0.63	0.69	1	0.43	0.56	0.71	0.55	0.39	0.59	0.61	0.58	0.57
Y1993Q4	0.56	0.66	0.64	0.58	0.39	0.6	0.45	0.61	0.56	0.46	0.43	1	0.49	0.67	0.68	0.42	0.52	0.64	0.62	0.53
Y1994Q1	0.47	0.43	0.58	0.45	0.54	0.53	0.48	0.65	0.64	0.44	0.56	0.49	1	0.68	0.55	0.43	0.61	0.56	0.61	0.5
Y1994Q2	0.58	0.64	0.78	0.55	0.55	0.67	0.58	0.79	0.67	0.72	0.71	0.67	0.68	1	0.67	0.55	0.65	0.72	0.71	0.64
Y1994Q3	0.69	0.56	0.71	0.56	0.47	0.52	0.74	0.64	0.62	0.41	0.55	0.68	0.55	0.67	1	0.62	0.51	0.57	0.73	0.57
Y1994Q4	0.51	0.31	0.54	0.46	0.37	0.45	0.59	0.52	0.41	0.3	0.39	0.42	0.43	0.55	0.62	1	0.34	0.38	0.63	0.62
Y1995Q1	0.57	0.31	0.57	0.31	0.68	0.49	0.41	0.57	0.71	0.65	0.59	0.52	0.61	0.65	0.51	0.34	1	0.54	0.49	0.39
Y1995Q2	0.56	0.6	0.74	0.47	0.45	0.7	0.43	0.74	0.68	0.69	0.61	0.64	0.56	0.72	0.57	0.38	0.54	1	0.45	0.56
Y1995Q3	0.53	0.5	0.7	0.58	0.38	0.59	0.67	0.63	0.53	0.44	0.58	0.62	0.61	0.71	0.73	0.63	0.49	0.45	1	0.63
Y1995Q4	0.59	0.51	0.74	0.45	0.32	0.64	0.65	0.73	0.55	0.43	0.57	0.53	0.5	0.64	0.57	0.62	0.39	0.56	0.63	1

Haddock

Age 0	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1991Q2	.	1	0.33	0.39	.	0.39	0.43	0.43	.	0.13	0.4	0.45	.	.	0.33	0.4	.	0.23	0.17	0.2
Y1991Q3	.	0.33	1	0.83	.	0.23	0.91	0.72	.	-0.05	0.94	0.85	.	.	0.92	0.63	.	-0.04	0.88	0.83
Y1991Q4	.	0.39	0.83	1	.	0.21	0.79	0.85	.	0.08	0.79	0.83	.	.	0.89	0.82	.	0.04	0.7	0.7
Y1992Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1992Q2	.	0.39	0.23	0.21	.	1	0.22	0.12	.	0.39	0.32	0.2	.	.	0.12	0.01	.	0.28	0.3	0.3
Y1992Q3	.	0.43	0.91	0.79	.	0.22	1	0.82	.	-0.08	0.9	0.87	.	.	0.9	0.7	.	-0.02	0.79	0.71
Y1992Q4	.	0.43	0.72	0.85	.	0.12	0.82	1	.	-0.04	0.72	0.86	.	.	0.82	0.86	.	-0.03	0.63	0.65
Y1993Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1993Q2	.	0.13	-0.05	0.08	.	0.39	-0.08	-0.04	.	1	0.09	-0.03	.	.	-0.04	0	.	0.56	0.09	0.14
Y1993Q3	.	0.4	0.94	0.79	.	0.32	0.9	0.72	.	0.09	1	0.85	.	.	0.88	0.61	.	0.11	0.86	0.82
Y1993Q4	.	0.45	0.85	0.83	.	0.2	0.87	0.86	.	-0.03	0.85	1	.	.	0.9	0.79	.	-0.04	0.72	0.77
Y1994Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1994Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1994Q3	.	0.33	0.92	0.89	.	0.12	0.9	0.82	.	-0.04	0.88	0.9	.	.	1	0.79	.	-0.04	0.81	0.78
Y1994Q4	.	0.4	0.63	0.82	.	0.01	0.7	0.86	.	0	0.61	0.79	.	.	0.79	1	.	-0.08	0.47	0.6
Y1995Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1995Q2	.	0.23	-0.04	0.04	.	0.28	-0.02	-0.03	.	0.56	0.11	-0.04	.	.	-0.04	-0.08	.	1	0.07	0.06
Y1995Q3	.	0.17	0.88	0.7	.	0.3	0.79	0.63	.	0.09	0.86	0.72	.	.	0.81	0.47	.	0.07	1	0.83
Y1995Q4	.	0.2	0.83	0.7	.	0.3	0.71	0.65	.	0.14	0.82	0.77	.	.	0.78	0.6	.	0.06	0.83	1

Age 1	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.9	0.9	0.91	0.77	0.82	0.91	0.77	0.72	0.77	0.83	0.83	0.81	0.79	0.83	0.87	0.69	0.84	0.86	0.84
Y1991Q2	0.9	1	0.9	0.88	0.65	0.79	0.85	0.74	0.63	0.69	0.82	0.81	0.68	0.76	0.79	0.87	0.58	0.85	0.88	0.85
Y1991Q3	0.9	0.9	1	0.93	0.73	0.83	0.91	0.85	0.76	0.83	0.91	0.92	0.79	0.79	0.89	0.96	0.73	0.88	0.93	0.91
Y1991Q4	0.91	0.88	0.93	1	0.73	0.82	0.9	0.89	0.75	0.84	0.92	0.92	0.8	0.75	0.82	0.93	0.73	0.9	0.93	0.9
Y1992Q1	0.77	0.65	0.73	0.73	1	0.82	0.79	0.76	0.81	0.79	0.78	0.78	0.91	0.73	0.73	0.72	0.84	0.76	0.7	0.69
Y1992Q2	0.82	0.79	0.83	0.82	0.82	1	0.89	0.83	0.81	0.84	0.84	0.84	0.85	0.78	0.8	0.81	0.75	0.83	0.79	0.74
Y1992Q3	0.91	0.85	0.91	0.9	0.79	0.89	1	0.84	0.85	0.88	0.89	0.88	0.85	0.84	0.88	0.88	0.75	0.89	0.85	0.84
Y1992Q4	0.77	0.74	0.85	0.89	0.76	0.83	0.84	1	0.8	0.89	0.92	0.94	0.82	0.69	0.76	0.88	0.79	0.84	0.87	0.86
Y1993Q1	0.72	0.63	0.76	0.75	0.81	0.81	0.85	0.8	1	0.91	0.84	0.83	0.87	0.74	0.77	0.76	0.87	0.75	0.72	0.7
Y1993Q2	0.77	0.69	0.83	0.84	0.79	0.84	0.88	0.89	0.91	1	0.92	0.9	0.85	0.77	0.79	0.84	0.88	0.86	0.81	0.78
Y1993Q3	0.83	0.82	0.91	0.92	0.78	0.84	0.89	0.92	0.84	0.92	1	0.97	0.85	0.73	0.82	0.94	0.85	0.91	0.94	0.9
Y1993Q4	0.83	0.81	0.92	0.92	0.78	0.84	0.88	0.94	0.83	0.9	0.97	1	0.83	0.79	0.86	0.95	0.84	0.91	0.94	0.92
Y1994Q1	0.81	0.68	0.79	0.8	0.91	0.85	0.85	0.82	0.87	0.85	0.85	0.83	1	0.74	0.76	0.78	0.87	0.8	0.77	0.73
Y1994Q2	0.79	0.76	0.79	0.75	0.73	0.78	0.84	0.69	0.74	0.77	0.73	0.79	0.74	1	0.88	0.76	0.68	0.76	0.69	0.71
Y1994Q3	0.83	0.79	0.89	0.82	0.73	0.8	0.88	0.76	0.77	0.79	0.82	0.86	0.76	0.88	1	0.87	0.7	0.8	0.81	0.83
Y1994Q4	0.87	0.87	0.96	0.93	0.72	0.81	0.88	0.88	0.76	0.84	0.94	0.95	0.78	0.76	0.87	1	0.76	0.89	0.95	0.95
Y1995Q1	0.69	0.58	0.73	0.73	0.84	0.75	0.75	0.79	0.87	0.88	0.85	0.84	0.87	0.68	0.7	0.76	1	0.78	0.77	0.73
Y1995Q2	0.84	0.85	0.88	0.9	0.76	0.83	0.89	0.84	0.75	0.86	0.91	0.91	0.8	0.76	0.8	0.89	0.78	1	0.89	0.88
Y1995Q3	0.86	0.88	0.93	0.93	0.7	0.79	0.85	0.87	0.72	0.81	0.94	0.94	0.77	0.69	0.81	0.95	0.77	0.89	1	0.94
Y1995Q4	0.84	0.85	0.91	0.9	0.69	0.74	0.84	0.86	0.7	0.78	0.9	0.92	0.73	0.71	0.83	0.95	0.73	0.88	0.94	1

Age 2	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.9	0.88	0.86	0.89	0.81	0.82	0.91	0.89	0.86	0.88	0.81	0.88	0.91	0.86	0.91	0.9	0.89	0.88	0.89
Y1991Q2	0.9	1	0.86	0.88	0.79	0.86	0.88	0.9	0.8	0.82	0.87	0.79	0.74	0.85	0.87	0.88	0.82	0.88	0.87	0.87
Y1991Q3	0.88	0.86	1	0.84	0.78	0.86	0.81	0.86	0.82	0.84	0.88	0.8	0.81	0.87	0.93	0.89	0.83	0.84	0.91	0.88
Y1991Q4	0.86	0.88	0.84	1	0.84	0.82	0.8	0.92	0.82	0.84	0.91	0.88	0.69	0.79	0.83	0.9	0.83	0.86	0.83	0.87
Y1992Q1	0.89	0.79	0.78	0.84	1	0.77	0.72	0.86	0.93	0.84	0.91	0.86	0.87	0.83	0.79	0.87	0.89	0.86	0.77	0.84
Y1992Q2	0.81	0.86	0.86	0.82	0.77	1	0.86	0.88	0.82	0.89	0.87	0.84	0.75	0.85	0.9	0.88	0.83	0.83	0.86	0.84
Y1992Q3	0.82	0.88	0.81	0.8	0.72	0.86	1	0.89	0.76	0.82	0.81	0.79	0.75	0.86	0.89	0.87	0.79	0.88	0.85	0.86
Y1992Q4	0.91	0.9	0.86	0.92	0.86	0.88	0.89	1	0.84	0.92	0.94	0.86	0.78	0.88	0.9	0.95	0.87	0.9	0.88	0.91
Y1993Q1	0.89	0.8	0.82	0.82	0.93	0.82	0.76	0.84	1	0.88	0.89	0.87	0.91	0.89	0.81	0.87	0.9	0.86	0.78	0.8
Y1993Q2	0.86	0.82	0.84	0.84	0.84	0.89	0.82	0.92	0.88	1	0.92	0.87	0.81	0.88	0.86	0.9	0.87	0.86	0.82	0.83
Y1993Q3	0.88	0.87	0.88	0.91	0.91	0.87	0.81	0.94	0.89	0.92	1	0.9	0.78	0.85	0.89	0.93	0.87	0.87	0.87	0.9
Y1993Q4	0.81	0.79	0.8	0.88	0.86	0.84	0.79	0.86	0.87	0.87	0.9	1	0.81	0.83	0.84	0.88	0.86	0.84	0.82	0.85
Y1994Q1	0.88	0.74	0.81	0.69	0.87	0.75	0.75	0.78	0.91	0.81	0.78	0.81	1	0.93	0.81	0.82	0.89	0.83	0.79	0.79
Y1994Q2	0.91	0.85	0.87	0.79	0.83	0.85	0.86	0.88	0.89	0.88	0.85	0.83	0.93	1	0.9	0.88	0.87	0.9	0.87	0.87
Y1994Q3	0.86	0.87	0.93	0.83	0.79	0.9	0.89	0.9	0.81	0.86	0.89	0.84	0.81	0.9	1	0.92	0.84	0.85	0.94	0.92
Y1994Q4	0.91	0.88	0.89	0.9	0.87	0.88	0.87	0.95	0.87	0.9	0.93	0.88	0.82	0.88	0.92	1	0.91	0.89	0.91	0.93
Y1995Q1	0.9	0.82	0.83	0.83	0.89	0.83	0.79	0.87	0.9	0.87	0.87	0.86	0.89	0.87	0.84	0.91	1	0.87	0.87	0.87
Y1995Q2	0.89	0.88	0.84	0.86	0.86	0.83	0.88	0.9	0.86	0.86	0.87	0.84	0.83	0.9	0.85	0.89	0.87	1	0.86	0.87
Y1995Q3	0.88	0.87	0.91	0.83	0.77	0.86	0.85	0.88	0.78	0.82	0.87	0.82	0.79	0.87	0.94	0.91	0.87	0.86	1	0.93
Y1995Q4	0.89	0.87	0.88	0.87	0.84	0.84	0.86	0.91	0.8	0.83	0.9	0.85	0.79	0.87	0.92	0.93	0.87	0.87	0.93	1

Age 3+	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.81	0.78	0.81	0.86	0.72	0.76	0.83	0.86	0.77	0.81	0.74	0.9	0.86	0.71	0.84	0.89	0.84	0.78	0.79
Y1991Q2	0.81	1	0.81	0.84	0.83	0.86	0.8	0.83	0.85	0.83	0.88	0.82	0.78	0.83	0.82	0.87	0.78	0.85	0.83	0.81
Y1991Q3	0.78	0.81	1	0.74	0.76	0.77	0.74	0.82	0.88	0.83	0.81	0.81	0.82	0.83	0.84	0.86	0.83	0.82	0.88	0.87
Y1991Q4	0.81	0.84	0.74	1	0.8	0.79	0.74	0.88	0.83	0.79	0.84	0.76	0.73	0.78	0.7	0.82	0.81	0.85	0.82	0.82
Y1992Q1	0.86	0.83	0.76	0.8	1	0.7	0.72	0.83	0.89	0.72	0.78	0.8	0.91	0.8	0.75	0.85	0.88	0.83	0.75	0.79
Y1992Q2	0.72	0.86	0.77	0.79	0.7	1	0.76	0.77	0.77	0.82	0.81	0.76	0.7	0.79	0.82	0.75	0.71	0.81	0.8	0.75
Y1992Q3	0.76	0.8	0.74	0.74	0.72	0.76	1	0.81	0.82	0.86	0.81	0.78	0.78	0.85	0.79	0.78	0.78	0.86	0.78	0.75
Y1992Q4	0.83	0.83	0.82	0.88	0.83	0.77	0.81	1	0.88	0.85	0.88	0.77	0.83	0.88	0.76	0.83	0.85	0.9	0.87	0.83
Y1993Q1	0.86	0.85	0.88	0.83	0.89	0.77	0.82	0.88	1	0.85	0.84	0.84	0.93	0.91	0.82	0.9	0.93	0.9	0.88	0.86
Y1993Q2	0.77	0.83	0.83	0.79	0.72	0.82	0.86	0.85	0.85	1	0.92	0.86	0.75	0.9	0.83	0.83	0.79	0.9	0.9	0.86
Y1993Q3	0.81	0.88	0.81	0.84	0.78	0.81	0.81	0.88	0.84	0.92	1	0.87	0.75	0.86	0.82	0.9	0.8	0.89	0.92	0.91
Y1993Q4	0.74	0.82	0.81	0.76	0.8	0.76	0.78	0.77	0.84	0.86	0.87	1	0.73	0.82	0.82	0.85	0.77	0.83	0.87	0.88
Y1994Q1	0.9	0.78	0.82	0.73	0.91	0.7	0.78	0.83	0.93	0.75	0.75	0.73	1	0.89	0.75	0.84	0.94	0.84	0.77	0.77
Y1994Q2	0.86	0.83	0.83	0.78	0.8	0.79	0.85	0.88	0.91	0.9	0.86	0.82	0.89	1	0.81	0.83	0.87	0.91	0.86	0.83
Y1994Q3	0.71	0.82	0.84	0.7	0.75	0.82	0.79	0.76	0.82	0.83	0.82	0.82	0.75	0.81	1	0.83	0.73	0.79	0.86	0.82
Y1994Q4	0.84	0.87	0.86	0.82	0.85	0.75	0.78	0.83	0.9	0.83	0.9	0.85	0.84	0.83	0.83	1	0.86	0.88	0.9	0.91
Y1995Q1	0.89	0.78	0.83	0.81	0.88	0.71	0.78	0.85	0.93	0.79	0.8	0.77	0.94	0.87	0.73	0.86	1	0.87	0.84	0.83
Y1995Q2	0.84	0.85	0.82	0.85	0.83	0.81	0.86	0.9	0.9	0.9	0.89	0.83	0.84	0.91	0.79	0.88	0.87	1	0.89	0.87
Y1995Q3	0.78	0.83	0.88	0.82	0.75	0.8	0.78	0.87	0.88	0.9	0.92	0.87	0.77	0.86	0.86	0.9	0.84	0.89	1	0.93
Y1995Q4	0.79	0.81	0.87	0.82	0.79	0.75	0.75	0.83	0.86	0.86	0.91	0.88	0.77	0.83	0.82	0.91	0.83	0.87	0.93	1

Whiting

Age 0	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1991Q2	.	1	0.26	0.24	.	-0.05	0.2	0.26	.	0.25	0.15	0.1	.	0.21	0.28	0.17	.	-0.13	0.21	-0.04
Y1991Q3	.	0.26	1	0.56	.	0.05	0.59	0.35	.	0.31	0.51	0.44	.	0.27	0.59	0.43	.	0.06	0.65	0.31
Y1991Q4	.	0.24	0.56	1	.	0.15	0.42	0.57	.	0.43	0.52	0.61	.	0.38	0.51	0.68	.	0.09	0.62	0.44
Y1992Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1992Q2	.	-0.05	0.05	0.15	.	1	-0.21	0.09	.	0.05	0.27	0.27	.	0.36	0.23	0.23	.	0.46	0.1	0.3
Y1992Q3	.	0.2	0.59	0.42	.	-0.21	1	0.29	.	0.28	0.49	0.42	.	0	0.47	0.35	.	-0.2	0.59	0.27
Y1992Q4	.	0.26	0.35	0.57	.	0.09	0.29	1	.	0.02	0.39	0.54	.	0.15	0.46	0.64	.	-0.04	0.31	0.28
Y1993Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1993Q2	.	0.25	0.31	0.43	.	0.05	0.28	0.02	.	1	0.23	0.26	.	0.33	0.17	0.24	.	0.03	0.42	0.32
Y1993Q3	.	0.15	0.51	0.52	.	0.27	0.49	0.39	.	0.23	1	0.75	.	0.59	0.83	0.67	.	0.41	0.82	0.82
Y1993Q4	.	0.1	0.44	0.61	.	0.27	0.42	0.54	.	0.26	0.75	1	.	0.59	0.73	0.82	.	0.37	0.75	0.74
Y1994Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1994Q2	.	0.21	0.27	0.38	.	0.36	0	0.15	.	0.33	0.59	0.59	.	1	0.61	0.49	.	0.4	0.6	0.6
Y1994Q3	.	0.28	0.59	0.51	.	0.23	0.47	0.46	.	0.17	0.83	0.73	.	0.61	1	0.66	.	0.3	0.77	0.71
Y1994Q4	.	0.17	0.43	0.68	.	0.23	0.35	0.64	.	0.24	0.67	0.82	.	0.49	0.66	1	.	0.26	0.68	0.68
Y1995Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1995Q2	.	-0.13	0.06	0.09	.	0.46	-0.2	-0.04	.	0.03	0.41	0.37	.	0.4	0.3	0.26	.	1	0.21	0.52
Y1995Q3	.	0.21	0.65	0.62	.	0.1	0.59	0.31	.	0.42	0.82	0.75	.	0.6	0.77	0.68	.	0.21	1	0.78
Y1995Q4	.	-0.04	0.31	0.44	.	0.3	0.27	0.28	.	0.32	0.82	0.74	.	0.6	0.71	0.68	.	0.52	0.78	1

Whiting

Age 1	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.84	0.76	0.58	0.72	0.66	0.67	0.45	0.66	0.62	0.79	0.57	0.39	0.63	0.79	0.46	0.62	0.53	0.73	0.62
Y1991Q2	0.84	1	0.85	0.59	0.49	0.63	0.6	0.27	0.41	0.47	0.75	0.34	0.43	0.6	0.69	0.34	0.34	0.44	0.57	0.48
Y1991Q3	0.76	0.85	1	0.66	0.43	0.58	0.66	0.31	0.43	0.52	0.77	0.39	0.44	0.64	0.75	0.4	0.38	0.51	0.63	0.55
Y1991Q4	0.58	0.59	0.66	1	0.38	0.49	0.73	0.71	0.47	0.51	0.79	0.68	0.57	0.52	0.56	0.84	0.45	0.51	0.66	0.79
Y1992Q1	0.72	0.49	0.43	0.38	1	0.56	0.69	0.55	0.81	0.73	0.56	0.56	0.42	0.58	0.7	0.36	0.69	0.66	0.79	0.64
Y1992Q2	0.66	0.63	0.58	0.49	0.56	1	0.64	0.38	0.54	0.61	0.55	0.34	0.55	0.53	0.53	0.27	0.34	0.48	0.6	0.45
Y1992Q3	0.67	0.6	0.66	0.73	0.69	0.64	1	0.68	0.76	0.8	0.75	0.6	0.75	0.78	0.8	0.57	0.65	0.77	0.84	0.75
Y1992Q4	0.45	0.27	0.31	0.71	0.55	0.38	0.68	1	0.68	0.66	0.58	0.79	0.52	0.52	0.48	0.76	0.67	0.65	0.71	0.83
Y1993Q1	0.66	0.41	0.43	0.47	0.81	0.54	0.76	0.68	1	0.84	0.61	0.59	0.59	0.74	0.76	0.47	0.8	0.75	0.83	0.72
Y1993Q2	0.62	0.47	0.52	0.51	0.73	0.61	0.8	0.66	0.84	1	0.67	0.57	0.62	0.81	0.75	0.4	0.74	0.82	0.81	0.74
Y1993Q3	0.79	0.75	0.77	0.79	0.56	0.55	0.75	0.58	0.61	0.67	1	0.68	0.57	0.71	0.79	0.68	0.56	0.65	0.8	0.79
Y1993Q4	0.57	0.34	0.39	0.68	0.56	0.34	0.6	0.79	0.59	0.57	0.68	1	0.38	0.4	0.46	0.79	0.64	0.55	0.73	0.82
Y1994Q1	0.39	0.43	0.44	0.57	0.42	0.55	0.75	0.52	0.59	0.62	0.57	0.38	1	0.74	0.57	0.43	0.5	0.66	0.62	0.72
Y1994Q2	0.63	0.6	0.64	0.52	0.58	0.53	0.78	0.52	0.74	0.81	0.71	0.4	0.74	1	0.83	0.34	0.72	0.84	0.75	0.72
Y1994Q3	0.79	0.69	0.75	0.56	0.7	0.53	0.8	0.48	0.76	0.75	0.79	0.46	0.57	0.83	1	0.43	0.69	0.72	0.81	0.75
Y1994Q4	0.46	0.34	0.4	0.84	0.36	0.27	0.57	0.76	0.47	0.4	0.68	0.79	0.43	0.34	0.43	1	0.5	0.42	0.62	0.78
Y1995Q1	0.62	0.34	0.38	0.45	0.69	0.34	0.65	0.67	0.8	0.74	0.56	0.64	0.5	0.72	0.69	0.5	1	0.73	0.75	0.76
Y1995Q2	0.53	0.44	0.51	0.51	0.66	0.48	0.77	0.65	0.75	0.82	0.65	0.55	0.66	0.84	0.72	0.42	0.73	1	0.77	0.73
Y1995Q3	0.73	0.57	0.63	0.66	0.79	0.6	0.84	0.71	0.83	0.81	0.8	0.73	0.62	0.75	0.81	0.62	0.75	0.77	1	0.84
Y1995Q4	0.62	0.48	0.55	0.79	0.64	0.45	0.75	0.83	0.72	0.74	0.79	0.82	0.72	0.72	0.75	0.78	0.76	0.73	0.84	1

Whiting

Age 2+	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.5	0.42	0.57	0.75	0.38	0.62	0.68	0.7	0.71	0.61	0.73	0.59	0.52	0.45	0.56	0.66	0.54	0.81	0.68
Y1991Q2	0.5	1	0.5	0.47	0.28	0.5	0.63	0.56	0.14	0.59	0.55	0.38	0.24	0.54	0.55	0.55	0.35	0.52	0.52	0.46
Y1991Q3	0.42	0.5	1	0.3	0.35	0.29	0.66	0.3	0.27	0.35	0.31	0.27	0.18	0.17	0.47	0.27	0.2	0.32	0.54	0.25
Y1991Q4	0.57	0.47	0.3	1	0.37	0.66	0.59	0.84	0.36	0.57	0.73	0.64	0.27	0.56	0.48	0.73	0.64	0.46	0.58	0.72
Y1992Q1	0.75	0.28	0.35	0.37	1	0.37	0.36	0.55	0.77	0.58	0.44	0.7	0.63	0.41	0.3	0.45	0.71	0.51	0.66	0.56
Y1992Q2	0.38	0.5	0.29	0.66	0.37	1	0.49	0.63	0.27	0.57	0.56	0.48	0.15	0.55	0.44	0.68	0.57	0.46	0.39	0.48
Y1992Q3	0.62	0.63	0.66	0.59	0.36	0.49	1	0.56	0.27	0.57	0.59	0.46	0.26	0.37	0.65	0.6	0.38	0.45	0.66	0.47
Y1992Q4	0.68	0.56	0.3	0.84	0.55	0.63	0.56	1	0.51	0.68	0.74	0.81	0.49	0.64	0.51	0.84	0.78	0.55	0.67	0.83
Y1993Q1	0.7	0.14	0.27	0.36	0.77	0.27	0.27	0.51	1	0.58	0.46	0.73	0.78	0.54	0.34	0.41	0.69	0.51	0.69	0.67
Y1993Q2	0.71	0.59	0.35	0.57	0.58	0.57	0.57	0.68	0.58	1	0.73	0.69	0.65	0.78	0.56	0.65	0.66	0.76	0.71	0.68
Y1993Q3	0.61	0.55	0.31	0.73	0.44	0.56	0.59	0.74	0.46	0.73	1	0.77	0.61	0.82	0.78	0.81	0.63	0.66	0.68	0.83
Y1993Q4	0.73	0.38	0.27	0.64	0.7	0.48	0.46	0.81	0.73	0.69	0.77	1	0.75	0.72	0.56	0.78	0.81	0.63	0.73	0.85
Y1994Q1	0.59	0.24	0.18	0.27	0.63	0.15	0.26	0.49	0.78	0.65	0.61	0.75	1	0.69	0.54	0.52	0.67	0.62	0.66	0.78
Y1994Q2	0.52	0.54	0.17	0.56	0.41	0.55	0.37	0.64	0.54	0.78	0.82	0.72	0.69	1	0.64	0.72	0.7	0.79	0.61	0.8
Y1994Q3	0.45	0.55	0.47	0.48	0.3	0.44	0.65	0.51	0.34	0.56	0.78	0.56	0.54	0.64	1	0.71	0.45	0.59	0.67	0.68
Y1994Q4	0.56	0.55	0.27	0.73	0.45	0.68	0.6	0.84	0.41	0.65	0.81	0.78	0.52	0.72	0.71	1	0.76	0.61	0.6	0.82
Y1995Q1	0.66	0.35	0.2	0.64	0.71	0.57	0.38	0.78	0.69	0.66	0.63	0.81	0.67	0.7	0.45	0.76	1	0.62	0.62	0.76
Y1995Q2	0.54	0.52	0.32	0.46	0.51	0.46	0.45	0.55	0.51	0.76	0.66	0.63	0.62	0.79	0.59	0.61	0.62	1	0.62	0.76
Y1995Q3	0.81	0.52	0.54	0.58	0.66	0.39	0.66	0.67	0.69	0.71	0.68	0.73	0.66	0.61	0.67	0.6	0.62	0.62	1	0.75
Y1995Q4	0.68	0.46	0.25	0.72	0.56	0.48	0.47	0.83	0.67	0.68	0.83	0.85	0.78	0.8	0.68	0.82	0.76	0.76	0.75	1

Saithe

Age 0	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1991Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1991Q3	.	.	1	0	.	.	-0.04	0.47	.	.	.	-0.08	.	.	-0.04	-0.05	.	.	-0.05	-0.07
Y1991Q4	.	.	0	1	.	.	-0.1	0.02	.	.	.	0.07	.	.	-0.1	-0.1	.	.	0.23	0.24
Y1992Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1992Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1992Q3	.	.	-0.04	-0.1	.	.	1	-0.1	.	.	.	-0.07	.	.	-0.04	-0.04	.	.	-0.05	-0.06
Y1992Q4	.	.	0.47	0.02	.	.	-0.1	1	.	.	.	-0.18	.	.	-0.1	0.01	.	.	0.01	0.1
Y1993Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1993Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1993Q3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1993Q4	.	.	-0.08	0.07	.	.	-0.07	-0.18	.	.	.	1	.	.	-0.08	-0.08	.	.	-0.09	-0.11
Y1994Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1994Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1994Q3	.	.	-0.04	-0.1	.	.	-0.04	-0.1	.	.	.	-0.08	.	.	1	-0.05	.	.	-0.05	-0.07
Y1994Q4	.	.	-0.05	-0.1	.	.	-0.04	0.01	.	.	.	-0.08	.	.	-0.05	1	.	.	-0.05	-0.07
Y1995Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1995Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1995Q3	.	.	-0.05	0.23	.	.	-0.05	0.01	.	.	.	-0.09	.	.	-0.05	-0.05	.	.	1	0.65
Y1995Q4	.	.	-0.07	0.24	.	.	-0.06	0.1	.	.	.	-0.11	.	.	-0.07	-0.07	.	.	0.65	1

Age 1	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.53	0.62	0.29	0.36	0.41	0.54	0.36	0.78	0.66	0.48	0.11	0.08	.	.	.	0.72	0.09	-0.07	-0.16
Y1991Q2	0.53	1	0.53	0.32	0.16	0.1	0.24	0.03	0.37	0.47	0.54	0.16	0.35	.	.	.	0.41	0.1	0.06	-0.14
Y1991Q3	0.62	0.53	1	0.28	0.23	0.27	0.43	0.21	0.47	0.71	0.59	0.19	0.29	.	.	.	0.56	0.21	-0.01	-0.08
Y1991Q4	0.29	0.32	0.28	1	0.32	0.15	0.3	0.18	0.18	0.48	0.45	0.34	0.44	.	.	.	0.29	-0.1	0.17	0.21
Y1992Q1	0.36	0.16	0.23	0.32	1	0.39	0.35	0.25	0.25	0.41	0.11	0.16	0.03	.	.	.	0.27	0.08	-0.08	0.19
Y1992Q2	0.41	0.1	0.27	0.15	0.39	1	0.24	0.51	0.63	0.23	0.22	0.02	0.06	.	.	.	0.36	0.56	-0.07	-0.07
Y1992Q3	0.54	0.24	0.43	0.3	0.35	0.24	1	0.41	0.42	0.54	0.45	0.21	0.07	.	.	.	0.45	0.16	-0.18	0.12
Y1992Q4	0.36	0.03	0.21	0.18	0.25	0.51	0.41	1	0.53	0.31	0.11	0.02	-0.07	.	.	.	0.57	0.3	-0.1	0.31
Y1993Q1	0.78	0.37	0.47	0.18	0.25	0.63	0.42	0.53	1	0.47	0.36	-0.02	-0.05	.	.	.	0.56	0.28	-0.09	-0.12
Y1993Q2	0.66	0.47	0.71	0.48	0.41	0.23	0.54	0.31	0.47	1	0.54	0.37	0.27	.	.	.	0.53	0.11	0.19	0.13
Y1993Q3	0.48	0.54	0.59	0.45	0.11	0.22	0.45	0.11	0.36	0.54	1	0.45	0.53	.	.	.	0.46	0.17	0.2	0
Y1993Q4	0.11	0.16	0.19	0.34	0.16	0.02	0.21	0.02	-0.02	0.37	0.45	1	0.34	.	.	.	0.04	-0.07	0.31	0.28
Y1994Q1	0.08	0.35	0.29	0.44	0.03	0.06	0.07	-0.07	-0.05	0.27	0.53	0.34	1	.	.	.	0.14	0.2	0.26	0.07
Y1994Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1994Q3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1994Q4	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1995Q1	0.72	0.41	0.56	0.29	0.27	0.36	0.45	0.57	0.56	0.53	0.46	0.04	0.14	.	.	.	1	0.09	-0.05	-0.11
Y1995Q2	0.09	0.1	0.21	-0.1	0.08	0.56	0.16	0.3	0.28	0.11	0.17	-0.07	0.2	.	.	.	0.09	1	-0.06	-0.08
Y1995Q3	-0.07	0.06	-0.01	0.17	-0.08	-0.07	-0.18	-0.1	-0.09	0.19	0.2	0.31	0.26	.	.	.	-0.05	-0.06	1	0.1
Y1995Q4	-0.16	-0.14	-0.08	0.21	0.19	-0.07	0.12	0.31	-0.12	0.13	0	0.28	0.07	.	.	.	-0.11	-0.08	0.1	1

Age 2	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.4	0.36	0.49	0.31	0.3	0.38	0.35	0.12	0.45	0.46	0.47	0.5	0.27	0.48	0.51	0.04	0.27	0.42	0.48
Y1991Q2	0.4	1	0.43	0.5	0.39	0.48	0.33	0.39	0.28	0.33	0.4	0.42	0.49	0.04	0.41	0.56	-0.06	0.1	0.22	0.44
Y1991Q3	0.36	0.43	1	0.64	0.69	0.6	0.8	0.72	0.57	0.77	0.84	0.74	0.66	0.42	0.79	0.77	0.11	0.41	0.82	0.66
Y1991Q4	0.49	0.5	0.64	1	0.58	0.49	0.54	0.72	0.44	0.72	0.72	0.67	0.51	0.35	0.58	0.72	0.12	0.22	0.52	0.74
Y1992Q1	0.31	0.39	0.69	0.58	1	0.45	0.64	0.64	0.54	0.66	0.63	0.58	0.58	0.37	0.58	0.63	0.03	0.34	0.57	0.46
Y1992Q2	0.3	0.48	0.6	0.49	0.45	1	0.5	0.57	0.4	0.52	0.56	0.64	0.44	0.26	0.6	0.53	0.04	0.42	0.54	0.46
Y1992Q3	0.38	0.33	0.8	0.54	0.64	0.5	1	0.66	0.62	0.75	0.82	0.73	0.55	0.51	0.77	0.7	0.2	0.43	0.73	0.57
Y1992Q4	0.35	0.39	0.72	0.72	0.64	0.57	0.66	1	0.53	0.76	0.76	0.79	0.48	0.46	0.68	0.69	0.19	0.33	0.7	0.8
Y1993Q1	0.12	0.28	0.57	0.44	0.54	0.4	0.62	0.53	1	0.73	0.67	0.56	0.32	0.19	0.52	0.49	0.28	0.35	0.46	0.47
Y1993Q2	0.45	0.33	0.77	0.72	0.66	0.52	0.75	0.76	0.73	1	0.84	0.75	0.55	0.42	0.72	0.67	0.19	0.36	0.72	0.77
Y1993Q3	0.46	0.4	0.84	0.72	0.63	0.56	0.82	0.76	0.67	0.84	1	0.79	0.55	0.46	0.8	0.76	0.23	0.38	0.82	0.77
Y1993Q4	0.47	0.42	0.74	0.67	0.58	0.64	0.73	0.79	0.56	0.75	0.79	1	0.57	0.49	0.76	0.69	0.16	0.37	0.7	0.76
Y1994Q1	0.5	0.49	0.66	0.51	0.58	0.44	0.55	0.48	0.32	0.55	0.55	0.57	1	0.32	0.61	0.59	-0.06	0.23	0.56	0.42
Y1994Q2	0.27	0.04	0.42	0.35	0.37	0.26	0.51	0.46	0.19	0.42	0.46	0.49	0.32	1	0.57	0.31	-0.11	0.05	0.49	0.3
Y1994Q3	0.48	0.41	0.79	0.58	0.58	0.6	0.77	0.68	0.52	0.72	0.8	0.76	0.61	0.57	1	0.71	0.05	0.43	0.74	0.59
Y1994Q4	0.51	0.56	0.77	0.72	0.63	0.53	0.7	0.69	0.49	0.67	0.76	0.69	0.59	0.31	0.71	1	0.18	0.38	0.65	0.7
Y1995Q1	0.04	-0.06	0.11	0.12	0.03	0.04	0.2	0.19	0.28	0.19	0.23	0.16	-0.06	-0.11	0.05	0.18	1	0.23	0.22	0.28
Y1995Q2	0.27	0.1	0.41	0.22	0.34	0.42	0.43	0.33	0.35	0.36	0.38	0.37	0.23	0.05	0.43	0.38	0.23	1	0.43	0.22
Y1995Q3	0.42	0.22	0.82	0.52	0.57	0.54	0.73	0.7	0.46	0.72	0.82	0.7	0.56	0.49	0.74	0.65	0.22	0.43	1	0.63
Y1995Q4	0.48	0.44	0.66	0.74	0.46	0.46	0.57	0.8	0.47	0.77	0.77	0.76	0.42	0.3	0.59	0.7	0.28	0.22	0.63	1

Age 3+	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.9	0.88	0.81	0.8	0.86	0.79	0.76	0.86	0.84	0.85	0.75	0.9	0.87	0.82	0.86	0.85	0.85	0.83	0.8
Y1991Q2	0.9	1	0.85	0.79	0.78	0.84	0.75	0.73	0.78	0.85	0.84	0.73	0.86	0.89	0.78	0.81	0.79	0.82	0.81	0.8
Y1991Q3	0.88	0.85	1	0.83	0.82	0.82	0.84	0.77	0.88	0.86	0.88	0.76	0.84	0.87	0.86	0.85	0.84	0.87	0.84	0.83
Y1991Q4	0.81	0.79	0.83	1	0.83	0.8	0.8	0.83	0.8	0.85	0.83	0.82	0.84	0.85	0.76	0.8	0.9	0.77	0.79	0.86
Y1992Q1	0.8	0.78	0.82	0.83	1	0.75	0.8	0.7	0.78	0.81	0.83	0.76	0.81	0.82	0.77	0.83	0.85	0.78	0.78	0.8
Y1992Q2	0.86	0.84	0.82	0.8	0.75	1	0.83	0.79	0.8	0.86	0.86	0.74	0.9	0.88	0.81	0.77	0.79	0.82	0.83	0.71
Y1992Q3	0.79	0.75	0.84	0.8	0.8	0.83	1	0.78	0.84	0.82	0.92	0.8	0.78	0.86	0.88	0.77	0.81	0.83	0.87	0.74
Y1992Q4	0.76	0.73	0.77	0.83	0.7	0.79	0.78	1	0.71	0.8	0.8	0.82	0.78	0.84	0.79	0.79	0.82	0.79	0.77	0.85
Y1993Q1	0.86	0.78	0.88	0.8	0.78	0.8	0.84	0.71	1	0.82	0.88	0.74	0.77	0.81	0.84	0.77	0.83	0.84	0.8	0.72
Y1993Q2	0.84	0.85	0.86	0.85	0.81	0.86	0.82	0.8	0.82	1	0.91	0.78	0.83	0.9	0.78	0.8	0.79	0.81	0.82	0.79
Y1993Q3	0.85	0.84	0.88	0.83	0.83	0.86	0.92	0.8	0.88	0.91	1	0.83	0.83	0.91	0.88	0.8	0.84	0.84	0.88	0.81
Y1993Q4	0.75	0.73	0.76	0.82	0.76	0.74	0.8	0.82	0.74	0.78	0.83	1	0.79	0.84	0.82	0.77	0.81	0.74	0.77	0.81
Y1994Q1	0.9	0.86	0.84	0.84	0.81	0.9	0.78	0.78	0.77	0.83	0.83	0.79	1	0.85	0.81	0.84	0.85	0.81	0.8	0.79
Y1994Q2	0.87	0.89	0.87	0.85	0.82	0.88	0.86	0.84	0.81	0.9	0.91	0.84	0.85	1	0.85	0.86	0.83	0.85	0.88	0.82
Y1994Q3	0.82	0.78	0.86	0.76	0.77	0.81	0.88	0.79	0.84	0.78	0.88	0.82	0.81	0.85	1	0.81	0.81	0.89	0.79	0.77
Y1994Q4	0.86	0.81	0.85	0.8	0.83	0.77	0.77	0.79	0.77	0.8	0.8	0.77	0.84	0.86	0.81	1	0.88	0.81	0.82	0.86
Y1995Q1	0.85	0.79	0.84	0.9	0.85	0.79	0.81	0.82	0.83	0.79	0.84	0.81	0.85	0.83	0.81	0.88	1	0.79	0.81	0.86
Y1995Q2	0.85	0.82	0.87	0.77	0.78	0.82	0.83	0.79	0.84	0.81	0.84	0.74	0.81	0.85	0.89	0.81	0.79	1	0.77	0.77
Y1995Q3	0.83	0.81	0.84	0.79	0.78	0.83	0.87	0.77	0.8	0.82	0.88	0.77	0.8	0.88	0.79	0.82	0.81	0.77	1	0.78
Y1995Q4	0.8	0.8	0.83	0.86	0.8	0.71	0.74	0.85	0.72	0.79	0.81	0.81	0.79	0.82	0.77	0.86	0.86	0.77	0.78	1

Mackerel

Age 0	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1991Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1991Q3	.	.	1	0.16	.	0.13	0.08	0.23	.	.	0	0.21	.	.	.	0.06	.	.	0.67	0.23
Y1991Q4	.	.	0.16	1	.	0.05	0.29	0.51	.	.	0.28	0.18	.	.	.	0.35	.	.	0.29	0.27
Y1992Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1992Q2	.	.	0.13	0.05	.	1	-0.07	0.08	.	.	-0.08	0.44	.	.	.	0.08	.	.	0.02	0.35
Y1992Q3	.	.	0.08	0.29	.	-0.07	1	0.09	.	.	0.34	0.09	.	.	.	0.43	.	.	0.51	0.04
Y1992Q4	.	.	0.23	0.51	.	0.08	0.09	1	.	.	0.4	0.31	.	.	.	0.1	.	.	0.23	0.42
Y1993Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1993Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1993Q3	.	.	0	0.28	.	-0.08	0.34	0.4	.	.	1	0.17	.	.	.	0.05	.	.	0.37	0.29
Y1993Q4	.	.	0.21	0.18	.	0.44	0.09	0.31	.	.	0.17	1	.	.	.	0.13	.	.	0.19	0.6
Y1994Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1994Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1994Q3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1994Q4	.	.	0.06	0.35	.	0.08	0.43	0.1	.	.	0.05	0.13	.	.	.	1	.	.	0.23	0.2
Y1995Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1995Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1995Q3	.	.	0.67	0.29	.	0.02	0.51	0.23	.	.	0.37	0.19	.	.	.	0.23	.	.	1	0.13
Y1995Q4	.	.	0.23	0.27	.	0.35	0.04	0.42	.	.	0.29	0.6	.	.	.	0.2	.	.	0.13	1

Mackerel

Age 1	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	-0.2	-0.08	0.28	0.65	0.46	-0.23	0.12	0.65	0.01	-0.24	0.18	0.56	0.23	-0.32	0.06	0.4	0.17	-0.42	-0.03
Y1991Q2	-0.2	1	0.52	0.19	0.06	-0.15	0.58	0.38	-0.32	0.54	0.56	0.13	-0.4	0.14	0.53	0.17	0.05	0.3	0.5	0.44
Y1991Q3	-0.08	0.52	1	0.35	0.14	-0.29	0.64	0.42	-0.11	0.26	0.69	0.18	-0.36	0.04	0.54	0.28	-0.15	0.28	0.52	0.22
Y1991Q4	0.28	0.19	0.35	1	0.28	-0.24	0.07	0.09	0.28	0.23	0.15	0.23	0.15	-0.01	0.06	0.11	0.15	0.14	0.1	0.02
Y1992Q1	0.65	0.06	0.14	0.28	1	0.42	-0.06	0.39	0.6	0.07	0.08	0.33	0.35	0.23	-0.12	0.31	0.26	0.34	-0.13	0.32
Y1992Q2	0.46	-0.15	-0.29	-0.24	0.42	1	-0.31	0.05	0.34	-0.12	-0.16	-0.03	0.44	0.12	-0.28	-0.05	0.33	0.26	-0.36	0.08
Y1992Q3	-0.23	0.58	0.64	0.07	-0.06	-0.31	1	0.39	-0.4	0.55	0.79	0.25	-0.41	0.2	0.76	0.24	-0.07	0.26	0.76	0.33
Y1992Q4	0.12	0.38	0.42	0.09	0.39	0.05	0.39	1	0.04	0.23	0.43	0.48	-0.07	-0.07	0.3	0.53	0.09	0.18	0.33	0.52
Y1993Q1	0.65	-0.32	-0.11	0.28	0.6	0.34	-0.4	0.04	1	-0.21	-0.24	0.07	0.45	-0.01	-0.36	-0.05	-0.08	0.16	-0.5	-0.08
Y1993Q2	0.01	0.54	0.26	0.23	0.07	-0.12	0.55	0.23	-0.21	1	0.45	0.29	-0.12	0.27	0.53	0.24	0.29	0.33	0.48	0.35
Y1993Q3	-0.24	0.56	0.69	0.15	0.08	-0.16	0.79	0.43	-0.24	0.45	1	0.32	-0.45	0.06	0.81	0.44	-0.07	0.44	0.8	0.47
Y1993Q4	0.18	0.13	0.18	0.23	0.33	-0.03	0.25	0.48	0.07	0.29	0.32	1	0.18	-0.03	0.27	0.66	0.22	0.12	0.32	0.5
Y1994Q1	0.56	-0.4	-0.36	0.15	0.35	0.44	-0.41	-0.07	0.45	-0.12	-0.45	0.18	1	-0.03	-0.47	-0.06	0.43	-0.06	-0.46	-0.16
Y1994Q2	0.23	0.14	0.04	-0.01	0.23	0.12	0.2	-0.07	-0.01	0.27	0.06	-0.03	-0.03	1	0.16	-0.02	0.11	0.24	0.06	0.01
Y1994Q3	-0.32	0.53	0.54	0.06	-0.12	-0.28	0.76	0.3	-0.36	0.53	0.81	0.27	-0.47	0.16	1	0.42	-0.15	0.25	0.82	0.46
Y1994Q4	0.06	0.17	0.28	0.11	0.31	-0.05	0.24	0.53	-0.05	0.24	0.44	0.66	-0.06	-0.02	0.42	1	0.21	0.02	0.42	0.61
Y1995Q1	0.4	0.05	-0.15	0.15	0.26	0.33	-0.07	0.09	-0.08	0.29	-0.07	0.22	0.43	0.11	-0.15	0.21	1	-0.05	0.01	0.19
Y1995Q2	0.17	0.3	0.28	0.14	0.34	0.26	0.26	0.18	0.16	0.33	0.44	0.12	-0.06	0.24	0.25	0.02	-0.05	1	0.13	0.08
Y1995Q3	-0.42	0.5	0.52	0.1	-0.13	-0.36	0.76	0.33	-0.5	0.48	0.8	0.32	-0.46	0.06	0.82	0.42	0.01	0.13	1	0.49
Y1995Q4	-0.03	0.44	0.22	0.02	0.32	0.08	0.33	0.52	-0.08	0.35	0.47	0.5	-0.16	0.01	0.46	0.61	0.19	0.08	0.49	1

Mackerel

Age 2	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	-0.11	0	-0.05	0.25	0.09	-0.21	0.18	0.2	-0.2	-0.03	0.04	-0.1	-0.02	-0.1	0.11	0.37	0.16	-0.05	-0.08
Y1991Q2	-0.11	1	0.63	-0.08	0.03	0.35	0.71	0.3	-0.39	0.72	0.8	0.38	0.03	0.46	0.65	0.42	-0.28	0.44	0.71	0.49
Y1991Q3	0	0.63	1	0.26	0.27	0.33	0.5	0.34	-0.06	0.47	0.72	0.36	0.16	0.53	0.63	0.45	0.05	0.55	0.66	0.23
Y1991Q4	-0.05	-0.08	0.26	1	0.51	0.29	-0.07	0.3	0.51	0.04	0.03	0.32	0.1	0.3	0.07	0.24	0.36	0.18	0.1	0.08
Y1992Q1	0.25	0.03	0.27	0.51	1	0.14	-0.08	0.55	0.49	0.01	0.14	0.47	0.22	0.3	-0.01	0.4	0.37	0.26	0.07	0.08
Y1992Q2	0.09	0.35	0.33	0.29	0.14	1	0.32	0.42	0.13	0.35	0.42	0.41	0.22	0.57	0.25	0.56	0.4	0.35	0.48	0.58
Y1992Q3	-0.21	0.71	0.5	-0.07	-0.08	0.32	1	0.26	-0.29	0.64	0.74	0.3	0.1	0.46	0.68	0.29	-0.18	0.33	0.73	0.35
Y1992Q4	0.18	0.3	0.34	0.3	0.55	0.42	0.26	1	0.26	0.19	0.4	0.55	0.14	0.48	0.21	0.5	0.27	0.31	0.38	0.31
Y1993Q1	0.2	-0.39	-0.06	0.51	0.49	0.13	-0.29	0.26	1	-0.33	-0.14	0.22	0.32	0.16	-0.09	0.23	0.48	0.07	-0.24	-0.04
Y1993Q2	-0.2	0.72	0.47	0.04	0.01	0.35	0.64	0.19	-0.33	1	0.64	0.34	-0.04	0.46	0.6	0.51	-0.25	0.3	0.63	0.62
Y1993Q3	-0.03	0.8	0.72	0.03	0.14	0.42	0.74	0.4	-0.14	0.64	1	0.48	0.08	0.52	0.68	0.49	-0.14	0.62	0.71	0.46
Y1993Q4	0.04	0.38	0.36	0.32	0.47	0.41	0.3	0.55	0.22	0.34	0.48	1	0.36	0.51	0.29	0.66	0.22	0.43	0.56	0.41
Y1994Q1	-0.1	0.03	0.16	0.1	0.22	0.22	0.1	0.14	0.32	-0.04	0.08	0.36	1	0.16	0.11	0.32	0.44	0.08	0.18	0.05
Y1994Q2	-0.02	0.46	0.53	0.3	0.3	0.57	0.46	0.48	0.16	0.46	0.52	0.51	0.16	1	0.53	0.62	0.21	0.47	0.55	0.46
Y1994Q3	-0.1	0.65	0.63	0.07	-0.01	0.25	0.68	0.21	-0.09	0.6	0.68	0.29	0.11	0.53	1	0.43	-0.16	0.34	0.66	0.29
Y1994Q4	0.11	0.42	0.45	0.24	0.4	0.56	0.29	0.5	0.23	0.51	0.49	0.66	0.32	0.62	0.43	1	0.3	0.29	0.49	0.56
Y1995Q1	0.37	-0.28	0.05	0.36	0.37	0.4	-0.18	0.27	0.48	-0.25	-0.14	0.22	0.44	0.21	-0.16	0.3	1	0.13	0.03	0
Y1995Q2	0.16	0.44	0.55	0.18	0.26	0.35	0.33	0.31	0.07	0.3	0.62	0.43	0.08	0.47	0.34	0.29	0.13	1	0.41	0.24
Y1995Q3	-0.05	0.71	0.66	0.1	0.07	0.48	0.73	0.38	-0.24	0.63	0.71	0.56	0.18	0.55	0.66	0.49	0.03	0.41	1	0.54
Y1995Q4	-0.08	0.49	0.23	0.08	0.08	0.58	0.35	0.31	-0.04	0.62	0.46	0.41	0.05	0.46	0.29	0.56	0	0.24	0.54	1

Mackerel

Age 3+	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	-0.32	-0.14	0.01	0.18	0.14	-0.21	-0.07	0.13	-0.26	-0.35	-0.16	0.01	0.13	-0.05	-0.03	0.51	-0.02	0	-0.16
Y1991Q2	-0.32	1	0.59	-0.02	-0.25	0.55	0.73	0.31	-0.35	0.77	0.79	0.4	-0.09	0.45	0.59	0.35	-0.28	0.4	0.57	0.44
Y1991Q3	-0.14	0.59	1	0.36	0.09	0.38	0.42	0.39	0.03	0.5	0.68	0.46	0.11	0.43	0.69	0.54	-0.07	0.25	0.65	0.26
Y1991Q4	0.01	-0.02	0.36	1	0.54	0.16	-0.07	0.47	0.42	0.06	0.16	0.42	0.22	0.21	0.3	0.4	0.2	0.11	0.47	0.18
Y1992Q1	0.18	-0.25	0.09	0.54	1	0.08	-0.22	0.5	0.77	-0.25	-0.1	0.46	0.34	0.29	0.08	0.57	0.56	0.15	0.16	0.27
Y1992Q2	0.14	0.55	0.38	0.16	0.08	1	0.45	0.35	0.01	0.54	0.59	0.35	0.13	0.62	0.43	0.51	0.19	0.37	0.59	0.61
Y1992Q3	-0.21	0.73	0.42	-0.07	-0.22	0.45	1	0.15	-0.22	0.64	0.67	0.28	0.05	0.38	0.61	0.3	-0.26	0.13	0.5	0.33
Y1992Q4	-0.07	0.31	0.39	0.47	0.5	0.35	0.15	1	0.3	0.23	0.4	0.71	0.24	0.44	0.41	0.72	0.17	0.31	0.48	0.46
Y1993Q1	0.13	-0.35	0.03	0.42	0.77	0.01	-0.22	0.3	1	-0.35	-0.25	0.28	0.35	0.17	0.1	0.45	0.49	0.03	0	0.13
Y1993Q2	-0.26	0.77	0.5	0.06	-0.25	0.54	0.64	0.23	-0.35	1	0.77	0.31	-0.18	0.41	0.58	0.37	-0.26	0.22	0.59	0.58
Y1993Q3	-0.35	0.79	0.68	0.16	-0.1	0.59	0.67	0.4	-0.25	0.77	1	0.48	0.01	0.42	0.61	0.46	-0.23	0.37	0.65	0.5
Y1993Q4	-0.16	0.4	0.46	0.42	0.46	0.35	0.28	0.71	0.28	0.31	0.48	1	0.23	0.44	0.45	0.73	0.1	0.4	0.59	0.49
Y1994Q1	0.01	-0.09	0.11	0.22	0.34	0.13	0.05	0.24	0.35	-0.18	0.01	0.23	1	0.27	0.13	0.3	0.24	-0.05	0.07	0.05
Y1994Q2	0.13	0.45	0.43	0.21	0.29	0.62	0.38	0.44	0.17	0.41	0.42	0.44	0.27	1	0.52	0.62	0.25	0.31	0.56	0.56
Y1994Q3	-0.05	0.59	0.69	0.3	0.08	0.43	0.61	0.41	0.1	0.58	0.61	0.45	0.13	0.52	1	0.56	-0.03	0.11	0.69	0.39
Y1994Q4	-0.03	0.35	0.54	0.4	0.57	0.51	0.3	0.72	0.45	0.37	0.46	0.73	0.3	0.62	0.56	1	0.23	0.27	0.55	0.61
Y1995Q1	0.51	-0.28	-0.07	0.2	0.56	0.19	-0.26	0.17	0.49	-0.26	-0.23	0.1	0.24	0.25	-0.03	0.23	1	0.26	0.07	0.04
Y1995Q2	-0.02	0.4	0.25	0.11	0.15	0.37	0.13	0.31	0.03	0.22	0.37	0.4	-0.05	0.31	0.11	0.27	0.26	1	0.29	0.3
Y1995Q3	0	0.57	0.65	0.47	0.16	0.59	0.5	0.48	0	0.59	0.65	0.59	0.07	0.56	0.69	0.55	0.07	0.29	1	0.51
Y1995Q4	-0.16	0.44	0.26	0.18	0.27	0.61	0.33	0.46	0.13	0.58	0.5	0.49	0.05	0.56	0.39	0.61	0.04	0.3	0.51	1

Sprat

Age 0	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1991Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1991Q3	.	.	1	0.1	.	.	0.12	0.14	.	.	-0.04	0.27	.	0.2	0.4	0.34	.	.	0.18	0.08
Y1991Q4	.	.	0.1	1	.	.	0.6	0.65	.	.	0.38	0.56	.	0.18	0.49	0.26	.	.	0	0.54
Y1992Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1992Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1992Q3	.	.	0.12	0.6	.	.	1	0.58	.	.	0.63	0.49	.	0.2	0.67	0.09	.	.	0.06	0.56
Y1992Q4	.	.	0.14	0.65	.	.	0.58	1	.	.	0.48	0.75	.	-0.09	0.41	0.22	.	.	0.13	0.77
Y1993Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1993Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1993Q3	.	.	-0.04	0.38	.	.	0.63	0.48	.	.	1	0.5	.	-0.15	0.52	0	.	.	-0.11	0.53
Y1993Q4	.	.	0.27	0.56	.	.	0.49	0.75	.	.	0.5	1	.	-0.11	0.51	0.4	.	.	0.06	0.65
Y1994Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1994Q2	.	.	0.2	0.18	.	.	0.2	-0.09	.	.	-0.15	-0.11	.	1	0.25	0.41	.	.	-0.07	-0.08
Y1994Q3	.	.	0.4	0.49	.	.	0.67	0.41	.	.	0.52	0.51	.	0.25	1	0.31	.	.	-0.16	0.5
Y1994Q4	.	.	0.34	0.26	.	.	0.09	0.22	.	.	0	0.4	.	0.41	0.31	1	.	.	-0.07	0.13
Y1995Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1995Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1995Q3	.	.	0.18	0	.	.	0.06	0.13	.	.	-0.11	0.06	.	-0.07	-0.16	-0.07	.	.	1	0.09
Y1995Q4	.	.	0.08	0.54	.	.	0.56	0.77	.	.	0.53	0.65	.	-0.08	0.5	0.13	.	.	0.09	1

Sprat

Age 1	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.84	0.78	0.91	0.74	0.82	0.87	0.85	0.88	0.82	0.87	0.88	0.86	0.82	0.84	0.8	0.83	0.76	0.55	0.76
Y1991Q2	0.84	1	0.7	0.81	0.87	0.79	0.82	0.72	0.86	0.89	0.78	0.78	0.73	0.7	0.69	0.73	0.67	0.81	0.52	0.57
Y1991Q3	0.78	0.7	1	0.73	0.68	0.72	0.77	0.72	0.79	0.71	0.78	0.73	0.79	0.82	0.82	0.81	0.78	0.77	0.63	0.73
Y1991Q4	0.91	0.81	0.73	1	0.74	0.86	0.88	0.87	0.82	0.81	0.87	0.9	0.77	0.81	0.82	0.83	0.77	0.78	0.55	0.76
Y1992Q1	0.74	0.87	0.68	0.74	1	0.69	0.78	0.62	0.85	0.8	0.68	0.71	0.74	0.66	0.64	0.74	0.66	0.85	0.63	0.57
Y1992Q2	0.82	0.79	0.72	0.86	0.69	1	0.84	0.78	0.74	0.79	0.79	0.79	0.73	0.77	0.8	0.77	0.7	0.75	0.5	0.65
Y1992Q3	0.87	0.82	0.77	0.88	0.78	0.84	1	0.84	0.8	0.81	0.88	0.86	0.75	0.73	0.82	0.84	0.72	0.77	0.61	0.73
Y1992Q4	0.85	0.72	0.72	0.87	0.62	0.78	0.84	1	0.75	0.76	0.89	0.89	0.72	0.7	0.75	0.79	0.7	0.67	0.47	0.67
Y1993Q1	0.88	0.86	0.79	0.82	0.85	0.74	0.8	0.75	1	0.83	0.78	0.8	0.9	0.82	0.79	0.8	0.85	0.84	0.63	0.69
Y1993Q2	0.82	0.89	0.71	0.81	0.8	0.79	0.81	0.76	0.83	1	0.77	0.79	0.74	0.73	0.65	0.69	0.64	0.84	0.48	0.51
Y1993Q3	0.87	0.78	0.78	0.87	0.68	0.79	0.88	0.89	0.78	0.77	1	0.9	0.75	0.77	0.81	0.82	0.72	0.7	0.57	0.73
Y1993Q4	0.88	0.78	0.73	0.9	0.71	0.79	0.86	0.89	0.8	0.79	0.9	1	0.75	0.71	0.73	0.77	0.69	0.69	0.51	0.7
Y1994Q1	0.86	0.73	0.79	0.77	0.74	0.73	0.75	0.72	0.9	0.74	0.75	0.75	1	0.86	0.81	0.77	0.88	0.79	0.6	0.72
Y1994Q2	0.82	0.7	0.82	0.81	0.66	0.77	0.73	0.7	0.82	0.73	0.77	0.71	0.86	1	0.89	0.82	0.89	0.82	0.63	0.76
Y1994Q3	0.84	0.69	0.82	0.82	0.64	0.8	0.82	0.75	0.79	0.65	0.81	0.73	0.81	0.89	1	0.88	0.87	0.77	0.64	0.79
Y1994Q4	0.8	0.73	0.81	0.83	0.74	0.77	0.84	0.79	0.8	0.69	0.82	0.77	0.77	0.82	0.88	1	0.8	0.79	0.68	0.84
Y1995Q1	0.83	0.67	0.78	0.77	0.66	0.7	0.72	0.7	0.85	0.64	0.72	0.69	0.88	0.89	0.87	0.8	1	0.75	0.6	0.78
Y1995Q2	0.76	0.81	0.77	0.78	0.85	0.75	0.77	0.67	0.84	0.84	0.7	0.69	0.79	0.82	0.77	0.79	0.75	1	0.64	0.61
Y1995Q3	0.55	0.52	0.63	0.55	0.63	0.5	0.61	0.47	0.63	0.48	0.57	0.51	0.6	0.63	0.64	0.68	0.6	0.64	1	0.65
Y1995Q4	0.76	0.57	0.73	0.76	0.57	0.65	0.73	0.67	0.69	0.51	0.73	0.7	0.72	0.76	0.79	0.84	0.78	0.61	0.65	1

Sprat

Age 2	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.82	0.61	0.78	0.82	0.78	0.73	0.7	0.79	0.77	0.7	0.75	0.83	0.66	0.65	0.62	0.75	0.76	0.44	0.46
Y1991Q2	0.82	1	0.7	0.82	0.88	0.81	0.8	0.75	0.87	0.83	0.71	0.74	0.85	0.75	0.75	0.71	0.79	0.82	0.46	0.54
Y1991Q3	0.61	0.7	1	0.69	0.57	0.68	0.74	0.68	0.7	0.62	0.76	0.65	0.68	0.76	0.78	0.79	0.77	0.73	0.62	0.55
Y1991Q4	0.78	0.82	0.69	1	0.76	0.82	0.86	0.9	0.78	0.75	0.79	0.84	0.84	0.68	0.85	0.82	0.87	0.76	0.56	0.72
Y1992Q1	0.82	0.88	0.57	0.76	1	0.83	0.76	0.7	0.85	0.84	0.62	0.7	0.86	0.71	0.66	0.6	0.67	0.81	0.48	0.46
Y1992Q2	0.78	0.81	0.68	0.82	0.83	1	0.83	0.8	0.71	0.85	0.72	0.77	0.84	0.81	0.83	0.69	0.71	0.79	0.6	0.63
Y1992Q3	0.73	0.8	0.74	0.86	0.76	0.83	1	0.89	0.73	0.78	0.84	0.84	0.89	0.75	0.89	0.8	0.82	0.78	0.7	0.75
Y1992Q4	0.7	0.75	0.68	0.9	0.7	0.8	0.89	1	0.71	0.76	0.82	0.86	0.85	0.73	0.89	0.8	0.84	0.75	0.61	0.76
Y1993Q1	0.79	0.87	0.7	0.78	0.85	0.71	0.73	0.71	1	0.78	0.66	0.71	0.85	0.68	0.69	0.72	0.81	0.8	0.47	0.51
Y1993Q2	0.77	0.83	0.62	0.75	0.84	0.85	0.78	0.76	0.78	1	0.68	0.73	0.82	0.82	0.74	0.66	0.7	0.83	0.55	0.51
Y1993Q3	0.7	0.71	0.76	0.79	0.62	0.72	0.84	0.82	0.66	0.68	1	0.79	0.79	0.72	0.83	0.81	0.76	0.68	0.62	0.63
Y1993Q4	0.75	0.74	0.65	0.84	0.7	0.77	0.84	0.86	0.71	0.73	0.79	1	0.84	0.66	0.76	0.74	0.78	0.7	0.6	0.69
Y1994Q1	0.83	0.85	0.68	0.84	0.86	0.84	0.89	0.85	0.85	0.82	0.79	0.84	1	0.75	0.79	0.74	0.83	0.84	0.59	0.63
Y1994Q2	0.66	0.75	0.76	0.68	0.71	0.81	0.75	0.73	0.68	0.82	0.72	0.66	0.75	1	0.8	0.66	0.7	0.78	0.57	0.58
Y1994Q3	0.65	0.75	0.78	0.85	0.66	0.83	0.89	0.89	0.69	0.74	0.83	0.76	0.79	0.8	1	0.82	0.8	0.75	0.66	0.72
Y1994Q4	0.62	0.71	0.79	0.82	0.6	0.69	0.8	0.8	0.72	0.66	0.81	0.74	0.74	0.66	0.82	1	0.88	0.7	0.65	0.7
Y1995Q1	0.75	0.79	0.77	0.87	0.67	0.71	0.82	0.84	0.81	0.7	0.76	0.78	0.83	0.7	0.8	0.88	1	0.74	0.58	0.71
Y1995Q2	0.76	0.82	0.73	0.76	0.81	0.79	0.78	0.75	0.8	0.83	0.68	0.7	0.84	0.78	0.75	0.7	0.74	1	0.58	0.51
Y1995Q3	0.44	0.46	0.62	0.56	0.48	0.6	0.7	0.61	0.47	0.55	0.62	0.6	0.59	0.57	0.66	0.65	0.58	0.58	1	0.62
Y1995Q4	0.46	0.54	0.55	0.72	0.46	0.63	0.75	0.76	0.51	0.51	0.63	0.69	0.63	0.58	0.72	0.7	0.71	0.51	0.62	1

Sprat

Age 3+	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.78	0.57	0.67	0.81	0.77	0.66	0.6	0.75	0.73	0.71	0.68	0.79	0.61	0.67	0.54	0.73	0.69	0.41	0.38
Y1991Q2	0.78	1	0.72	0.77	0.83	0.78	0.8	0.71	0.82	0.76	0.66	0.72	0.8	0.7	0.77	0.56	0.71	0.76	0.43	0.47
Y1991Q3	0.57	0.72	1	0.64	0.52	0.64	0.79	0.7	0.63	0.57	0.73	0.62	0.61	0.7	0.77	0.46	0.62	0.68	0.58	0.45
Y1991Q4	0.67	0.77	0.64	1	0.59	0.72	0.79	0.88	0.66	0.59	0.72	0.8	0.71	0.52	0.79	0.62	0.82	0.6	0.49	0.62
Y1992Q1	0.81	0.83	0.52	0.59	1	0.73	0.62	0.48	0.88	0.77	0.5	0.57	0.83	0.68	0.63	0.34	0.61	0.73	0.34	0.32
Y1992Q2	0.77	0.78	0.64	0.72	0.73	1	0.77	0.74	0.71	0.84	0.67	0.8	0.82	0.72	0.84	0.65	0.81	0.82	0.6	0.58
Y1992Q3	0.66	0.8	0.79	0.79	0.62	0.77	1	0.83	0.71	0.72	0.8	0.78	0.82	0.69	0.9	0.64	0.77	0.78	0.72	0.64
Y1992Q4	0.6	0.71	0.7	0.88	0.48	0.74	0.83	1	0.56	0.58	0.76	0.83	0.7	0.55	0.82	0.76	0.84	0.65	0.61	0.69
Y1993Q1	0.75	0.82	0.63	0.66	0.88	0.71	0.71	0.56	1	0.81	0.57	0.62	0.86	0.71	0.72	0.4	0.64	0.74	0.43	0.41
Y1993Q2	0.73	0.76	0.57	0.59	0.77	0.84	0.72	0.58	0.81	1	0.59	0.62	0.82	0.8	0.79	0.54	0.64	0.81	0.58	0.45
Y1993Q3	0.71	0.66	0.73	0.72	0.5	0.67	0.8	0.76	0.57	0.59	1	0.75	0.73	0.6	0.76	0.71	0.75	0.65	0.63	0.6
Y1993Q4	0.68	0.72	0.62	0.8	0.57	0.8	0.78	0.83	0.62	0.62	0.75	1	0.77	0.53	0.78	0.74	0.85	0.67	0.67	0.75
Y1994Q1	0.79	0.8	0.61	0.71	0.83	0.82	0.82	0.7	0.86	0.82	0.73	0.77	1	0.7	0.83	0.6	0.78	0.82	0.61	0.55
Y1994Q2	0.61	0.7	0.7	0.52	0.68	0.72	0.69	0.55	0.71	0.8	0.6	0.53	0.7	1	0.71	0.43	0.63	0.79	0.54	0.38
Y1994Q3	0.67	0.77	0.77	0.79	0.63	0.84	0.9	0.82	0.72	0.79	0.76	0.78	0.83	0.71	1	0.65	0.75	0.8	0.68	0.59
Y1994Q4	0.54	0.56	0.46	0.62	0.34	0.65	0.64	0.76	0.4	0.54	0.71	0.74	0.6	0.43	0.65	1	0.74	0.59	0.57	0.74
Y1995Q1	0.73	0.71	0.62	0.82	0.61	0.81	0.77	0.84	0.64	0.64	0.75	0.85	0.78	0.63	0.75	0.74	1	0.7	0.66	0.75
Y1995Q2	0.69	0.76	0.68	0.6	0.73	0.82	0.78	0.65	0.74	0.81	0.65	0.67	0.82	0.79	0.8	0.59	0.7	1	0.61	0.52
Y1995Q3	0.41	0.43	0.58	0.49	0.34	0.6	0.72	0.61	0.43	0.58	0.63	0.67	0.61	0.54	0.68	0.57	0.66	0.61	1	0.64
Y1995Q4	0.38	0.47	0.45	0.62	0.32	0.58	0.64	0.69	0.41	0.45	0.6	0.75	0.55	0.38	0.59	0.74	0.75	0.52	0.64	1

Norway pout

Age 0	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1991Q2	.	1	0.28	0.11	.	0.08	0.28	0.12	.	.	0.36	0.1	.	0.31	0.18	0.1	.	.	0.24	0.1
Y1991Q3	.	0.28	1	0.71	.	0.23	0.86	0.77	.	.	0.92	0.69	.	0.11	0.86	0.61	.	.	0.86	0.58
Y1991Q4	.	0.11	0.71	1	.	0.23	0.65	0.83	.	.	0.67	0.82	.	0	0.79	0.88	.	.	0.55	0.76
Y1992Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1992Q2	.	0.08	0.23	0.23	.	1	0.18	0.11	.	.	0.23	0.16	.	-0.05	0.12	0.12	.	.	0.24	0.28
Y1992Q3	.	0.28	0.86	0.65	.	0.18	1	0.76	.	.	0.84	0.65	.	0.11	0.81	0.55	.	.	0.85	0.48
Y1992Q4	.	0.12	0.77	0.83	.	0.11	0.76	1	.	.	0.72	0.84	.	0.05	0.78	0.85	.	.	0.67	0.7
Y1993Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1993Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1993Q3	.	0.36	0.92	0.67	.	0.23	0.84	0.72	.	.	1	0.69	.	0.18	0.81	0.57	.	.	0.8	0.54
Y1993Q4	.	0.1	0.69	0.82	.	0.16	0.65	0.84	.	.	0.69	1	.	-0.03	0.75	0.88	.	.	0.58	0.76
Y1994Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1994Q2	.	0.31	0.11	0	.	-0.05	0.11	0.05	.	.	0.18	-0.03	.	1	-0.02	-0.03	.	.	0.1	0.11
Y1994Q3	.	0.18	0.86	0.79	.	0.12	0.81	0.78	.	.	0.81	0.75	.	-0.02	1	0.73	.	.	0.76	0.65
Y1994Q4	.	0.1	0.61	0.88	.	0.12	0.55	0.85	.	.	0.57	0.88	.	-0.03	0.73	1	.	.	0.5	0.8
Y1995Q1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1995Q2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Y1995Q3	.	0.24	0.86	0.55	.	0.24	0.85	0.67	.	.	0.8	0.58	.	0.1	0.76	0.5	.	.	1	0.52
Y1995Q4	.	0.1	0.58	0.76	.	0.28	0.48	0.7	.	.	0.54	0.76	.	0.11	0.65	0.8	.	.	0.52	1

Norway pout

Age 1	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.84	0.8	0.71	0.74	0.79	0.8	0.7	0.74	0.76	0.77	0.75	0.61	0.76	0.62	0.7	0.77	0.79	0.73	0.66
Y1991Q2	0.84	1	0.77	0.73	0.7	0.79	0.81	0.75	0.76	0.79	0.79	0.81	0.64	0.8	0.72	0.76	0.76	0.79	0.78	0.73
Y1991Q3	0.8	0.77	1	0.71	0.55	0.77	0.77	0.64	0.62	0.64	0.75	0.72	0.46	0.65	0.67	0.72	0.64	0.77	0.73	0.58
Y1991Q4	0.71	0.73	0.71	1	0.77	0.84	0.84	0.86	0.75	0.77	0.79	0.83	0.73	0.84	0.78	0.9	0.85	0.81	0.81	0.81
Y1992Q1	0.74	0.7	0.55	0.77	1	0.81	0.82	0.85	0.92	0.86	0.72	0.76	0.89	0.85	0.65	0.78	0.92	0.79	0.77	0.84
Y1992Q2	0.79	0.79	0.77	0.84	0.81	1	0.88	0.86	0.79	0.82	0.77	0.81	0.76	0.86	0.77	0.86	0.87	0.88	0.87	0.83
Y1992Q3	0.8	0.81	0.77	0.84	0.82	0.88	1	0.89	0.85	0.88	0.88	0.85	0.77	0.87	0.74	0.85	0.86	0.85	0.89	0.83
Y1992Q4	0.7	0.75	0.64	0.86	0.85	0.86	0.89	1	0.85	0.88	0.79	0.87	0.87	0.89	0.74	0.89	0.9	0.84	0.86	0.9
Y1993Q1	0.74	0.76	0.62	0.75	0.92	0.79	0.85	0.85	1	0.89	0.73	0.78	0.9	0.86	0.68	0.78	0.89	0.79	0.74	0.81
Y1993Q2	0.76	0.79	0.64	0.77	0.86	0.82	0.88	0.88	0.89	1	0.81	0.79	0.88	0.92	0.7	0.81	0.91	0.83	0.83	0.82
Y1993Q3	0.77	0.79	0.75	0.79	0.72	0.77	0.88	0.79	0.73	0.81	1	0.85	0.68	0.81	0.7	0.8	0.77	0.75	0.82	0.73
Y1993Q4	0.75	0.81	0.72	0.83	0.76	0.81	0.85	0.87	0.78	0.79	0.85	1	0.75	0.87	0.74	0.91	0.83	0.78	0.8	0.81
Y1994Q1	0.61	0.64	0.46	0.73	0.89	0.76	0.77	0.87	0.9	0.88	0.68	0.75	1	0.88	0.58	0.77	0.92	0.72	0.74	0.86
Y1994Q2	0.76	0.8	0.65	0.84	0.85	0.86	0.87	0.89	0.86	0.92	0.81	0.87	0.88	1	0.77	0.91	0.92	0.85	0.88	0.86
Y1994Q3	0.62	0.72	0.67	0.78	0.65	0.77	0.74	0.74	0.68	0.7	0.7	0.74	0.58	0.77	1	0.82	0.72	0.77	0.79	0.76
Y1994Q4	0.7	0.76	0.72	0.9	0.78	0.86	0.85	0.89	0.78	0.81	0.8	0.91	0.77	0.91	0.82	1	0.87	0.85	0.85	0.85
Y1995Q1	0.77	0.76	0.64	0.85	0.92	0.87	0.86	0.9	0.89	0.91	0.77	0.83	0.92	0.92	0.72	0.87	1	0.83	0.81	0.85
Y1995Q2	0.79	0.79	0.77	0.81	0.79	0.88	0.85	0.84	0.79	0.83	0.75	0.78	0.72	0.85	0.77	0.85	0.83	1	0.87	0.8
Y1995Q3	0.73	0.78	0.73	0.81	0.77	0.87	0.89	0.86	0.74	0.83	0.82	0.8	0.74	0.88	0.79	0.85	0.81	0.87	1	0.83
Y1995Q4	0.66	0.73	0.58	0.81	0.84	0.83	0.83	0.9	0.81	0.82	0.73	0.81	0.86	0.86	0.76	0.85	0.85	0.8	0.83	1

Norway pout

Age2+	Y1991Q1	Y1991Q2	Y1991Q3	Y1991Q4	Y1992Q1	Y1992Q2	Y1992Q3	Y1992Q4	Y1993Q1	Y1993Q2	Y1993Q3	Y1993Q4	Y1994Q1	Y1994Q2	Y1994Q3	Y1994Q4	Y1995Q1	Y1995Q2	Y1995Q3	Y1995Q4
Y1991Q1	1	0.8	0.68	0.65	0.78	0.7	0.74	0.69	0.81	0.86	0.78	0.76	0.86	0.85	0.81	0.74	0.87	0.86	0.73	0.68
Y1991Q2	0.8	1	0.73	0.8	0.82	0.72	0.87	0.86	0.82	0.73	0.73	0.85	0.76	0.77	0.77	0.8	0.87	0.88	0.69	0.86
Y1991Q3	0.68	0.73	1	0.68	0.56	0.74	0.86	0.7	0.64	0.72	0.82	0.76	0.69	0.76	0.78	0.74	0.7	0.76	0.83	0.68
Y1991Q4	0.65	0.8	0.68	1	0.65	0.74	0.82	0.84	0.66	0.72	0.73	0.83	0.75	0.78	0.75	0.8	0.77	0.79	0.7	0.81
Y1992Q1	0.78	0.82	0.56	0.65	1	0.67	0.75	0.82	0.96	0.68	0.58	0.75	0.78	0.69	0.75	0.72	0.86	0.83	0.58	0.81
Y1992Q2	0.7	0.72	0.74	0.74	0.67	1	0.8	0.71	0.69	0.73	0.7	0.77	0.68	0.78	0.74	0.78	0.77	0.84	0.75	0.69
Y1992Q3	0.74	0.87	0.86	0.82	0.75	0.8	1	0.89	0.79	0.73	0.78	0.86	0.73	0.78	0.8	0.83	0.84	0.87	0.75	0.85
Y1992Q4	0.69	0.86	0.7	0.84	0.82	0.71	0.89	1	0.83	0.62	0.63	0.89	0.71	0.7	0.74	0.84	0.82	0.84	0.61	0.88
Y1993Q1	0.81	0.82	0.64	0.66	0.96	0.69	0.79	0.83	1	0.73	0.68	0.78	0.83	0.74	0.83	0.74	0.88	0.85	0.65	0.86
Y1993Q2	0.86	0.73	0.72	0.72	0.68	0.73	0.73	0.62	0.73	1	0.87	0.76	0.87	0.91	0.84	0.74	0.85	0.79	0.82	0.64
Y1993Q3	0.78	0.73	0.82	0.73	0.58	0.7	0.78	0.63	0.68	0.87	1	0.78	0.8	0.83	0.83	0.74	0.76	0.74	0.85	0.69
Y1993Q4	0.76	0.85	0.76	0.83	0.75	0.77	0.86	0.89	0.78	0.76	0.78	1	0.78	0.8	0.81	0.9	0.85	0.85	0.72	0.85
Y1994Q1	0.86	0.76	0.69	0.75	0.78	0.68	0.73	0.71	0.83	0.87	0.8	0.78	1	0.85	0.85	0.75	0.87	0.8	0.76	0.7
Y1994Q2	0.85	0.77	0.76	0.78	0.69	0.78	0.78	0.7	0.74	0.91	0.83	0.8	0.85	1	0.86	0.8	0.85	0.84	0.85	0.69
Y1994Q3	0.81	0.77	0.78	0.75	0.75	0.74	0.8	0.74	0.83	0.84	0.83	0.81	0.85	0.86	1	0.78	0.82	0.82	0.81	0.79
Y1994Q4	0.74	0.8	0.74	0.8	0.72	0.78	0.83	0.84	0.74	0.74	0.74	0.9	0.75	0.8	0.78	1	0.83	0.84	0.7	0.75
Y1995Q1	0.87	0.87	0.7	0.77	0.86	0.77	0.84	0.82	0.88	0.85	0.76	0.85	0.87	0.85	0.82	0.83	1	0.89	0.73	0.79
Y1995Q2	0.86	0.88	0.76	0.79	0.83	0.84	0.87	0.84	0.85	0.79	0.74	0.85	0.8	0.84	0.82	0.84	0.89	1	0.78	0.8
Y1995Q3	0.73	0.69	0.83	0.7	0.58	0.75	0.75	0.61	0.65	0.82	0.85	0.72	0.76	0.85	0.81	0.7	0.73	0.78	1	0.62
Y1995Q4	0.68	0.86	0.68	0.81	0.81	0.69	0.85	0.88	0.86	0.64	0.69	0.85	0.7	0.69	0.79	0.75	0.79	0.8	0.62	1

1991 1

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
char1	.	1.00	0.36	-0.33	.	0.73	-0.07	-0.24	.	-0.49	-0.63	-0.76	.	-0.58	-0.25	-0.30	.	0.71	-0.25	.	0.80	0.66	0.65	.	0.25	-0.16	-0.64	.	-0.39	-0.70
char2	.	0.36	1.00	0.51	.	0.28	0.03	-0.25	.	0.07	-0.03	-0.20	.	-0.22	-0.25	-0.12	.	0.36	0.17	.	0.31	0.41	0.39	.	0.03	-0.09	-0.42	.	0.13	-0.20
char3p	.	-0.33	0.51	1.00	.	-0.34	0.17	0.24	.	0.11	0.15	0.23	.	0.49	0.09	0.12	.	-0.39	0.24	.	-0.27	-0.19	-0.17	.	-0.05	0.02	0.21	.	0.19	0.39
gmor0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
gmor1	.	0.73	0.28	-0.33	.	1.00	0.25	-0.15	.	-0.22	-0.36	-0.49	.	-0.55	-0.21	-0.32	.	0.73	-0.10	.	0.58	0.55	0.53	.	0.12	0.06	-0.51	.	-0.21	-0.53
gmor2	.	-0.07	0.03	0.17	.	0.25	1.00	0.70	.	0.29	0.27	0.28	.	0.03	0.20	0.14	.	0.17	0.33	.	-0.32	-0.26	-0.26	.	0.42	0.30	0.32	.	0.36	0.39
gmor3p	.	-0.24	-0.25	0.24	.	-0.15	0.70	1.00	.	0.05	0.13	0.27	.	0.30	0.28	0.29	.	-0.18	0.07	.	-0.42	-0.47	-0.45	.	0.49	0.20	0.52	.	0.16	0.55
maeg0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
maeg1	.	-0.49	0.07	0.11	.	-0.22	0.30	0.05	.	1.00	0.91	0.82	.	0.19	0.25	0.25	.	-0.09	0.41	.	-0.68	-0.50	-0.54	.	-0.08	0.40	0.47	.	0.90	0.58
maeg2	.	-0.63	-0.03	0.15	.	-0.36	0.27	0.13	.	0.91	1.00	0.92	.	0.29	0.31	0.37	.	-0.25	0.50	.	-0.73	-0.54	-0.57	.	-0.13	0.35	0.56	.	0.79	0.72
maeg3p	.	-0.76	-0.20	0.23	.	-0.49	0.28	0.27	.	0.82	0.92	1.00	.	0.47	0.35	0.32	.	-0.46	0.40	.	-0.83	-0.70	-0.72	.	-0.18	0.34	0.72	.	0.72	0.81
ssco0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ssco1	.	-0.58	-0.22	0.49	.	-0.55	0.03	0.30	.	0.18	0.29	0.47	.	1.00	0.38	0.36	.	-0.64	0.18	.	-0.50	-0.48	-0.45	.	-0.14	0.08	0.54	.	0.15	0.62
ssco2	.	-0.25	-0.25	0.09	.	-0.21	0.20	0.28	.	0.25	0.31	0.35	.	0.38	1.00	0.53	.	-0.28	0.19	.	-0.41	-0.49	-0.45	.	-0.19	0.40	0.46	.	0.30	0.36
ssco3p	.	-0.30	-0.12	0.12	.	-0.32	0.14	0.29	.	0.25	0.37	0.32	.	0.36	0.53	1.00	.	-0.17	0.35	.	-0.29	-0.26	-0.26	.	0.01	0.15	0.33	.	0.27	0.42
mmng0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
mmng1	.	0.71	0.36	-0.39	.	0.73	0.17	-0.18	.	-0.09	-0.25	-0.46	.	-0.64	-0.28	-0.17	.	1.00	0.16	.	0.58	0.63	0.60	.	0.34	-0.24	-0.65	.	-0.05	-0.50
sspr0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
sspr1	.	0.80	0.31	-0.27	.	0.58	-0.32	-0.42	.	-0.68	-0.73	-0.83	.	-0.50	-0.41	-0.29	.	0.58	-0.16	.	1.00	0.87	0.87	.	0.03	-0.42	-0.83	.	-0.68	-0.81
sspr2	.	0.66	0.41	-0.19	.	0.55	-0.26	-0.47	.	-0.50	-0.55	-0.70	.	-0.48	-0.49	-0.26	.	0.63	0.03	.	0.87	1.00	0.97	.	0.08	-0.45	-0.85	.	-0.54	-0.68
sspr3p	.	0.65	0.39	-0.17	.	0.53	-0.26	-0.45	.	-0.54	-0.57	-0.72	.	-0.45	-0.45	-0.26	.	0.60	0.06	.	0.87	0.97	1.00	.	0.08	-0.46	-0.85	.	-0.58	-0.70
pvir0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
pvir1	.	0.25	0.03	-0.05	.	0.12	0.42	0.49	.	-0.08	-0.13	-0.18	.	-0.14	-0.19	0.01	.	0.34	-0.04	.	0.03	0.08	0.08	.	1.00	-0.08	0.00	.	0.07	0.12
pvir2	.	-0.16	-0.09	0.02	.	0.06	0.30	0.20	.	0.40	0.35	0.34	.	0.08	0.40	0.15	.	-0.24	-0.09	.	-0.42	-0.45	-0.46	.	-0.08	1.00	0.54	.	0.42	0.29
pvir3p	.	-0.64	-0.42	0.21	.	-0.51	0.32	0.52	.	0.47	0.56	0.72	.	0.54	0.46	0.33	.	-0.65	-0.01	.	-0.83	-0.85	-0.85	.	0.00	0.54	1.00	.	0.46	0.79
tesm0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
tesm1	.	-0.39	0.13	0.19	.	-0.21	0.36	0.16	.	0.90	0.79	0.72	.	0.15	0.30	0.28	.	-0.05	0.38	.	-0.68	-0.54	-0.58	.	0.07	0.42	0.46	.	1.00	0.58
tesm2p	.	-0.70	-0.20	0.39	.	-0.53	0.39	0.55	.	0.58	0.72	0.81	.	0.62	0.36	0.42	.	-0.50	0.35	.	-0.81	-0.68	-0.70	.	0.12	0.29	0.79	.	0.58	1.00

1991 2

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	1.00	0.21	-0.01	-0.24	0.50	0.18	0.10	0.18	0.21	0.08	0.04	0.00	.	0.12	0.03	0.07	-0.08	0.14	-0.09	.	-0.07	-0.07	-0.06	.	0.22	-0.07	-0.06	0.01	-0.05	-0.09
char1	0.21	1.00	0.56	0.13	0.24	0.51	0.11	-0.39	-0.14	-0.28	-0.39	-0.54	.	0.42	0.33	0.34	0.01	0.78	0.32	.	0.64	0.67	0.66	.	0.44	-0.24	-0.58	0.10	-0.34	-0.59
char2	-0.01	0.56	1.00	0.82	0.06	0.13	0.14	-0.28	-0.01	0.30	0.24	0.03	.	0.10	0.09	0.13	0.04	0.38	0.55	.	0.36	0.40	0.39	.	0.02	-0.28	-0.29	0.06	0.21	0.05
char3p	-0.24	0.13	0.82	1.00	-0.19	-0.06	0.22	-0.11	-0.06	0.43	0.40	0.23	.	-0.03	-0.01	0.03	0.12	0.06	0.54	.	0.16	0.20	0.20	.	-0.22	-0.25	-0.11	-0.02	0.45	0.35
gmor0	0.50	0.24	0.06	-0.19	1.00	0.19	0.15	0.18	0.49	0.23	0.25	0.17	.	-0.06	0.02	-0.02	-0.16	0.09	-0.10	.	-0.17	-0.15	-0.20	.	0.13	0.04	0.05	0.58	0.11	0.01
gmor1	0.18	0.51	0.13	-0.06	0.19	1.00	0.45	-0.14	0.13	-0.01	-0.14	-0.29	.	0.24	0.13	0.10	0.17	0.66	0.15	.	0.31	0.35	0.34	.	0.53	-0.12	-0.42	0.06	-0.16	-0.37
gmor2	0.10	0.11	0.13	0.22	0.15	0.45	1.00	0.52	0.03	0.25	0.24	0.10	.	-0.04	-0.15	-0.21	0.25	0.07	0.03	.	-0.16	-0.14	-0.09	.	0.41	0.18	0.10	0.22	0.34	0.18
gmor3p	0.18	-0.39	-0.28	-0.11	0.18	-0.14	0.52	1.00	0.14	0.30	0.36	0.42	.	-0.36	-0.44	-0.48	0.17	-0.55	-0.53	.	-0.72	-0.72	-0.66	.	0.20	0.45	0.66	0.30	0.56	0.53
maeg0	0.21	-0.14	-0.01	-0.06	0.49	0.13	0.03	0.14	1.00	0.55	0.49	0.41	.	-0.25	-0.02	-0.09	0.01	-0.11	-0.05	.	-0.34	-0.34	-0.40	.	0.01	0.06	0.21	0.23	0.26	0.27
maeg1	0.08	-0.28	0.30	0.43	0.23	-0.01	0.25	0.30	0.55	1.00	0.94	0.79	.	-0.32	-0.16	-0.17	0.19	-0.21	0.18	.	-0.52	-0.48	-0.50	.	-0.21	0.01	0.36	0.18	0.77	0.69
maeg2	0.04	-0.39	0.24	0.40	0.25	-0.14	0.24	0.36	0.49	0.94	1.00	0.89	.	-0.33	-0.22	-0.24	0.16	-0.33	0.12	.	-0.59	-0.56	-0.57	.	-0.25	0.09	0.46	0.24	0.73	0.75
maeg3p	0.00	-0.54	0.03	0.23	0.17	-0.29	0.10	0.42	0.41	0.79	0.89	1.00	.	-0.36	-0.27	-0.27	0.04	-0.48	-0.01	.	-0.68	-0.64	-0.64	.	-0.32	0.21	0.55	0.22	0.62	0.71
ssco0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ssco1	0.12	0.42	0.10	-0.03	-0.06	0.24	-0.04	-0.36	-0.25	-0.32	-0.33	-0.36	.	1.00	0.63	0.63	-0.05	0.47	0.41	.	0.50	0.51	0.51	.	0.13	-0.21	-0.39	-0.11	-0.45	-0.46
ssco2	0.03	0.33	0.09	-0.01	0.02	0.13	-0.15	-0.44	-0.02	-0.16	-0.22	-0.27	.	0.63	1.00	0.94	-0.13	0.41	0.40	.	0.49	0.48	0.45	.	-0.11	-0.23	-0.43	0.03	-0.35	-0.36
ssco3p	0.07	0.34	0.13	0.03	-0.02	0.10	-0.21	-0.48	-0.09	-0.17	-0.24	-0.27	.	0.63	0.94	1.00	-0.17	0.43	0.44	.	0.51	0.51	0.49	.	-0.20	-0.26	-0.47	-0.02	-0.36	-0.37
mmng0	-0.08	0.01	0.04	0.12	-0.16	0.17	0.25	0.18	0.01	0.19	0.16	0.04	.	-0.05	-0.13	-0.17	1.00	-0.06	-0.13	.	-0.11	-0.11	-0.07	.	0.17	0.00	0.11	-0.09	0.25	0.13
mmng1	0.14	0.78	0.38	0.06	0.09	0.66	0.07	-0.55	-0.11	-0.21	-0.33	-0.48	.	0.47	0.41	0.43	-0.06	1.00	0.48	.	0.71	0.73	0.70	.	0.29	-0.39	-0.75	-0.10	-0.40	-0.59
sspr0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
sspr1	-0.07	0.64	0.36	0.16	-0.17	0.31	-0.16	-0.72	-0.34	-0.52	-0.59	-0.68	.	0.50	0.49	0.51	-0.11	0.71	0.44	.	1.00	0.98	0.96	.	0.08	-0.52	-0.84	-0.24	-0.58	-0.69
sspr2	-0.07	0.67	0.40	0.20	-0.15	0.36	-0.14	-0.72	-0.34	-0.48	-0.56	-0.64	.	0.51	0.48	0.51	-0.11	0.73	0.46	.	0.98	1.00	0.98	.	0.10	-0.49	-0.83	-0.17	-0.57	-0.67
sspr3p	-0.06	0.66	0.39	0.20	-0.20	0.34	-0.09	-0.66	-0.40	-0.50	-0.57	-0.64	.	0.51	0.45	0.49	-0.07	0.70	0.44	.	0.96	0.98	1.00	.	0.13	-0.47	-0.79	-0.18	-0.54	-0.66
pvir0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
pvir1	0.22	0.44	0.02	-0.22	0.13	0.53	0.41	0.20	0.01	-0.21	-0.25	-0.32	.	0.13	-0.11	-0.20	0.17	0.29	-0.15	.	0.08	0.10	0.13	.	1.00	0.27	-0.03	0.10	-0.15	-0.33
pvir2	-0.07	-0.24	-0.28	-0.25	0.04	-0.12	0.18	0.45	0.06	0.01	0.09	0.21	.	-0.21	-0.23	-0.26	0.00	-0.39	-0.34	.	-0.51	-0.49	-0.47	.	0.27	1.00	0.64	0.31	0.15	0.31
pvir3p	-0.06	-0.58	-0.29	-0.11	0.05	-0.42	0.10	0.66	0.21	0.36	0.46	0.55	.	-0.39	-0.43	-0.47	0.11	-0.75	-0.45	.	-0.84	-0.83	-0.79	.	-0.03	0.64	1.00	0.22	0.50	0.67
tesm0	0.01	0.10	0.06	-0.02	0.58	0.06	0.22	0.30	0.23	0.18	0.24	0.22	.	-0.11	0.03	-0.03	-0.09	-0.10	-0.20	.	-0.24	-0.17	-0.18	.	0.10	0.32	0.22	1.00	0.21	0.14
tesm1	-0.05	-0.34	0.21	0.45	0.11	-0.16	0.34	0.56	0.26	0.77	0.73	0.62	.	-0.45	-0.35	-0.36	0.25	-0.40	-0.05	.	-0.58	-0.57	-0.54	.	-0.15	0.15	0.50	0.21	1.00	0.84
tesm2p	-0.09	-0.59	0.05	0.35	0.01	-0.37	0.18	0.53	0.27	0.69	0.75	0.71	.	-0.46	-0.36	-0.37	0.13	-0.59	-0.04	.	-0.69	-0.67	-0.66	.	-0.33	0.31	0.67	0.14	0.84	1.00

1991	3																													
	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	1.00	0.79	0.23	-0.11	0.57	0.46	0.15	-0.09	-0.04	-0.26	-0.27	-0.37	0.16	0.15	-0.12	-0.10	0.58	0.63	0.31	0.41	0.76	0.72	0.69	-0.17	0.32	-0.28	-0.45	-0.03	-0.16	-0.26
char1	0.79	1.00	0.54	0.15	0.48	0.38	0.22	-0.15	-0.15	-0.10	-0.19	-0.27	0.22	0.19	-0.03	-0.02	0.37	0.68	0.45	0.30	0.78	0.81	0.80	-0.03	0.19	-0.39	-0.53	-0.10	-0.10	-0.13
char2	0.23	0.54	1.00	0.82	0.23	0.26	0.55	0.28	0.25	0.49	0.39	0.30	0.17	-0.23	-0.33	-0.34	0.16	0.13	0.31	0.25	0.15	0.25	0.25	0.11	0.19	0.00	-0.07	0.33	0.45	0.47
char3p	-0.11	0.15	0.82	1.00	0.00	0.12	0.60	0.47	0.39	0.64	0.54	0.50	0.14	-0.38	-0.38	-0.37	-0.01	-0.17	0.23	0.26	-0.15	-0.06	-0.05	0.14	0.18	0.23	0.19	0.46	0.60	0.68
gmor0	0.57	0.48	0.22	0.00	1.00	0.48	0.48	0.25	0.39	-0.02	-0.06	-0.27	-0.08	-0.01	-0.38	-0.40	0.77	0.27	0.16	0.31	0.32	0.31	0.30	0.10	0.43	0.17	0.02	0.41	0.33	0.10
gmor1	0.46	0.37	0.25	0.12	0.48	1.00	0.45	0.06	0.22	0.24	0.25	0.13	-0.18	-0.16	-0.24	-0.18	0.52	0.45	0.39	0.31	0.30	0.26	0.22	0.04	0.45	-0.02	-0.21	0.19	0.05	-0.04
gmor2	0.15	0.22	0.55	0.60	0.48	0.45	1.00	0.74	0.68	0.51	0.47	0.30	-0.07	-0.30	-0.57	-0.60	0.49	-0.16	0.09	0.24	-0.07	0.02	0.02	0.20	0.49	0.45	0.33	0.66	0.62	0.53
gmor3p	-0.09	-0.15	0.27	0.47	0.25	0.06	0.74	1.00	0.79	0.38	0.41	0.31	-0.11	-0.42	-0.63	-0.60	0.35	-0.48	-0.08	0.16	-0.31	-0.22	-0.20	0.10	0.43	0.71	0.63	0.71	0.70	0.61
maeg0	-0.04	-0.15	0.25	0.39	0.39	0.22	0.68	0.79	1.00	0.63	0.64	0.47	-0.18	-0.54	-0.65	-0.66	0.54	-0.45	-0.10	0.12	-0.37	-0.31	-0.32	0.22	0.50	0.75	0.70	0.90	0.74	0.59
maeg1	-0.26	-0.10	0.49	0.64	-0.02	0.24	0.51	0.38	0.63	1.00	0.94	0.89	-0.05	-0.58	-0.35	-0.33	0.10	-0.36	0.05	-0.10	-0.44	-0.39	-0.41	0.30	0.18	0.43	0.49	0.61	0.63	0.65
maeg2	-0.27	-0.19	0.39	0.54	-0.06	0.25	0.47	0.41	0.64	0.94	1.00	0.94	-0.12	-0.57	-0.33	-0.31	0.09	-0.43	-0.02	-0.18	-0.50	-0.46	-0.49	0.24	0.14	0.42	0.51	0.62	0.60	0.59
maeg3p	-0.37	-0.27	0.30	0.50	-0.27	0.13	0.30	0.31	0.47	0.89	0.94	1.00	-0.07	-0.56	-0.20	-0.15	-0.09	-0.44	0.00	-0.24	-0.52	-0.49	-0.52	0.13	-0.01	0.33	0.47	0.44	0.46	0.54
ssco0	0.16	0.22	0.17	0.14	-0.08	-0.18	-0.07	-0.11	-0.18	-0.05	-0.12	-0.07	1.00	0.01	-0.06	-0.10	-0.18	0.12	0.12	0.13	0.23	0.27	0.27	-0.05	-0.11	-0.18	-0.17	-0.20	-0.09	0.05
ssco1	0.15	0.19	-0.23	-0.38	-0.01	-0.16	-0.30	-0.42	-0.54	-0.58	-0.57	-0.56	0.01	1.00	0.71	0.54	-0.10	0.20	-0.02	-0.15	0.26	0.21	0.24	0.08	-0.38	-0.51	-0.38	-0.46	-0.48	-0.48
ssco2	-0.12	-0.03	-0.33	-0.38	-0.38	-0.24	-0.57	-0.63	-0.65	-0.35	-0.33	-0.20	-0.06	0.71	1.00	0.89	-0.38	0.18	0.09	-0.35	0.12	0.02	0.02	0.06	-0.52	-0.56	-0.36	-0.57	-0.51	-0.39
ssco3p	-0.10	-0.02	-0.34	-0.37	-0.40	-0.18	-0.60	-0.60	-0.66	-0.33	-0.31	-0.15	-0.10	0.54	0.89	1.00	-0.41	0.21	0.13	-0.32	0.13	0.03	0.04	-0.03	-0.45	-0.48	-0.33	-0.60	-0.48	-0.29
mmng0	0.58	0.37	0.16	-0.01	0.78	0.52	0.49	0.35	0.54	0.10	0.09	-0.09	-0.18	-0.10	-0.38	-0.41	1.00	0.22	0.15	0.23	0.23	0.21	0.18	0.08	0.41	0.21	0.06	0.49	0.24	-0.01
mmng1	0.63	0.68	0.13	-0.17	0.27	0.45	-0.16	-0.48	-0.45	-0.36	-0.43	-0.44	0.12	0.20	0.18	0.21	0.22	1.00	0.64	0.37	0.80	0.75	0.72	-0.17	0.16	-0.57	-0.76	-0.42	-0.42	-0.43
sspr0	0.41	0.30	0.25	0.26	0.31	0.31	0.24	0.16	0.12	-0.10	-0.18	-0.24	0.13	-0.15	-0.35	-0.32	0.23	0.37	0.24	1.00	0.47	0.48	0.50	-0.10	0.48	0.08	-0.17	0.09	0.04	0.04
sspr1	0.76	0.78	0.15	-0.15	0.32	0.30	-0.07	-0.31	-0.37	-0.44	-0.50	-0.52	0.23	0.27	0.12	0.13	0.23	0.80	0.40	0.47	1.00	0.97	0.94	-0.19	0.16	-0.47	-0.65	-0.37	-0.42	-0.40
sspr2	0.72	0.81	0.25	-0.06	0.31	0.26	0.02	-0.22	-0.31	-0.39	-0.46	-0.49	0.27	0.21	0.02	0.03	0.21	0.75	0.36	0.48	0.97	1.00	0.98	-0.19	0.22	-0.41	-0.61	-0.30	-0.36	-0.33
sspr3p	0.69	0.80	0.25	-0.05	0.30	0.22	0.02	-0.20	-0.32	-0.41	-0.49	-0.53	0.27	0.24	0.02	0.04	0.18	0.72	0.35	0.50	0.94	0.98	1.00	-0.17	0.21	-0.40	-0.59	-0.30	-0.34	-0.32
pvir0	-0.17	-0.03	0.11	0.13	0.10	0.04	0.20	0.10	0.22	0.30	0.24	0.13	-0.05	0.08	0.06	-0.03	0.08	-0.17	0.03	-0.10	-0.19	-0.19	-0.17	1.00	0.18	0.29	0.30	0.23	0.22	0.23
pvir1	0.32	0.19	0.19	0.18	0.43	0.45	0.49	0.43	0.50	0.18	0.14	-0.01	-0.11	-0.38	-0.52	-0.45	0.41	0.16	0.12	0.48	0.16	0.22	0.21	0.18	1.00	0.53	0.20	0.44	0.33	0.26
pvir2	-0.28	-0.39	0.00	0.23	0.17	-0.02	0.45	0.71	0.75	0.43	0.42	0.33	-0.18	-0.51	-0.56	-0.48	0.21	-0.57	-0.22	0.08	-0.47	-0.41	-0.40	0.29	0.53	1.00	0.90	0.65	0.62	0.61
pvir3p	-0.45	-0.53	-0.06	0.19	0.02	-0.21	0.33	0.63	0.70	0.49	0.51	0.47	-0.17	-0.38	-0.36	-0.33	0.06	-0.76	-0.30	-0.17	-0.65	-0.61	-0.59	0.30	0.20	0.90	1.00	0.63	0.62	0.63
tesm0	-0.03	-0.10	0.33	0.46	0.41	0.19	0.66	0.71	0.90	0.61	0.62	0.44	-0.20	-0.46	-0.57	-0.60	0.49	-0.42	-0.07	0.09	-0.37	-0.30	-0.30	0.23	0.44	0.65	0.63	1.00	0.80	0.59
tesm1	-0.16	-0.10	0.45	0.60	0.33	0.05	0.63	0.70	0.74	0.63	0.60	0.46	-0.09	-0.48	-0.51	-0.48	0.24	-0.42	0.05	0.04	-0.42	-0.36	-0.34	0.22	0.33	0.62	0.62	0.80	1.00	0.88
tesm2p	-0.26	-0.13	0.47	0.68	0.10	-0.04	0.53	0.61	0.59	0.65	0.59	0.54	0.05	-0.48	-0.39	-0.29	-0.01	-0.43	0.12	0.04	-0.40	-0.33	-0.32	0.23	0.26	0.61	0.63	0.59	0.88	1.00

1991	4																													
	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	1.00	0.85	0.36	-0.12	0.61	0.07	-0.24	-0.33	-0.55	-0.51	-0.51	-0.59	0.51	-0.09	-0.41	-0.28	0.54	0.35	-0.24	0.76	0.81	0.80	0.82	-0.17	-0.11	-0.40	-0.51	-0.57	-0.60	-0.54
char1	0.85	1.00	0.47	-0.05	0.42	-0.04	-0.21	-0.39	-0.47	-0.39	-0.38	-0.48	0.41	-0.13	-0.40	-0.31	0.47	0.29	-0.22	0.59	0.72	0.75	0.76	-0.12	-0.14	-0.41	-0.51	-0.52	-0.52	-0.45
char2	0.36	0.47	1.00	0.67	0.15	0.18	0.31	-0.02	0.04	0.01	0.02	-0.05	0.18	-0.12	-0.21	-0.19	0.30	-0.07	-0.13	0.23	0.13	0.18	0.26	0.12	0.21	0.11	0.07	0.10	0.09	0.09
char3p	-0.12	-0.05	0.67	1.00	-0.07	0.10	0.39	0.37	0.23	0.04	0.10	0.19	-0.02	0.15	0.20	0.18	-0.15	-0.37	-0.11	-0.11	-0.26	-0.21	-0.07	-0.05	0.29	0.53	0.53	0.41	0.42	0.32
gmor0	0.61	0.42	0.15	-0.07	1.00	0.19	-0.06	0.19	-0.04	-0.33	-0.34	-0.40	0.28	-0.24	-0.34	-0.26	0.57	-0.09	-0.47	0.34	0.29	0.27	0.36	-0.12	0.19	0.01	-0.03	-0.14	-0.16	-0.19
gmor1	0.07	-0.03	0.18	0.10	0.19	1.00	0.47	0.16	0.37	0.31	0.32	0.25	0.06	0.05	0.05	0.04	0.19	0.11	0.24	0.00	-0.22	-0.26	-0.21	0.18	0.29	0.30	0.25	0.28	0.14	0.02
gmor2	-0.24	-0.21	0.31	0.39	-0.06	0.47	1.00	0.37	0.40	0.28	0.30	0.33	0.13	-0.15	-0.01	-0.07	-0.04	-0.12	0.12	-0.23	-0.40	-0.38	-0.30	0.11	0.32	0.41	0.44	0.44	0.43	0.31
gmor3p	-0.33	-0.39	-0.02	0.37	0.19	0.16	0.37	1.00	0.49	0.22	0.31	0.37	0.01	-0.06	0.10	0.03	-0.02	-0.47	-0.14	-0.21	-0.47	-0.47	-0.37	-0.01	0.33	0.61	0.69	0.55	0.62	0.52
maeg0	-0.55	-0.47	0.04	0.23	-0.04	0.38	0.40	0.49	1.00	0.76	0.73	0.74	-0.24	-0.17	0.00	-0.12	0.04	-0.40	0.08	-0.54	-0.83	-0.81	-0.78	0.28	0.33	0.56	0.65	0.85	0.70	0.60
maeg1	-0.51	-0.39	0.01	0.04	-0.33	0.31	0.28	0.22	0.76	1.00	0.94	0.86	-0.23	-0.16	-0.12	-0.22	0.12	0.02	0.42	-0.39	-0.63	-0.62	-0.72	0.38	0.08	0.24	0.33	0.72	0.60	0.63
maeg2	-0.51	-0.38	0.02	0.10	-0.34	0.32	0.30	0.31	0.73	0.94	1.00	0.91	-0.20	-0.19	-0.11	-0.21	0.07	-0.01	0.45	-0.33	-0.62	-0.61	-0.70	0.31	0.15	0.35	0.42	0.72	0.62	0.64
maeg3p	-0.58	-0.48	-0.05	0.19	-0.40	0.25	0.33	0.37	0.74	0.86	0.91	1.00	-0.25	-0.11	0.00	-0.12	-0.05	-0.09	0.44	-0.41	-0.68	-0.67	-0.74	0.21	0.15	0.45	0.54	0.76	0.65	0.65
ssco0	0.51	0.40	0.18	-0.01	0.28	0.06	0.13	0.01	-0.24	-0.23	-0.20	-0.25	1.00	0.06	-0.24	-0.17	0.29	0.20	-0.11	0.53	0.47	0.47	0.50	-0.10	0.00	-0.13	-0.19	-0.23	-0.26	-0.29
ssco1	-0.09	-0.13	-0.12	0.15	-0.24	0.05	-0.15	-0.06	-0.17	-0.16	-0.19	-0.11	0.06	1.00	0.70	0.73	-0.31	0.05	0.08	-0.02	0.06	0.04	0.04	0.11	0.02	0.13	0.10	-0.09	-0.05	-0.07
ssco2	-0.41	-0.40	-0.21	0.20	-0.34	0.05	-0.01	0.10	0.00	-0.12	-0.11	0.00	-0.24	0.70	1.00	0.98	-0.52	-0.22	0.06	-0.27	-0.22	-0.21	-0.16	0.13	0.16	0.29	0.31	0.10	0.16	0.05
ssco3p	-0.28	-0.31	-0.19	0.18	-0.26	0.04	-0.07	0.03	-0.12	-0.22	-0.21	-0.12	-0.17	0.73	0.98	1.00	-0.49	-0.14	0.04	-0.16	-0.09	-0.09	-0.04	0.11	0.11	0.21	0.20	-0.02	0.06	-0.03
mmng0	0.54	0.47	0.30	-0.15	0.57	0.20	-0.04	-0.03	0.04	0.12	0.07	-0.05	0.29	-0.31	-0.52	-0.49	1.00	0.24	-0.14	0.38	0.31	0.32	0.27	0.13	0.01	-0.22	-0.22	0.02	-0.06	0.00
mmng1	0.35	0.29	-0.07	-0.37	-0.09	0.11	-0.12	-0.47	-0.40	0.02	-0.01	-0.09	0.20	0.05	-0.22	-0.15	0.24	1.00	0.70	0.47	0.52	0.47	0.30	0.06	-0.44	-0.57	-0.60	-0.44	-0.34	-0.22
sspr0	0.76	0.59	0.23	-0.11	0.34	0.00	-0.23	-0.21	-0.54	-0.39	-0.33	-0.41	0.53	-0.02	-0.28	-0.16	0.38	0.47	0.11	1.00	0.81	0.77	0.73	-0.07	-0.17	-0.35	-0.48	-0.51	-0.52	-0.42
sspr1	0.81	0.72	0.13	-0.26	0.29	-0.22	-0.40	-0.47	-0.83	-0.63	-0.62	-0.68	0.47	0.06	-0.22	-0.09	0.31	0.52	-0.03	0.81	1.00	0.99	0.93	-0.19	-0.33	-0.61	-0.72	-0.80	-0.73	-0.64
sspr2	0.80	0.75	0.18	-0.21	0.27	-0.26	-0.38	-0.47	-0.81	-0.62	-0.62	-0.67	0.47	0.04	-0.21	-0.09	0.32	0.47	-0.08	0.77	0.99	1.00	0.95	-0.19	-0.33	-0.60	-0.71	-0.78	-0.71	-0.61
sspr3p	0.82	0.76	0.26	-0.07	0.36	-0.21	-0.30	-0.37	-0.78	-0.72	-0.70	-0.74	0.51	0.05	-0.16	-0.04	0.27	0.30	-0.23	0.73	0.93	0.95	1.00	-0.23	-0.21	-0.49	-0.60	-0.76	-0.68	-0.61
pvir0	-0.17	-0.12	0.12	-0.05	-0.12	0.18	0.11	-0.01	0.28	0.38	0.31	0.21	-0.10	0.11	0.13	0.11	0.13	0.06	0.20	-0.07	-0.19	-0.19	-0.23	1.00	0.10	-0.03	0.05	0.27	0.29	0.29
pvir1	-0.10	-0.14	0.21	0.29	0.19	0.29	0.32	0.33	0.33	0.07	0.15	0.15	0.00	0.02	0.16	0.11	0.01	-0.44	-0.24	-0.17	-0.33	-0.33	-0.21	0.10	1.00	0.71	0.61	0.45	0.34	0.26
pvir2	-0.40	-0.41	0.11	0.53	0.01	0.30	0.41	0.61	0.56	0.24	0.35	0.45	-0.13	0.13	0.29	0.21	-0.22	-0.57	-0.13	-0.35	-0.61	-0.60	-0.49	-0.03	0.71	1.00	0.92	0.67	0.61	0.50
pvir3p	-0.51	-0.51	0.07	0.53	-0.03	0.25	0.44	0.69	0.65	0.33	0.42	0.54	-0.19	0.10	0.31	0.20	-0.22	-0.60	-0.11	-0.48	-0.72	-0.71	-0.60	0.05	0.61	0.92	1.00	0.76	0.74	0.60
tesm0	-0.57	-0.52	0.10	0.41	-0.14	0.28	0.44	0.55	0.85	0.72	0.73	0.76	-0.23	-0.09	0.10	-0.02	0.02	-0.44	0.07	-0.51	-0.80	-0.78	-0.76	0.27	0.45	0.67	0.76	1.00	0.80	0.69
tesm1	-0.60	-0.52	0.09	0.42	-0.17	0.14	0.43	0.62	0.70	0.60	0.62	0.65	-0.26	-0.05	0.16	0.06	-0.06	-0.34	0.10	-0.52	-0.73	-0.71	-0.68	0.29	0.34	0.61	0.74	0.80	1.00	0.92
tesm2p	-0.54	-0.45	0.09	0.32	-0.19	0.02	0.31	0.52	0.60	0.63	0.64	0.65	-0.29	-0.07	0.05	-0.03	0.00	-0.22	0.16	-0.42	-0.64	-0.61	-0.61	0.29	0.26	0.50	0.60	0.69	0.92	1.00

1992 1

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
char1	.	1.00	0.63	-0.32	.	0.33	-0.20	-0.13	.	-0.70	-0.68	-0.73	.	-0.47	-0.57	-0.59	.	0.45	-0.31	.	0.75	0.64	0.70	.	0.08	-0.25	-0.56	.	-0.64	-0.74
char2	.	0.63	1.00	0.32	.	0.20	-0.07	-0.05	.	-0.58	-0.53	-0.55	.	-0.16	-0.32	-0.25	.	0.17	-0.04	.	0.51	0.61	0.61	.	-0.01	-0.20	-0.38	.	-0.55	-0.54
char3p	.	-0.32	0.32	1.00	.	-0.10	0.34	0.44	.	0.26	0.26	0.30	.	0.41	0.31	0.46	.	-0.14	0.48	.	-0.25	-0.14	-0.11	.	0.10	0.43	0.53	.	0.24	0.37
gmor0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
gmor1	.	0.33	0.20	-0.10	.	1.00	0.27	0.16	.	-0.39	-0.49	-0.53	.	-0.42	-0.27	-0.39	.	0.25	-0.09	.	0.28	0.17	0.21	.	0.16	0.11	-0.09	.	-0.42	-0.50
gmor2	.	-0.20	-0.07	0.34	.	0.27	1.00	0.56	.	0.05	0.06	0.06	.	-0.04	0.28	0.14	.	0.07	0.53	.	0.09	0.07	0.13	.	0.25	0.32	0.21	.	0.17	0.18
gmor3p	.	-0.13	-0.05	0.44	.	0.16	0.56	1.00	.	0.18	0.09	0.18	.	0.13	0.17	0.29	.	0.05	0.34	.	-0.05	-0.12	-0.05	.	0.29	0.51	0.52	.	0.26	0.32
maeg0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
maeg1	.	-0.70	-0.58	0.26	.	-0.39	0.05	0.18	.	1.00	0.90	0.89	.	0.49	0.39	0.44	.	-0.10	0.23	.	-0.79	-0.75	-0.74	.	-0.15	0.30	0.67	.	0.91	0.86
maeg2	.	-0.68	-0.53	0.26	.	-0.49	0.06	0.09	.	0.90	1.00	0.94	.	0.36	0.27	0.35	.	0.07	0.42	.	-0.69	-0.61	-0.60	.	-0.16	0.18	0.52	.	0.83	0.83
maeg3p	.	-0.73	-0.55	0.30	.	-0.53	0.06	0.18	.	0.89	0.94	1.00	.	0.43	0.33	0.48	.	-0.06	0.38	.	-0.73	-0.65	-0.64	.	-0.08	0.28	0.61	.	0.82	0.90
ssco0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ssco1	.	-0.47	-0.16	0.41	.	-0.42	-0.04	0.13	.	0.49	0.36	0.43	.	1.00	0.63	0.61	.	-0.38	0.04	.	-0.38	-0.33	-0.36	.	-0.06	0.19	0.44	.	0.46	0.53
ssco2	.	-0.57	-0.32	0.31	.	-0.27	0.28	0.17	.	0.39	0.27	0.33	.	0.63	1.00	0.75	.	-0.53	0.19	.	-0.42	-0.36	-0.35	.	0.10	0.24	0.40	.	0.36	0.41
ssco3p	.	-0.59	-0.25	0.46	.	-0.39	0.14	0.29	.	0.44	0.35	0.48	.	0.61	0.75	1.00	.	-0.52	0.25	.	-0.47	-0.41	-0.38	.	0.09	0.36	0.55	.	0.36	0.55
mmng0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
mmng1	.	0.45	0.17	-0.14	.	0.25	0.07	0.05	.	-0.10	0.07	-0.06	.	-0.38	-0.53	-0.52	.	1.00	0.28	.	0.39	0.35	0.40	.	0.01	-0.27	-0.23	.	-0.05	-0.11
sspr0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
sspr1	.	0.75	0.51	-0.25	.	0.29	0.09	-0.05	.	-0.79	-0.69	-0.73	.	-0.38	-0.42	-0.47	.	0.39	-0.11	.	1.00	0.90	0.90	.	0.06	-0.29	-0.61	.	-0.63	-0.68
sspr2	.	0.64	0.61	-0.14	.	0.17	0.07	-0.12	.	-0.75	-0.61	-0.65	.	-0.33	-0.36	-0.41	.	0.35	-0.03	.	0.90	1.00	0.95	.	-0.07	-0.44	-0.67	.	-0.59	-0.61
sspr3p	.	0.70	0.61	-0.11	.	0.21	0.13	-0.05	.	-0.74	-0.60	-0.64	.	-0.36	-0.35	-0.38	.	0.40	0.02	.	0.90	0.95	1.00	.	0.02	-0.32	-0.62	.	-0.59	-0.62
pvir0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
pvir1	.	0.08	-0.01	0.10	.	0.16	0.25	0.29	.	-0.15	-0.16	-0.08	.	-0.06	0.10	0.09	.	0.01	0.23	.	0.06	-0.07	0.02	.	1.00	0.34	0.20	.	-0.17	-0.07
pvir2	.	-0.25	-0.20	0.43	.	0.11	0.32	0.51	.	0.30	0.18	0.28	.	0.19	0.24	0.36	.	-0.27	0.17	.	-0.28	-0.44	-0.32	.	0.34	1.00	0.66	.	0.20	0.25
pvir3p	.	-0.56	-0.38	0.53	.	-0.09	0.21	0.52	.	0.67	0.52	0.61	.	0.44	0.40	0.55	.	-0.23	0.24	.	-0.60	-0.67	-0.62	.	0.20	0.66	1.00	.	0.58	0.65
tesm0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
tesm1	.	-0.64	-0.55	0.24	.	-0.42	0.18	0.26	.	0.91	0.83	0.82	.	0.46	0.36	0.36	.	-0.05	0.21	.	-0.63	-0.59	-0.59	.	-0.17	0.20	0.58	.	1.00	0.89
tesm2p	.	-0.74	-0.54	0.37	.	-0.50	0.18	0.32	.	0.86	0.83	0.90	.	0.53	0.41	0.55	.	-0.11	0.32	.	-0.68	-0.61	-0.62	.	-0.07	0.25	0.65	.	0.89	1.00

1992 2

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	1.00	0.34	0.24	0.06	-0.03	0.13	-0.09	0.14	-0.02	-0.15	-0.19	-0.14	-0.12	-0.06	-0.25	-0.30	-0.05	0.11	-0.31	.	0.16	0.04	-0.02	.	0.32	0.14	0.01	0.00	-0.13	-0.13
char1	0.34	1.00	0.78	0.22	0.10	0.51	-0.35	-0.24	0.15	-0.41	-0.32	-0.30	0.06	-0.32	-0.13	-0.03	0.16	0.63	-0.03	.	0.77	0.72	0.71	.	0.13	-0.25	-0.54	-0.03	-0.59	-0.46
char2	0.24	0.78	1.00	0.48	0.07	0.35	-0.15	-0.22	0.09	-0.07	0.05	0.06	0.36	-0.08	0.08	0.21	0.04	0.67	0.18	.	0.53	0.59	0.54	.	0.09	-0.24	-0.44	0.05	-0.31	-0.17
char3p	0.06	0.22	0.48	1.00	-0.19	0.25	0.20	0.07	-0.17	0.03	0.17	0.07	0.20	-0.09	0.18	0.27	-0.08	0.36	0.26	.	0.23	0.40	0.31	.	0.35	-0.14	-0.12	-0.16	0.07	0.06
gmor0	-0.03	0.10	0.06	-0.19	1.00	0.15	0.21	0.26	0.92	0.34	0.23	0.35	0.26	0.13	-0.26	-0.21	-0.06	0.23	-0.28	.	-0.11	-0.21	-0.15	.	-0.10	0.11	0.13	0.79	0.10	0.25
gmor1	0.13	0.51	0.35	0.25	0.15	1.00	-0.02	-0.08	0.16	-0.51	-0.46	-0.33	0.18	-0.33	-0.26	-0.11	0.20	0.29	-0.07	.	0.41	0.39	0.42	.	0.07	-0.27	-0.34	0.04	-0.53	-0.29
gmor2	-0.09	-0.35	-0.15	0.20	0.21	-0.02	1.00	0.65	0.21	0.51	0.50	0.53	0.19	0.27	-0.29	-0.27	-0.14	-0.02	-0.22	.	-0.39	-0.41	-0.39	.	0.09	0.38	0.46	0.14	0.53	0.61
gmor3p	0.14	-0.24	-0.22	0.07	0.26	-0.08	0.65	1.00	0.27	0.42	0.26	0.35	0.16	0.24	-0.44	-0.48	-0.07	-0.20	-0.55	.	-0.37	-0.44	-0.43	.	0.14	0.52	0.65	0.13	0.51	0.56
maeg0	-0.02	0.15	0.09	-0.17	0.92	0.16	0.21	0.27	1.00	0.33	0.24	0.35	0.26	0.17	-0.25	-0.19	-0.05	0.28	-0.27	.	-0.05	-0.16	-0.10	.	-0.09	0.12	0.12	0.64	0.08	0.22
maeg1	-0.15	-0.41	-0.07	0.03	0.35	-0.51	0.51	0.42	0.33	1.00	0.88	0.86	0.27	0.61	0.02	-0.04	-0.26	0.02	-0.10	.	-0.60	-0.56	-0.59	.	0.03	0.41	0.60	0.34	0.80	0.79
maeg2	-0.19	-0.32	0.05	0.17	0.23	-0.46	0.50	0.26	0.24	0.88	1.00	0.92	0.30	0.53	0.12	0.11	-0.24	0.27	0.10	.	-0.44	-0.34	-0.37	.	0.11	0.27	0.35	0.19	0.67	0.67
maeg3p	-0.14	-0.30	0.06	0.07	0.35	-0.33	0.53	0.35	0.35	0.86	0.92	1.00	0.45	0.60	0.03	0.03	-0.21	0.19	-0.03	.	-0.52	-0.43	-0.44	.	0.05	0.32	0.40	0.30	0.67	0.74
ssco0	-0.12	0.06	0.35	0.20	0.26	0.18	0.19	0.16	0.26	0.27	0.30	0.45	1.00	0.41	-0.01	0.11	-0.07	0.22	-0.02	.	-0.08	0.05	0.04	.	-0.13	-0.07	0.03	0.17	0.14	0.34
ssco1	-0.06	-0.32	-0.08	-0.09	0.13	-0.33	0.27	0.24	0.17	0.61	0.53	0.60	0.41	1.00	0.30	0.24	-0.19	-0.04	0.11	.	-0.43	-0.34	-0.33	.	-0.11	0.28	0.42	0.08	0.52	0.57
ssco2	-0.25	-0.13	0.08	0.18	-0.26	-0.26	-0.29	-0.44	-0.25	0.02	0.12	0.03	-0.01	0.30	1.00	0.94	-0.19	0.06	0.75	.	-0.04	0.17	0.16	.	-0.13	-0.13	-0.22	-0.13	-0.03	-0.15
ssco3p	-0.30	-0.03	0.21	0.27	-0.21	-0.11	-0.27	-0.48	-0.19	-0.04	0.11	0.03	0.11	0.24	0.94	1.00	-0.17	0.18	0.82	.	0.08	0.31	0.31	.	-0.16	-0.22	-0.34	-0.08	-0.12	-0.17
mmng0	-0.05	0.16	0.04	-0.08	-0.06	0.20	-0.14	-0.07	-0.05	-0.26	-0.24	-0.21	-0.07	-0.19	-0.19	-0.17	1.00	-0.03	0.02	.	0.16	0.07	0.09	.	-0.05	-0.12	-0.17	-0.04	-0.23	-0.24
mmng1	0.11	0.63	0.67	0.36	0.23	0.29	-0.02	-0.20	0.28	0.02	0.27	0.19	0.23	-0.04	0.06	0.19	-0.03	1.00	0.24	.	0.49	0.55	0.56	.	0.17	-0.26	-0.49	0.13	-0.31	-0.19
sspr0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
sspr1	0.16	0.77	0.53	0.23	-0.11	0.41	-0.39	-0.37	-0.05	-0.60	-0.44	-0.52	-0.08	-0.43	-0.04	0.08	0.16	0.49	0.16	.	1.00	0.92	0.87	.	0.01	-0.43	-0.71	-0.15	-0.71	-0.65
sspr2	0.04	0.72	0.59	0.40	-0.21	0.39	-0.41	-0.44	-0.16	-0.56	-0.34	-0.43	0.05	-0.34	0.17	0.31	0.07	0.55	0.34	.	0.92	1.00	0.95	.	-0.01	-0.47	-0.74	-0.22	-0.65	-0.60
sspr3p	-0.02	0.71	0.54	0.31	-0.15	0.42	-0.39	-0.43	-0.10	-0.59	-0.37	-0.44	0.04	-0.33	0.16	0.31	0.09	0.56	0.35	.	0.87	0.95	1.00	.	-0.05	-0.43	-0.76	-0.20	-0.70	-0.63
pvir0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
pvir1	0.32	0.13	0.09	0.35	-0.10	0.07	0.09	0.14	-0.09	0.03	0.11	0.05	-0.13	-0.11	-0.13	-0.16	-0.05	0.16	-0.20	.	0.01	-0.01	-0.05	.	1.00	0.07	0.11	-0.08	0.16	0.11
pvir2	0.14	-0.25	-0.24	-0.14	0.11	-0.27	0.38	0.52	0.12	0.41	0.27	0.32	-0.07	0.28	-0.13	-0.22	-0.12	-0.26	-0.23	.	-0.43	-0.47	-0.43	.	0.07	1.00	0.66	-0.04	0.45	0.39
pvir3p	0.01	-0.54	-0.44	-0.12	0.13	-0.34	0.46	0.65	0.12	0.60	0.35	0.40	0.03	0.42	-0.22	-0.34	-0.17	-0.49	-0.41	.	-0.71	-0.74	-0.76	.	0.11	0.66	1.00	0.05	0.75	0.69
tesm0	0.00	-0.03	0.05	-0.16	0.80	0.04	0.14	0.13	0.64	0.34	0.19	0.30	0.17	0.08	-0.13	-0.08	-0.04	0.13	-0.18	.	-0.15	-0.22	-0.20	.	-0.08	-0.04	0.05	1.00	0.12	0.23
tesm1	-0.13	-0.59	-0.31	0.07	0.10	-0.53	0.53	0.51	0.08	0.80	0.67	0.67	0.14	0.52	-0.03	-0.12	-0.23	-0.31	-0.22	.	-0.71	-0.65	-0.70	.	0.16	0.45	0.75	0.12	1.00	0.89
tesm2p	-0.13	-0.46	-0.17	0.06	0.25	-0.29	0.61	0.56	0.22	0.79	0.67	0.74	0.34	0.57	-0.15	-0.17	-0.24	-0.19	-0.29	.	-0.65	-0.60	-0.63	.	0.11	0.40	0.69	0.23	0.89	1.00

1992 3

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	1.00	0.63	0.11	-0.32	0.49	0.70	0.04	-0.16	-0.14	-0.41	-0.39	-0.47	0.23	0.51	0.27	0.22	0.53	0.35	0.13	0.50	0.65	0.63	0.68	0.17	0.18	-0.23	-0.47	0.06	-0.58	-0.56
char1	0.63	1.00	0.70	0.12	0.40	0.55	0.03	-0.02	-0.06	-0.05	0.06	-0.09	0.10	0.36	0.19	0.15	0.35	0.55	0.48	0.17	0.57	0.64	0.61	0.24	0.03	-0.31	-0.43	0.01	-0.26	-0.22
char2	0.11	0.70	1.00	0.73	0.25	0.24	0.21	0.24	0.14	0.40	0.52	0.39	-0.07	-0.05	0.02	0.07	0.14	0.50	0.55	-0.32	0.17	0.26	0.26	0.10	0.08	-0.12	-0.05	0.17	0.26	0.32
char3p	-0.32	0.12	0.73	1.00	-0.05	-0.11	0.23	0.41	0.10	0.49	0.59	0.55	-0.18	-0.30	-0.08	0.01	-0.08	0.30	0.39	-0.50	-0.10	-0.04	0.02	-0.05	0.11	0.10	0.30	0.21	0.53	0.58
gmor0	0.49	0.40	0.25	-0.05	1.00	0.62	0.30	0.10	0.35	0.25	0.19	0.11	-0.01	0.10	-0.04	-0.04	0.38	0.07	-0.05	-0.09	0.02	0.06	0.15	-0.05	0.28	0.25	0.12	0.50	0.07	0.11
gmor1	0.70	0.55	0.24	-0.11	0.62	1.00	0.26	0.00	0.02	-0.10	-0.08	-0.16	-0.04	0.31	0.11	0.09	0.36	0.27	0.23	0.16	0.33	0.37	0.43	0.15	0.24	-0.04	-0.19	0.28	-0.27	-0.23
gmor2	0.04	0.03	0.21	0.23	0.30	0.26	1.00	0.66	0.51	0.31	0.35	0.33	-0.23	-0.46	-0.51	-0.48	0.18	-0.07	0.09	-0.47	-0.31	-0.28	-0.16	-0.09	0.59	0.52	0.45	0.51	0.34	0.39
gmor3p	-0.16	-0.02	0.24	0.41	0.10	0.00	0.66	1.00	0.31	0.23	0.31	0.35	-0.09	-0.41	-0.48	-0.50	-0.03	-0.22	-0.01	-0.48	-0.26	-0.23	-0.10	-0.15	0.39	0.45	0.49	0.36	0.37	0.43
maeg0	-0.14	-0.06	0.14	0.10	0.35	0.02	0.51	0.31	1.00	0.75	0.53	0.52	-0.24	-0.60	-0.61	-0.57	0.40	-0.23	-0.17	-0.59	-0.62	-0.65	-0.60	-0.23	0.39	0.64	0.64	0.72	0.62	0.56
maeg1	-0.41	-0.05	0.40	0.49	0.25	-0.10	0.31	0.23	0.75	1.00	0.86	0.82	-0.32	-0.54	-0.39	-0.29	0.15	0.01	0.08	-0.69	-0.61	-0.60	-0.58	-0.20	0.24	0.50	0.61	0.59	0.80	0.77
maeg2	-0.39	0.06	0.52	0.59	0.19	-0.08	0.35	0.31	0.52	0.86	1.00	0.93	-0.33	-0.51	-0.28	-0.18	0.06	0.24	0.24	-0.66	-0.45	-0.42	-0.43	-0.18	0.30	0.37	0.42	0.38	0.68	0.70
maeg3p	-0.47	-0.09	0.39	0.55	0.11	-0.16	0.33	0.35	0.52	0.82	0.93	1.00	-0.36	-0.51	-0.27	-0.18	0.01	0.06	0.07	-0.67	-0.54	-0.51	-0.51	-0.18	0.30	0.39	0.48	0.38	0.65	0.66
ssco0	0.23	0.10	-0.07	-0.18	-0.01	-0.04	-0.23	-0.09	-0.24	-0.32	-0.33	-0.36	1.00	0.32	0.21	0.14	0.13	0.01	-0.09	0.40	0.35	0.33	0.32	0.01	-0.22	-0.36	-0.37	-0.26	-0.40	-0.38
ssco1	0.51	0.36	-0.05	-0.30	0.10	0.31	-0.46	-0.41	-0.60	-0.54	-0.51	-0.51	0.32	1.00	0.81	0.63	0.07	0.24	0.16	0.64	0.66	0.68	0.62	0.21	-0.27	-0.52	-0.56	-0.37	-0.61	-0.61
ssco2	0.27	0.19	0.01	-0.08	-0.04	0.11	-0.51	-0.48	-0.61	-0.39	-0.28	-0.27	0.21	0.81	1.00	0.90	-0.03	0.40	0.30	0.51	0.55	0.58	0.49	0.22	-0.30	-0.53	-0.47	-0.46	-0.42	-0.43
ssco3p	0.22	0.15	0.07	0.01	-0.04	0.09	-0.48	-0.50	-0.57	-0.29	-0.18	-0.18	0.14	0.63	0.90	1.00	-0.05	0.45	0.28	0.47	0.49	0.51	0.42	0.17	-0.21	-0.47	-0.44	-0.44	-0.37	-0.36
mmng0	0.53	0.35	0.14	-0.08	0.38	0.36	0.18	-0.03	0.40	0.15	0.06	0.01	0.13	0.07	-0.03	-0.05	1.00	0.28	0.05	0.10	0.20	0.13	0.18	-0.13	0.25	0.07	-0.04	0.33	-0.08	-0.12
mmng1	0.35	0.55	0.50	0.30	0.07	0.27	-0.07	-0.22	-0.23	0.01	0.24	0.06	0.01	0.24	0.40	0.45	0.28	1.00	0.69	0.20	0.57	0.59	0.56	0.17	0.07	-0.35	-0.44	-0.21	-0.17	-0.13
sspr0	0.50	0.17	-0.32	-0.50	-0.09	0.16	-0.47	-0.48	-0.59	-0.69	-0.66	-0.67	0.40	0.64	0.51	0.47	0.10	0.20	0.06	1.00	0.72	0.64	0.58	0.22	-0.26	-0.49	-0.60	-0.53	-0.73	-0.73
sspr1	0.65	0.57	0.17	-0.10	0.02	0.33	-0.31	-0.26	-0.62	-0.61	-0.45	-0.54	0.35	0.66	0.55	0.49	0.20	0.57	0.41	0.72	1.00	0.97	0.91	0.21	-0.19	-0.60	-0.70	-0.49	-0.67	-0.63
sspr2	0.63	0.64	0.26	-0.04	0.06	0.37	-0.28	-0.23	-0.65	-0.60	-0.42	-0.52	0.33	0.68	0.58	0.51	0.13	0.59	0.46	0.64	0.97	1.00	0.95	0.29	-0.20	-0.61	-0.70	-0.50	-0.65	-0.60
sspr3p	0.68	0.61	0.26	0.02	0.15	0.43	-0.16	-0.10	-0.60	-0.58	-0.43	-0.51	0.32	0.62	0.49	0.42	0.18	0.56	0.40	0.58	0.91	0.95	1.00	0.27	-0.09	-0.48	-0.60	-0.34	-0.61	-0.54
pvir0	0.16	0.23	0.10	-0.05	-0.05	0.15	-0.09	-0.15	-0.23	-0.20	-0.18	-0.18	0.01	0.21	0.22	0.17	-0.12	0.17	0.22	0.22	0.21	0.29	0.27	1.00	-0.13	-0.19	-0.21	-0.24	-0.26	-0.24
pvir1	0.18	0.03	0.08	0.11	0.28	0.24	0.59	0.39	0.39	0.24	0.30	0.30	-0.22	-0.27	-0.30	-0.21	0.25	0.07	0.00	-0.26	-0.19	-0.20	-0.09	-0.13	1.00	0.50	0.26	0.41	0.11	0.14
pvir2	-0.23	-0.31	-0.12	0.10	0.25	-0.04	0.52	0.45	0.64	0.50	0.37	0.39	-0.36	-0.52	-0.53	-0.47	0.07	-0.35	-0.22	-0.49	-0.60	-0.61	-0.48	-0.19	0.50	1.00	0.86	0.63	0.60	0.58
pvir3p	-0.47	-0.43	-0.05	0.30	0.12	-0.19	0.45	0.49	0.64	0.61	0.42	0.48	-0.37	-0.56	-0.47	-0.44	-0.04	-0.44	-0.22	-0.60	-0.70	-0.70	-0.60	-0.21	0.26	0.86	1.00	0.61	0.78	0.74
tesm0	0.06	0.01	0.17	0.21	0.50	0.28	0.52	0.36	0.72	0.59	0.39	0.38	-0.26	-0.37	-0.47	-0.44	0.33	-0.21	-0.15	-0.53	-0.49	-0.50	-0.34	-0.24	0.41	0.63	0.61	1.00	0.60	0.56
tesm1	-0.58	-0.26	0.26	0.53	0.07	-0.27	0.34	0.37	0.62	0.80	0.68	0.65	-0.40	-0.61	-0.42	-0.37	-0.08	-0.17	0.08	-0.73	-0.67	-0.65	-0.61	-0.26	0.11	0.60	0.78	0.60	1.00	0.97
tesm2p	-0.56	-0.22	0.32	0.58	0.11	-0.24	0.39	0.43	0.56	0.77	0.70	0.66	-0.39	-0.61	-0.43	-0.36	-0.12	-0.13	0.11	-0.73	-0.63	-0.60	-0.54	-0.24	0.14	0.58	0.74	0.56	0.97	1.00

1992 4

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	1.00	0.62	0.23	-0.19	0.43	0.18	-0.31	-0.34	-0.55	-0.55	-0.52	-0.58	0.39	0.01	-0.17	-0.06	0.35	0.06	-0.23	0.47	0.76	0.80	0.78	0.04	-0.37	-0.39	-0.48	-0.42	-0.61	-0.62
char1	0.62	1.00	0.66	0.12	0.36	0.26	-0.31	-0.31	-0.28	-0.09	-0.02	-0.17	0.39	0.12	-0.15	-0.18	0.31	0.38	0.16	0.41	0.60	0.60	0.55	0.08	-0.37	-0.43	-0.39	-0.29	-0.31	-0.25
char2	0.23	0.66	1.00	0.60	-0.03	0.08	-0.26	-0.40	-0.33	-0.08	0.06	-0.02	0.41	0.59	0.38	0.29	0.02	0.38	0.40	0.55	0.41	0.43	0.37	0.05	-0.37	-0.40	-0.30	-0.39	-0.12	-0.01
char3p	-0.19	0.12	0.60	1.00	-0.40	-0.11	-0.15	-0.03	-0.02	0.08	0.10	0.13	0.38	0.61	0.61	0.50	-0.28	-0.07	0.14	0.05	-0.12	-0.06	0.02	0.07	-0.27	0.09	0.22	0.01	0.27	0.31
gmor0	0.43	0.35	-0.03	-0.40	1.00	0.52	0.04	0.13	-0.04	-0.04	0.03	-0.04	0.01	-0.18	-0.35	-0.45	0.32	0.07	-0.28	0.03	0.22	0.22	0.16	0.42	-0.08	-0.06	-0.06	0.09	-0.15	-0.15
gmor1	0.18	0.26	0.08	-0.11	0.52	1.00	0.43	0.28	-0.05	0.00	0.09	-0.01	0.19	0.08	0.02	-0.10	0.29	0.28	0.14	-0.07	0.02	0.05	0.08	0.38	-0.24	0.02	0.13	0.09	0.01	0.08
gmor2	-0.31	-0.31	-0.26	-0.15	0.04	0.43	1.00	0.63	0.21	0.16	0.19	0.20	-0.26	-0.09	0.05	-0.02	0.15	0.06	0.07	-0.35	-0.46	-0.44	-0.37	0.23	0.30	0.36	0.32	0.34	0.28	0.30
gmor3p	-0.34	-0.31	-0.40	-0.03	0.13	0.28	0.63	1.00	0.52	0.38	0.38	0.41	-0.24	-0.16	-0.02	-0.18	0.14	-0.09	-0.13	-0.62	-0.61	-0.58	-0.52	0.29	0.26	0.55	0.65	0.70	0.56	0.51
maeg0	-0.55	-0.28	-0.33	-0.02	-0.04	-0.05	0.21	0.52	1.00	0.82	0.72	0.75	-0.48	-0.28	-0.11	-0.19	0.07	-0.02	0.06	-0.62	-0.68	-0.76	-0.78	0.05	0.33	0.52	0.57	0.79	0.74	0.60
maeg1	-0.55	-0.09	-0.08	0.08	-0.04	0.00	0.16	0.38	0.82	1.00	0.91	0.86	-0.46	-0.18	-0.08	-0.26	0.13	0.25	0.31	-0.43	-0.52	-0.61	-0.67	0.06	0.23	0.19	0.36	0.64	0.73	0.68
maeg2	-0.52	-0.02	0.06	0.10	0.03	0.09	0.19	0.38	0.72	0.91	1.00	0.93	-0.42	-0.09	-0.04	-0.28	0.23	0.39	0.46	-0.31	-0.45	-0.52	-0.60	0.15	0.18	0.13	0.34	0.56	0.73	0.72
maeg3p	-0.58	-0.17	-0.02	0.13	-0.04	-0.01	0.20	0.41	0.75	0.86	0.93	1.00	-0.39	-0.01	0.09	-0.13	0.12	0.22	0.33	-0.39	-0.57	-0.64	-0.70	0.18	0.30	0.31	0.47	0.66	0.75	0.72
ssco0	0.38	0.39	0.41	0.38	0.01	0.19	-0.26	-0.24	-0.48	-0.46	-0.42	-0.39	1.00	0.48	0.27	0.26	-0.26	-0.08	-0.15	0.24	0.34	0.44	0.52	0.18	-0.40	-0.16	-0.13	-0.37	-0.40	-0.34
ssco1	0.01	0.12	0.59	0.61	-0.18	0.08	-0.09	-0.16	-0.28	-0.18	-0.09	-0.01	0.48	1.00	0.90	0.71	-0.25	0.03	0.16	0.32	0.15	0.17	0.16	0.07	-0.32	-0.05	0.07	-0.20	0.00	0.04
ssco2	-0.17	-0.15	0.38	0.61	-0.35	0.02	0.05	-0.02	-0.11	-0.08	-0.04	0.09	0.27	0.90	1.00	0.86	-0.25	-0.09	0.16	0.14	-0.09	-0.08	-0.07	0.00	-0.18	0.16	0.24	-0.02	0.21	0.21
ssco3p	-0.06	-0.18	0.29	0.50	-0.45	-0.10	-0.02	-0.18	-0.19	-0.26	-0.28	-0.13	0.26	0.71	0.86	1.00	-0.26	-0.16	0.11	0.16	-0.03	-0.02	0.00	-0.15	-0.19	0.20	0.15	-0.16	0.06	0.05
mmng0	0.35	0.31	0.02	-0.28	0.32	0.29	0.15	0.14	0.07	0.13	0.23	0.12	-0.26	-0.25	-0.25	-0.26	1.00	0.62	0.39	0.17	0.18	0.13	0.07	0.14	-0.12	-0.13	-0.12	0.21	0.12	0.10
mmng1	0.06	0.38	0.38	-0.07	0.07	0.28	0.06	-0.09	-0.02	0.25	0.39	0.22	-0.08	0.03	-0.09	-0.16	0.62	1.00	0.80	0.32	0.18	0.14	0.03	0.01	-0.07	-0.41	-0.30	-0.07	0.10	0.16
sspr0	0.47	0.41	0.55	0.05	0.03	-0.07	-0.35	-0.62	-0.62	-0.43	-0.31	-0.39	0.24	0.32	0.14	0.16	0.17	0.32	0.34	1.00	0.81	0.77	0.67	-0.09	-0.23	-0.56	-0.54	-0.60	-0.39	-0.30
sspr1	0.76	0.60	0.41	-0.12	0.22	0.02	-0.46	-0.61	-0.68	-0.52	-0.45	-0.57	0.34	0.15	-0.09	-0.03	0.18	0.18	0.10	0.81	1.00	0.97	0.89	-0.14	-0.30	-0.61	-0.62	-0.66	-0.61	-0.55
sspr2	0.80	0.60	0.43	-0.06	0.22	0.05	-0.44	-0.58	-0.76	-0.61	-0.52	-0.64	0.44	0.17	-0.08	-0.02	0.13	0.14	0.03	0.77	0.97	1.00	0.95	-0.12	-0.35	-0.62	-0.63	-0.71	-0.67	-0.60
sspr3p	0.78	0.55	0.37	0.02	0.16	0.08	-0.37	-0.52	-0.78	-0.67	-0.60	-0.70	0.52	0.16	-0.07	0.00	0.07	0.03	-0.08	0.67	0.89	0.95	1.00	-0.06	-0.39	-0.52	-0.53	-0.68	-0.67	-0.59
pvir0	0.04	0.08	0.05	0.07	0.42	0.38	0.23	0.29	0.05	0.06	0.15	0.18	0.18	0.07	0.00	-0.15	0.14	0.01	-0.15	-0.09	-0.14	-0.12	-0.06	1.00	0.12	0.32	0.31	0.32	0.20	0.25
pvir1	-0.37	-0.37	-0.37	-0.27	-0.08	-0.24	0.30	0.26	0.32	0.23	0.18	0.30	-0.40	-0.32	-0.18	-0.19	-0.12	-0.07	-0.05	-0.22	-0.30	-0.35	-0.39	0.12	1.00	0.35	0.18	0.29	0.21	0.17
pvir2	-0.39	-0.43	-0.40	0.09	-0.06	0.02	0.36	0.55	0.52	0.19	0.13	0.31	-0.16	-0.05	0.16	0.20	-0.13	-0.41	-0.30	-0.56	-0.61	-0.62	-0.52	0.32	0.35	1.00	0.83	0.65	0.50	0.41
pvir3p	-0.48	-0.39	-0.30	0.22	-0.06	0.13	0.32	0.65	0.57	0.36	0.34	0.47	-0.13	0.07	0.24	0.15	-0.12	-0.30	-0.17	-0.54	-0.62	-0.63	-0.53	0.31	0.18	0.83	1.00	0.74	0.69	0.66
tesm0	-0.42	-0.29	-0.39	0.01	0.09	0.09	0.34	0.70	0.79	0.64	0.56	0.66	-0.37	-0.20	-0.02	-0.16	0.21	-0.07	-0.07	-0.60	-0.66	-0.71	-0.68	0.32	0.29	0.65	0.74	1.00	0.79	0.69
tesm1	-0.61	-0.31	-0.12	0.27	-0.15	0.01	0.28	0.56	0.74	0.73	0.73	0.75	-0.40	0.00	0.21	0.06	0.12	0.10	0.27	-0.39	-0.61	-0.67	-0.67	0.20	0.21	0.50	0.69	0.79	1.00	0.94
tesm2p	-0.62	-0.25	-0.01	0.31	-0.15	0.078	0.299	0.507	0.6	0.68	0.724	0.722	-0.344	0.039	0.214	0.051	0.1	0.16	0.34	-0.3	-0.55	-0.6	-0.59	0.255	0.173	0.414	0.656	0.69	0.94	1

1993 1

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
char1	.	1.00	0.48	-0.26	.	0.74	-0.52	-0.16	.	-0.48	-0.64	-0.59	.	-0.55	-0.51	-0.48	.	0.43	-0.44	.	0.72	0.67	0.62	.	0.41	-0.37	-0.55	.	-0.60	-0.74
char2	.	0.48	1.00	0.44	.	0.56	-0.06	-0.13	.	-0.10	-0.15	-0.13	.	-0.44	-0.54	-0.55	.	0.60	-0.05	.	0.29	0.49	0.60	.	0.37	-0.41	-0.34	.	-0.09	-0.28
char3p	.	-0.26	0.44	1.00	.	-0.13	0.39	-0.01	.	0.13	0.14	0.16	.	0.26	0.24	0.23	.	0.05	0.19	.	-0.16	0.07	0.21	.	0.01	-0.01	0.10	.	0.20	0.21
gmor0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
gmor1	.	0.74	0.56	-0.13	.	1.00	-0.09	0.04	.	-0.28	-0.38	-0.36	.	-0.46	-0.52	-0.52	.	0.56	-0.24	.	0.31	0.41	0.47	.	0.24	-0.34	-0.42	.	-0.21	-0.48
gmor2	.	-0.52	-0.06	0.39	.	-0.09	1.00	0.66	.	0.47	0.52	0.49	.	0.53	0.44	0.41	.	-0.13	0.39	.	-0.71	-0.53	-0.35	.	-0.08	0.40	0.56	.	0.67	0.63
gmor3p	.	-0.16	-0.13	-0.01	.	0.04	0.66	1.00	.	0.47	0.43	0.39	.	0.42	0.35	0.33	.	-0.09	0.28	.	-0.48	-0.44	-0.35	.	0.29	0.53	0.60	.	0.40	0.45
maeg0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
maeg1	.	-0.48	-0.10	0.13	.	-0.28	0.47	0.48	.	1.00	0.89	0.84	.	0.50	0.44	0.42	.	0.00	0.51	.	-0.74	-0.72	-0.62	.	0.09	0.50	0.76	.	0.69	0.77
maeg2	.	-0.64	-0.15	0.14	.	-0.38	0.52	0.43	.	0.89	1.00	0.95	.	0.45	0.37	0.35	.	0.01	0.63	.	-0.81	-0.77	-0.65	.	-0.07	0.51	0.74	.	0.76	0.90
maeg3p	.	-0.59	-0.13	0.16	.	-0.36	0.49	0.39	.	0.84	0.95	1.00	.	0.35	0.34	0.34	.	0.12	0.66	.	-0.73	-0.68	-0.55	.	-0.04	0.51	0.63	.	0.69	0.85
ssco0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ssco1	.	-0.55	-0.44	0.26	.	-0.46	0.53	0.42	.	0.50	0.45	0.35	.	1.00	0.78	0.75	.	-0.53	0.11	.	-0.62	-0.65	-0.63	.	-0.20	0.50	0.69	.	0.55	0.56
ssco2	.	-0.51	-0.54	0.24	.	-0.52	0.44	0.35	.	0.44	0.37	0.34	.	0.78	1.00	0.97	.	-0.57	0.17	.	-0.52	-0.56	-0.55	.	-0.16	0.58	0.63	.	0.38	0.54
ssco3p	.	-0.48	-0.55	0.23	.	-0.52	0.41	0.33	.	0.42	0.35	0.34	.	0.75	0.97	1.00	.	-0.56	0.17	.	-0.50	-0.54	-0.53	.	-0.16	0.58	0.61	.	0.33	0.53
mmng0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
mmng1	.	0.43	0.60	0.05	.	0.56	-0.13	-0.09	.	0.00	0.01	0.12	.	-0.53	-0.57	-0.56	.	1.00	0.31	.	0.22	0.40	0.54	.	0.40	-0.23	-0.32	.	0.01	-0.13
sspr0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
sspr1	.	0.72	0.29	-0.16	.	0.32	-0.71	-0.48	.	-0.74	-0.81	-0.73	.	-0.62	-0.52	-0.50	.	0.22	-0.44	.	1.00	0.90	0.77	.	0.31	-0.49	-0.75	.	-0.82	-0.87
sspr2	.	0.67	0.49	0.07	.	0.41	-0.53	-0.44	.	-0.72	-0.77	-0.68	.	-0.65	-0.56	-0.54	.	0.40	-0.32	.	0.90	1.00	0.94	.	0.36	-0.49	-0.77	.	-0.71	-0.81
sspr3p	.	0.62	0.60	0.21	.	0.47	-0.35	-0.35	.	-0.62	-0.65	-0.55	.	-0.63	-0.55	-0.53	.	0.54	-0.15	.	0.77	0.94	1.00	.	0.37	-0.46	-0.71	.	-0.57	-0.67
pvir0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
pvir1	.	0.41	0.37	0.01	.	0.24	-0.08	0.29	.	0.09	-0.07	-0.04	.	-0.20	-0.16	-0.16	.	0.40	0.16	.	0.31	0.36	0.37	.	1.00	0.13	0.03	.	-0.22	-0.19
pvir2	.	-0.37	-0.41	-0.01	.	-0.34	0.40	0.53	.	0.50	0.51	0.51	.	0.50	0.58	0.58	.	-0.23	0.40	.	-0.48	-0.49	-0.46	.	0.13	1.00	0.77	.	0.36	0.58
pvir3p	.	-0.55	-0.34	0.10	.	-0.42	0.56	0.60	.	0.76	0.74	0.63	.	0.69	0.63	0.61	.	-0.32	0.42	.	-0.75	-0.77	-0.71	.	0.03	0.77	1.00	.	0.63	0.77
tesm0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
tesm1	.	-0.6	-0.09	0.2	.	-0.208	0.667	0.402	.	0.69	0.765	0.69	.	0.547	0.375	0.332	.	0.01	0.41	.	-0.82	-0.71	-0.57	.	-0.22	0.363	0.63	.	1	0.84
tesm2p	.	-0.74	-0.28	0.21	.	-0.483	0.629	0.455	.	0.77	0.901	0.854	.	0.564	0.541	0.528	.	-0.13	0.61	.	-0.87	-0.81	-0.67	.	-0.19	0.58	0.765	.	0.84	1

1993 2

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	1.00	0.11	0.34	0.21	0.24	0.04	0.06	-0.24	0.35	-0.07	0.00	0.15	.	0.01	0.05	0.08	0.38	0.12	0.03	.	-0.03	0.09	0.11	.	-0.18	-0.12	-0.04	.	-0.02	-0.08
char1	0.11	1.00	0.48	0.22	0.25	0.20	-0.29	-0.03	0.05	-0.56	-0.57	-0.46	.	0.22	0.18	0.13	0.35	0.42	-0.25	.	0.65	0.64	0.60	.	0.21	-0.45	-0.57	.	-0.64	-0.39
char2	0.34	0.48	1.00	0.81	0.23	0.12	0.11	0.00	0.21	0.08	0.13	0.30	.	0.02	0.08	0.13	0.25	0.64	0.30	.	0.21	0.41	0.49	.	-0.08	-0.26	-0.23	.	0.04	-0.01
char3p	0.21	0.22	0.81	1.00	0.17	0.23	0.24	0.10	0.06	0.16	0.22	0.35	.	0.03	0.06	0.10	0.00	0.60	0.44	.	0.08	0.32	0.47	.	0.04	-0.10	-0.07	.	0.25	0.23
gmor0	0.24	0.25	0.23	0.17	1.00	0.26	0.05	0.08	0.77	0.00	-0.06	0.05	.	-0.02	-0.27	-0.23	0.49	0.09	-0.13	.	-0.11	-0.03	-0.01	.	0.18	0.11	0.05	.	0.02	0.20
gmor1	0.04	0.20	0.12	0.23	0.26	1.00	0.58	0.54	0.06	0.09	0.04	0.07	.	-0.13	-0.31	-0.32	0.18	0.10	-0.04	.	-0.23	-0.11	-0.03	.	0.42	0.25	0.31	.	0.23	0.47
gmor2	0.06	-0.29	0.11	0.24	0.05	0.58	1.00	0.45	0.19	0.38	0.43	0.43	.	-0.31	-0.23	-0.18	0.06	-0.01	0.34	.	-0.47	-0.30	-0.20	.	0.00	0.30	0.48	.	0.61	0.56
gmor3p	-0.24	-0.03	0.00	0.10	0.08	0.54	0.45	1.00	-0.15	0.49	0.32	0.19	.	-0.34	-0.51	-0.49	0.04	0.08	0.03	.	-0.35	-0.37	-0.30	.	0.52	0.53	0.42	.	0.36	0.72
maeg0	0.35	0.05	0.21	0.06	0.77	0.06	0.19	-0.15	1.00	0.01	0.04	0.17	.	0.02	-0.15	-0.09	0.57	0.03	0.02	.	-0.13	-0.03	0.00	.	-0.15	-0.06	0.03	.	0.08	0.01
maeg1	-0.07	-0.56	0.08	0.16	0.00	0.09	0.38	0.49	0.01	1.00	0.91	0.78	.	-0.43	-0.45	-0.35	-0.14	0.04	0.38	.	-0.64	-0.57	-0.48	.	0.18	0.67	0.65	.	0.79	0.71
maeg2	0.00	-0.57	0.13	0.22	-0.06	0.04	0.43	0.32	0.04	0.91	1.00	0.91	.	-0.44	-0.31	-0.20	-0.19	0.11	0.51	.	-0.56	-0.44	-0.34	.	0.04	0.53	0.52	.	0.80	0.59
maeg3p	0.14	-0.45	0.30	0.35	0.05	0.07	0.43	0.19	0.17	0.78	0.91	1.00	.	-0.33	-0.14	-0.03	-0.11	0.30	0.57	.	-0.41	-0.25	-0.14	.	-0.11	0.31	0.37	.	0.78	0.47
ssco0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ssco1	0.01	0.22	0.02	0.03	-0.02	-0.13	-0.31	-0.34	0.02	-0.43	-0.44	-0.33	.	1.00	0.59	0.47	0.18	0.10	-0.01	.	0.49	0.49	0.47	.	-0.21	-0.39	-0.18	.	-0.33	-0.31
ssco2	0.05	0.18	0.08	0.06	-0.27	-0.31	-0.23	-0.51	-0.15	-0.45	-0.31	-0.14	.	0.59	1.00	0.95	-0.09	0.24	0.15	.	0.59	0.59	0.55	.	-0.42	-0.54	-0.37	.	-0.24	-0.56
ssco3p	0.08	0.13	0.13	0.10	-0.23	-0.32	-0.18	-0.49	-0.09	-0.35	-0.20	-0.03	.	0.47	0.95	1.00	-0.11	0.31	0.23	.	0.55	0.57	0.54	.	-0.43	-0.52	-0.35	.	-0.17	-0.55
mmng0	0.38	0.35	0.25	0.00	0.49	0.18	0.06	0.04	0.57	-0.14	-0.19	-0.11	.	0.18	-0.09	-0.11	1.00	0.06	-0.15	.	0.03	0.04	0.04	.	0.03	-0.06	-0.02	.	-0.20	-0.03
mmng1	0.12	0.42	0.64	0.60	0.09	0.10	-0.01	0.08	0.03	0.04	0.11	0.30	.	0.10	0.24	0.31	0.06	1.00	0.53	.	0.49	0.60	0.67	.	0.04	-0.32	-0.43	.	-0.06	-0.07
sspr0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
sspr1	-0.03	0.65	0.21	0.08	-0.11	-0.23	-0.47	-0.35	-0.13	-0.64	-0.56	-0.41	.	0.49	0.59	0.55	0.03	0.49	0.10	.	1.00	0.92	0.82	.	-0.12	-0.70	-0.75	.	-0.65	-0.65
sspr2	0.09	0.64	0.41	0.32	-0.03	-0.11	-0.30	-0.37	-0.03	-0.57	-0.44	-0.25	.	0.49	0.59	0.57	0.04	0.60	0.25	.	0.92	1.00	0.96	.	-0.17	-0.72	-0.69	.	-0.51	-0.56
sspr3p	0.11	0.60	0.49	0.47	-0.01	-0.03	-0.21	-0.30	0.00	-0.48	-0.34	-0.14	.	0.47	0.55	0.54	0.04	0.67	0.32	.	0.82	0.96	1.00	.	-0.11	-0.67	-0.64	.	-0.41	-0.45
pvir0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
pvir1	-0.18	0.21	-0.08	0.04	0.18	0.42	0.00	0.52	-0.15	0.18	0.04	-0.11	.	-0.21	-0.42	-0.43	0.03	0.04	-0.19	.	-0.12	-0.17	-0.11	.	1.00	0.46	0.16	.	0.01	0.35
pvir2	-0.12	-0.45	-0.26	-0.10	0.11	0.25	0.30	0.53	-0.06	0.67	0.53	0.31	.	-0.39	-0.54	-0.52	-0.06	-0.32	-0.03	.	-0.70	-0.72	-0.67	.	0.46	1.00	0.77	.	0.55	0.72
pvir3p	-0.04	-0.57	-0.23	-0.07	0.05	0.31	0.48	0.42	0.03	0.65	0.52	0.37	.	-0.18	-0.37	-0.35	-0.02	-0.43	-0.02	.	-0.75	-0.69	-0.64	.	0.16	0.77	1.00	.	0.70	0.70
tesm0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
tesm1	-0.02	-0.64	0.04	0.25	0.018	0.234	0.615	0.359	0.08	0.79	0.798	0.781	.	-0.331	-0.236	-0.168	-0.2	-0.06	0.38	.	-0.65	-0.51	-0.41	.	0.011	0.555	0.704	.	1	0.73
tesm2p	-0.08	-0.39	-0.01	0.23	0.2	0.474	0.56	0.715	0.01	0.71	0.585	0.469	.	-0.311	-0.564	-0.554	-0.03	-0.07	0.21	.	-0.65	-0.56	-0.45	.	0.354	0.724	0.698	.	0.73	1

1993 3

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	1.00	0.68	-0.19	-0.37	0.66	0.69	-0.26	-0.16	-0.05	-0.68	-0.64	-0.59	0.25	0.34	0.09	-0.06	0.76	0.31	-0.51	0.24	0.62	0.65	0.63	.	0.26	-0.48	-0.52	0.01	-0.44	-0.38
char1	0.68	1.00	0.35	0.12	0.49	0.70	-0.09	-0.02	0.06	-0.28	-0.26	-0.17	0.00	0.17	0.04	-0.04	0.59	0.44	-0.07	0.04	0.55	0.66	0.68	.	0.26	-0.36	-0.37	0.01	-0.12	-0.15
char2	-0.19	0.35	1.00	0.92	-0.05	0.14	0.29	0.22	0.09	0.44	0.43	0.50	-0.21	-0.20	-0.05	0.09	-0.05	0.31	0.72	-0.04	-0.01	0.08	0.09	.	0.05	0.06	0.10	0.10	0.48	0.31
char3p	-0.37	0.12	0.92	1.00	-0.19	-0.06	0.35	0.28	0.04	0.51	0.47	0.54	-0.21	-0.18	0.01	0.12	-0.24	0.15	0.75	-0.06	-0.14	-0.08	-0.07	.	-0.06	0.16	0.22	0.11	0.55	0.37
gmor0	0.66	0.49	-0.05	-0.19	1.00	0.68	0.08	0.05	0.31	-0.20	-0.14	-0.08	-0.04	0.17	-0.04	-0.20	0.56	0.05	-0.36	-0.20	0.23	0.31	0.27	.	0.53	-0.03	-0.03	0.36	0.00	-0.07
gmor1	0.69	0.70	0.14	-0.06	0.68	1.00	0.11	0.00	0.11	-0.34	-0.29	-0.15	0.03	0.15	0.01	-0.03	0.71	0.41	-0.20	-0.06	0.42	0.47	0.44	.	0.34	-0.21	-0.27	0.09	-0.09	-0.07
gmor2	-0.26	-0.09	0.29	0.35	0.08	0.11	1.00	0.60	0.39	0.33	0.33	0.38	-0.31	-0.35	-0.21	-0.22	-0.20	-0.41	0.19	-0.28	-0.47	-0.40	-0.43	.	0.25	0.66	0.63	0.38	0.53	0.66
gmor3p	-0.16	-0.02	0.22	0.28	0.05	0.00	0.60	1.00	0.60	0.41	0.35	0.34	-0.51	-0.58	-0.53	-0.51	-0.13	-0.26	0.04	-0.45	-0.52	-0.40	-0.43	.	0.40	0.57	0.58	0.53	0.54	0.70
maeg0	-0.05	0.06	0.09	0.04	0.31	0.11	0.39	0.60	1.00	0.50	0.45	0.39	-0.59	-0.64	-0.70	-0.67	-0.05	-0.35	-0.18	-0.62	-0.62	-0.46	-0.46	.	0.82	0.65	0.67	0.83	0.58	0.59
maeg1	-0.68	-0.28	0.44	0.51	-0.20	-0.34	0.33	0.41	0.50	1.00	0.94	0.89	-0.57	-0.54	-0.38	-0.23	-0.51	-0.15	0.51	-0.61	-0.63	-0.54	-0.52	.	0.14	0.57	0.62	0.44	0.74	0.57
maeg2	-0.64	-0.26	0.43	0.47	-0.14	-0.29	0.33	0.35	0.45	0.94	1.00	0.92	-0.55	-0.47	-0.33	-0.18	-0.49	-0.18	0.51	-0.58	-0.60	-0.50	-0.48	.	0.15	0.54	0.58	0.37	0.68	0.48
maeg3p	-0.59	-0.17	0.50	0.54	-0.08	-0.15	0.38	0.34	0.39	0.89	0.92	1.00	-0.52	-0.42	-0.25	-0.07	-0.42	-0.08	0.56	-0.57	-0.53	-0.45	-0.44	.	0.14	0.49	0.50	0.33	0.69	0.48
ssco0	0.25	0.00	-0.21	-0.21	-0.04	0.03	-0.31	-0.51	-0.59	-0.57	-0.55	-0.52	1.00	0.56	0.52	0.51	0.29	0.25	-0.09	0.60	0.51	0.39	0.38	.	-0.33	-0.50	-0.52	-0.50	-0.58	-0.58
ssco1	0.34	0.17	-0.20	-0.18	0.17	0.15	-0.35	-0.58	-0.64	-0.54	-0.47	-0.42	0.56	1.00	0.89	0.69	0.24	0.20	-0.16	0.50	0.64	0.51	0.52	.	-0.32	-0.56	-0.58	-0.52	-0.58	-0.72
ssco2	0.09	0.04	-0.05	0.01	-0.04	0.01	-0.21	-0.53	-0.70	-0.38	-0.33	-0.25	0.52	0.89	1.00	0.87	0.04	0.18	0.06	0.49	0.52	0.39	0.42	.	-0.44	-0.43	-0.44	-0.57	-0.43	-0.63
ssco3p	-0.06	-0.04	0.09	0.12	-0.20	-0.03	-0.22	-0.51	-0.67	-0.23	-0.18	-0.07	0.51	0.69	0.87	1.00	0.02	0.34	0.26	0.48	0.45	0.29	0.32	.	-0.45	-0.42	-0.46	-0.61	-0.34	-0.54
mmng0	0.76	0.59	-0.05	-0.24	0.56	0.71	-0.20	-0.14	-0.05	-0.51	-0.49	-0.42	0.29	0.24	0.04	0.02	1.00	0.60	-0.24	0.19	0.63	0.66	0.58	.	0.18	-0.43	-0.52	-0.12	-0.38	-0.34
mmng1	0.31	0.44	0.31	0.15	0.05	0.41	-0.41	-0.26	-0.35	-0.15	-0.18	-0.08	0.25	0.20	0.18	0.34	0.60	1.00	0.33	0.19	0.62	0.61	0.59	.	-0.23	-0.57	-0.66	-0.43	-0.27	-0.36
sspr0	0.24	0.04	-0.04	-0.06	-0.20	-0.06	-0.28	-0.45	-0.62	-0.61	-0.58	-0.57	0.60	0.50	0.49	0.49	0.19	0.19	0.06	1.00	0.50	0.36	0.38	.	-0.35	-0.51	-0.55	-0.50	-0.54	-0.52
sspr1	0.62	0.55	-0.01	-0.14	0.23	0.42	-0.47	-0.52	-0.62	-0.63	-0.60	-0.53	0.51	0.64	0.52	0.45	0.63	0.62	-0.07	0.50	1.00	0.96	0.93	.	-0.35	-0.80	-0.81	-0.59	-0.59	-0.67
sspr2	0.65	0.66	0.08	-0.08	0.31	0.47	-0.40	-0.40	-0.46	-0.54	-0.50	-0.45	0.39	0.51	0.39	0.29	0.66	0.61	-0.07	0.36	0.96	1.00	0.98	.	-0.22	-0.72	-0.71	-0.45	-0.47	-0.55
sspr3p	0.63	0.68	0.09	-0.07	0.27	0.44	-0.44	-0.43	-0.46	-0.52	-0.48	-0.44	0.38	0.52	0.42	0.32	0.58	0.59	-0.06	0.38	0.93	0.98	1.00	.	-0.23	-0.73	-0.70	-0.43	-0.45	-0.56
pvir0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
pvir1	0.26	0.26	0.05	-0.06	0.53	0.34	0.25	0.40	0.82	0.14	0.15	0.14	-0.33	-0.32	-0.44	-0.45	0.18	-0.23	-0.32	-0.35	-0.35	-0.22	-0.23	.	1.00	0.48	0.43	0.73	0.32	0.30
pvir2	-0.48	-0.36	0.06	0.16	-0.03	-0.21	0.66	0.57	0.65	0.57	0.54	0.49	-0.50	-0.56	-0.43	-0.42	-0.43	-0.57	-0.01	-0.51	-0.80	-0.72	-0.73	.	0.48	1.00	0.91	0.61	0.64	0.71
pvir3p	-0.52	-0.37	0.10	0.22	-0.03	-0.27	0.63	0.58	0.67	0.62	0.58	0.50	-0.52	-0.58	-0.44	-0.46	-0.52	-0.66	0.01	-0.55	-0.81	-0.71	-0.70	.	0.43	0.91	1.00	0.65	0.76	0.76
tesm0	0.01	0.01	0.10	0.11	0.36	0.09	0.38	0.53	0.83	0.44	0.37	0.33	-0.50	-0.52	-0.57	-0.61	-0.12	-0.43	-0.17	-0.50	-0.59	-0.45	-0.43	.	0.74	0.61	0.65	1.00	0.62	0.59
tesm1	-0.44	-0.12	0.48	0.55	0.003	-0.087	0.535	0.542	0.58	0.74	0.678	0.693	-0.575	-0.582	-0.426	-0.34	-0.38	-0.27	0.39	-0.54	-0.59	-0.47	-0.45	.	0.32	0.645	0.758	0.62	1	0.8
tesm2p	-0.38	-0.15	0.31	0.37	-0.065	-0.073	0.656	0.697	0.59	0.57	0.476	0.484	-0.575	-0.72	-0.625	-0.538	-0.34	-0.36	0.18	-0.52	-0.67	-0.55	-0.56	.	0.299	0.708	0.761	0.59	0.8	1

1993 4

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	1.00	0.26	0.01	-0.29	0.67	0.25	-0.44	-0.32	-0.49	-0.66	-0.65	-0.56	0.14	-0.07	-0.23	-0.16	0.68	0.17	-0.44	0.54	0.73	0.74	0.67	0.19	-0.38	-0.45	-0.53	-0.58	-0.46	-0.51
char1	0.26	1.00	0.75	0.30	0.18	0.50	0.02	-0.14	-0.03	0.16	0.10	0.19	0.42	0.05	-0.15	-0.28	0.26	0.46	0.36	0.29	0.20	0.24	0.30	0.12	-0.03	-0.10	-0.08	-0.02	0.23	0.22
char2	0.01	0.75	1.00	0.69	-0.20	0.32	0.19	-0.05	-0.05	0.14	0.11	0.13	0.34	0.27	0.12	-0.03	0.00	0.39	0.60	0.26	0.06	0.10	0.18	-0.10	-0.04	-0.05	-0.02	0.03	0.32	0.36
char3p	-0.29	0.30	0.69	1.00	-0.28	0.14	0.37	0.20	0.07	0.18	0.31	0.24	0.34	0.45	0.42	0.30	-0.41	-0.02	0.43	-0.08	-0.22	-0.24	-0.16	-0.21	0.13	0.21	0.23	0.24	0.50	0.53
gmor0	0.67	0.18	-0.20	-0.28	1.00	0.49	-0.33	-0.15	-0.09	-0.30	-0.25	-0.26	0.06	-0.33	-0.43	-0.39	0.62	0.11	-0.48	0.19	0.33	0.30	0.20	0.14	-0.08	-0.09	-0.25	-0.26	-0.22	-0.30
gmor1	0.25	0.50	0.32	0.14	0.49	1.00	0.26	0.19	0.35	0.25	0.27	0.23	0.11	-0.19	-0.30	-0.38	0.24	0.24	0.11	-0.07	-0.17	-0.13	-0.13	-0.15	0.33	0.30	0.20	0.21	0.37	0.32
gmor2	-0.44	0.02	0.19	0.37	-0.33	0.26	1.00	0.78	0.46	0.33	0.38	0.26	-0.18	-0.05	0.15	0.18	-0.48	-0.30	0.21	-0.46	-0.63	-0.58	-0.52	-0.15	0.63	0.70	0.77	0.59	0.59	0.60
gmor3p	-0.32	-0.14	-0.05	0.20	-0.15	0.19	0.78	1.00	0.51	0.24	0.29	0.11	-0.23	-0.15	0.07	0.12	-0.41	-0.46	-0.10	-0.49	-0.63	-0.59	-0.55	-0.09	0.65	0.76	0.79	0.67	0.57	0.54
maeg0	-0.49	-0.03	-0.05	0.07	-0.09	0.35	0.46	0.51	1.00	0.73	0.62	0.48	-0.30	-0.17	-0.04	-0.14	-0.23	-0.01	0.25	-0.55	-0.77	-0.76	-0.75	0.01	0.57	0.64	0.66	0.82	0.63	0.62
maeg1	-0.66	0.16	0.14	0.18	-0.30	0.25	0.33	0.24	0.73	1.00	0.92	0.86	0.06	-0.03	-0.04	-0.22	-0.28	0.28	0.58	-0.44	-0.65	-0.64	-0.63	0.02	0.38	0.42	0.49	0.69	0.66	0.67
maeg2	-0.65	0.10	0.11	0.31	-0.25	0.27	0.38	0.29	0.62	0.92	1.00	0.91	0.14	0.07	0.08	-0.09	-0.34	0.18	0.50	-0.48	-0.64	-0.64	-0.63	-0.05	0.42	0.47	0.50	0.64	0.66	0.67
maeg3p	-0.56	0.19	0.13	0.24	-0.26	0.23	0.26	0.11	0.48	0.86	0.91	1.00	0.25	0.09	0.05	-0.11	-0.29	0.24	0.54	-0.31	-0.45	-0.47	-0.47	-0.02	0.28	0.27	0.33	0.52	0.61	0.61
ssco0	0.14	0.42	0.34	0.34	0.06	0.11	-0.18	-0.23	-0.30	0.06	0.14	0.25	1.00	0.60	0.34	0.19	-0.03	0.13	0.18	0.29	0.32	0.33	0.42	-0.04	-0.16	-0.20	-0.19	-0.18	0.10	0.07
ssco1	-0.07	0.05	0.27	0.45	-0.33	-0.19	-0.05	-0.15	-0.17	-0.03	0.07	0.09	0.60	1.00	0.90	0.73	-0.21	0.11	0.33	0.23	0.22	0.22	0.27	0.02	-0.07	-0.13	-0.03	-0.10	0.06	0.08
ssco2	-0.23	-0.15	0.12	0.42	-0.43	-0.30	0.15	0.07	-0.04	-0.04	0.08	0.05	0.34	0.90	1.00	0.91	-0.34	-0.06	0.27	0.02	0.04	0.04	0.08	0.00	0.12	0.08	0.20	0.08	0.13	0.15
ssco3p	-0.16	-0.28	-0.03	0.30	-0.39	-0.38	0.18	0.12	-0.14	-0.22	-0.09	-0.11	0.19	0.73	0.91	1.00	-0.35	-0.22	0.08	0.01	0.09	0.08	0.11	-0.05	0.11	0.08	0.18	0.02	0.01	0.01
mmng0	0.68	0.26	0.00	-0.41	0.62	0.24	-0.48	-0.41	-0.23	-0.28	-0.34	-0.29	-0.04	-0.21	-0.34	-0.35	1.00	0.53	-0.15	0.52	0.59	0.58	0.43	0.32	-0.30	-0.35	-0.43	-0.44	-0.43	-0.43
mmng1	0.17	0.46	0.39	-0.02	0.11	0.24	-0.30	-0.46	-0.01	0.28	0.18	0.24	0.13	0.11	-0.06	-0.22	0.53	1.00	0.64	0.30	0.25	0.26	0.13	0.24	-0.23	-0.26	-0.25	-0.14	0.00	0.03
sspr0	0.54	0.29	0.26	-0.08	0.19	-0.07	-0.46	-0.49	-0.55	-0.44	-0.48	-0.31	0.29	0.23	0.02	0.01	0.52	0.30	0.02	1.00	0.78	0.76	0.70	0.08	-0.46	-0.52	-0.53	-0.55	-0.42	-0.40
sspr1	0.73	0.20	0.06	-0.22	0.33	-0.17	-0.64	-0.64	-0.77	-0.65	-0.64	-0.46	0.32	0.23	0.04	0.09	0.59	0.25	-0.20	0.78	1.00	0.97	0.90	0.28	-0.59	-0.69	-0.70	-0.78	-0.61	-0.62
sspr2	0.74	0.24	0.10	-0.24	0.30	-0.13	-0.58	-0.59	-0.76	-0.64	-0.64	-0.47	0.33	0.22	0.04	0.08	0.58	0.26	-0.18	0.76	0.97	1.00	0.94	0.25	-0.51	-0.64	-0.65	-0.75	-0.57	-0.58
sspr3p	0.67	0.30	0.18	-0.16	0.20	-0.13	-0.52	-0.55	-0.75	-0.63	-0.63	-0.47	0.42	0.27	0.09	0.11	0.43	0.13	-0.18	0.70	0.90	0.94	1.00	0.18	-0.47	-0.61	-0.62	-0.71	-0.52	-0.53
pvir0	0.19	0.12	-0.10	-0.21	0.14	-0.15	-0.15	-0.09	0.00	0.02	-0.05	-0.02	-0.04	0.02	0.00	-0.05	0.32	0.24	-0.04	0.08	0.28	0.25	0.18	1.00	-0.21	-0.18	-0.08	-0.05	-0.06	-0.04
pvir1	-0.38	-0.03	-0.04	0.13	-0.08	0.33	0.63	0.65	0.57	0.38	0.42	0.28	-0.16	-0.07	0.12	0.11	-0.30	-0.23	0.10	-0.46	-0.58	-0.51	-0.47	-0.21	1.00	0.89	0.81	0.60	0.55	0.52
pvir2	-0.45	-0.10	-0.05	0.21	-0.09	0.30	0.70	0.76	0.64	0.42	0.47	0.27	-0.20	-0.13	0.08	0.08	-0.35	-0.26	0.11	-0.52	-0.69	-0.64	-0.61	-0.18	0.89	1.00	0.93	0.69	0.61	0.58
pvir3p	-0.53	-0.08	-0.02	0.23	-0.25	0.20	0.77	0.79	0.66	0.48	0.50	0.33	-0.19	-0.03	0.20	0.18	-0.43	-0.25	0.20	-0.53	-0.70	-0.65	-0.62	-0.08	0.81	0.93	1.00	0.77	0.69	0.68
tesm0	-0.58	-0.02	0.03	0.24	-0.26	0.21	0.59	0.67	0.82	0.69	0.64	0.52	-0.18	-0.10	0.08	0.02	-0.44	-0.14	0.31	-0.55	-0.78	-0.75	-0.71	-0.05	0.60	0.69	0.77	1.00	0.83	0.83
tesm1	-0.46	0.23	0.32	0.5	-0.225	0.369	0.594	0.57	0.63	0.66	0.665	0.605	0.096	0.061	0.129	0.007	-0.43	0	0.46	-0.42	-0.61	-0.57	-0.52	-0.06	0.555	0.608	0.692	0.83	1	0.98
tesm2p	-0.51	0.22	0.36	0.53	-0.298	0.323	0.603	0.544	0.62	0.67	0.666	0.608	0.073	0.083	0.145	0.014	-0.43	0.03	0.51	-0.4	-0.62	-0.58	-0.53	-0.042	0.525	0.585	0.682	0.83	0.98	1

1994 1

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
char1	.	1.00	0.26	-0.06	.	0.64	0.09	-0.14	.	-0.56	-0.42	-0.56	.	-0.48	-0.39	-0.23	.	0.29	-0.27	.	0.77	0.71	0.67	.	-0.03	-0.06	-0.43	.	-0.62	-0.49
char2	.	0.26	1.00	0.84	.	0.21	0.44	0.12	.	0.05	0.26	0.14	.	0.13	0.11	0.05	.	0.40	0.51	.	0.01	0.17	0.38	.	-0.13	-0.04	-0.13	.	0.01	0.10
char3p	.	-0.06	0.84	1.00	.	-0.01	0.39	0.17	.	0.09	0.25	0.19	.	0.26	0.31	0.32	.	0.20	0.56	.	-0.18	-0.01	0.23	.	-0.06	0.06	0.02	.	0.08	0.23
gmor0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
gmor1	.	0.64	0.21	-0.01	.	1.00	0.41	-0.01	.	-0.47	-0.46	-0.51	.	-0.52	-0.28	-0.13	.	0.12	-0.32	.	0.39	0.35	0.34	.	0.17	0.19	-0.16	.	-0.51	-0.38
gmor2	.	0.09	0.44	0.39	.	0.41	1.00	0.57	.	0.20	0.20	0.20	.	0.17	-0.03	0.04	.	-0.08	0.38	.	-0.31	-0.18	0.01	.	0.35	0.46	0.31	.	0.19	0.41
gmor3p	.	-0.14	0.12	0.17	.	-0.01	0.57	1.00	.	0.46	0.34	0.43	.	0.42	0.09	0.22	.	-0.41	0.24	.	-0.36	-0.39	-0.26	.	0.27	0.50	0.59	.	0.52	0.54
maeg0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
maeg1	.	-0.56	0.05	0.09	.	-0.47	0.20	0.46	.	1.00	0.83	0.87	.	0.60	0.14	-0.09	.	-0.25	0.37	.	-0.72	-0.75	-0.70	.	0.25	0.31	0.68	.	0.83	0.76
maeg2	.	-0.42	0.26	0.25	.	-0.46	0.20	0.34	.	0.83	1.00	0.93	.	0.52	0.10	-0.11	.	-0.20	0.63	.	-0.54	-0.66	-0.58	.	0.11	0.20	0.51	.	0.64	0.77
maeg3p	.	-0.56	0.14	0.18	.	-0.51	0.20	0.43	.	0.87	0.93	1.00	.	0.65	0.16	-0.03	.	-0.29	0.57	.	-0.70	-0.77	-0.69	.	0.17	0.24	0.61	.	0.79	0.80
ssco0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ssco1	.	-0.48	0.13	0.26	.	-0.52	0.17	0.42	.	0.60	0.52	0.65	.	1.00	0.41	0.26	.	-0.18	0.52	.	-0.56	-0.46	-0.32	.	-0.06	0.05	0.36	.	0.68	0.64
ssco2	.	-0.39	0.11	0.31	.	-0.28	-0.03	0.09	.	0.14	0.10	0.16	.	0.41	1.00	0.48	.	0.09	0.31	.	-0.30	-0.14	-0.05	.	-0.19	-0.11	0.09	.	0.26	0.09
ssco3p	.	-0.22	0.05	0.32	.	-0.13	0.04	0.22	.	-0.09	-0.11	-0.03	.	0.26	0.48	1.00	.	-0.20	0.19	.	-0.19	-0.06	0.10	.	-0.16	0.00	0.04	.	0.05	0.15
mmng0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
mmng1	.	0.29	0.40	0.20	.	0.12	-0.08	-0.41	.	-0.25	-0.20	-0.29	.	-0.18	0.09	-0.20	.	1.00	0.16	.	0.25	0.57	0.57	.	-0.34	-0.56	-0.65	.	-0.17	-0.43
sspr0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
sspr1	.	0.77	0.01	-0.18	.	0.39	-0.31	-0.36	.	-0.72	-0.54	-0.70	.	-0.56	-0.30	-0.19	.	0.25	-0.35	.	1.00	0.82	0.69	.	-0.21	-0.29	-0.60	.	-0.77	-0.69
sspr2	.	0.71	0.17	-0.01	.	0.35	-0.18	-0.40	.	-0.75	-0.67	-0.77	.	-0.46	-0.14	-0.06	.	0.57	-0.26	.	0.82	1.00	0.94	.	-0.32	-0.44	-0.77	.	-0.64	-0.74
sspr3p	.	0.67	0.38	0.23	.	0.34	0.01	-0.26	.	-0.70	-0.58	-0.69	.	-0.32	-0.05	0.10	.	0.57	-0.07	.	0.69	0.94	1.00	.	-0.35	-0.40	-0.73	.	-0.57	-0.59
pvir0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
pvir1	.	-0.03	-0.13	-0.06	.	0.17	0.35	0.27	.	0.25	0.11	0.17	.	-0.06	-0.19	-0.16	.	-0.34	-0.23	.	-0.21	-0.32	-0.35	.	1.00	0.76	0.55	.	0.12	0.17
pvir2	.	-0.06	-0.04	0.06	.	0.19	0.46	0.50	.	0.31	0.20	0.24	.	0.05	-0.11	0.00	.	-0.56	-0.06	.	-0.29	-0.44	-0.40	.	0.76	1.00	0.72	.	0.15	0.39
pvir3p	.	-0.43	-0.13	0.01	.	-0.16	0.31	0.59	.	0.68	0.51	0.61	.	0.36	0.09	0.04	.	-0.65	0.05	.	-0.60	-0.77	-0.73	.	0.55	0.72	1.00	.	0.57	0.63
tesm0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
tesm1	.	-0.62	0.01	0.08	.	-0.506	0.189	0.524	.	0.83	0.635	0.795	.	0.68	0.262	0.053	.	-0.17	0.36	.	-0.77	-0.64	-0.57	.	0.12	0.153	0.567	.	1	0.69
tesm2p	.	-0.49	0.1	0.23	.	-0.377	0.413	0.545	.	0.76	0.774	0.803	.	0.638	0.089	0.147	.	-0.43	0.58	.	-0.69	-0.74	-0.59	.	0.173	0.393	0.629	.	0.69	1

1994 2

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	1.00	0.19	0.22	0.18	1.00	0.14	0.04	0.10	.	0.15	-0.04	-0.11	.	0.22	-0.24	-0.24	0.20	0.14	-0.14	0.33	0.17	0.03	0.14	.	.	0.40	0.10	-0.04	-0.04	0.20
char1	0.19	1.00	0.18	-0.07	0.19	0.66	0.08	-0.31	.	-0.20	-0.36	-0.44	.	-0.02	-0.29	-0.35	0.59	0.43	-0.42	0.35	0.83	0.66	0.58	.	.	0.02	-0.54	0.23	-0.55	-0.45
char2	0.22	0.18	1.00	0.86	0.22	0.09	0.44	0.12	.	0.55	0.58	0.52	.	0.10	-0.24	-0.06	-0.17	0.46	0.49	-0.01	-0.02	0.21	0.37	.	.	0.27	0.06	-0.13	0.30	0.31
char3p	0.18	-0.07	0.86	1.00	0.18	-0.09	0.34	0.15	.	0.45	0.51	0.47	.	0.14	-0.08	0.13	-0.26	0.46	0.65	-0.09	-0.10	0.12	0.32	.	.	0.20	0.06	-0.24	0.32	0.36
gmor0	1.00	0.19	0.22	0.18	1.00	0.14	0.04	0.10	.	0.15	-0.04	-0.11	.	0.22	-0.24	-0.24	0.20	0.14	-0.14	0.33	0.17	0.03	0.14	.	.	0.40	0.10	-0.04	-0.04	0.20
gmor1	0.14	0.66	0.09	-0.09	0.14	1.00	0.51	-0.12	.	0.02	-0.28	-0.34	.	0.12	-0.36	-0.36	0.40	0.14	-0.47	0.34	0.48	0.33	0.31	.	.	0.08	-0.20	0.33	-0.30	-0.19
gmor2	0.04	0.08	0.43	0.34	0.04	0.51	1.00	0.46	.	0.48	0.31	0.33	.	-0.11	-0.42	-0.25	-0.21	-0.02	0.07	0.03	-0.22	-0.04	0.04	.	.	0.23	0.32	0.21	0.45	0.41
gmor3p	0.10	-0.31	0.12	0.15	0.10	-0.12	0.46	1.00	.	0.48	0.43	0.40	.	-0.05	-0.33	-0.26	-0.23	-0.45	-0.03	0.01	-0.48	-0.59	-0.45	.	.	0.33	0.68	0.09	0.67	0.67
maeg0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
maeg1	0.15	-0.20	0.55	0.45	0.15	0.02	0.48	0.48	.	1.00	0.85	0.69	.	0.08	-0.45	-0.30	-0.36	-0.12	0.20	0.05	-0.47	-0.45	-0.34	.	.	0.54	0.66	0.05	0.67	0.73
maeg2	-0.04	-0.36	0.58	0.51	-0.04	-0.28	0.31	0.43	.	0.85	1.00	0.92	.	0.01	-0.26	-0.09	-0.45	-0.14	0.47	-0.08	-0.52	-0.40	-0.29	.	.	0.29	0.56	-0.06	0.71	0.66
maeg3p	-0.11	-0.44	0.52	0.47	-0.11	-0.34	0.33	0.40	.	0.69	0.92	1.00	.	-0.10	-0.13	0.06	-0.53	-0.16	0.56	-0.18	-0.59	-0.35	-0.24	.	.	0.09	0.54	-0.07	0.75	0.60
ssco0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ssco1	0.22	-0.02	0.10	0.14	0.22	0.12	-0.11	-0.05	.	0.08	0.01	-0.10	.	1.00	0.14	0.16	0.07	-0.01	-0.05	0.21	0.07	-0.10	-0.05	.	.	0.05	0.13	0.00	-0.03	0.09
ssco2	-0.24	-0.29	-0.24	-0.08	-0.24	-0.36	-0.42	-0.33	.	-0.45	-0.26	-0.13	.	0.14	1.00	0.91	-0.10	0.08	0.29	-0.34	-0.11	0.06	-0.04	.	.	-0.37	-0.18	-0.07	-0.15	-0.34
ssco3p	-0.24	-0.35	-0.06	0.13	-0.24	-0.36	-0.25	-0.26	.	-0.30	-0.09	0.06	.	0.16	0.91	1.00	-0.25	0.12	0.46	-0.34	-0.22	0.05	-0.01	.	.	-0.33	-0.08	-0.08	0.04	-0.19
mmng0	0.20	0.59	-0.17	-0.26	0.21	0.40	-0.21	-0.23	.	-0.36	-0.45	-0.53	.	0.07	-0.10	-0.25	1.00	0.02	-0.53	0.39	0.70	0.31	0.28	.	.	-0.09	-0.34	-0.03	-0.53	-0.34
mmng1	0.14	0.43	0.46	0.46	0.14	0.14	-0.02	-0.45	.	-0.12	-0.14	-0.16	.	-0.01	0.08	0.12	0.02	1.00	0.43	-0.05	0.46	0.67	0.68	.	.	-0.03	-0.60	-0.13	-0.45	-0.41
sspr0	0.33	0.35	-0.01	-0.09	0.33	0.34	0.03	0.02	.	0.05	-0.09	-0.18	.	0.21	-0.35	-0.34	0.39	-0.05	-0.38	1.00	0.43	0.13	0.13	.	.	0.11	-0.02	0.25	-0.17	0.00
sspr1	0.17	0.83	-0.02	-0.10	0.17	0.48	-0.22	-0.48	.	-0.47	-0.52	-0.59	.	0.07	-0.11	-0.22	0.70	0.46	-0.36	0.43	1.00	0.71	0.65	.	.	-0.15	-0.72	0.14	-0.76	-0.61
sspr2	0.03	0.66	0.21	0.12	0.03	0.33	-0.04	-0.59	.	-0.45	-0.40	-0.35	.	-0.10	0.06	0.05	0.31	0.67	0.07	0.13	0.71	1.00	0.92	.	.	-0.26	-0.79	0.13	-0.59	-0.63
sspr3p	0.14	0.58	0.37	0.32	0.14	0.31	0.04	-0.45	.	-0.34	-0.29	-0.24	.	-0.05	-0.04	-0.01	0.28	0.68	0.16	0.13	0.65	0.92	1.00	.	.	-0.22	-0.71	0.07	-0.49	-0.45
pvir0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
pvir1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
pvir2	0.40	0.02	0.27	0.20	0.40	0.08	0.23	0.33	.	0.54	0.29	0.09	.	0.05	-0.37	-0.33	-0.09	-0.03	-0.05	0.11	-0.15	-0.26	-0.22	.	.	1.00	0.43	0.00	0.30	0.41
pvir3p	0.10	-0.54	0.06	0.06	0.10	-0.20	0.32	0.68	.	0.66	0.56	0.54	.	0.13	-0.18	-0.08	-0.34	-0.60	-0.02	-0.02	-0.72	-0.79	-0.71	.	.	0.43	1.00	0.00	0.82	0.83
tesm0	-0.04	0.23	-0.13	-0.24	-0.04	0.33	0.21	0.09	.	0.05	-0.06	-0.07	.	0.00	-0.07	-0.08	-0.03	-0.13	-0.29	0.25	0.14	0.13	0.07	.	.	0.00	-0.01	1.00	0.00	-0.08
tesm1	-0.04	-0.55	0.3	0.32	-0.045	-0.298	0.448	0.668	.	0.67	0.713	0.746	.	-0.03	-0.149	0.037	-0.53	-0.45	0.29	-0.17	-0.76	-0.59	-0.49	.	.	0.303	0.823	0	1	0.83
tesm2p	0.2	-0.45	0.31	0.36	0.201	-0.19	0.406	0.67	.	0.73	0.656	0.602	.	0.09	-0.342	-0.195	-0.34	-0.41	0.13	0	-0.61	-0.63	-0.45	.	.	0.409	0.825	-0.08	0.83	1

1994 3

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	1.00	0.59	0.16	0.00	0.37	0.70	0.21	-0.47	-0.25	-0.29	-0.38	-0.38	.	0.39	0.25	0.04	0.65	0.36	-0.01	0.53	0.70	0.55	0.51	-0.23	.	-0.30	-0.42	-0.15	-0.52	-0.54
char1	0.59	1.00	0.65	0.36	0.23	0.75	0.37	-0.34	-0.15	-0.06	-0.11	-0.11	.	0.28	0.06	-0.21	0.54	0.62	0.31	0.34	0.67	0.65	0.62	-0.27	.	-0.20	-0.39	-0.03	-0.27	-0.31
char2	0.16	0.65	1.00	0.86	0.14	0.28	0.24	0.08	0.21	0.39	0.44	0.44	.	-0.11	-0.19	-0.25	0.14	0.44	0.60	-0.14	0.19	0.24	0.29	-0.28	.	0.07	-0.03	0.42	0.23	0.23
char3p	0.00	0.36	0.86	1.00	0.06	0.08	0.21	0.32	0.22	0.33	0.38	0.44	.	-0.23	-0.23	-0.21	-0.03	0.27	0.53	-0.20	0.01	0.11	0.19	-0.16	.	0.15	0.15	0.44	0.40	0.39
gmor0	0.37	0.23	0.14	0.06	1.00	0.47	0.30	0.22	0.62	0.37	0.11	0.01	.	-0.35	-0.38	-0.41	0.49	0.02	-0.15	0.10	0.03	-0.20	-0.12	0.25	.	0.44	0.36	0.56	0.33	0.32
gmor1	0.70	0.75	0.28	0.08	0.47	1.00	0.56	-0.28	-0.09	-0.10	-0.24	-0.25	.	0.22	-0.01	-0.30	0.62	0.48	0.02	0.45	0.58	0.45	0.44	-0.25	.	-0.07	-0.30	-0.02	-0.29	-0.35
gmor2	0.21	0.37	0.24	0.21	0.30	0.56	1.00	0.22	0.05	0.03	-0.08	-0.06	.	0.11	-0.01	-0.15	0.29	0.29	0.25	0.19	0.14	0.21	0.27	-0.11	.	0.10	-0.06	0.10	0.09	0.07
gmor3p	-0.47	-0.34	0.08	0.32	0.22	-0.28	0.22	1.00	0.53	0.33	0.31	0.39	.	-0.54	-0.43	-0.30	-0.36	-0.52	-0.11	-0.35	-0.54	-0.53	-0.45	0.27	.	0.53	0.68	0.49	0.73	0.73
maeg0	-0.25	-0.15	0.21	0.22	0.62	-0.09	0.06	0.53	1.00	0.85	0.65	0.53	.	-0.64	-0.60	-0.49	-0.07	-0.28	-0.09	-0.47	-0.50	-0.61	-0.58	0.35	.	0.79	0.76	0.85	0.70	0.70
maeg1	-0.29	-0.06	0.39	0.33	0.37	-0.10	0.03	0.33	0.85	1.00	0.88	0.75	.	-0.54	-0.52	-0.40	-0.14	-0.07	0.16	-0.63	-0.50	-0.53	-0.52	0.09	.	0.68	0.59	0.81	0.64	0.62
maeg2	-0.37	-0.11	0.44	0.38	0.11	-0.24	-0.08	0.31	0.65	0.88	1.00	0.93	.	-0.45	-0.42	-0.27	-0.33	-0.08	0.28	-0.69	-0.48	-0.45	-0.44	-0.02	.	0.46	0.44	0.69	0.54	0.56
maeg3p	-0.38	-0.11	0.44	0.43	0.01	-0.25	-0.06	0.39	0.53	0.75	0.93	1.00	.	-0.39	-0.36	-0.21	-0.40	-0.14	0.27	-0.66	-0.44	-0.38	-0.39	0.04	.	0.37	0.38	0.58	0.51	0.52
ssco0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ssco1	0.39	0.28	-0.11	-0.23	-0.35	0.22	0.11	-0.54	-0.64	-0.54	-0.45	-0.39	.	1.00	0.92	0.72	0.30	0.28	0.13	0.47	0.57	0.66	0.57	-0.23	.	-0.53	-0.64	-0.54	-0.64	-0.65
ssco2	0.25	0.06	-0.19	-0.23	-0.38	-0.01	-0.01	-0.43	-0.60	-0.52	-0.42	-0.36	.	0.92	1.00	0.90	0.18	0.18	0.15	0.40	0.41	0.50	0.46	-0.10	.	-0.48	-0.52	-0.47	-0.50	-0.50
ssco3p	0.04	-0.21	-0.25	-0.21	-0.41	-0.30	-0.15	-0.30	-0.49	-0.39	-0.27	-0.21	.	0.72	0.90	1.00	-0.04	0.04	0.20	0.21	0.13	0.25	0.24	-0.02	.	-0.40	-0.37	-0.35	-0.31	-0.28
mmng0	0.65	0.54	0.14	-0.03	0.49	0.62	0.30	-0.36	-0.07	-0.14	-0.33	-0.40	.	0.30	0.18	-0.04	1.00	0.58	0.08	0.60	0.71	0.52	0.50	-0.06	.	-0.12	-0.29	-0.08	-0.25	-0.29
mmng1	0.36	0.62	0.44	0.27	0.02	0.48	0.29	-0.52	-0.28	-0.07	-0.08	-0.14	.	0.28	0.18	0.04	0.58	1.00	0.64	0.43	0.56	0.57	0.63	-0.30	.	-0.27	-0.46	-0.15	-0.27	-0.29
sspr0	0.53	0.34	-0.14	-0.20	0.10	0.45	0.19	-0.35	-0.47	-0.63	-0.69	-0.66	.	0.47	0.40	0.21	0.60	0.43	0.04	1.00	0.68	0.54	0.59	-0.15	.	-0.41	-0.46	-0.43	-0.48	-0.51
sspr1	0.70	0.67	0.19	0.01	0.03	0.58	0.14	-0.54	-0.50	-0.50	-0.48	-0.44	.	0.57	0.41	0.13	0.71	0.56	0.08	0.68	1.00	0.87	0.77	-0.27	.	-0.51	-0.63	-0.45	-0.61	-0.64
sspr2	0.55	0.65	0.24	0.11	-0.20	0.45	0.21	-0.53	-0.61	-0.53	-0.45	-0.38	.	0.66	0.50	0.25	0.52	0.57	0.26	0.54	0.87	1.00	0.92	-0.27	.	-0.55	-0.67	-0.53	-0.62	-0.61
sspr3p	0.51	0.62	0.29	0.19	-0.12	0.44	0.27	-0.45	-0.58	-0.52	-0.44	-0.39	.	0.58	0.46	0.24	0.50	0.63	0.38	0.59	0.77	0.92	1.00	-0.24	.	-0.52	-0.61	-0.46	-0.54	-0.52
pvir0	-0.23	-0.27	-0.28	-0.16	0.25	-0.25	-0.11	0.27	0.35	0.09	-0.02	0.04	.	-0.23	-0.10	-0.02	-0.06	-0.30	-0.28	-0.15	-0.27	-0.26	-0.24	1.00	.	0.26	0.29	0.08	0.21	0.24
pvir1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
pvir2	-0.30	-0.20	0.07	0.15	0.44	-0.07	0.10	0.53	0.79	0.68	0.46	0.37	.	-0.53	-0.48	-0.40	-0.12	-0.27	-0.17	-0.41	-0.51	-0.55	-0.52	0.26	.	1.00	0.88	0.67	0.69	0.64
pvir3p	-0.42	-0.39	-0.03	0.14	0.36	-0.30	-0.06	0.68	0.76	0.59	0.44	0.38	.	-0.64	-0.52	-0.37	-0.29	-0.45	-0.22	-0.46	-0.63	-0.67	-0.61	0.29	.	0.88	1.00	0.68	0.79	0.75
tesm0	-0.15	-0.03	0.42	0.44	0.56	-0.02	0.10	0.49	0.85	0.81	0.69	0.58	.	-0.54	-0.47	-0.35	-0.08	-0.15	0.13	-0.43	-0.45	-0.53	-0.46	0.08	.	0.67	0.68	1.00	0.74	0.72
tesm1	-0.52	-0.27	0.23	0.4	0.329	-0.292	0.089	0.729	0.7	0.64	0.541	0.506	.	-0.639	-0.499	-0.313	-0.25	-0.27	0.09	-0.48	-0.61	-0.62	-0.54	0.21	.	0.693	0.785	0.74	1	0.96
tesm2p	-0.54	-0.31	0.23	0.39	0.32	-0.355	0.07	0.731	0.7	0.62	0.563	0.521	.	-0.654	-0.502	-0.279	-0.29	-0.29	0.13	-0.51	-0.64	-0.61	-0.52	0.243	.	0.637	0.753	0.72	0.96	1

1994 4

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	1.00	0.76	0.19	-0.10	0.40	0.51	0.12	-0.05	-0.66	-0.51	-0.55	-0.59	0.61	-0.02	-0.26	-0.27	0.61	0.23	-0.06	0.52	0.89	0.91	0.61	0.17	.	-0.52	-0.53	-0.64	-0.57	-0.48
char1	0.76	1.00	0.53	0.11	0.35	0.62	0.45	0.25	-0.25	-0.07	-0.12	-0.14	0.61	-0.06	-0.31	-0.40	0.50	0.11	-0.04	0.66	0.70	0.72	0.38	0.13	.	-0.23	-0.23	-0.28	-0.19	-0.11
char2	0.19	0.53	1.00	0.83	0.11	0.26	0.62	0.55	0.13	0.19	0.18	0.25	0.27	0.22	0.16	0.09	-0.09	0.17	0.35	0.38	0.22	0.18	0.19	0.30	.	0.10	0.10	0.20	0.31	0.40
char3p	-0.10	0.11	0.83	1.00	-0.06	-0.02	0.38	0.40	0.08	0.02	0.05	0.16	-0.04	0.29	0.36	0.35	-0.36	0.07	0.36	0.15	0.00	-0.03	0.10	0.29	.	0.17	0.15	0.21	0.33	0.41
gmor0	0.40	0.35	0.11	-0.06	1.00	0.76	0.26	0.39	-0.03	-0.14	-0.20	-0.13	0.07	-0.38	-0.35	-0.27	0.30	-0.02	-0.38	0.19	0.30	0.33	-0.12	-0.19	.	0.19	0.18	0.03	0.14	0.15
gmor1	0.51	0.62	0.26	-0.01	0.76	1.00	0.49	0.36	-0.09	-0.04	-0.12	-0.07	0.19	-0.18	-0.34	-0.38	0.36	0.00	-0.24	0.32	0.39	0.44	-0.03	-0.11	.	0.11	0.08	-0.05	0.06	0.09
gmor2	0.12	0.45	0.62	0.38	0.26	0.49	1.00	0.71	0.25	0.31	0.30	0.37	0.17	0.10	0.01	-0.13	-0.03	0.18	0.27	0.35	0.07	0.04	-0.01	0.21	.	0.21	0.16	0.33	0.34	0.38
gmor3p	-0.05	0.25	0.54	0.40	0.39	0.36	0.71	1.00	0.25	0.22	0.19	0.28	0.13	-0.12	-0.05	-0.02	-0.19	-0.03	0.11	0.29	-0.06	-0.07	-0.28	0.14	.	0.43	0.34	0.40	0.52	0.53
maeg0	-0.66	-0.25	0.13	0.08	-0.03	-0.09	0.25	0.25	1.00	0.91	0.90	0.90	-0.34	-0.06	0.03	-0.11	-0.22	0.10	0.15	-0.18	-0.66	-0.69	-0.51	-0.24	.	0.49	0.51	0.86	0.75	0.67
maeg1	-0.51	-0.07	0.19	0.02	-0.14	-0.04	0.31	0.23	0.91	1.00	0.97	0.92	-0.22	0.07	0.03	-0.19	-0.04	0.24	0.29	-0.11	-0.51	-0.55	-0.36	-0.18	.	0.36	0.36	0.76	0.66	0.58
maeg2	-0.55	-0.12	0.18	0.04	-0.20	-0.12	0.30	0.19	0.90	0.97	1.00	0.96	-0.23	0.07	0.06	-0.15	-0.08	0.24	0.30	-0.14	-0.53	-0.58	-0.34	-0.13	.	0.33	0.33	0.73	0.63	0.56
maeg3p	-0.58	-0.14	0.25	0.16	-0.13	-0.07	0.37	0.28	0.89	0.92	0.96	1.00	-0.28	0.09	0.14	-0.05	-0.22	0.19	0.28	-0.18	-0.57	-0.62	-0.38	-0.12	.	0.45	0.44	0.78	0.71	0.66
ssco0	0.61	0.61	0.26	-0.04	0.07	0.19	0.17	0.13	-0.34	-0.21	-0.23	-0.28	1.00	0.09	-0.15	-0.15	0.31	0.14	0.07	0.44	0.52	0.51	0.35	0.30	.	-0.35	-0.34	-0.34	-0.33	-0.28
ssco1	-0.02	-0.06	0.22	0.29	-0.38	-0.18	0.10	-0.12	-0.06	0.07	0.07	0.09	0.09	1.00	0.84	0.64	-0.16	0.45	0.62	-0.17	0.00	-0.05	0.42	0.18	.	-0.17	-0.24	-0.06	-0.10	-0.09
ssco2	-0.26	-0.31	0.16	0.36	-0.35	-0.34	0.01	-0.05	0.03	0.03	0.06	0.14	-0.15	0.84	1.00	0.90	-0.35	0.28	0.53	-0.32	-0.21	-0.25	0.20	-0.02	.	0.07	-0.02	0.10	0.07	0.08
ssco3p	-0.27	-0.40	0.09	0.35	-0.27	-0.38	-0.13	-0.02	-0.11	-0.19	-0.15	-0.05	-0.15	0.64	0.90	1.00	-0.51	0.05	0.30	-0.33	-0.23	-0.26	0.14	0.04	.	0.15	0.08	0.05	0.05	0.07
mmng0	0.61	0.50	-0.09	-0.36	0.30	0.36	-0.03	-0.19	-0.22	-0.04	-0.08	-0.22	0.31	-0.16	-0.35	-0.51	1.00	0.49	0.09	0.33	0.62	0.60	0.23	-0.10	.	-0.50	-0.53	-0.43	-0.41	-0.41
mmng1	0.23	0.11	0.17	0.07	-0.02	0.00	0.18	-0.03	0.10	0.24	0.24	0.19	0.14	0.45	0.28	0.05	0.49	1.00	0.76	0.05	0.32	0.21	0.40	0.07	.	-0.40	-0.48	-0.08	-0.14	-0.13
sspr0	0.52	0.66	0.38	0.15	0.19	0.32	0.35	0.29	-0.18	-0.11	-0.14	-0.18	0.44	-0.17	-0.32	-0.33	0.33	0.05	0.05	1.00	0.55	0.56	0.23	0.24	.	-0.15	-0.22	-0.21	-0.16	-0.11
sspr1	0.89	0.70	0.22	0.00	0.30	0.39	0.07	-0.06	-0.66	-0.51	-0.53	-0.57	0.52	0.00	-0.21	-0.23	0.62	0.32	0.09	0.55	1.00	0.98	0.64	0.27	.	-0.55	-0.59	-0.69	-0.61	-0.53
sspr2	0.91	0.72	0.18	-0.03	0.33	0.44	0.04	-0.07	-0.69	-0.55	-0.58	-0.62	0.51	-0.05	-0.25	-0.26	0.60	0.21	-0.02	0.56	0.98	1.00	0.61	0.19	.	-0.52	-0.55	-0.70	-0.61	-0.53
sspr3p	0.61	0.38	0.19	0.10	-0.12	-0.03	-0.01	-0.28	-0.51	-0.36	-0.34	-0.38	0.35	0.42	0.20	0.14	0.23	0.40	0.28	0.23	0.64	0.61	1.00	0.28	.	-0.60	-0.59	-0.53	-0.56	-0.47
pvir0	0.17	0.13	0.30	0.29	-0.19	-0.11	0.21	0.14	-0.24	-0.18	-0.13	-0.12	0.30	0.18	-0.02	0.04	-0.10	0.07	0.17	0.24	0.27	0.19	0.28	1.00	.	-0.19	-0.21	-0.19	-0.16	-0.13
pvir1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
pvir2	-0.52	-0.23	0.10	0.17	0.19	0.11	0.21	0.43	0.49	0.36	0.33	0.45	-0.35	-0.17	0.07	0.15	-0.50	-0.40	-0.31	-0.15	-0.55	-0.52	-0.60	-0.19	.	1.00	0.92	0.69	0.75	0.70
pvir3p	-0.53	-0.23	0.10	0.15	0.18	0.08	0.16	0.34	0.51	0.36	0.33	0.44	-0.34	-0.24	-0.02	0.08	-0.53	-0.48	-0.39	-0.22	-0.59	-0.55	-0.59	-0.21	.	0.92	1.00	0.73	0.77	0.72
tesm0	-0.64	-0.28	0.20	0.21	0.03	-0.06	0.33	0.40	0.86	0.76	0.73	0.78	-0.34	-0.06	0.10	0.05	-0.43	-0.08	0.03	-0.21	-0.69	-0.70	-0.53	-0.19	.	0.69	0.73	1.00	0.91	0.85
tesm1	-0.57	-0.19	0.31	0.33	0.137	0.057	0.342	0.52	0.75	0.66	0.627	0.707	-0.327	-0.101	0.067	0.046	-0.41	-0.14	-0.02	-0.16	-0.61	-0.61	-0.56	-0.164	.	0.747	0.766	0.91	1	0.96
tesm2p	-0.48	-0.11	0.4	0.41	0.152	0.088	0.38	0.534	0.67	0.58	0.561	0.662	-0.278	-0.087	0.085	0.074	-0.41	-0.13	-0.01	-0.11	-0.53	-0.53	-0.47	-0.13	.	0.701	0.722	0.85	0.96	1

1995 1

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
char1	.	1.00	0.43	-0.19	.	0.29	-0.14	-0.15	.	-0.60	-0.44	-0.53	.	-0.31	-0.64	-0.53	.	0.23	-0.43	.	0.72	0.75	0.64	.	0.10	-0.20	-0.43	.	-0.45	-0.50
char2	.	0.43	1.00	0.68	.	0.20	0.14	-0.13	.	-0.23	-0.06	-0.20	.	0.31	-0.18	-0.08	.	0.34	0.10	.	0.21	0.32	0.43	.	-0.05	0.07	-0.26	.	-0.09	-0.13
char3p	.	-0.19	0.68	1.00	.	0.16	0.45	0.20	.	0.22	0.21	0.16	.	0.46	0.34	0.40	.	0.17	0.37	.	-0.37	-0.27	-0.11	.	-0.10	0.16	0.23	.	0.33	0.33
gmor0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
gmor1	.	0.29	0.20	0.16	.	1.00	0.62	0.38	.	-0.23	-0.29	-0.32	.	-0.15	-0.32	-0.28	.	0.28	0.02	.	0.26	0.24	0.05	.	0.34	-0.10	0.06	.	-0.17	-0.10
gmor2	.	-0.14	0.14	0.45	.	0.62	1.00	0.73	.	0.41	0.36	0.33	.	0.02	0.13	0.19	.	0.19	0.24	.	-0.39	-0.42	-0.50	.	0.23	0.07	0.56	.	0.50	0.53
gmor3p	.	-0.15	-0.13	0.20	.	0.38	0.73	1.00	.	0.37	0.29	0.36	.	-0.16	0.08	0.08	.	0.15	0.11	.	-0.26	-0.36	-0.53	.	0.30	-0.06	0.55	.	0.39	0.42
maeg0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
maeg1	.	-0.60	-0.23	0.22	.	-0.23	0.41	0.37	.	1.00	0.89	0.94	.	0.36	0.68	0.71	.	-0.04	0.35	.	-0.77	-0.86	-0.79	.	0.03	0.34	0.66	.	0.84	0.89
maeg2	.	-0.43	-0.06	0.21	.	-0.29	0.36	0.29	.	0.88	1.00	0.95	.	0.40	0.54	0.57	.	0.16	0.45	.	-0.68	-0.73	-0.63	.	-0.05	0.32	0.42	.	0.78	0.79
maeg3p	.	-0.53	-0.20	0.16	.	-0.32	0.33	0.36	.	0.94	0.95	1.00	.	0.38	0.63	0.66	.	0.01	0.39	.	-0.74	-0.82	-0.72	.	-0.07	0.32	0.55	.	0.84	0.85
ssco0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ssco1	.	-0.31	0.30	0.46	.	-0.15	0.02	-0.16	.	0.36	0.40	0.38	.	1.00	0.62	0.57	.	0.18	0.59	.	-0.39	-0.29	-0.06	.	-0.18	0.37	-0.04	.	0.30	0.39
ssco2	.	-0.64	-0.18	0.34	.	-0.32	0.13	0.08	.	0.68	0.54	0.63	.	0.62	1.00	0.88	.	-0.15	0.48	.	-0.65	-0.65	-0.45	.	-0.19	0.40	0.35	.	0.53	0.61
ssco3p	.	-0.53	-0.08	0.40	.	-0.28	0.19	0.08	.	0.71	0.57	0.66	.	0.57	0.88	1.00	.	-0.22	0.37	.	-0.68	-0.68	-0.50	.	-0.17	0.42	0.48	.	0.66	0.72
mmng0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
mmng1	.	0.23	0.34	0.17	.	0.28	0.19	0.15	.	-0.04	0.16	0.01	.	0.18	-0.15	-0.22	.	1.00	0.54	.	0.11	0.15	0.08	.	0.28	-0.09	-0.38	.	-0.10	-0.03
sspr0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
sspr1	.	0.72	0.21	-0.37	.	0.26	-0.39	-0.26	.	-0.77	-0.68	-0.74	.	-0.39	-0.65	-0.68	.	0.11	-0.44	.	1.00	0.94	0.75	.	0.16	-0.20	-0.59	.	-0.84	-0.79
sspr2	.	0.75	0.32	-0.27	.	0.24	-0.42	-0.36	.	-0.86	-0.73	-0.82	.	-0.29	-0.65	-0.68	.	0.15	-0.36	.	0.94	1.00	0.88	.	0.09	-0.19	-0.69	.	-0.85	-0.84
sspr3p	.	0.64	0.43	-0.11	.	0.05	-0.50	-0.53	.	-0.79	-0.63	-0.72	.	-0.06	-0.45	-0.50	.	0.08	-0.21	.	0.75	0.88	1.00	.	-0.24	-0.10	-0.75	.	-0.72	-0.76
pvir0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
pvir1	.	0.10	-0.05	-0.10	.	0.34	0.23	0.30	.	0.03	-0.05	-0.07	.	-0.18	-0.19	-0.17	.	0.28	-0.12	.	0.16	0.09	-0.24	.	1.00	-0.05	0.17	.	-0.08	0.05
pvir2	.	-0.20	0.07	0.16	.	-0.10	0.07	-0.06	.	0.34	0.32	0.32	.	0.37	0.40	0.42	.	-0.09	0.30	.	-0.19	-0.19	-0.10	.	-0.05	1.00	0.22	.	0.21	0.32
pvir3p	.	-0.43	-0.26	0.23	.	0.06	0.56	0.55	.	0.66	0.42	0.55	.	-0.04	0.35	0.48	.	-0.38	-0.06	.	-0.59	-0.68	-0.75	.	0.17	0.22	1.00	.	0.72	0.70
tesm0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
tesm1	.	-0.45	-0.09	0.33	.	-0.17	0.499	0.395	.	0.84	0.78	0.843	.	0.3	0.526	0.656	.	-0.1	0.29	.	-0.84	-0.85	-0.72	.	-0.08	0.208	0.717	.	1	0.92
tesm2p	.	-0.5	-0.13	0.33	.	-0.101	0.528	0.422	.	0.89	0.793	0.854	.	0.386	0.609	0.72	.	-0.03	0.36	.	-0.79	-0.84	-0.76	.	0.049	0.32	0.705	.	0.92	1

1995 2

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	1.00	0.09	0.28	-0.22	0.15	-0.03	0.03	-0.27	0.18	-0.20	-0.20	-0.27	.	0.50	0.55	0.49	0.31	-0.15	-0.24	.	0.08	0.10	0.10	.	-0.19	-0.21	-0.20	.	-0.13	-0.18
char1	0.09	1.00	0.73	0.20	-0.10	0.33	-0.23	-0.21	-0.05	-0.08	-0.05	-0.14	.	-0.07	-0.14	-0.16	-0.04	0.65	0.26	.	0.75	0.78	0.74	.	0.18	-0.04	-0.47	.	-0.27	-0.34
char2	0.28	0.73	1.00	0.54	0.00	-0.09	-0.18	-0.26	-0.16	0.15	0.16	0.09	.	0.01	0.16	0.18	-0.08	0.52	0.41	.	0.42	0.55	0.57	.	-0.09	-0.10	-0.32	.	-0.02	-0.04
char3p	-0.22	0.20	0.54	1.00	0.00	-0.37	0.01	0.12	-0.27	0.43	0.40	0.36	.	-0.23	-0.05	-0.10	-0.35	0.30	0.53	.	-0.08	0.02	0.06	.	-0.08	0.14	0.15	.	0.41	0.43
gmor0	0.15	-0.10	0.00	0.00	1.00	-0.05	0.20	0.04	0.72	0.24	0.19	0.14	.	0.10	-0.02	0.12	-0.08	-0.02	-0.01	.	-0.17	-0.16	-0.11	.	-0.08	-0.14	0.04	.	0.17	0.16
gmor1	-0.03	0.33	-0.09	-0.37	-0.05	1.00	0.29	0.19	0.18	-0.30	-0.30	-0.32	.	-0.01	-0.34	-0.28	0.15	-0.01	-0.47	.	0.37	0.24	0.17	.	0.03	0.05	-0.13	.	-0.21	-0.30
gmor2	0.03	-0.23	-0.18	0.01	0.20	0.29	1.00	0.67	0.24	0.47	0.50	0.46	.	0.09	-0.22	0.00	-0.33	-0.37	-0.27	.	-0.50	-0.53	-0.50	.	-0.03	0.16	0.61	.	0.65	0.62
gmor3p	-0.27	-0.21	-0.26	0.12	0.04	0.19	0.67	1.00	-0.01	0.34	0.37	0.39	.	-0.06	-0.39	-0.31	-0.31	-0.34	-0.15	.	-0.39	-0.48	-0.52	.	0.10	0.40	0.66	.	0.56	0.55
maeg0	0.18	-0.05	-0.16	-0.27	0.72	0.18	0.24	-0.01	1.00	0.10	0.05	0.04	.	0.26	-0.04	0.14	-0.02	-0.06	-0.16	.	-0.06	-0.03	0.05	.	-0.06	-0.10	-0.06	.	-0.02	-0.06
maeg1	-0.20	-0.08	0.15	0.43	0.24	-0.30	0.47	0.34	0.10	1.00	0.96	0.93	.	-0.15	-0.23	0.06	-0.53	0.18	0.34	.	-0.49	-0.40	-0.32	.	0.16	0.17	0.52	.	0.79	0.79
maeg2	-0.20	-0.05	0.16	0.40	0.19	-0.30	0.50	0.37	0.05	0.96	1.00	0.96	.	-0.17	-0.23	0.07	-0.53	0.18	0.37	.	-0.46	-0.37	-0.30	.	0.23	0.15	0.49	.	0.77	0.76
maeg3p	-0.27	-0.13	0.09	0.36	0.14	-0.32	0.46	0.39	0.04	0.93	0.96	1.00	.	-0.20	-0.21	0.10	-0.51	0.11	0.35	.	-0.53	-0.41	-0.33	.	0.18	0.13	0.51	.	0.74	0.75
ssco0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
ssco1	0.50	-0.07	0.01	-0.23	0.10	-0.01	0.09	-0.06	0.26	-0.15	-0.17	-0.20	.	1.00	0.66	0.54	0.19	-0.26	-0.17	.	0.02	0.01	-0.01	.	0.04	0.22	0.09	.	-0.01	-0.06
ssco2	0.55	-0.14	0.16	-0.05	-0.02	-0.34	-0.22	-0.39	-0.04	-0.23	-0.23	-0.21	.	0.66	1.00	0.80	0.37	-0.24	-0.06	.	-0.07	0.01	0.04	.	-0.18	-0.14	-0.16	.	-0.16	-0.14
ssco3p	0.49	-0.16	0.18	-0.10	0.12	-0.28	0.00	-0.31	0.14	0.06	0.07	0.10	.	0.54	0.80	1.00	0.14	-0.17	0.01	.	-0.20	-0.08	0.00	.	-0.22	-0.18	-0.08	.	0.01	0.05
mmng0	0.31	-0.04	-0.08	-0.35	-0.08	0.15	-0.33	-0.31	-0.02	-0.53	-0.53	-0.51	.	0.19	0.38	0.14	1.00	-0.21	-0.33	.	0.32	0.24	0.19	.	-0.11	-0.19	-0.43	.	-0.51	-0.54
mmng1	-0.15	0.65	0.52	0.30	-0.02	-0.01	-0.37	-0.34	-0.06	0.18	0.18	0.11	.	-0.26	-0.24	-0.17	-0.21	1.00	0.71	.	0.55	0.63	0.62	.	0.18	-0.04	-0.46	.	-0.16	-0.20
sspr0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
sspr1	0.08	0.75	0.42	-0.08	-0.17	0.37	-0.50	-0.39	-0.06	-0.49	-0.46	-0.53	.	0.02	-0.07	-0.20	0.32	0.55	0.11	.	1.00	0.92	0.82	.	0.15	-0.08	-0.67	.	-0.61	-0.69
sspr2	0.10	0.78	0.55	0.02	-0.16	0.24	-0.53	-0.48	-0.03	-0.40	-0.37	-0.41	.	0.01	0.01	-0.08	0.24	0.63	0.24	.	0.92	1.00	0.96	.	0.08	-0.08	-0.70	.	-0.58	-0.65
sspr3p	0.10	0.74	0.57	0.06	-0.11	0.17	-0.50	-0.52	0.05	-0.32	-0.30	-0.33	.	-0.01	0.04	0.00	0.19	0.62	0.28	.	0.82	0.96	1.00	.	-0.01	-0.13	-0.71	.	-0.56	-0.60
pvir0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
pvir1	-0.19	0.18	-0.09	-0.08	-0.08	0.03	-0.03	0.10	-0.06	0.16	0.23	0.18	.	0.04	-0.18	-0.22	-0.11	0.18	0.05	.	0.15	0.07	-0.01	.	1.00	0.25	0.03	.	0.10	0.06
pvir2	-0.21	-0.04	-0.10	0.14	-0.14	0.05	0.16	0.40	-0.10	0.17	0.15	0.13	.	0.22	-0.14	-0.18	-0.19	-0.04	0.08	.	-0.08	-0.08	-0.13	.	0.25	1.00	0.42	.	0.28	0.23
pvir3p	-0.20	-0.47	-0.32	0.15	0.04	-0.13	0.61	0.66	-0.06	0.52	0.49	0.51	.	0.09	-0.16	-0.08	-0.43	-0.46	-0.11	.	-0.67	-0.70	-0.71	.	0.03	0.42	1.00	.	0.77	0.80
tesm0	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
tesm1	-0.13	-0.27	-0.02	0.41	0.172	-0.209	0.651	0.564	-0.02	0.79	0.769	0.741	.	-0.012	-0.157	0.006	-0.51	-0.16	0.13	.	-0.61	-0.58	-0.56	.	0.103	0.282	0.772	.	1	0.94
tesm2p	-0.18	-0.34	-0.04	0.43	0.164	-0.304	0.616	0.548	-0.06	0.79	0.763	0.751	.	-0.061	-0.141	0.049	-0.54	-0.2	0.14	.	-0.69	-0.65	-0.6	.	0.058	0.232	0.801	.	0.94	1

1995	3																													
	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	1.00	0.73	0.16	0.02	0.57	0.63	0.06	-0.09	0.11	-0.27	-0.14	-0.27	0.02	0.17	-0.15	-0.32	0.57	0.35	0.05	0.12	0.76	0.63	0.56	0.36	-0.19	0.00	-0.20	0.21	-0.34	-0.06
char1	0.73	1.00	0.64	0.40	0.46	0.55	0.20	0.10	0.28	0.16	0.27	0.14	-0.08	0.02	-0.15	-0.34	0.51	0.44	0.32	0.14	0.62	0.62	0.60	0.36	-0.12	0.12	-0.05	0.46	0.05	0.22
char2	0.16	0.64	1.00	0.86	0.10	0.15	0.25	0.36	0.37	0.68	0.66	0.65	-0.17	-0.36	-0.19	-0.25	-0.01	0.33	0.58	0.18	0.14	0.23	0.26	0.25	0.06	0.34	0.27	0.49	0.59	0.56
char3p	0.02	0.40	0.86	1.00	0.02	0.04	0.23	0.40	0.24	0.57	0.50	0.54	-0.20	-0.38	-0.11	-0.06	-0.19	0.30	0.64	0.13	0.02	0.11	0.14	0.28	0.08	0.30	0.28	0.31	0.56	0.49
gmor0	0.57	0.46	0.10	0.02	1.00	0.73	0.14	0.06	0.31	-0.29	-0.12	-0.26	-0.08	-0.06	-0.47	-0.61	0.65	0.25	-0.02	-0.14	0.34	0.23	0.18	0.36	-0.16	0.10	-0.04	0.34	-0.23	0.07
gmor1	0.63	0.55	0.15	0.04	0.73	1.00	0.50	0.14	0.20	-0.25	-0.08	-0.23	0.06	0.07	-0.24	-0.41	0.56	0.29	0.05	-0.21	0.42	0.34	0.32	0.38	-0.08	0.13	-0.03	0.37	-0.25	0.04
gmor2	0.06	0.20	0.25	0.23	0.14	0.50	1.00	0.60	0.24	0.18	0.22	0.22	0.03	-0.12	-0.04	-0.15	0.03	-0.07	0.11	-0.25	-0.04	0.14	0.21	0.03	0.26	0.28	0.31	0.33	0.21	0.12
gmor3p	-0.09	0.09	0.36	0.40	0.06	0.14	0.60	1.00	0.55	0.42	0.43	0.45	-0.10	-0.59	-0.43	-0.35	-0.23	-0.26	0.16	-0.20	-0.22	-0.08	-0.06	0.06	0.21	0.63	0.77	0.43	0.59	0.55
maeg0	0.11	0.28	0.37	0.24	0.31	0.20	0.24	0.55	1.00	0.32	0.42	0.30	-0.32	-0.65	-0.64	-0.61	0.16	-0.26	-0.02	-0.06	-0.10	-0.20	-0.24	0.23	0.21	0.64	0.66	0.81	0.53	0.65
maeg1	-0.27	0.16	0.68	0.57	-0.29	-0.25	0.18	0.42	0.32	1.00	0.94	0.97	-0.18	-0.45	-0.16	-0.08	-0.31	0.27	0.63	0.33	-0.22	-0.09	-0.05	-0.17	0.14	0.45	0.41	0.36	0.80	0.60
maeg2	-0.14	0.27	0.66	0.50	-0.12	-0.08	0.22	0.43	0.42	0.94	1.00	0.95	-0.21	-0.40	-0.25	-0.20	-0.13	0.27	0.56	0.27	-0.14	-0.04	-0.04	-0.11	0.10	0.50	0.42	0.48	0.76	0.62
maeg3p	-0.27	0.14	0.65	0.54	-0.26	-0.23	0.22	0.45	0.30	0.97	0.95	1.00	-0.18	-0.39	-0.16	-0.10	-0.28	0.23	0.57	0.27	-0.25	-0.08	-0.05	-0.17	0.15	0.43	0.39	0.33	0.76	0.53
ssco0	0.02	-0.08	-0.17	-0.20	-0.08	0.06	0.03	-0.10	-0.32	-0.18	-0.21	-0.18	1.00	0.32	0.30	0.21	0.10	0.14	-0.04	-0.07	0.10	0.27	0.27	-0.07	-0.07	-0.22	-0.21	-0.28	-0.27	-0.26
ssco1	0.17	0.02	-0.36	-0.38	-0.06	0.07	-0.12	-0.59	-0.65	-0.45	-0.40	-0.39	0.32	1.00	0.78	0.51	0.20	0.20	-0.16	-0.02	0.23	0.34	0.36	-0.24	-0.25	-0.62	-0.68	-0.49	-0.62	-0.68
ssco2	-0.15	-0.15	-0.19	-0.11	-0.47	-0.24	-0.04	-0.43	-0.64	-0.16	-0.25	-0.16	0.30	0.78	1.00	0.83	-0.16	0.09	0.01	0.02	0.02	0.19	0.24	-0.36	0.04	-0.49	-0.44	-0.45	-0.27	-0.51
ssco3p	-0.32	-0.34	-0.25	-0.06	-0.61	-0.41	-0.15	-0.35	-0.61	-0.08	-0.20	-0.10	0.21	0.51	0.83	1.00	-0.35	0.06	0.14	-0.01	-0.13	-0.02	0.00	-0.35	0.05	-0.34	-0.27	-0.47	-0.07	-0.30
mmng0	0.57	0.51	-0.01	-0.19	0.65	0.56	0.03	-0.23	0.16	-0.31	-0.13	-0.28	0.10	0.20	-0.17	-0.36	1.00	0.36	0.02	-0.07	0.53	0.40	0.32	0.35	-0.15	-0.10	-0.27	0.29	-0.32	-0.12
mmng1	0.35	0.44	0.33	0.30	0.25	0.29	-0.07	-0.26	-0.26	0.27	0.27	0.23	0.14	0.20	0.09	0.06	0.36	1.00	0.75	0.36	0.40	0.37	0.37	0.18	-0.26	-0.12	-0.39	0.01	-0.06	0.01
sspr0	0.12	0.14	0.18	0.13	-0.14	-0.21	-0.25	-0.20	-0.06	0.33	0.27	0.27	-0.07	-0.02	0.02	-0.01	-0.07	0.36	0.22	1.00	0.15	0.06	0.06	-0.05	-0.05	0.05	-0.18	0.01	0.08	0.02
sspr1	0.76	0.62	0.14	0.02	0.34	0.42	-0.04	-0.22	-0.10	-0.22	-0.14	-0.25	0.10	0.23	0.02	-0.13	0.53	0.40	0.10	0.15	1.00	0.86	0.75	0.36	-0.23	-0.20	-0.38	0.00	-0.34	-0.18
sspr2	0.63	0.62	0.23	0.11	0.23	0.34	0.14	-0.08	-0.20	-0.09	-0.04	-0.08	0.27	0.34	0.19	-0.02	0.40	0.37	0.16	0.06	0.86	1.00	0.96	0.22	-0.22	-0.33	-0.41	-0.13	-0.29	-0.28
sspr3p	0.56	0.60	0.26	0.14	0.18	0.32	0.21	-0.06	-0.24	-0.05	-0.04	-0.05	0.27	0.36	0.24	0.00	0.32	0.37	0.18	0.06	0.75	0.96	1.00	0.21	-0.19	-0.36	-0.41	-0.14	-0.29	-0.33
pvir0	0.36	0.36	0.25	0.28	0.36	0.38	0.03	0.06	0.23	-0.17	-0.11	-0.17	-0.07	-0.24	-0.36	-0.35	0.34	0.18	0.12	-0.05	0.36	0.22	0.21	1.00	-0.05	0.02	-0.05	0.29	-0.06	0.11
pvir1	-0.19	-0.12	0.06	0.08	-0.16	-0.08	0.26	0.21	0.21	0.14	0.10	0.15	-0.07	-0.25	0.04	0.05	-0.15	-0.26	-0.04	-0.05	-0.23	-0.22	-0.19	-0.05	1.00	0.31	0.34	0.20	0.23	0.09
pvir2	0.00	0.12	0.34	0.30	0.10	0.13	0.28	0.63	0.64	0.45	0.50	0.43	-0.22	-0.62	-0.49	-0.34	-0.10	-0.12	0.18	0.05	-0.20	-0.33	-0.36	0.02	0.31	1.00	0.85	0.62	0.62	0.73
pvir3p	-0.20	-0.05	0.26	0.28	-0.04	-0.03	0.31	0.77	0.66	0.41	0.42	0.39	-0.21	-0.68	-0.44	-0.27	-0.27	-0.38	0.04	-0.18	-0.38	-0.41	-0.41	-0.05	0.34	0.85	1.00	0.56	0.69	0.72
tesm0	0.21	0.46	0.49	0.31	0.34	0.37	0.33	0.43	0.81	0.36	0.48	0.33	-0.28	-0.49	-0.45	-0.47	0.29	0.01	0.16	0.01	0.00	-0.13	-0.14	0.29	0.20	0.63	0.56	1.00	0.54	0.68
tesm1	-0.34	0.05	0.59	0.56	-0.235	-0.25	0.209	0.594	0.53	0.8	0.759	0.756	-0.266	-0.615	-0.273	-0.072	-0.32	-0.06	0.45	0.08	-0.34	-0.29	-0.29	-0.06	0.231	0.62	0.687	0.54	1	0.83
tesm2p	-0.06	0.22	0.56	0.49	0.071	0.037	0.117	0.552	0.65	0.6	0.622	0.535	-0.26	-0.677	-0.51	-0.303	-0.12	0.01	0.39	0.02	-0.18	-0.28	-0.33	0.106	0.089	0.732	0.724	0.68	0.83	1

1995 4

	char0	char1	char2	char3p	gmor0	gmor1	gmor2	gmor3p	maeg0	maeg1	maeg2	maeg3p	ssco0	ssco1	ssco2	ssco3p	mmng0	mmng1	mmng2p	sspr0	sspr1	sspr2	sspr3p	pvir0	pvir1	pvir2	pvir3p	tesm0	tesm1	tesm2p
char0	1.00	0.65	0.18	-0.08	0.64	0.43	0.10	0.17	-0.05	-0.34	-0.32	-0.44	0.33	-0.07	-0.29	-0.42	0.84	0.15	-0.32	0.38	0.82	0.66	0.55	0.29	-0.35	-0.39	-0.36	-0.31	-0.54	-0.51
char1	0.65	1.00	0.71	0.30	0.32	0.28	0.20	0.09	0.07	0.20	0.19	0.12	0.41	0.08	-0.05	-0.23	0.56	0.30	0.03	0.26	0.50	0.48	0.50	0.23	-0.14	-0.14	-0.17	0.20	-0.02	0.03
char2	0.18	0.71	1.00	0.80	-0.01	0.17	0.36	0.15	0.15	0.47	0.40	0.41	0.27	0.27	0.30	0.18	0.15	0.30	0.31	0.09	0.14	0.25	0.33	0.08	0.13	0.16	0.15	0.42	0.44	0.49
char3p	-0.08	0.30	0.80	1.00	-0.14	0.04	0.30	0.18	0.24	0.32	0.22	0.29	0.06	0.29	0.39	0.36	-0.11	-0.01	0.15	-0.09	-0.05	0.07	0.16	0.09	0.22	0.31	0.34	0.37	0.48	0.50
gmor0	0.64	0.32	-0.01	-0.13	1.00	0.13	0.12	0.18	-0.07	-0.39	-0.33	-0.45	0.20	-0.05	-0.22	-0.28	0.63	-0.17	-0.55	0.13	0.50	0.45	0.33	0.14	-0.11	-0.19	-0.17	-0.26	-0.47	-0.53
gmor1	0.43	0.28	0.17	0.04	0.13	1.00	0.61	0.48	0.24	0.05	0.02	-0.09	0.03	-0.02	-0.02	-0.04	0.09	0.22	0.23	0.04	0.41	0.27	0.20	0.23	-0.16	-0.10	-0.02	-0.06	-0.12	-0.08
gmor2	0.10	0.20	0.35	0.30	0.12	0.61	1.00	0.81	0.48	0.40	0.39	0.34	-0.01	-0.02	0.04	0.01	-0.22	-0.09	0.15	-0.40	-0.06	0.00	0.02	0.26	0.32	0.40	0.47	0.46	0.39	0.34
gmor3p	0.17	0.09	0.15	0.18	0.18	0.48	0.81	1.00	0.61	0.17	0.16	0.10	-0.24	-0.38	-0.33	-0.30	-0.24	-0.39	-0.13	-0.54	-0.03	-0.14	-0.17	0.31	0.33	0.45	0.52	0.37	0.33	0.21
maeg0	-0.05	0.07	0.15	0.24	-0.07	0.24	0.48	0.61	1.00	0.43	0.40	0.30	-0.38	-0.47	-0.35	-0.29	-0.42	-0.44	-0.10	-0.69	-0.24	-0.40	-0.40	0.33	0.24	0.55	0.61	0.49	0.46	0.40
maeg1	-0.34	0.20	0.47	0.32	-0.39	0.05	0.40	0.17	0.43	1.00	0.97	0.95	-0.06	0.02	0.22	0.11	-0.35	0.34	0.61	-0.31	-0.40	-0.28	-0.20	-0.05	0.30	0.35	0.32	0.65	0.73	0.74
maeg2	-0.32	0.19	0.39	0.22	-0.33	0.02	0.39	0.16	0.40	0.97	1.00	0.96	-0.01	0.00	0.18	0.09	-0.34	0.28	0.53	-0.33	-0.41	-0.28	-0.20	-0.11	0.27	0.35	0.32	0.67	0.69	0.67
maeg3p	-0.44	0.12	0.41	0.29	-0.45	-0.09	0.34	0.10	0.30	0.94	0.96	1.00	-0.02	0.06	0.28	0.20	-0.42	0.29	0.59	-0.30	-0.49	-0.32	-0.22	-0.19	0.31	0.39	0.35	0.69	0.76	0.74
ssco0	0.33	0.41	0.26	0.06	0.20	0.03	-0.01	-0.24	-0.38	-0.06	-0.01	-0.02	1.00	0.54	0.31	0.15	0.39	0.20	-0.03	0.39	0.35	0.60	0.69	0.09	-0.07	-0.26	-0.25	0.10	-0.13	-0.10
ssco1	-0.07	0.08	0.27	0.29	-0.05	-0.02	-0.02	-0.38	-0.47	0.02	0.00	0.06	0.54	1.00	0.90	0.78	0.17	0.35	0.26	0.41	0.14	0.46	0.55	-0.13	0.02	-0.21	-0.22	-0.02	-0.07	-0.03
ssco2	-0.29	-0.05	0.30	0.39	-0.22	-0.02	0.04	-0.33	-0.35	0.22	0.18	0.28	0.31	0.90	1.00	0.94	-0.06	0.40	0.46	0.29	-0.04	0.24	0.32	-0.27	0.06	-0.10	-0.09	0.06	0.14	0.17
ssco3p	-0.42	-0.23	0.18	0.36	-0.28	-0.04	0.01	-0.30	-0.29	0.11	0.09	0.20	0.15	0.78	0.94	1.00	-0.25	0.18	0.33	0.20	-0.15	0.10	0.16	-0.34	0.07	0.02	0.05	0.05	0.19	0.19
mmng0	0.84	0.56	0.15	-0.11	0.63	0.09	-0.22	-0.24	-0.42	-0.35	-0.34	-0.42	0.39	0.17	-0.06	-0.25	1.00	0.29	-0.27	0.59	0.74	0.69	0.62	0.01	-0.38	-0.49	-0.52	-0.36	-0.60	-0.52
mmng1	0.15	0.30	0.30	-0.01	-0.17	0.22	-0.09	-0.39	-0.44	0.34	0.28	0.29	0.20	0.35	0.40	0.18	0.29	1.00	0.77	0.55	0.22	0.21	0.21	-0.07	-0.16	-0.49	-0.58	-0.29	-0.10	0.10
sspr0	0.38	0.26	0.09	-0.09	0.13	0.04	-0.40	-0.54	-0.69	-0.31	-0.33	-0.30	0.39	0.41	0.29	0.20	0.59	0.55	0.17	1.00	0.61	0.61	0.54	-0.20	-0.33	-0.65	-0.70	-0.56	-0.48	-0.31
sspr1	0.82	0.50	0.14	-0.05	0.50	0.41	-0.06	-0.03	-0.24	-0.40	-0.41	-0.49	0.35	0.14	-0.04	-0.15	0.74	0.22	-0.22	0.61	1.00	0.85	0.72	0.13	-0.37	-0.51	-0.51	-0.49	-0.64	-0.58
sspr2	0.66	0.48	0.25	0.07	0.45	0.27	0.00	-0.14	-0.40	-0.28	-0.28	-0.32	0.60	0.46	0.24	0.10	0.69	0.21	-0.16	0.61	0.85	1.00	0.95	0.03	-0.30	-0.46	-0.46	-0.31	-0.50	-0.45
sspr3p	0.55	0.50	0.33	0.16	0.33	0.20	0.02	-0.17	-0.40	-0.20	-0.20	-0.22	0.69	0.55	0.32	0.16	0.62	0.21	-0.11	0.54	0.72	0.95	1.00	0.08	-0.24	-0.41	-0.42	-0.15	-0.38	-0.33
pvir0	0.29	0.23	0.08	0.09	0.14	0.23	0.26	0.31	0.33	-0.05	-0.11	-0.19	0.09	-0.13	-0.27	-0.34	0.01	-0.07	-0.05	-0.20	0.13	0.03	0.08	1.00	0.08	-0.06	-0.03	-0.03	-0.13	-0.09
pvir1	-0.34	-0.14	0.13	0.22	-0.11	-0.16	0.32	0.33	0.24	0.30	0.27	0.31	-0.07	0.02	0.06	0.07	-0.38	-0.16	0.07	-0.33	-0.37	-0.30	-0.24	0.08	1.00	0.56	0.42	0.40	0.46	0.40
pvir2	-0.39	-0.14	0.16	0.31	-0.19	-0.10	0.40	0.45	0.55	0.35	0.35	0.39	-0.26	-0.21	-0.10	0.02	-0.49	-0.49	-0.13	-0.65	-0.51	-0.46	-0.41	-0.06	0.56	1.00	0.88	0.67	0.70	0.57
pvir3p	-0.36	-0.17	0.15	0.34	-0.17	-0.02	0.47	0.52	0.61	0.32	0.32	0.35	-0.25	-0.22	-0.09	0.05	-0.52	-0.58	-0.19	-0.69	-0.51	-0.46	-0.42	-0.03	0.42	0.88	1.00	0.67	0.68	0.55
tesm0	-0.31	0.20	0.42	0.37	-0.26	-0.06	0.46	0.37	0.49	0.65	0.67	0.69	0.10	-0.02	0.06	0.05	-0.36	-0.29	0.04	-0.56	-0.49	-0.31	-0.15	-0.03	0.40	0.67	0.67	1.00	0.81	0.68
tesm1	-0.54	-0.02	0.44	0.48	-0.47	-0.117	0.391	0.327	0.46	0.73	0.687	0.759	-0.128	-0.066	0.142	0.193	-0.6	-0.1	0.35	-0.48	-0.64	-0.5	-0.38	-0.127	0.463	0.7	0.685	0.81	1	0.92
tesm2p	-0.51	0.03	0.49	0.5	-0.535	-0.078	0.337	0.212	0.4	0.74	0.674	0.744	-0.103	-0.031	0.169	0.189	-0.52	0.1	0.51	-0.31	-0.58	-0.45	-0.33	-0.088	0.405	0.572	0.549	0.68	0.92	1