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Summary of North Atlantic Fish Recruitment 1942 - 1987

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Canada

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Summary of North Atlantic Fish Recruitment 1942-1987

by

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Abstract

Myers, R. A., W. Blanchard and K. R. Thompson 1990. Summary of North Atlantic Fish Recruitment 1942-1987. Can Tech. Rep. Fish. Aquat. Sci. 17-43: iii + 108 p.

The recruitment variability in 100 North Atlantic stocks was examined. This report lists the available data and provides plots of the log-transformed values. Additional displays are provided so that the reader can assess the degree of autocorrelation within each series (*i.e.* the persistence of anomalous recruitment from year to year) and the assumption of normality often assumed in the statistical analysis of log-transformed recruitment.

Résumé

Myers, R. A., W. Blanchard and K. R. Thompson 1990. Résumé de données de recrutement pour les poissons de l'Atlantique Nord 1942-1987. Can Tech. Rep. Fish. Aquat. Sci. 17-43: iii + 108 p.

Nous avons examiné la variabilité de recrutement parmi 100 stocks de l'Atlantique Nord. Ce rapport liste les données disponibles et procure des graphiques des valeurs transformées logarithmiquement. Nous avons produit d'autres graphiques afin que le lecteur puisse réaliser le degré d'autocorrélation parmi chaque série (par exemple la persistance de recrutement anormal d'année en année) et la présomption courante de normalité dans les analyses statistiques de données de recrutement transformées logarithmiquement.

INTRODUCTION

As part of an ongoing study of recruitment variability in the North Atlantic, we have compiled 100 time series of annual recruitment. This report lists the available data and provides plots of the log-transformed values. (Logarithm to base 10 has been used throughout.) Additional displays are provided so the reader can assess the degree of autocorrelation within each series (*i.e.* the persistence of anomalous recruitment from year to year) and the assumption of normality often assumed in the statistical analysis of log-transformed recruitment.

DATA

Recruitment has been estimated either from research surveys (RV) or by sequential population analysis (SPA). The latter includes such techniques as virtual population analysis (Gulland 1965), cohort analysis (Pope 1972), and related methods which reconstruct population size from catch at age data. Recruitment indices from research surveys were usually calculated using more than one age. An index for a given stock was constructed by averaging two or more ages of the same cohort after the data had been standardized by subtracting the mean and dividing by the standard deviation, calculated over some common time period. The common mean was then added to the standardized series.

The stock boundaries generally follow those of the Northwest Atlantic Fisheries Organization (NAFO) or the International Council for the Exploration of the Sea (ICES). They are given in Figure 1. We sometimes refer to the region by an alternative name, *e.g.* the North Sea, if it commonly applies to the stock in practice, or if the NAFO or ICES regions do not adequately describe the presently used stock boundaries. The NAFO boundaries do not describe the herring stocks around the island of Newfoundland; see Winters and Wheeler (1987) for the stock boundaries used. Similarly, the stock boundaries used for the Baltic are complex; see the ICES assessment documents for definitions of these subregions.

There are two nonoverlapping time series for haddock from NAFO regions 3NO and 3Ps. These time series have not been merged because there is no overlap between them.

Recruitment data were compiled directly from assessment documents except for 3 redfish stocks (4VWX, 3NO, and 3Ps); these data were estimated as part of a separate study (Myers and Drinkwater 1988, 1989). Recruitment data were taken from assessments from the National Marine Fisheries Service (USA) laboratory at Woods Hole, the Canadian Atlantic Fisheries Scientific Advisory Committee (CAFSAC), the Northwest Atlantic Fisheries Organization (NAFO), the International Council for the Exploration of the Seas (ICES), and the Marine Research Institute, Iceland. Two older series were taken from the predecessor to NAFO, the International Commission for the Northwest Atlantic Fisheries (ICNAF).

We have used the accepted North American names for species (Leim and Scott 1966). We hope this does not cause confusion in the case of pollock (*Pollachius virens*) and American Plaice (*Hippoglossoides platessoides*) which are known as saithe and long rough dab respectively in Britain.

DESCRIPTION OF THE FIGURES

For each of the 100 time series there is a separate page of subplots and text.

At the top of each page there are up to six lines of text which define the stock, the number of data points available (N), data sources and any relevant comments. There is also an alphanumeric name, i.e. AMPL3LNO. The method used to estimate recruitment, SPA or RV, is also given. The numbers in parentheses after "RV" are the ages used to estimate recruitment.

For each stock there are three time series:

(i) log-recruitment is denoted by $\log R$ in the text and by a solid lines in all the figures;

(ii) Detrended log-recruitment is denoted by $d\log R$ in the text and by the dashed lines in all the figures. It is defined implicitly by

$$\log R = a_0 + a_1 Y + d\log R \quad (1)$$

where a_1 is the linear slope, determined by least squares, and Y is the year;

(iii) First-differenced log-recruitment is denoted by $\nabla \log R$ in the text and by the dash-dot line in the figures. It is defined by

$$\nabla \log R_{t+\frac{1}{2}} = \log R_t - \log R_{t-1} \quad (2)$$

Note that the first-differenced values have been shifted by 1/2 to account for the differencing operation. The $\log R$ data can be found at the bottom of each page.

PANEL ONE (TOP LEFT-HAND CORNER)

This panel shows the interannual variability of $\log R$, $d\log R$ and $\nabla \log R$. The mean has been removed prior to plotting. The mean of $\log R$ and the linear slope (a_1) are specified on the line just above this panel. The sample standard deviation, defined by

$$s^2 = \frac{1}{N} \sum_{t=1}^N (X_t - \bar{X})^2, \quad (3)$$

for each of the three series is shown just below this panel in the following order: $\log R$, $d\log R$, and $\nabla \log R$.

Suppose we first difference a purely random process (*i.e.* one with no serial correlation). It is straightforward to show that first-differencing will double the variance. Consider now the statistic

$$\text{VAR RATIO} = \frac{s_{\nabla \log R}^2}{2s_{\log R}^2} \quad (4)$$

where $s_{\log R}^2$ and $s_{\nabla \log R}^2$ are the sample variances of the log-transformed and first-differenced series respectively. One would expect this ratio to be unity if $\log R$ is a purely random process, *i.e.* that s.d. is $\sqrt{2}$ bigger for $\nabla \log R$; if it is significantly less than unity it indicates persistence of anomalous recruitment from year to year.

PANEL TWO (TOP RIGHT-HAND CORNER)

The panel shows the normal scores plots of the three time series. It provides a visual display and a test statistic, to assess the weight of evidence against the null hypothesis that $\log R$, $d\log R$ and $\nabla \log R$ are normally distributed.

The subplot was produced as follows:

- (i) standardize the sample (*i.e.* subtract the mean and divide by the standard deviation);
- (ii) sort standardized values into an ascending sequence;
- (iii) for the i th sorted value compute its normal score, $(i - \frac{3}{8})/(N + \frac{1}{4})$, and then determine the corresponding normal quantile from the normal distribution.
- (iv) plot normal quantiles on the y-axis (from (iii)) and the sample quantiles on the x-axis (from (ii)).

The test statistic is the Pearson correlation coefficient between the normal and sample quantiles. The correlation coefficients appear on the line directly below this panel in the following order: $\log R$, $d\log R$ and $\nabla \log R$. Cryer (1986) gives the following table to assess the significance of a departure from normality.

| N | $\alpha = 0.01$ | $\alpha = 0.05$ |
|----|-----------------|-----------------|
| 10 | 0.880 | 0.918 |
| 15 | 0.911 | 0.938 |
| 20 | 0.929 | 0.950 |
| 25 | 0.941 | 0.958 |
| 30 | 0.949 | 0.964 |
| 40 | 0.960 | 0.972 |
| 50 | 0.966 | 0.976 |
| 60 | 0.971 | 0.980 |

PANEL THREE (LOWER LEFT-HAND CORNER)

This panel shows the sample autocorrelation function of each of the three time series. It was calculated as follows:

$$r(k) = \frac{1}{s^2 N} \sum_{t=1}^{N-k} (X_t - \bar{X})(X_{t+k} - \bar{X}). \quad (5)$$

The autocorrelation function is only shown for lags up to 20. The lag one autocorrelations appears on the line just below this panel in the following order: $\log R$, $d\log R$ and $\nabla \log R$.

PANEL FOUR (LOWER RIGHT-HAND CORNER)

This panel shows the normalized integrated spectrum of each of the three time series. For the definition of the normalized integrated spectrum, first

note that the sample normalized spectrum is simply (*e.g.* Priestley, 1981)

$$f(\omega) = \frac{1}{2\pi} \sum_{k=-N}^N r(k) \cos(k\omega), \quad -\pi \leq \omega \leq \pi \quad (6)$$

and the integrated spectrum is

$$F(\omega) = \int_{-\pi}^{\omega} f(\omega') d\omega'. \quad (7)$$

We define the integral time scale τ by $F(2\pi/\tau) = 0.5$ *i.e.* that period for which one half of the energy lies below and one half lies above this period. For example, if a process was purely random, then it would possess a linear integrated spectrum and τ would equal 4 time units.

The figure shows the integrated spectrum plotted against frequency in cycles per year for each of the three time series. The integrated spectrum was calculated using a Fast Fourier Transform routine. The integral time scale TAU is shown on the line just below this panel, for $\log R$, $d\log R$ and $\nabla \log R$ respectively.

ACKNOWLEDGMENTS

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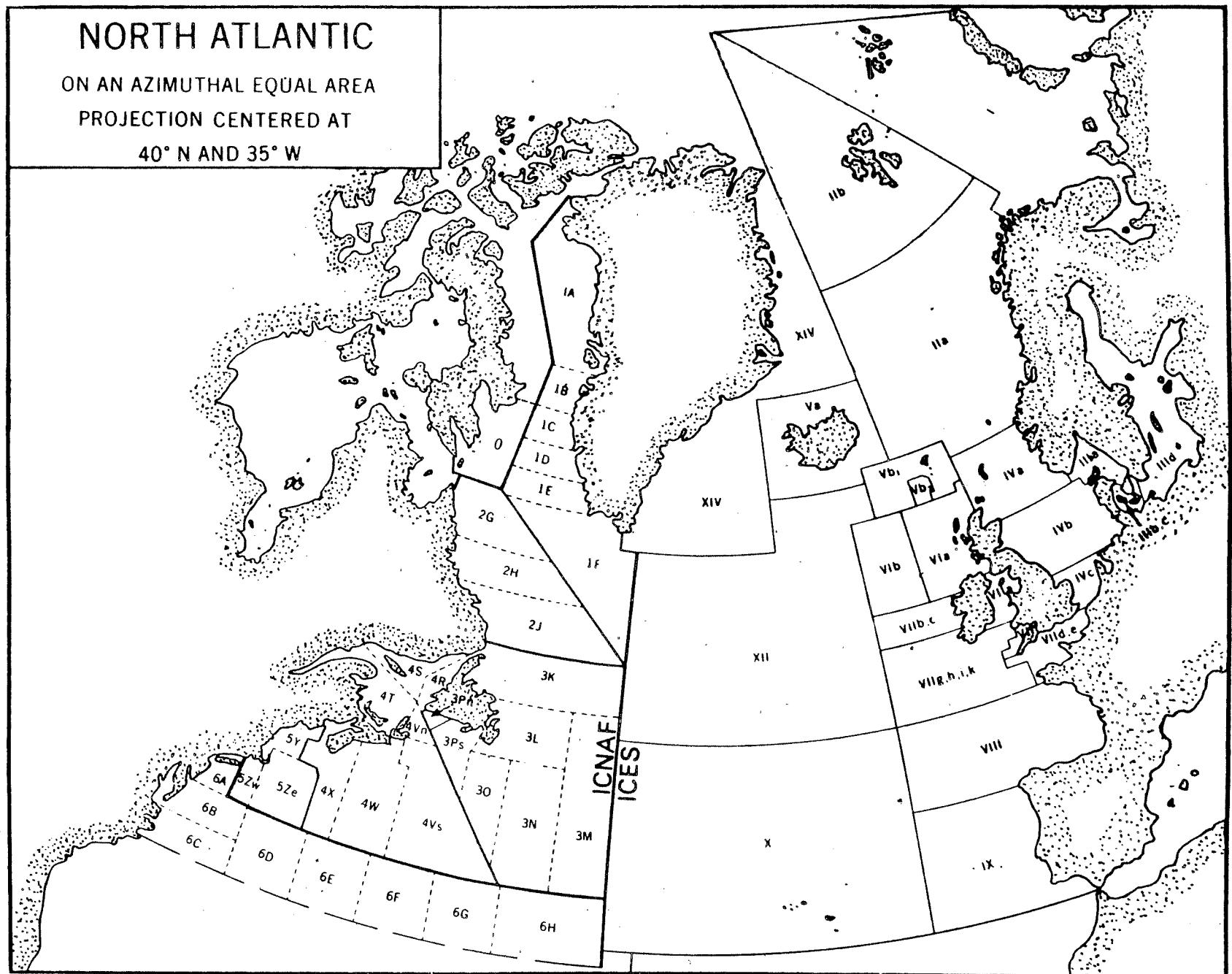


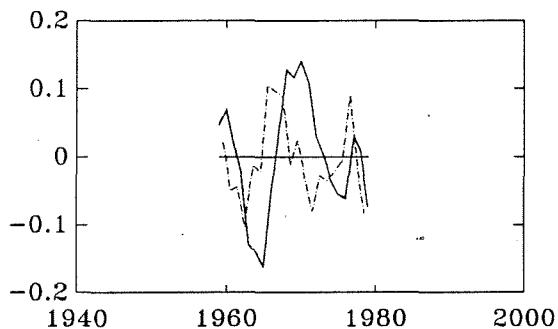
Fig. 1. Boundaries of regions used in the analysis.

AMERICAN PLAICE 3LNO
 START YEAR = 59 END YEAR = 79 NUMBER OF DATA POINTS = 21
 SOURCE: Brodie, NAFO SCR Doc. 88/37.

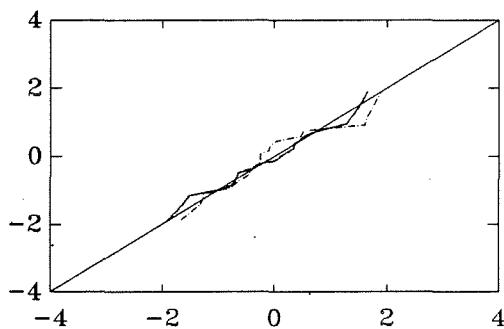
AMPL3LNO

COMMENTS: SPA, 6 year olds in (000's).

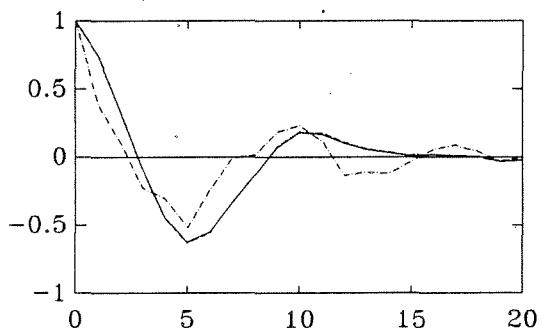
AMPL3LNO MEAN = 5.217 SLOPE = 0.000 VAR RATIO = 0.241 N = 21



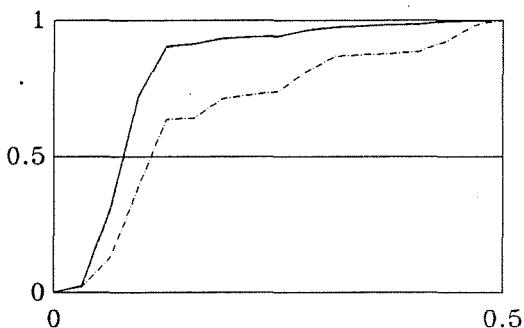
SD (0.085, 0.085, 0.059)



RHO (0.989, 0.990, 0.960)



ACF(1) (0.743, 0.741, 0.385)



TAU (13.003, 12.955, 9.280)

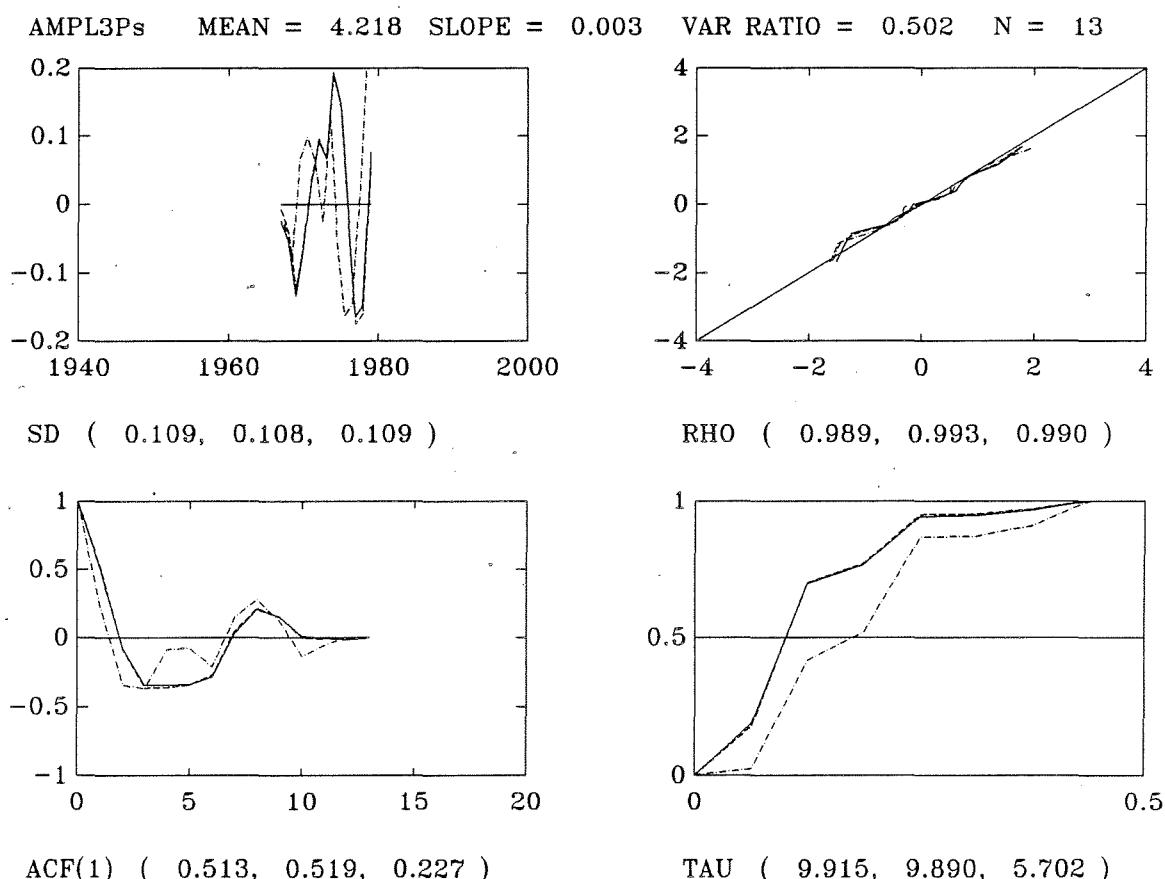
Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 5.263 | 50-59 |
| 5.286 | 5.235 | 5.191 | 5.087 | 5.076 | 5.054 | 5.159 | 5.256 | 5.345 | 5.333 | 5.333 | 60-69 | |
| 5.358 | 5.327 | 5.247 | 5.219 | 5.184 | 5.162 | 5.157 | 5.248 | 5.227 | 5.144 | 5.144 | 70-79 | |

AMERICAN PLAICE 3Ps
START YEAR = 67 END YEAR = 79 NUMBER OF DATA POINTS = 13
SOURCE: Brodie NAFO SCR Doc. 88/75.

AMPL3Ps

COMMENTS: SPA, 6 year olds in (000's).



Log Transformed (base 10) Recruitment Data

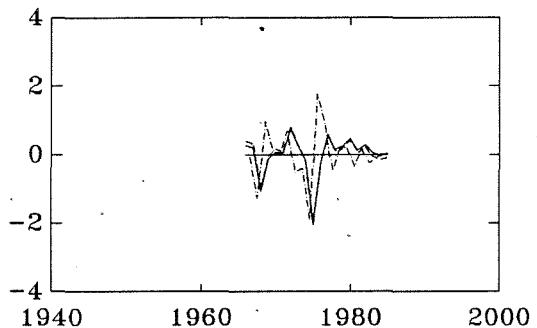
AMERICAN PLAICE 4V

AMPL4V

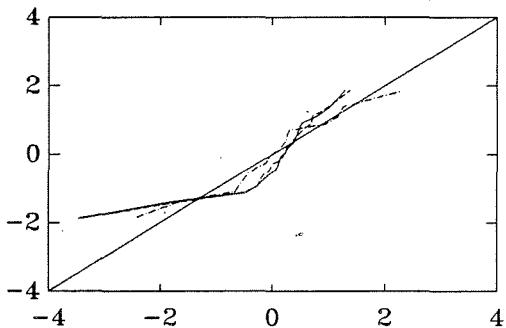
START YEAR = 66 END YEAR = 85 NUMBER OF DATA POINTS = 20
SOURCE: Neilson and Perley, CAFSAC 86/48, updated by Neilson

COMMENTS: RV(3+4) index * 1000.

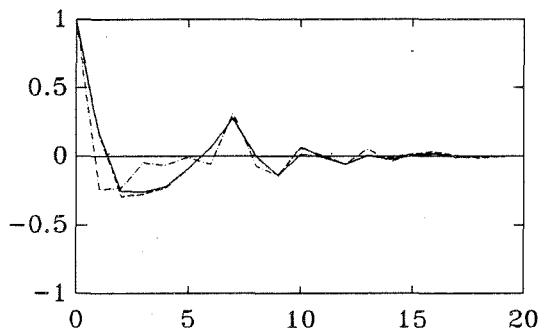
AMPL4V MEAN = 3.052 SLOPE = 0.014 VAR RATIO = 0.864 N = 20



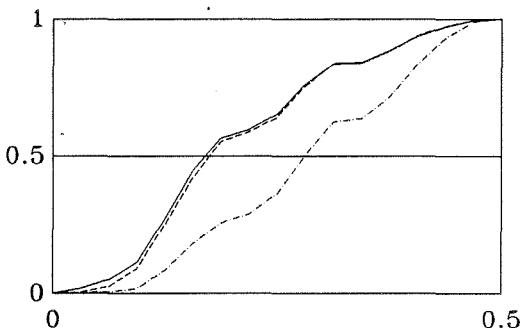
SD (0.594, 0.589, 0.780)



RHO (0.853, 0.867, 0.966)



ACF(1) (0.173, 0.151, -0.242)



TAU (5.876, 5.711, 3.565)

Log Transformed (base 10) Recruitment Data

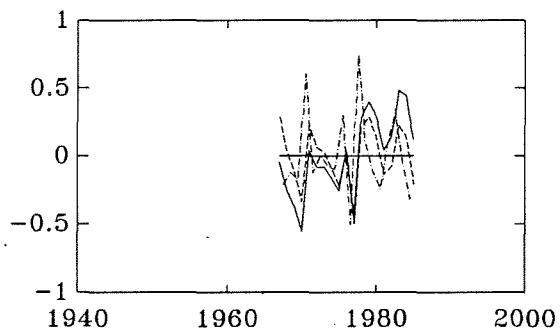
| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | 3.330 | 3.260 | 1.983 | 2.953 | 60-69 | |
| 3.137 | 3.112 | 3.818 | 3.292 | 2.896 | 1.000 | 2.776 | 3.664 | 3.195 | 3.312 | 70-79 | | |
| 3.530 | 3.188 | 3.357 | 3.124 | 3.016 | 3.093 | .. | .. | .. | .. | .. | 80-89 | |

BUTTERFISH 5 & 6
 START YEAR = 67 END YEAR = 85 NUMBER OF DATA POINTS = 19
 SOURCE: Woods Hole Ref. Doc. 86-09

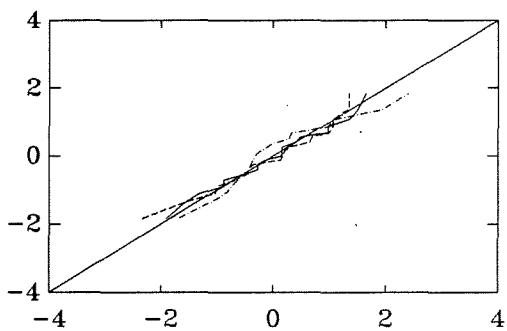
BUTTER56

COMMENTS: RV(0+1).

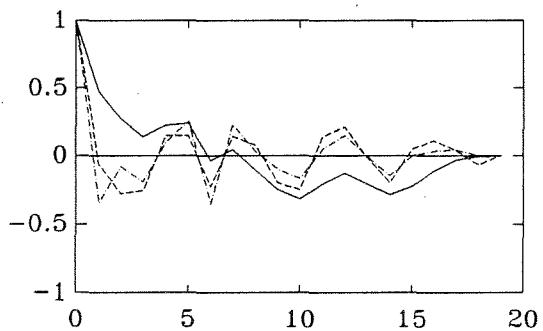
BUTTER56 MEAN = 0.160 SLOPE = 0.037 VAR RATIO = 0.551 N = 19



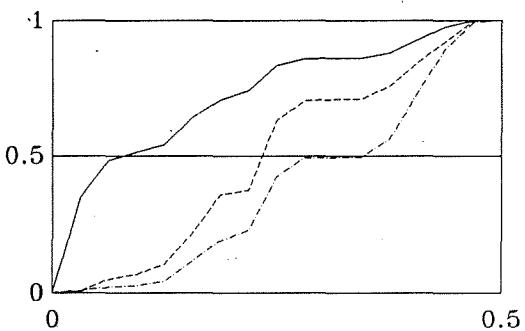
SD (0.293, 0.213, 0.308)



RHO (0.992, 0.977, 0.956)



ACF(1) (0.473, -0.065, -0.344)



TAU (12.708, 4.273, 2.893)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|--------|-------|-------|-------|-------|--------|-------|--------|-------|--------|--------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | 0.114 | -0.097 | -0.223 | .. | 60-69 |
| -0.398 | 0.204 | 0.079 | 0.079 | 0.000 | -0.097 | 0.204 | -0.301 | 0.447 | 0.556 | 70-79 | .. | .. |
| 0.447 | 0.204 | 0.301 | 0.643 | 0.602 | 0.279 | .. | .. | .. | .. | .. | 80-89 | .. |

BLUE WHITING NORTHERN AREA

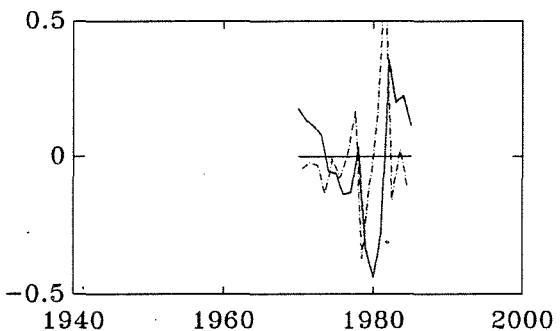
BWHITNA

START YEAR = 70 END YEAR = 85 NUMBER OF DATA POINTS = 16

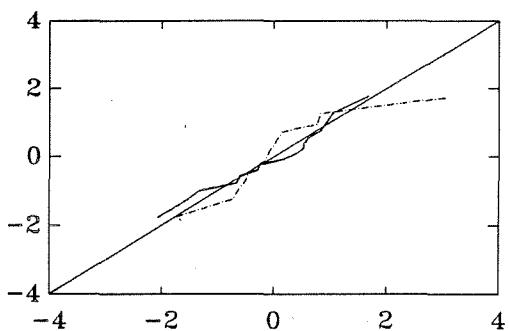
SOURCE: Report of the Blue Whiting Assessment Working Group ICES, C.M.1988.

COMMENTS: SPA, 0 year olds in (000 000's).

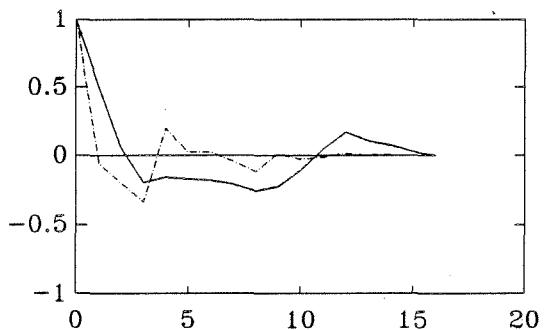
BWHITNA MEAN = 4.209 SLOPE = -0.000 VAR RATIO = 0.495 N = 16



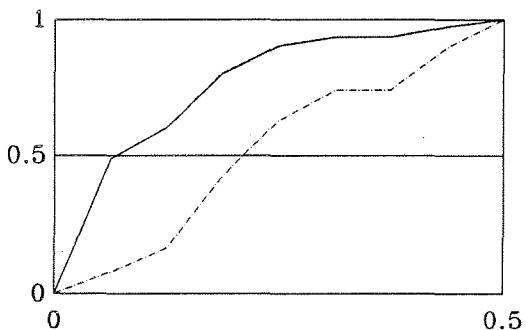
SD (0.213, 0.213, 0.212)



RHO (0.981, 0.982, 0.894)



ACF(1) (0.505, 0.506, -0.058)



TAU (14.659, 14.520, 4.756)

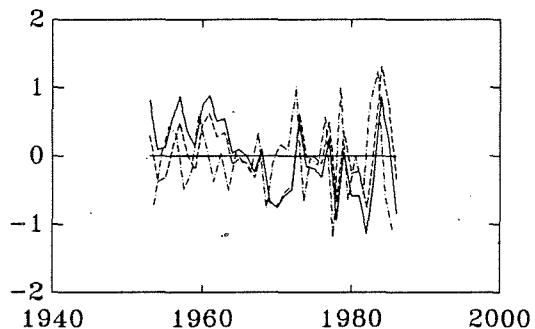
Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| 4.387 | 4.344 | 4.322 | 4.290 | 4.155 | 4.149 | 4.072 | 4.079 | 4.246 | 3.875 | 70-79 | | |
| 3.771 | 3.929 | 4.566 | 4.407 | 4.433 | 4.322 | .. | .. | .. | .. | .. | 80-89 | |

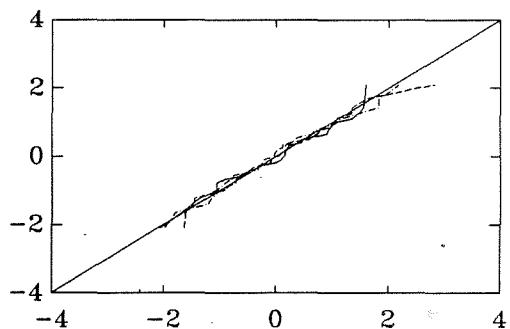
COD 1
 START YEAR = 53 END YEAR = 86 NUMBER OF DATA POINTS = 34
 SOURCE: Hansen and Buch, NAFO SRC Doc. 85/62, updated by Hovgard,
 Greenland Inst.
 COMMENTS: SPA, 3 year olds in (000 000's).

COD1

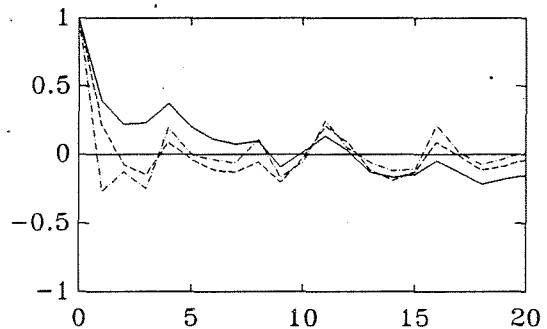
COD1 MEAN = 1.841 SLOPE = -0.031 VAR RATIO = 0.554 N = 34



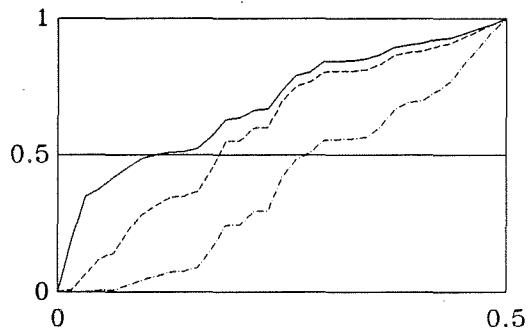
SD (0.556, 0.464, 0.585)



RHO (0.988, 0.985, 0.992)



ACF(1) (0.393, 0.215, -0.271)



TAU (9.168, 5.560, 3.610)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | 2.654 | 1.934 | 1.959 | 2.393 | 2.713 | 2.215 | 1.978 | 40-49 |
| 2.592 | 2.724 | 2.352 | 2.387 | 1.886 | 1.934 | 1.839 | 1.602 | 1.944 | 1.176 | 50-59 | |
| 1.079 | 1.255 | 1.342 | 2.358 | 1.690 | 1.663 | 1.531 | 2.100 | 0.903 | 1.909 | 60-69 | |
| 1.255 | 1.255 | 0.699 | 1.477 | 2.699 | 2.097 | 1.000 | .. | .. | .. | 70-79 | |

80-89

COD 2J3KL

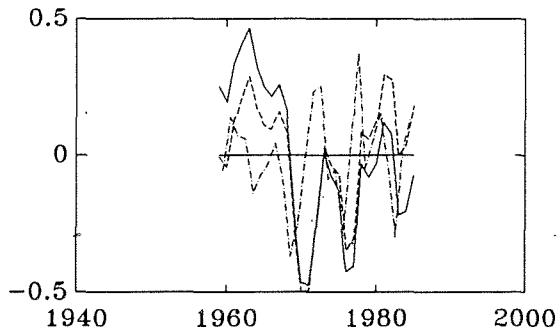
COD2J3KL

START YEAR = 59 END YEAR = 85 NUMBER OF DATA POINTS = 27

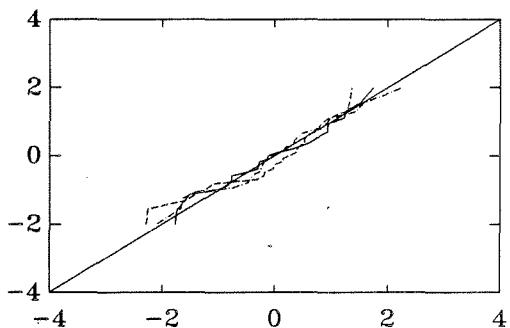
SOURCE: Baird and Bishop, CAFSAC Res. Doc. 87/42 updated by Baird.

COMMENTS: SPA, 3 year olds in (000's).

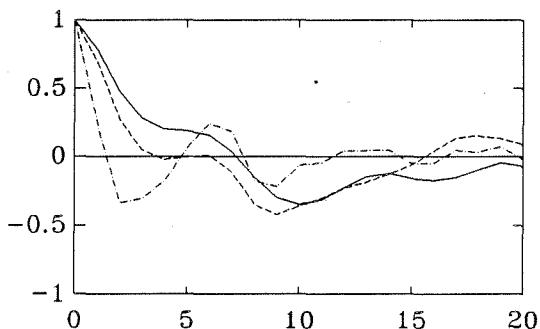
COD2J3KL MEAN = 5.611 SLOPE = -0.020 VAR RATIO = 0.203 N = 27



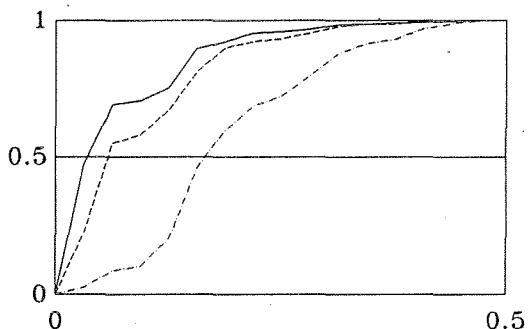
SD (0.268, 0.219, 0.171)



RHO (0.987, 0.955, 0.986)



ACF(1) (0.786, 0.695, 0.238)



TAU (28.246, 17.311, 6.029)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 5.861 | 50-59 |
| 5.805 | 5.945 | 6.016 | 6.077 | 5.937 | 5.862 | 5.825 | 5.869 | 5.775 | 5.405 | 5.529 | 60-69 | |
| 5.147 | 5.137 | 5.368 | 5.621 | 5.535 | 5.481 | 5.186 | 5.206 | 5.578 | 70-79 | | | |
| 5.579 | 5.732 | 5.691 | 5.392 | 5.406 | 5.537 | .. | .. | .. | .. | .. | 80-89 | |

COD 3M

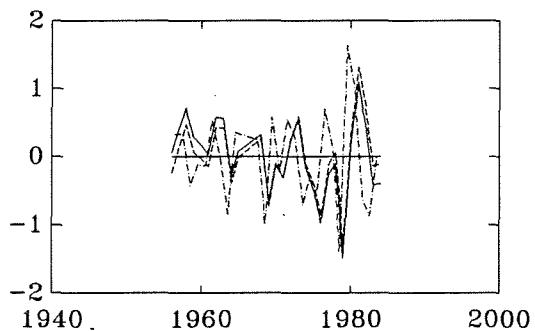
COD3M

START YEAR = 56 END YEAR = 84 NUMBER OF DATA POINTS = 27

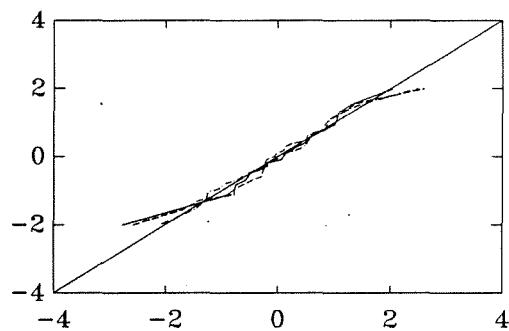
SOURCE: 56-65: Anderson, NAFO SRC Doc. 82/62, 67-84: Wells and Baird, NAFO SRC Doc. 85/65.

COMMENTS: 56-65:SPA, 67-84:SPA, RV(2+3).

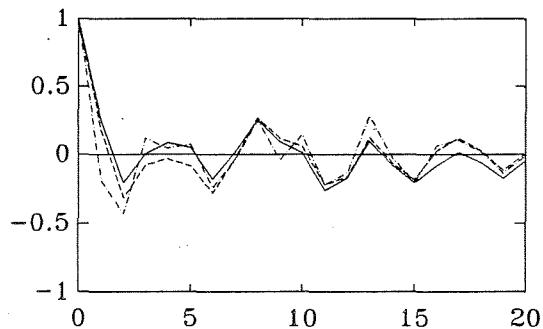
COD3M MEAN = 4.410 SLOPE = -0.023 VAR RATIO = 0.761 N = 27



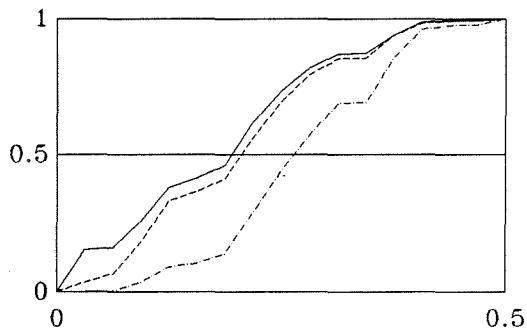
SD (0.538, 0.509, 0.664)



RHO (0.983, 0.976, 0.991)



ACF(1) (0.256, 0.175, -0.195)



TAU (5.121, 4.852, 3.780)

Log Transformed (base 10) Recruitment Data

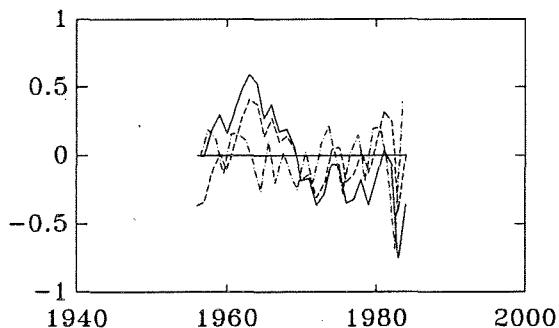
| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | 4.463 | 4.797 | 5.127 | 4.696 | 50-59 | |
| 4.580 | 4.442 | 4.989 | 4.972 | 4.126 | 4.484 | .. | .. | 4.732 | 3.731 | 60-69 | | |
| 4.312 | 4.095 | 4.651 | 4.959 | 4.244 | 3.926 | 3.439 | 4.146 | 4.308 | 2.918 | 70-79 | | |
| 4.551 | 5.503 | 4.867 | 3.999 | 4.003 | .. | .. | .. | .. | .. | 80-89 | | |

COD 3NO
 START YEAR = 56 END YEAR = 84 NUMBER OF DATA POINTS = 29
 SOURCE: Anom. (Baird, Bishop), NAFO SCS Doc. 88/20.

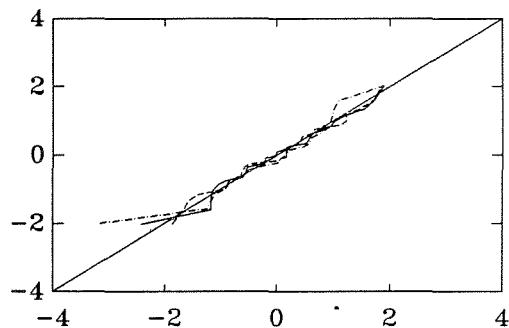
COD3NO

COMMENTS: SPA, 3 year olds in (000's).

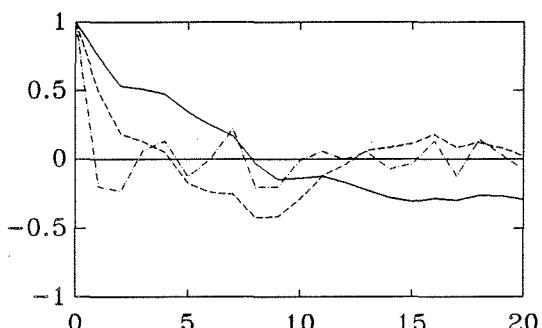
COD3NO MEAN = 4.731 SLOPE = -0.026 VAR RATIO = 0.236 N = 29



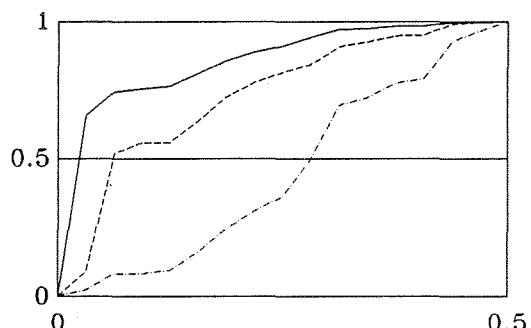
SD (0.310, 0.220, 0.213)



RHO (0.989, 0.991, 0.961)



ACF(1) (0.749, 0.498, -0.199)



TAU (42.081, 16.368, 3.546)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | 4.730 | 4.726 | 4.914 | 5.032 | 50-59 | |
| 4.893 | 5.050 | 5.211 | 5.322 | 5.263 | 5.002 | 5.107 | 4.905 | 4.927 | 4.792 | 60-69 | | |
| 4.546 | 4.568 | 4.369 | 4.447 | 4.668 | 4.661 | 4.383 | 4.409 | 4.557 | 4.368 | 70-79 | | |
| 4.566 | 4.767 | 4.667 | 3.982 | 4.372 | .. | .. | .. | .. | .. | 80-89 | | |

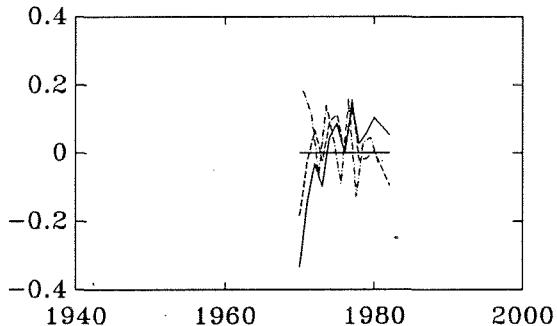
COD 3PnRS

COD3PnRS

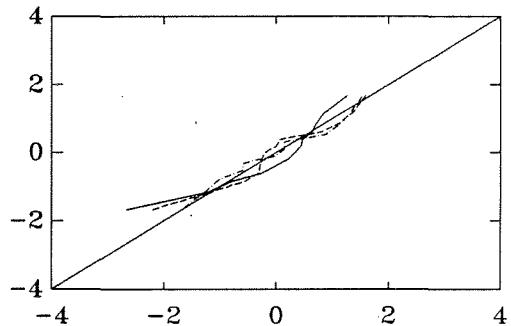
START YEAR = 70 END YEAR = 82 NUMBER OF DATA POINTS = 13
SOURCE: Frechet, CAFSAC Res. Doc. 88/24.

COMMENTS: SPA, 4 year olds in (000's).

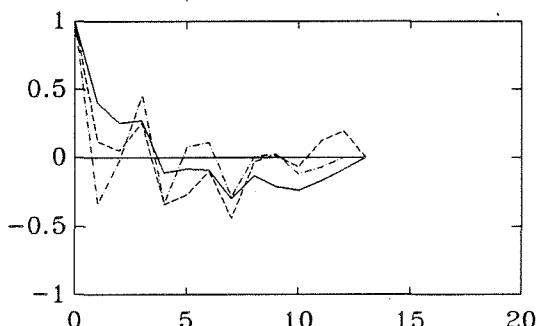
COD3PnRS MEAN = 5.089 SLOPE = 0.025 VAR RATIO = 0.308 N = 13



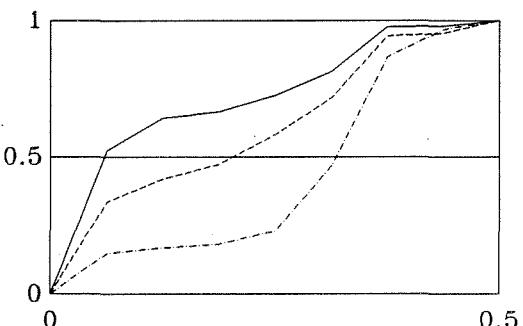
SD (-0.125, 0.083, 0.098)



RHO (0.924, 0.970, 0.985)



ACF(1) (-0.405, 0.122, -0.341)



TAU (16.762, 4.922, 3.151)

Log Transformed (base 10) Recruitment Data

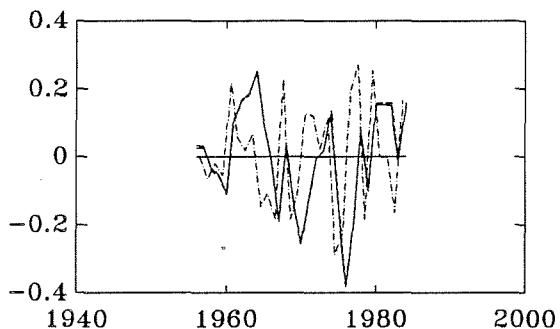
COD 3Ps

COD3Ps

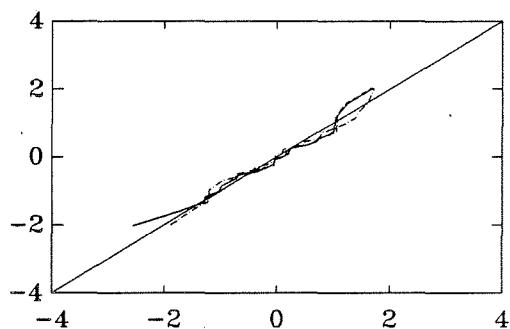
START YEAR = 56 END YEAR = 84 NUMBER OF DATA POINTS = 29
 SOURCE: Anom. (Baird, Bishop), NAFO SCS Doc. 88/20.

COMMENTS: SPA, 3 year olds in (000's).

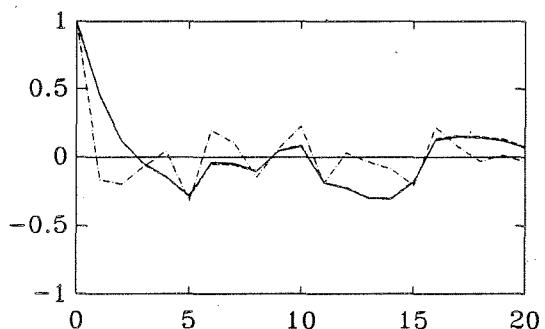
COD3Ps MEAN = 4.740 SLOPE = -0.001 VAR RATIO = 0.543 N = 29



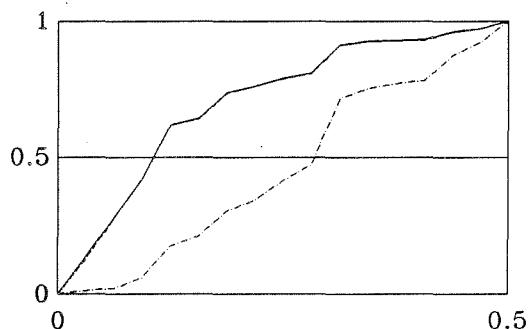
SD (0.149, 0.149, 0.155)



RHO (0.981, 0.981, 0.989)



ACF(1) (0.457, 0.455, -0.160)



TAU (9.415, 9.426, 3.511)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | 4.774 | 4.773 | 4.707 | 4.687 | 50-59 |
| 4.633 | 4.850 | 4.908 | 4.926 | 4.993 | 4.846 | 4.735 | 4.550 | 4.778 | 4.593 | 60-69 | |
| 4.483 | 4.613 | 4.734 | 4.757 | 4.875 | 4.587 | 4.359 | 4.551 | 4.822 | 4.639 | 70-79 | |
| 4.893 | 4.893 | 4.892 | 4.727 | 4.891 | .. | .. | .. | .. | .. | 80-89 | |

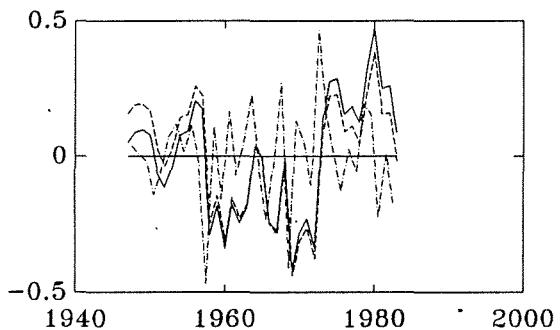
COD 4TVn

COD4TVn

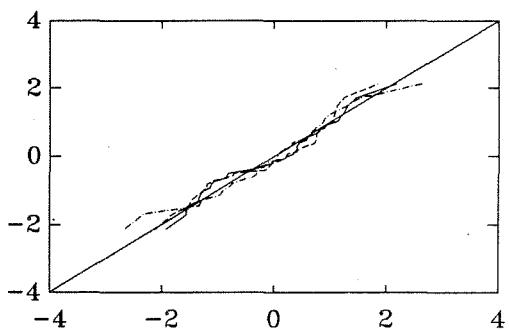
START YEAR = 47 END YEAR = 83 NUMBER OF DATA POINTS = 37
SOURCE: Chouinard and Sinclair, CAFSAC Res. Doc. 88/28.

COMMENTS: SPA, 3 year olds in (000's).

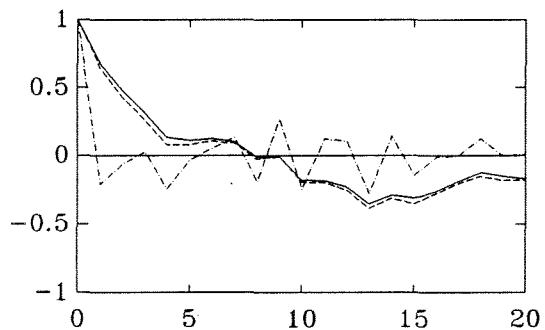
COD4TVn MEAN = 4.952 SLOPE = 0.006 VAR RATIO = 0.330 N = 37



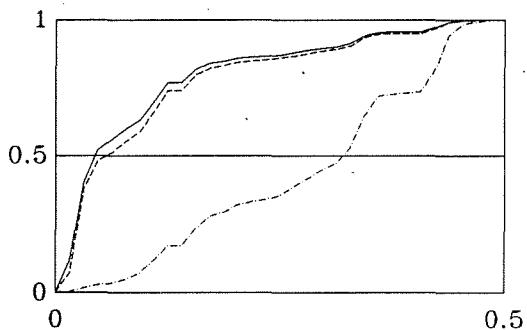
SD (0.217, 0.208, 0.176)



RHO (0.985, 0.974, 0.980)



ACF(1) (0.676, 0.641, -0.210)



TAU (22.645, 17.694, 3.124)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | 5.003 | 5.039 | 5.048 | 40-49 |
| 5.030 | 4.890 | 4.838 | 4.910 | 5.028 | 5.044 | 5.156 | 5.128 | 4.662 | 4.770 | 50-59 |
| 4.614 | 4.777 | 4.709 | 4.764 | 4.990 | 4.945 | 4.711 | 4.679 | 4.946 | 4.536 | 60-69 |
| 4.666 | 4.723 | 4.617 | 5.081 | 5.225 | 5.237 | 5.108 | 5.134 | 5.078 | 5.268 | 70-79 |
| 5.424 | 5.201 | 5.210 | 5.041 | .. | .. | .. | .. | .. | .. | 80-89 |

COD 4VsW

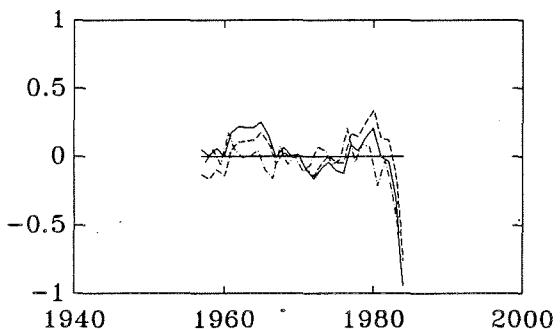
COD4VsW

START YEAR = 57 END YEAR = 84 NUMBER OF DATA POINTS = 28

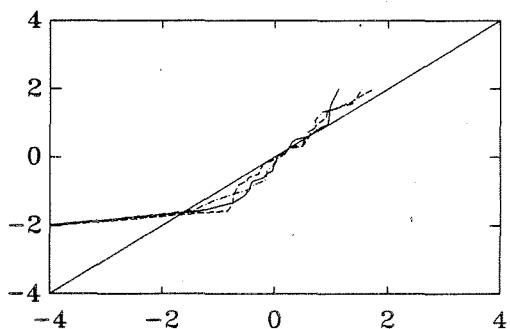
SOURCE: Sinclair and Smith, CAFSAC Res. Doc. 87/72, updated by Fanning.

COMMENTS: SPA, 1 year olds in (000's).

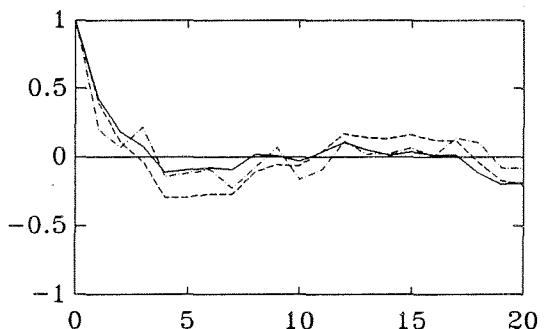
COD4TVsW MEAN = 4.969 SLOPE = -0.014 VAR RATIO = 0.249 N = 28



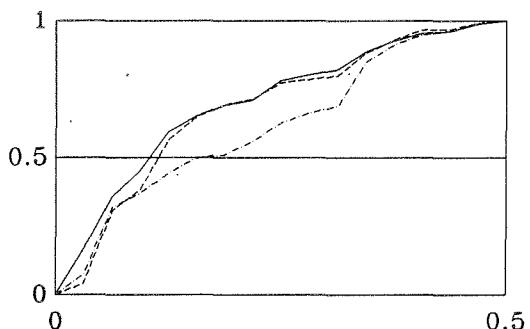
SD. (0.223, 0.194, 0.157)



RHO (0.848, 0.899, 0.892)



ACF(1) (0.425, 0.392, 0.204)



TAU (9.598, 8.764, 6.183)

Log Transformed (base 10) Recruitment Data

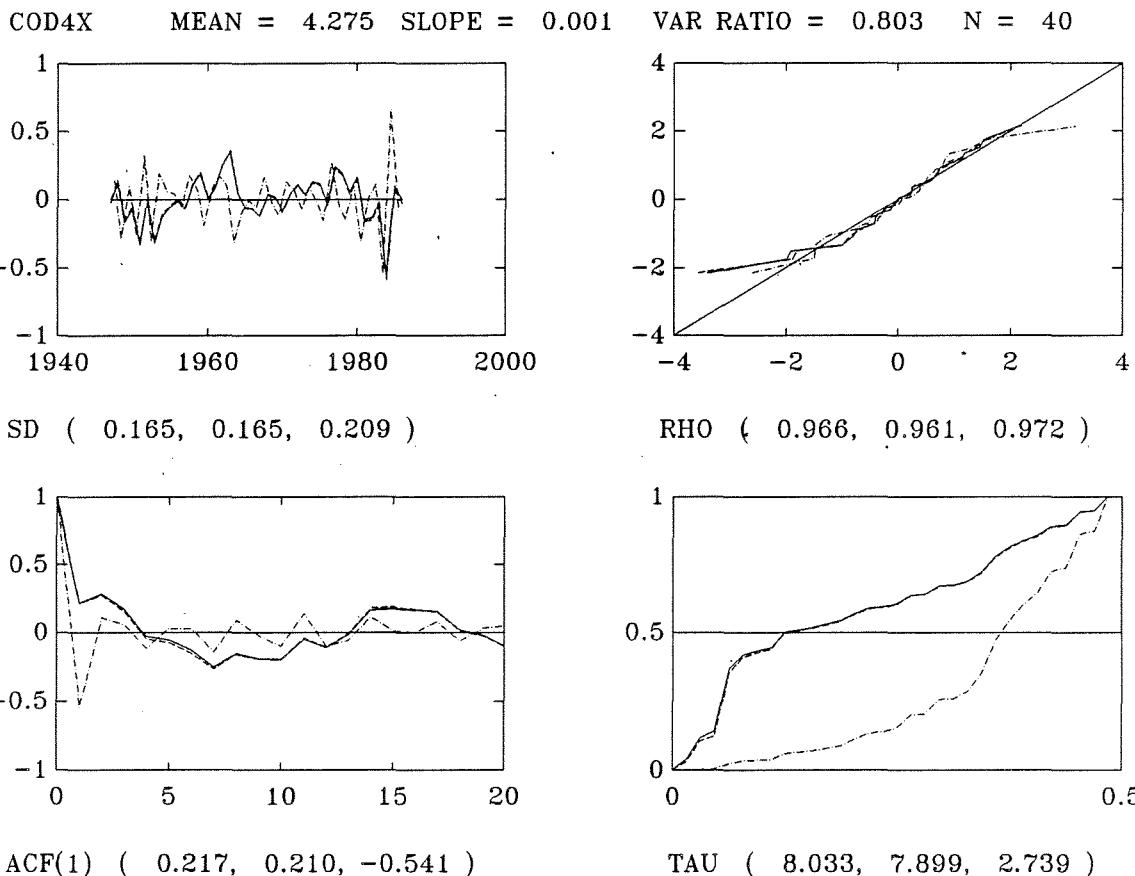
| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| 4.969 | 5.145 | 5.191 | 5.182 | 5.180 | 5.222 | 5.126 | 4.962 | 5.035 | 4.974 | 5.030 | 50-59 |
| 4.982 | 4.872 | 4.806 | 4.881 | 4.927 | 4.868 | 4.847 | 5.052 | 5.013 | 5.106 | 70-79 | |
| 5.177 | 4.964 | 4.933 | 4.672 | 4.026 | .. | .. | .. | .. | .. | .. | 80-89 |

COD 4X

COD4X

START YEAR = 47 END YEAR = 86 NUMBER OF DATA POINTS = 40
 SOURCE: Campana and Simon, CAFSAC 88/26.

COMMENTS: SPA, 1 year olds in (000's).



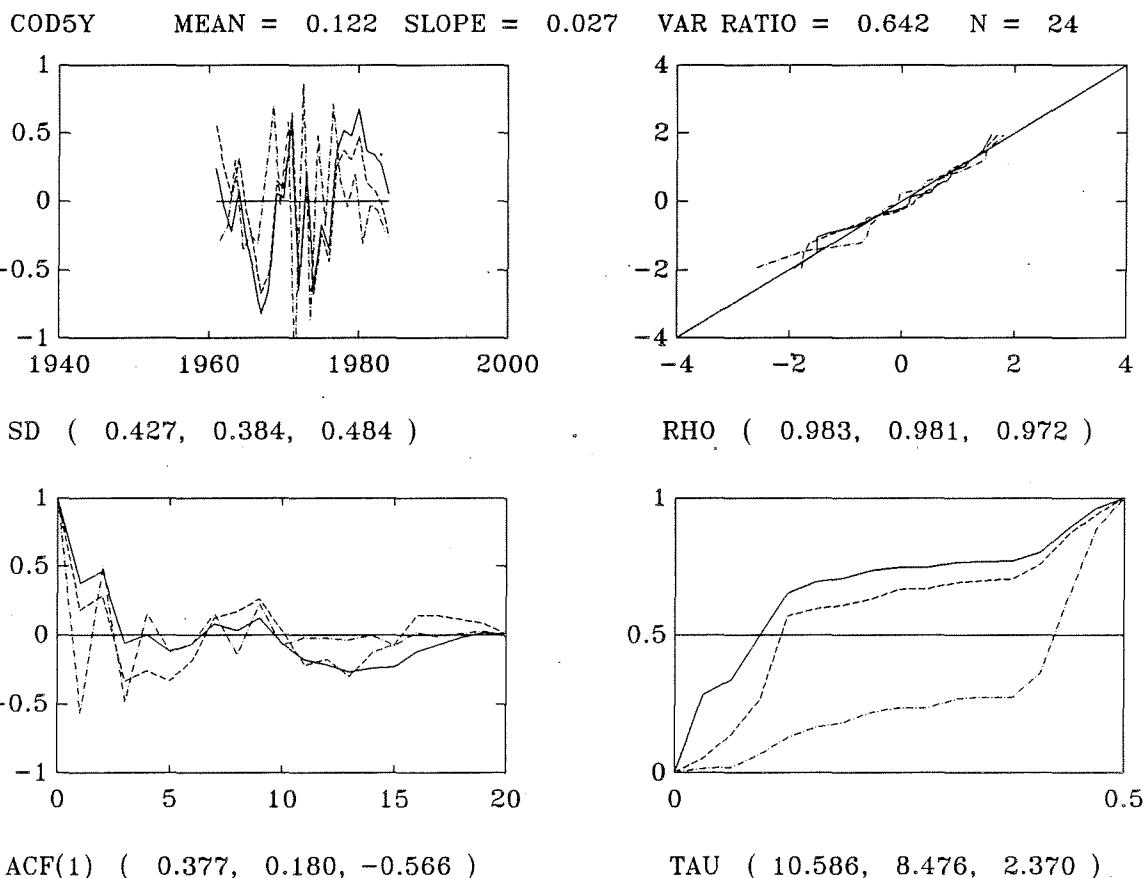
Log Transformed (base 10) Recruitment Data

| | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | 4.254 | 4.395 | 4.110 | 40-49 |
| 4.208 | 3.946 | 4.268 | 3.960 | 4.151 | 4.218 | 4.261 | 4.205 | 4.381 | 4.463 |
| 4.275 | 4.356 | 4.527 | 4.631 | 4.318 | 4.214 | 4.209 | 4.154 | 4.316 | 4.292 |
| 4.186 | 4.316 | 4.385 | 4.312 | 4.406 | 4.391 | 4.241 | 4.513 | 4.469 | 4.328 |
| 4.437 | 4.129 | 4.144 | 4.255 | 3.711 | 4.374 | 4.275 | .. | .. | 80-89 |

COD 5Y
 START YEAR = 61 END YEAR = 84 NUMBER OF DATA POINTS = 24
 SOURCE: Woods Hole Ref. Doc. 86-12.

COD5Y

COMMENTS: RV(0+1).



Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | 0.362 | 0.079 | -0.097 | 0.204 | -0.155 | -0.398 | -0.699 | -0.523 | 0.176 | 0.176 | 60-69 |
| 0.146 | 0.732 | -0.523 | 0.342 | -0.523 | -0.046 | -0.222 | 0.491 | 0.643 | 0.602 | 0.602 | 70-79 |
| 0.799 | 0.491 | 0.462 | 0.398 | 0.176 | .. | .. | .. | .. | .. | .. | 80-89 |

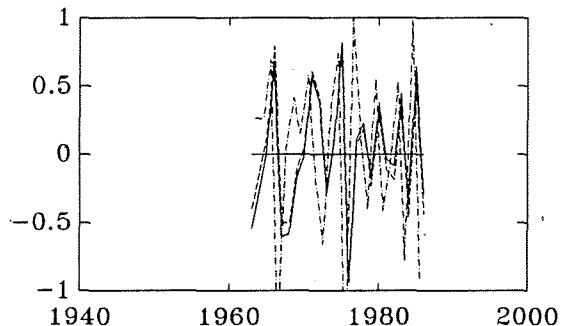
COD 5Ze

COD5Ze

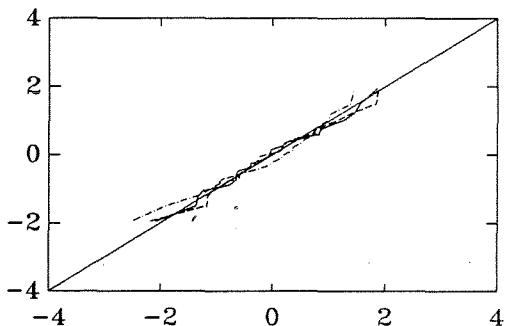
START YEAR = 63 END YEAR = 87 NUMBER OF DATA POINTS = 24
SOURCE: Hunt, CAFSAC Res. Doc. 88/73.

COMMENTS: RV(0+1), index * 1000.

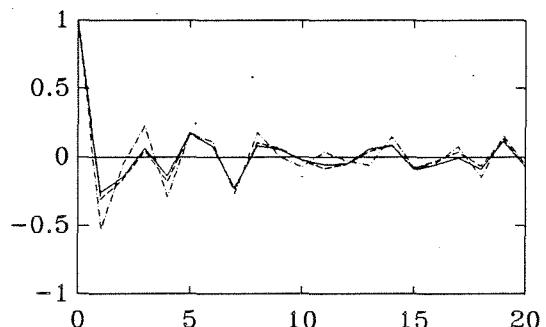
COD5Ze MEAN = 2.784 SLOPE = 0.013 VAR RATIO = 1.270 N = 24



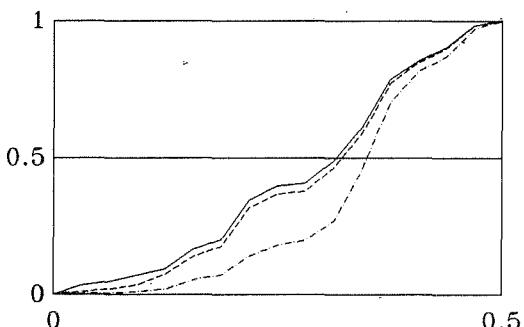
SD (0.442, 0.433, 0.704)



RHO (0.992, 0.991, 0.974)



ACF(1) (-0.258, -0.307, -0.527)



TAU (3.173, 3.109, 2.863)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | 2.243 | 2.512 | 2.774 | 3.467 | 2.182 | 2.198 | 2.611 | 60-69 | .. | .. |
| 2.767 | 3.348 | 3.155 | 2.497 | 2.864 | 3.603 | 1.862 | 2.888 | 3.012 | 2.613 | 70-79 | .. | .. |
| 3.164 | 2.751 | 2.696 | 3.230 | 2.447 | 3.424 | 2.496 | .. | .. | .. | 80-89 | .. | .. |

GOD NORTH-EAST ARCTIC

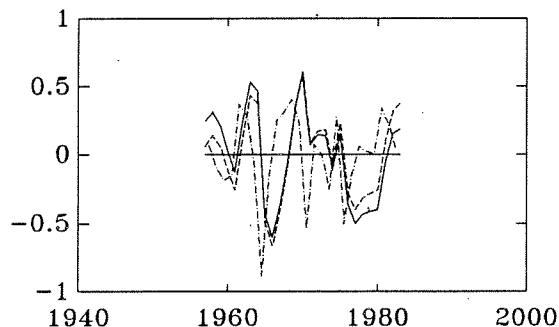
CODNEAR

START YEAR = 57 END YEAR = 83 NUMBER OF DATA POINTS = 27

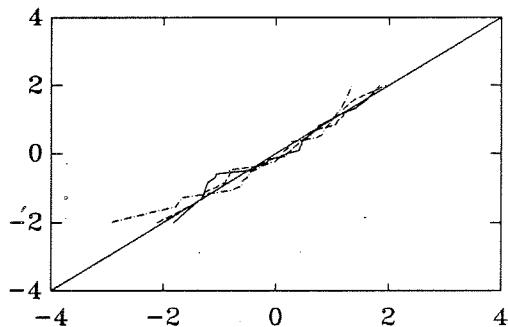
SOURCE: Report of the Arctic Fisheries Working Group, ICES C.M. 1988.

COMMENTS: SPA, 3 year olds in (000's).

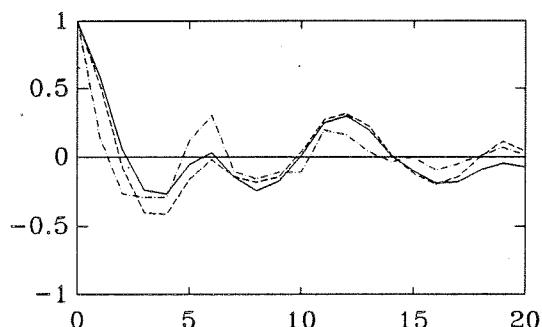
CODNEAR MEAN = 5.652 SLOPE = -0.014 VAR RATIO = 0.414 N = 27



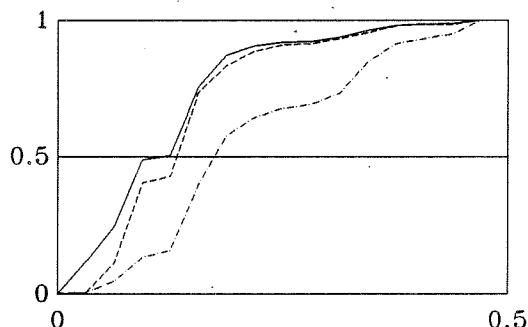
SD (-0.332, 0.312, 0.302)



RHO (0.982, 0.990, 0.957)



ACF(1) (-0.586, 0.522, 0.136)



TAU (8.552, 7.562, 5.748)

Log Transformed (base 10) Recruitment Data

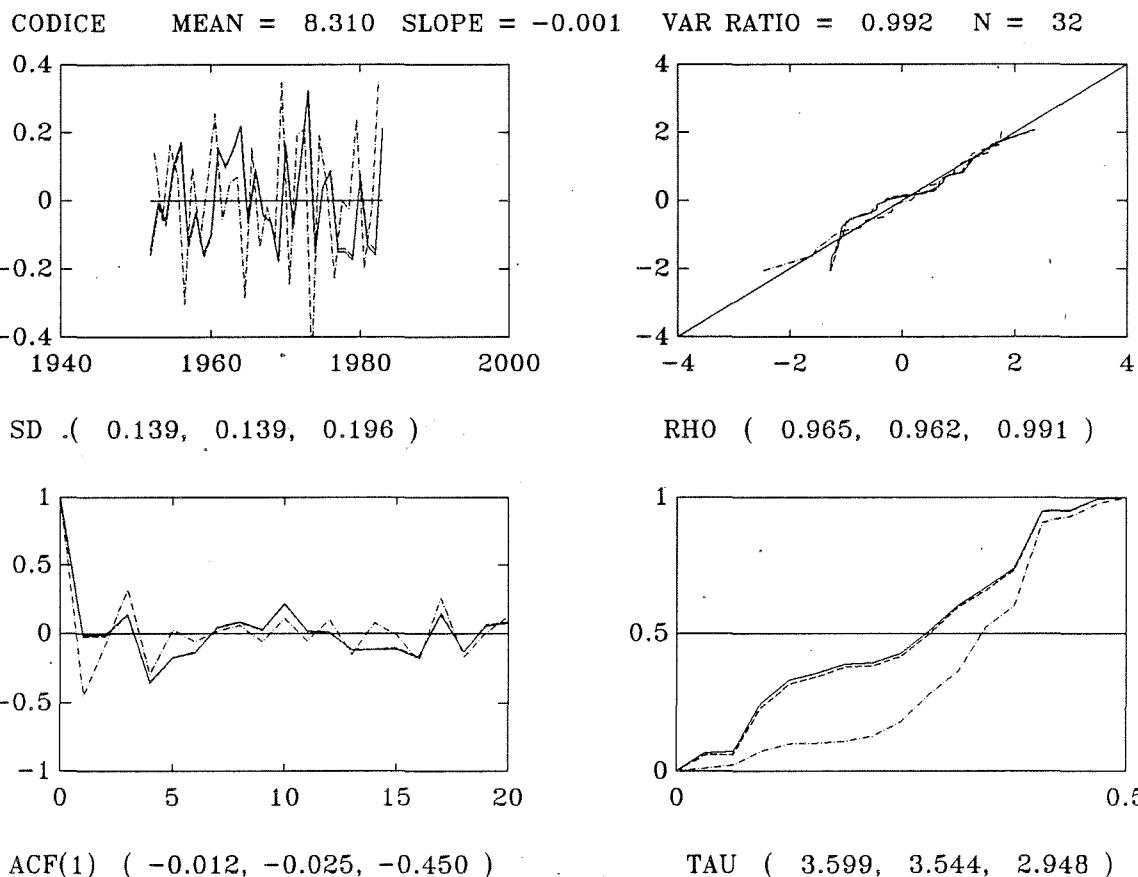
.. 5.898 5.963 5.863 40-49
 5.230 5.049 5.295 5.607 6.005 50-59
 5.676 5.524 5.891 6.184 6.112 5.230 5.049 5.295 5.607 6.005 60-69
 6.260 5.720 5.794 5.788 5.535 5.806 5.300 5.152 5.215 5.239 70-79
 5.252 5.594 5.804 5.839 80-89

COD ICELAND

CODICE

START YEAR = 52 END YEAR = 83 NUMBER OF DATA POINTS = 32
SOURCE: Marine Research Institute, Iceland, Mon Jun 20/1988.

COMMENTS: SPA, 3 year olds in actual numbers.



Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | 8.165 | 8.305 | 8.249 | 8.413 | 8.484 | 8.181 | 8.277 | 8.151 | 50-59 | |
| 8.211 | 8.467 | 8.412 | 8.463 | 8.532 | 8.247 | 8.402 | 8.267 | 8.248 | 8.132 | 60-69 | |
| 8.478 | 8.229 | 8.420 | 8.632 | 8.157 | 8.348 | 8.390 | 8.159 | 8.159 | 8.135 | 70-79 | |
| 8.376 | 8.176 | 8.151 | 8.508 | .. | .. | .. | .. | .. | .. | 80-89 | |

COD FAROE PLATEAU

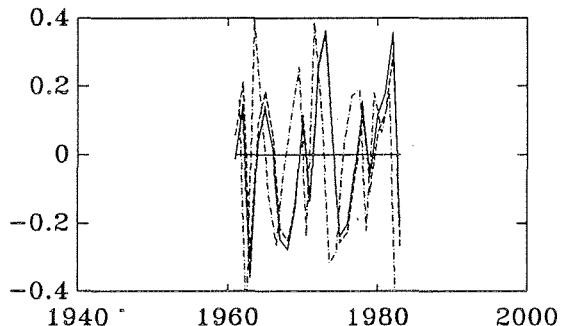
CODFAPL

START YEAR = 61 END YEAR = 83 NUMBER OF DATA POINTS = 23

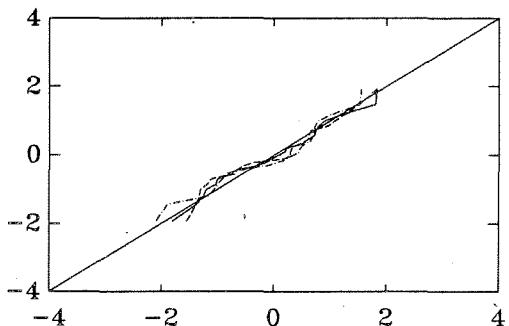
SOURCE: Report of the North-Western Working Group, ICES C.M. 1987.

COMMENTS: SPA, 1 year olds in actual numbers.

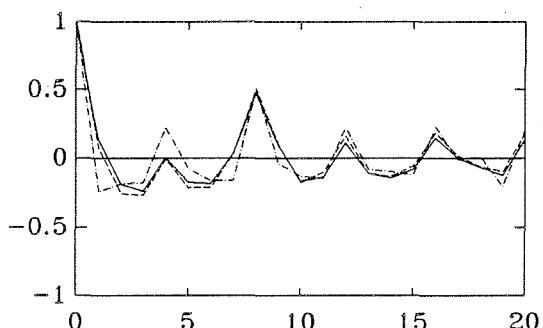
CODFAPL MEAN = 7.327 SLOPE = 0.006 VAR RATIO = 0.876 N = 23



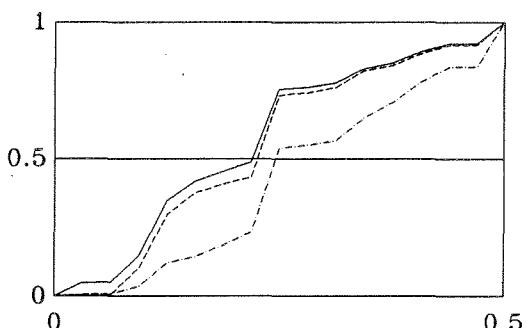
SD (0.198, 0.193, 0.262)



RHO (0.990, 0.979, 0.972)



ACF(1) (0.140, 0.076, -0.244)



TAU (4.544, 4.430, 4.063)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | 7.314 | 7.474 | 6.969 | 7.365 | 7.468 | 7.344 | 7.079 | 7.049 | 7.173 | 60-69 | |
| 7.430 | 7.190 | 7.579 | 7.689 | 7.373 | 7.089 | 7.124 | 7.295 | 7.484 | 7.261 | 70-79 | |
| 7.442 | 7.507 | 7.684 | 7.129 | .. | .. | .. | .. | .. | .. | 80-89 | |

COD VIa

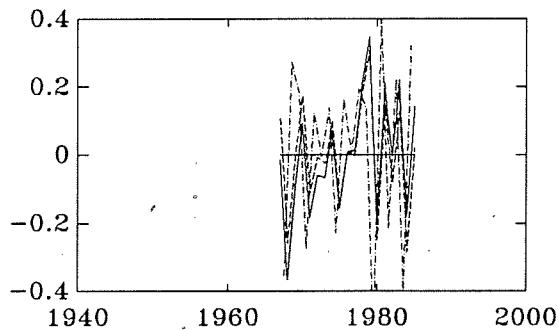
CODVIA

START YEAR = 67 END YEAR = 85 NUMBER OF DATA POINTS = 19

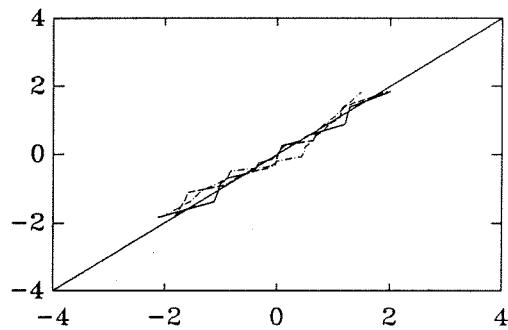
SOURCE: Report of the North Sea Roundfish Working Group, ICES C.M. 1988.

COMMENTS: SPA, 1 year olds in (000's).

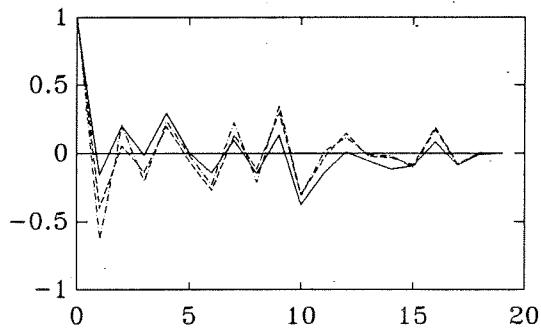
CODVIA MEAN = 3.969 SLOPE = 0.013 VAR RATIO = 1.197 N = 19



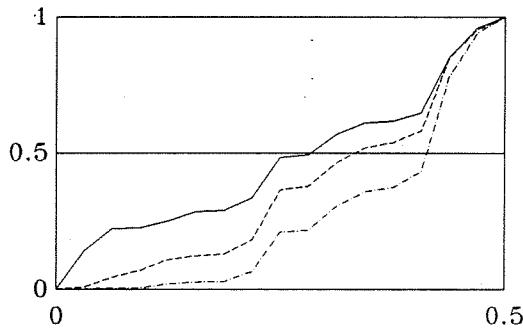
SD (0.173, 0.156, 0.268)



RHO (0.991, 0.985, 0.966)



ACF(1) (-0.154, -0.400, -0.635)



TAU (3.527, 3.004, 2.426)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | 3.954 | 3.602 | 3.875 | 60-69 | |
| 4.061 | 3.785 | 3.908 | 3.903 | 4.041 | 3.813 | 3.978 | 3.981 | 4.176 | 4.314 | 70-79 | |
| 3.775 | 4.181 | 3.967 | 4.190 | 3.791 | 4.111 | .. | .. | .. | .. | 80-89 | |

COD NORTH SEA

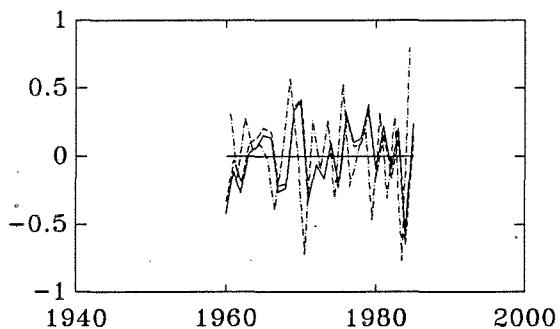
CODNS

START YEAR = 60 END YEAR = 85 NUMBER OF DATA POINTS = 26

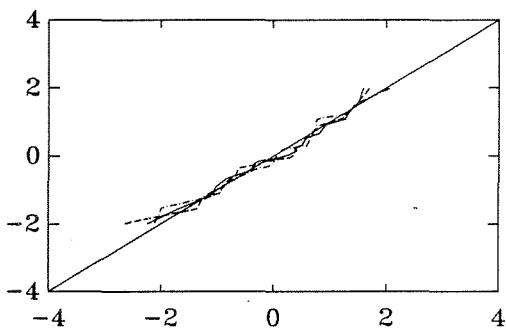
SOURCE: Report of the North Sea Roundfish Working Group. ICES C.M. 1988.

COMMENTS: SPA, 1 year olds in (000's).

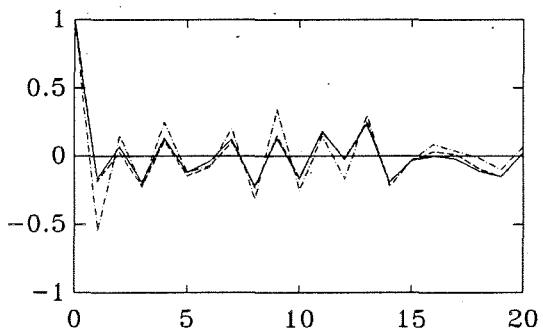
CODNS MEAN = 5.528 SLOPE = 0.007 VAR RATIO = 1.131 N = 26



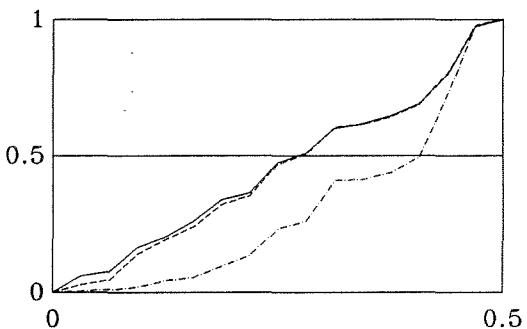
SD (0.251, 0.245, 0.378)



RHO (0.989, 0.980, 0.988)



ACF(1) (-0.164, -0.185, -0.549)



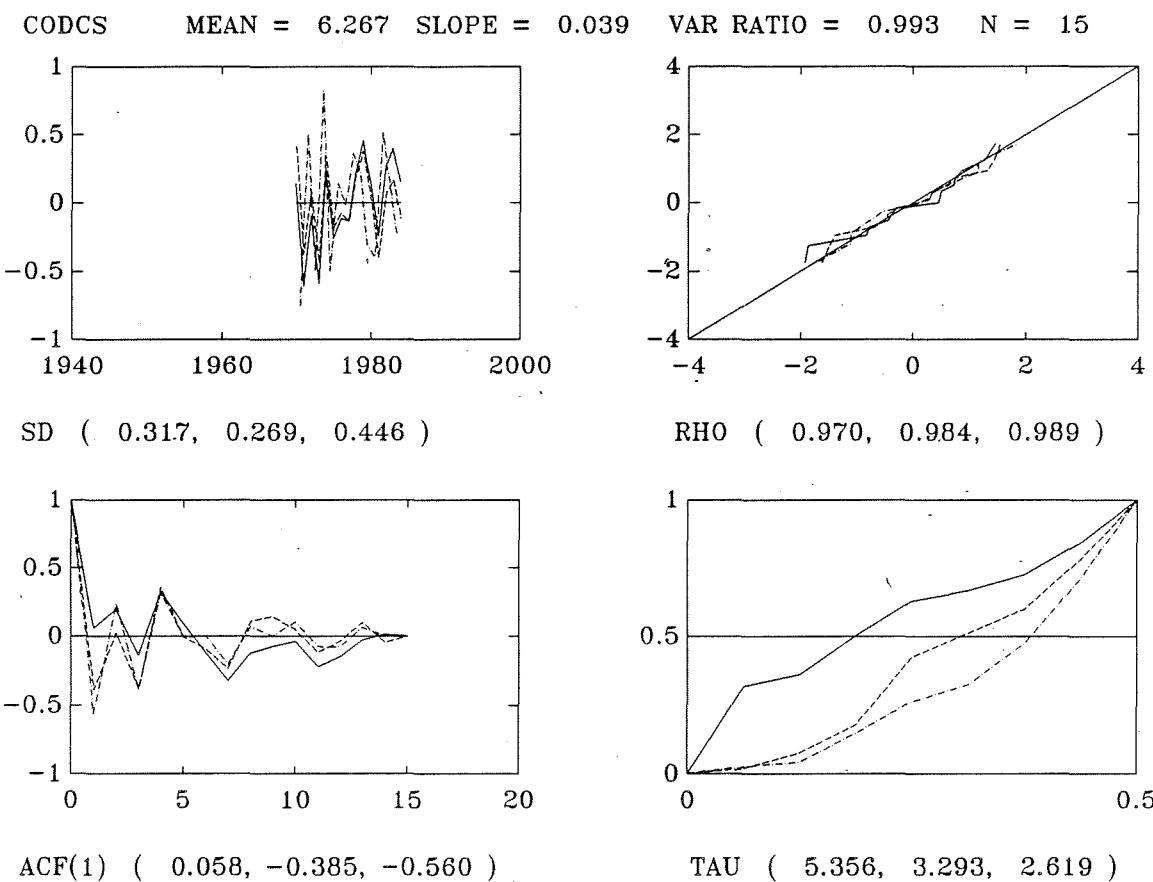
TAU (3.671, 3.602, 2.457)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| 5.107 | 5.418 | 5.263 | 5.549 | 5.594 | 5.680 | 5.664 | 5.267 | 5.295 | 5.861 | 60-69 | | |
| 5.928 | 5.204 | 5.467 | 5.369 | 5.629 | 5.316 | 5.851 | 5.631 | 5.658 | 5.903 | 70-79 | | |
| 5.435 | 5.748 | 5.438 | 5.732 | 4.966 | 5.764 | .. | .. | .. | .. | 80-89 | | |

COD CELTIC SEA (VIIIf & VIIg)
 START YEAR = 70 END YEAR = 84 NUMBER OF DATA POINTS = 15
 SOURCE: Report of the Irish Sea and Bristol Channel Working Group,
 ICES C.M. 1987.
 COMMENTS: SPA, 1 year olds in actual numbers.

CODCS



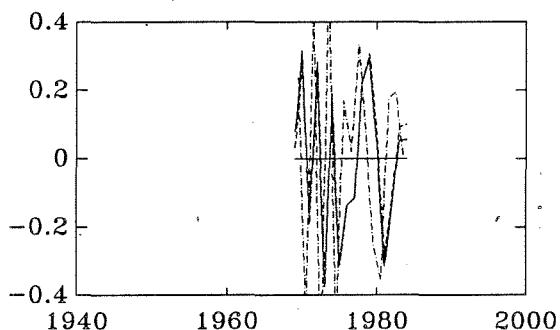
Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| 6.410 | 5.660 | 6.169 | 5.677 | 6.502 | 6.008 | 6.151 | 6.133 | 6.495 | 6.728 | 70-79 | |
| 6.417 | 6.023 | 6.539 | 6.666 | 6.422 | .. | .. | .. | .. | .. | .. | 80-89 |

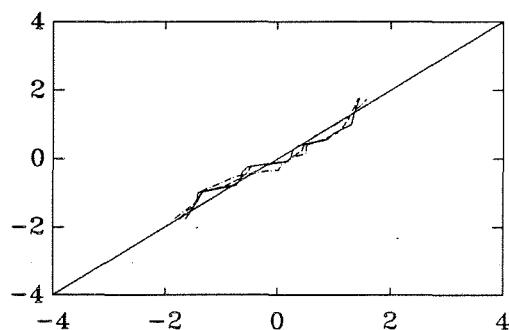
COD IRISH SEA (VIIa)
 START YEAR = 69 END YEAR = 84 NUMBER OF DATA POINTS = 16
 SOURCE: Report of the Irish Sea and Bristol Channel Working Group,
 ICES C.M. 1987.
 COMMENTS: SPA, 1 year olds in actual numbers.

CODIS

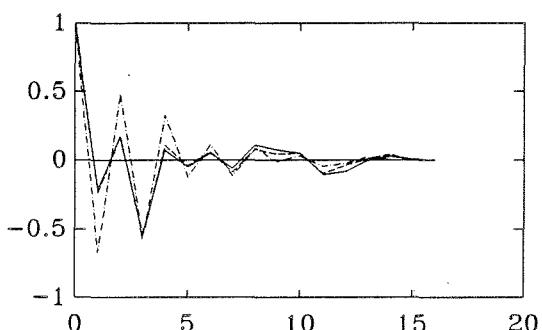
CODIS MEAN = 6.780 SLOPE = -0.006 VAR RATIO = 1.290 N = 16



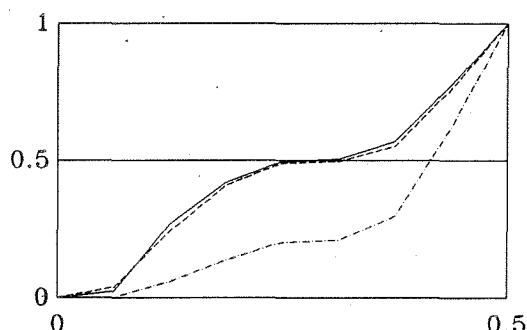
SD (0.217, 0.216, 0.349)



RHO (0.975, 0.979, 0.977)



ACF(1) (-0.215, -0.236, -0.672)

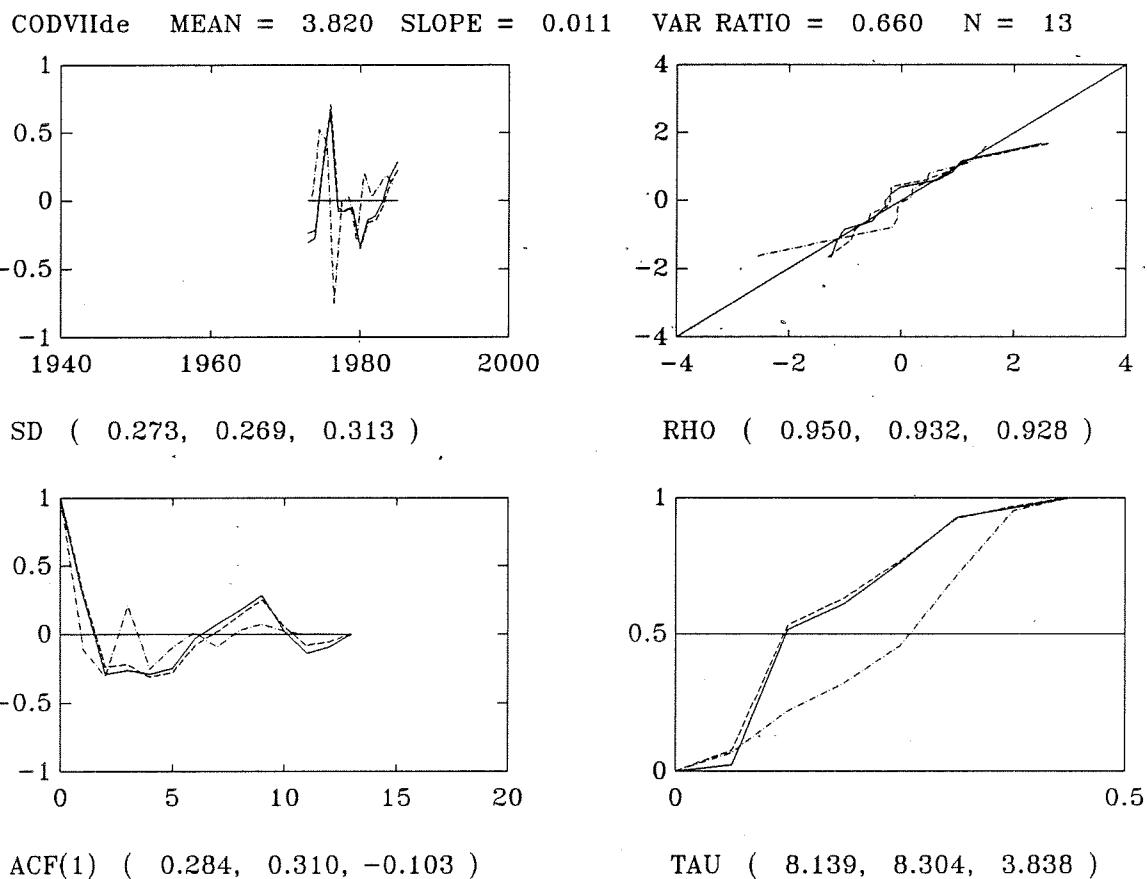


TAU (3.655, 3.158, 2.414)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 6.858 60-69 |
| 7.095 | 6.620 | 7.061 | 6.425 | 6.970 | 6.473 | 6.644 | 6.663 | 6.996 | 7.070 | 70-79 | |
| 6.819 | 6.466 | 6.641 | 6.834 | 6.836 | .. | .. | .. | .. | .. | .. | 80-89 |

COD VIIde CODVIIde
 START YEAR = 73 END YEAR = 85 NUMBER OF DATA POINTS = 13
 SOURCE: Report of the North Sea Roundfish Working Group, ICES C.M. 1988.
 COMMENTS: SPA, 1 year olds in (000's).



Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| .. | .. | .. | 3.512 | 3.544 | 4.070 | 4.495 | 3.744 | 3.742 | 3.770 | 70-79 | |
| 3.480 | 3.681 | 3.707 | 3.812 | 4.000 | 4.108 | .. | .. | .. | .. | .. | 80-89 |

COD KATTEGAT

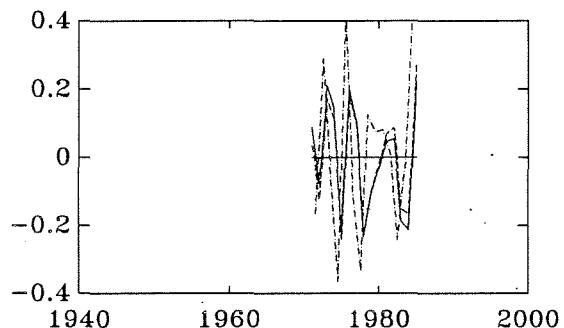
CODKAT

START YEAR = 71 END YEAR = 85 NUMBER OF DATA POINTS = 15

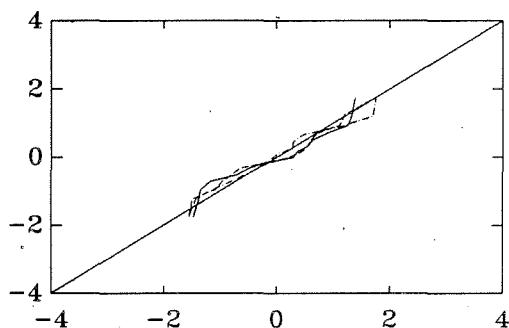
SOURCE: Report of the Division IIIa Demersal Stocks Working Groups, ICES
C.M.1987.

COMMENTS: SPA, 1 year olds in (000's).

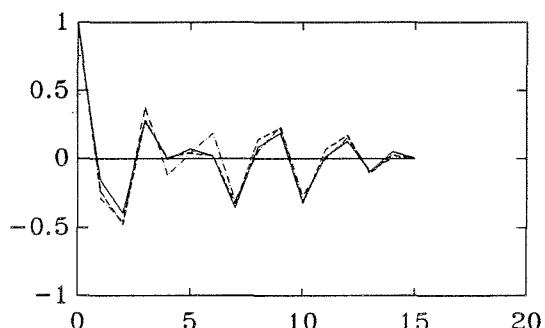
CODKAT MEAN = 4.268 SLOPE = -0.008 VAR RATIO = 1.157 N = 15



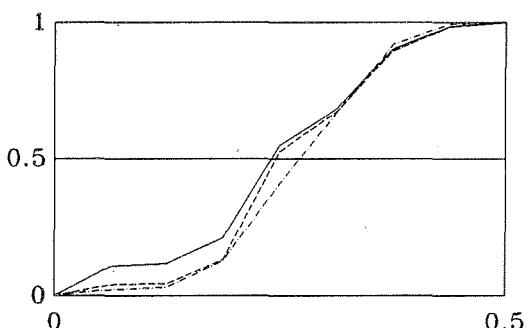
SD (0.159, 0.156, 0.242)



RHO (0.968, 0.983, 0.985)



ACF(1) (-0.155, -0.238, -0.288)



TAU (4.147, 4.068, 3.678)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| .. | 4.357 | 4.191 | 4.480 | 4.414 | 4.050 | 4.470 | 4.370 | 4.035 | 4.159 | 70-79 | |
| 4.234 | 4.315 | 4.325 | 4.082 | 4.055 | 4.489 | .. | .. | .. | .. | .. | 80-89 |

COD SKAGERRAK

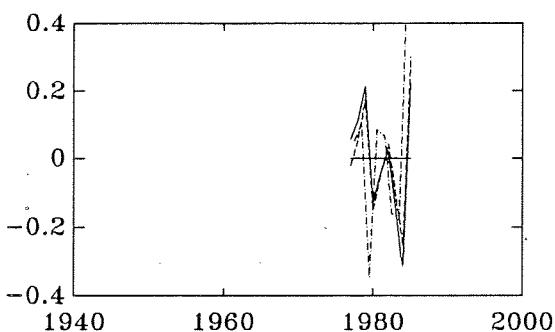
CODSKAG

START YEAR = 77 END YEAR = 85 NUMBER OF DATA POINTS = 9

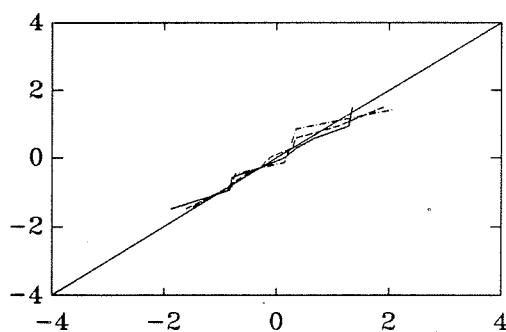
SOURCE: Report of the Division IIIa Demersal Stocks Working Groups, ICES
C.M.1987.

COMMENTS: SPA, 1 year olds in actual numbers.

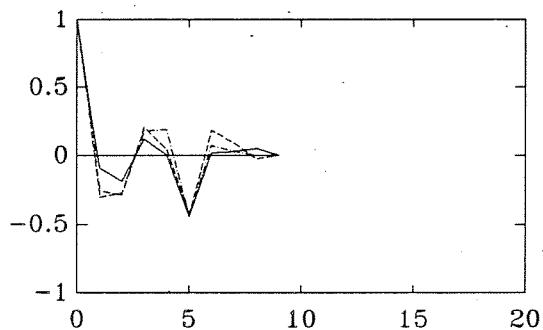
CODSKAG MEAN = 7.278 SLOPE = -0.019 VAR RATIO = 1.101 N = 9



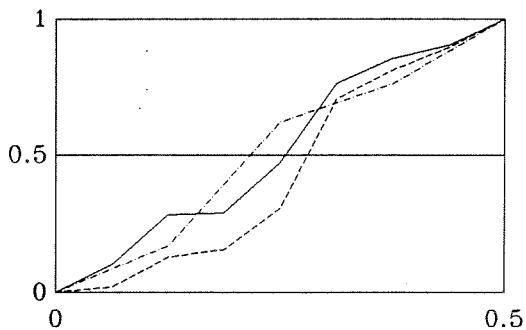
SD (0.166, 0.158, 0.246)



RHO (0.983, 0.990, 0.945)



ACF(1) (-0.093, -0.305, -0.253)



TAU (3.906, 3.568, 4.614)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|----|-------|-------|-------|----|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 70-79 |
| 7.147 | 7.233 | 7.301 | 7.141 | 6.966 | 7.501 | .. | 7.336 | 7.389 | 7.492 | .. | 80-89 |

COD BALTIC AREAS 22&24

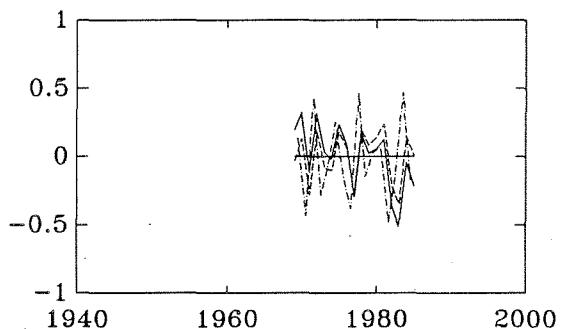
CODBA2224

START YEAR = 69 END YEAR = 85 NUMBER OF DATA POINTS = 17

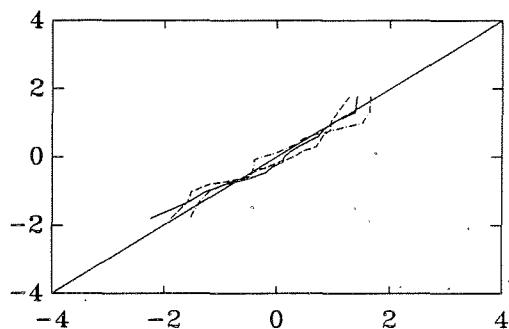
SOURCE: Report of the Working Group on Assessment of Demersal Stocks in the Baltic ICES C.M. 1988.

COMMENTS: SPA, 1 year olds in (000's).

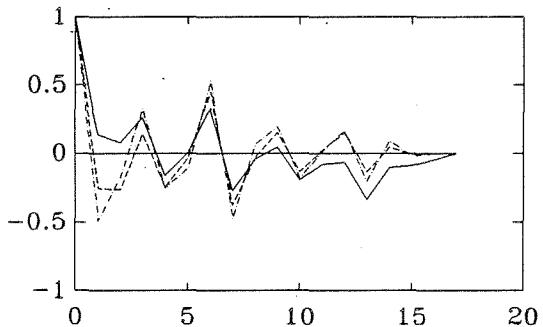
CODBA2224 MEAN = 4.838 SLOPE = -0.028 VAR RATIO = 0.859 N = 17



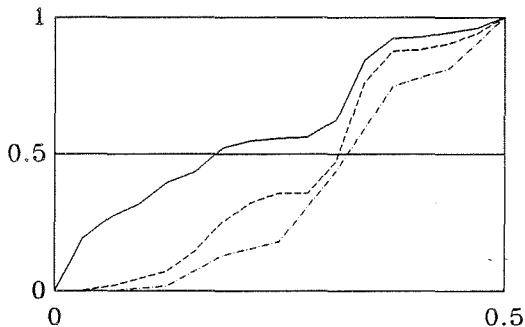
SD (0.230, 0.185, 0.301)



RHO (0.979, 0.960, 0.978)



ACF(1) (0.140, -0.251, -0.494)



TAU (5.586, 3.173, 3.078)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|-------------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 5.028 60-69 |
| 5.161 | 4.724 | 5.155 | 4.869 | 4.820 | 5.072 | 4.924 | 4.544 | 5.009 | 4.862 | 70-79 | | |
| 4.892 | 4.964 | 4.477 | 4.322 | 4.792 | 4.623 | .. | .. | .. | .. | .. | .. | 80-89 |

COD BALTIC AREAS 25-32

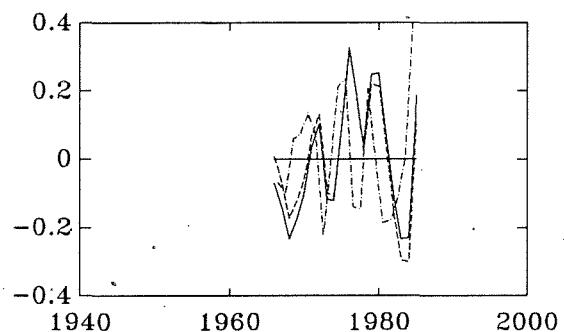
CODBA2532

START YEAR = 66 END YEAR = 85 NUMBER OF DATA POINTS = 20

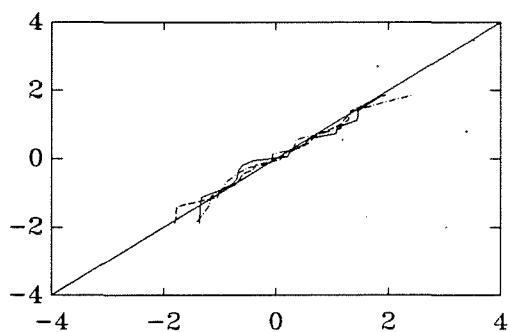
SOURCE: Report of the Working Group on Assessment of Demersal Stocks in the Baltic ICES C.M. 1988.

COMMENTS: SPA, 1 year olds in (000's).

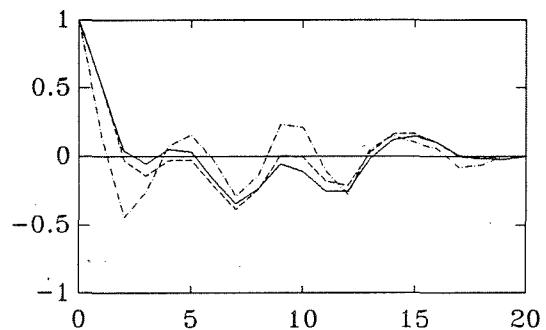
CODBA2532 MEAN = 5.649 SLOPE = 0.008 VAR RATIO = 0.466 N = 20



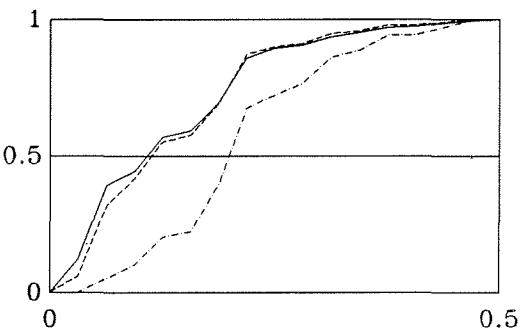
SD (0.172, 0.166, 0.167)



RHO (0.974, 0.993, 0.976)



ACF(1) (0.521, 0.510, 0.138)



TAU (9.297, 8.865, 5.025)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | 5.580 | 5.512 | 5.415 | 5.473 | .. | 60-69 |
| 5.546 | 5.683 | 5.752 | 5.531 | 5.529 | 5.740 | 5.976 | 5.837 | 5.692 | 5.896 | 70-79 | .. | .. |
| 5.900 | 5.714 | 5.535 | 5.417 | 5.420 | 5.835 | .. | .. | .. | .. | .. | .. | 80-89 |

GREENLAND HALIBUT V&XIV

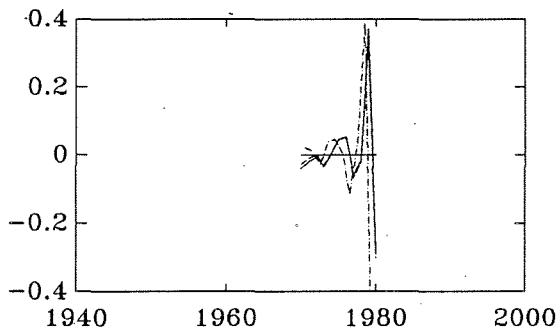
GHALV&XIV

START YEAR = 70 END YEAR = 80 NUMBER OF DATA POINTS = 11

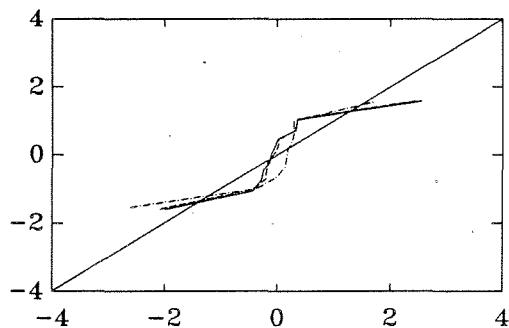
SOURCE: Report of the North-Western Working Group, ICES C.M. 1987.

COMMENTS: SPA, 5 year olds in actual numbers.

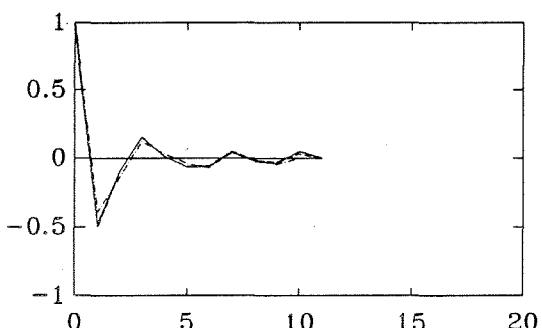
GHALV&XIV MEAN = 7.429 SLOPE = 0.003 VAR RATIO = 1.412 N = 11



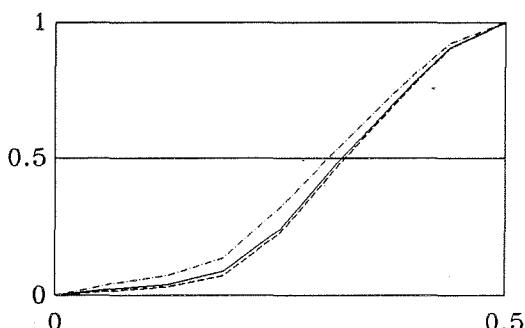
SD (-0.146, 0.146, 0.245)



RHO (-0.871, -0.873, -0.844)



ACF(1) (-0.480, -0.502, -0.390)



TAU (3.148, 3.113, 3.303)

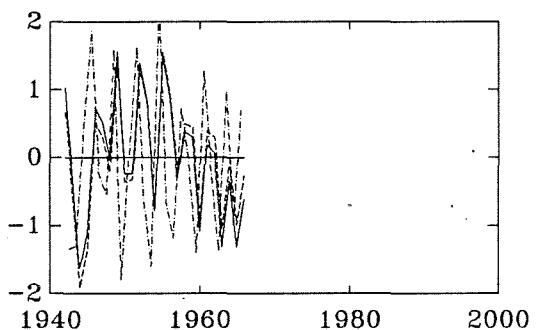
Log Transformed (base 10) Recruitment Data

HADDOCK 3NO1 (First part of HAD3NO)
START YEAR = 42 END YEAR = 66 NUMBER OF DATA POINTS = 25
SOURCE: Templeman et al., ICNAF Res. Bull. 13, 1978.

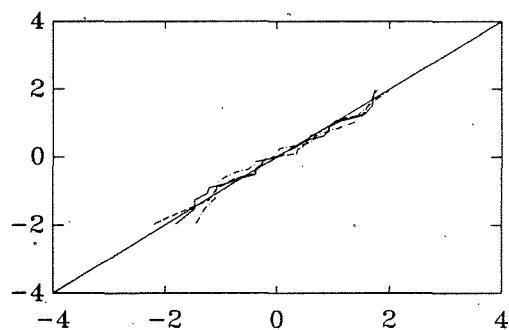
HAD3N01

COMMENTS: RV(5+7).

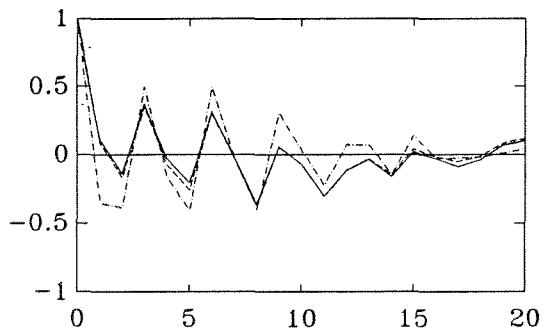
HAD3NO1 MEAN = 1.317 SLOPE = -0.030 VAR RATIO = 0.888 N = 25



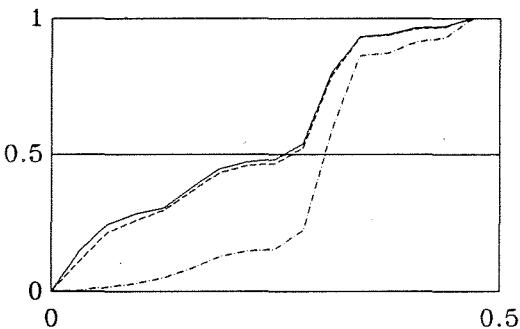
SD (0.898, 0.873, 1.197)



RHO (0.991, 0.993, 0.977)



ACF(1) (-0.109, 0.082, -0.352)



TAU (3.849, 3.726, 3.280)

Log Transformed (base 10) Recruitment Data

.. .. 2.346 1.000 -0.301 0.204 2.064 1.833 1.279 2.874 40-49
 1.079 1.079 2.710 2.134 0.531 2.836 2.161 0.978 1.699 1.624 50-59
 0.230 1.505 1.380 0.000 0.978 0.000 0.699 60-69
 70-79
 80-89

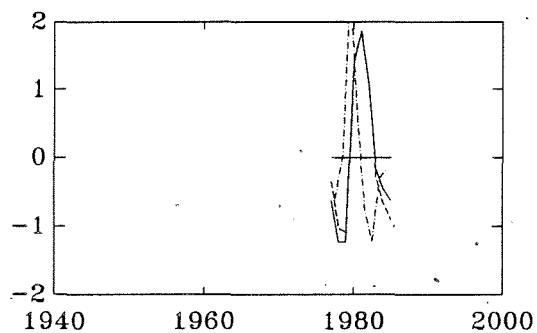
HADDOCK 3NO2 (Second part of HAD3NO)

HAD3NO2

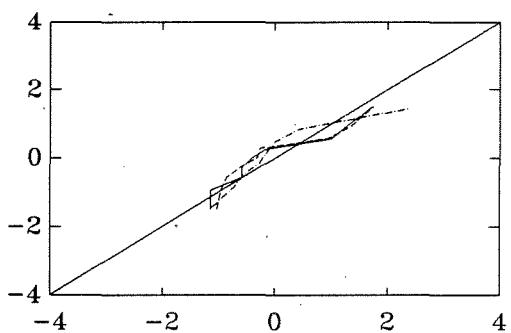
START YEAR = 77 END YEAR = 85 NUMBER OF DATA POINTS = 9
SOURCE: Bishop, Baird, Hicks, CAFSAC Res. Doc. 87/48.

COMMENTS: RV(1+2) index * 1000.

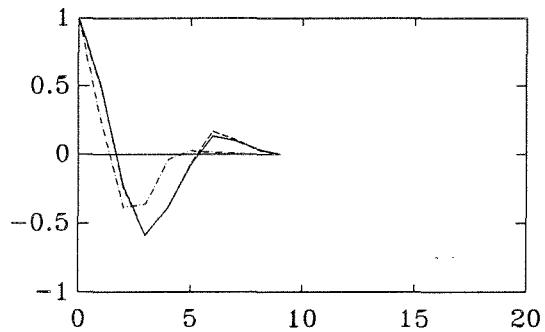
HAD3NO2 MEAN = 2.228 SLOPE = 0.070 VAR RATIO = 0.513 N = 9



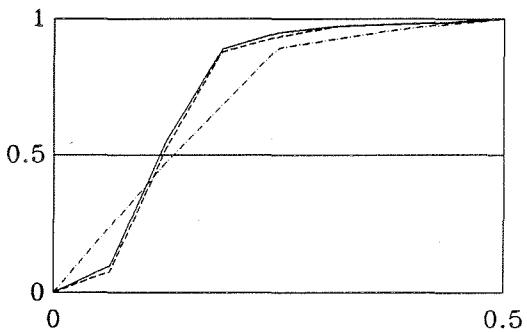
SD (1.081, 1.066, 1.095)



RHO (0.948, 0.932, 0.901)



ACF(1) (0.506, 0.483, 0.236)



TAU (8.487, 8.255, 7.557)

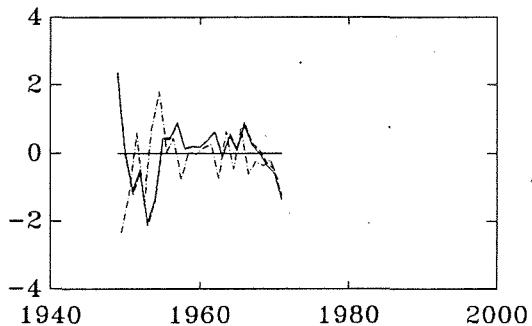
Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|----|----|-------|-------|-------|----|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 70-79 |
| 3.602 | 4.087 | 3.301 | 2.079 | 1.778 | 1.602 | .. | .. | 1.602 | 1.000 | 1.000 | .. | 80-89 |

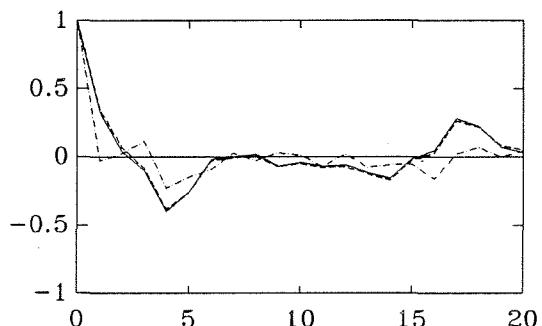
HADDOCK 3Ps1 (First part of HAD3Ps) HAD3Ps1
START YEAR = 49 END YEAR = 71 NUMBER OF DATA POINTS = 23
SOURCE: Templeman et al., ICNAF Res. Bull. 14, 1979.

COMMENTS: RV(2-4).

HAD3Ps1 MEAN = 1.063 SLOPE = -0.011 VAR RATIO = 0.469 N = 23

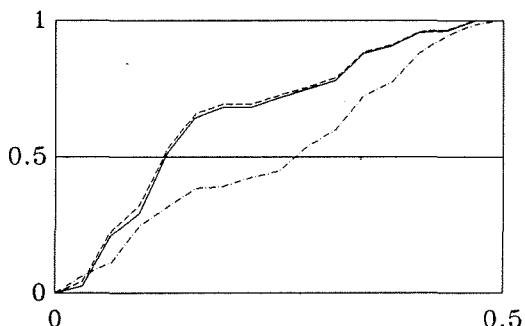


SD (-0.896, -0.893, -0.867)



ACF(1) (-0.332, 0.353, -0.032)

RHO (0.961, 0.962, 0.982)



TAU (8.129, 8.307, 3.728)

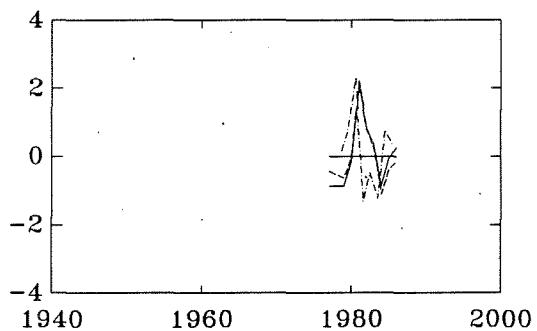
Log Transformed (base 10) Recruitment Data

HADDOCK 3Ps2 (Second part of HAD3Ps)
 START YEAR = 77 END YEAR = 86 NUMBER OF DATA POINTS = 10
 SOURCE: Bishop, Baird, Hicks, CAFSAC Res. Doc. 87/48.

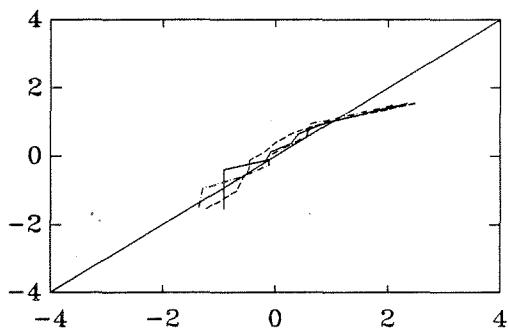
HAD3Ps2

COMMENTS: RV(1+2) index*1000.

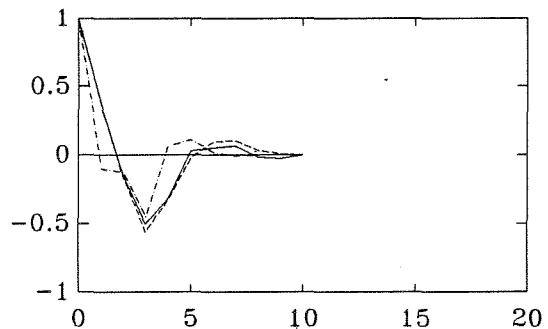
HAD3Ps2 MEAN = 1.855 SLOPE = 0.096 VAR RATIO = 0.642 N = 10



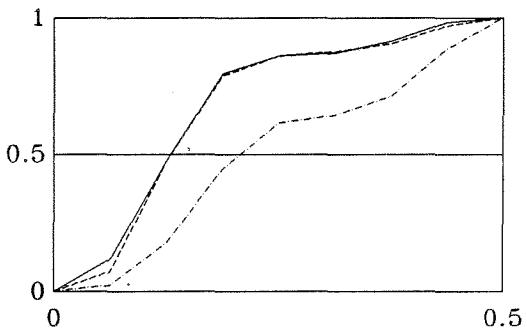
SD (0.925, 0.884, 1.048)



RHO (0.922, 0.914, 0.967)



ACF(1) (0.368, 0.353, -0.102)



TAU (7.689, 7.669, 4.821)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|----|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| .. | .. | .. | .. | .. | .. | .. | .. | 1.000 | 1.000 | 1.000 | 1.000 | 70-79 |
| 1.699 | 4.016 | 2.708 | 2.230 | 1.000 | 1.778 | 2.114 | .. | .. | .. | .. | .. | 80-89 |

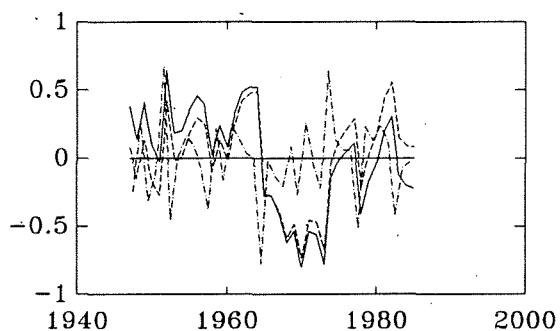
HADDOCK 4TVW

START YEAR = 47 END YEAR = 85 NUMBER OF DATA POINTS = 39
SOURCE: Zwanenburg and Fanning, CAFSAC Res. Doc. 88/76.

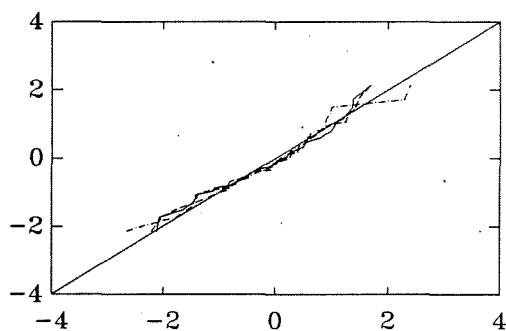
HAD4TVW

COMMENTS: SPA, 1 year olds in (000's).

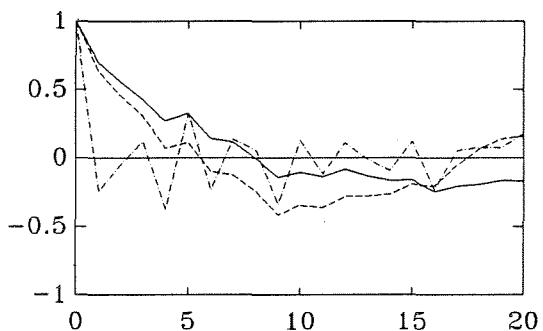
HAD4TVW MEAN = 4.443 SLOPE = -0.016 VAR RATIO = 0.287 N = 39



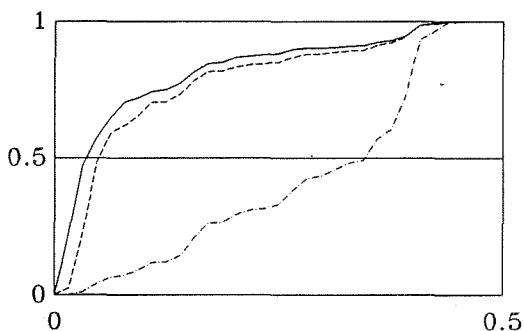
SD (0.378, 0.332, 0.287)



RHO (0.986, 0.986, 0.982)



ACF(1) (0.702, 0.636, -0.249)



TAU (28.091, 20.309, 2.894)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | 4.826 | 4.583 | 4.850 | 40-49 |
| 4.533 | 4.414 | 5.085 | 4.629 | 4.644 | 4.808 | 4.900 | 4.840 | 4.467 | 4.683 | 50-59 |
| 4.524 | 4.768 | 4.927 | 4.963 | 4.962 | 4.183 | 4.168 | 4.032 | 3.823 | 3.907 | 60-69 |
| 3.643 | 3.907 | 3.880 | 3.660 | 4.300 | 4.434 | 4.492 | 4.555 | 4.036 | 4.266 | 70-79 |
| 4.396 | 4.636 | 4.745 | 4.323 | 4.248 | 4.221 | .. | .. | .. | .. | 80-89 |

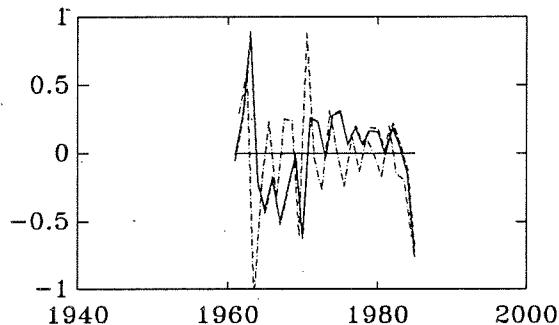
HADDOCK 4X

START YEAR = 61 END YEAR = 85 NUMBER OF DATA POINTS = 25
 SOURCE: O'Boyle, Simon, Frank, CAFSAC Res. Doc. 88/72.

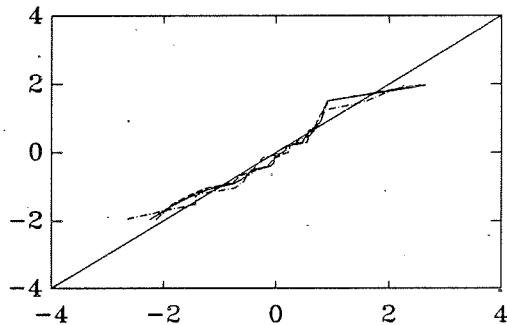
HAD4X

COMMENTS: SPA, 1 year olds in (000's).

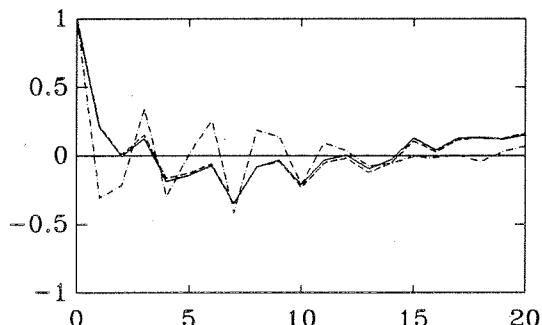
HAD4X MEAN = 4.411 SLOPE = -0.004 VAR RATIO = 0.715 N = 25



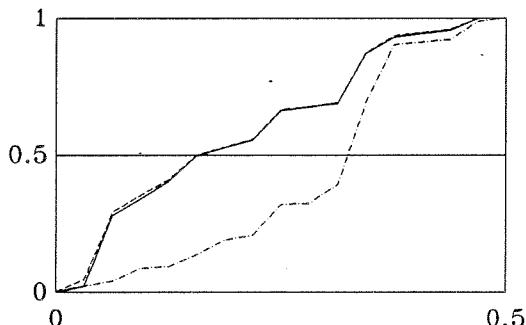
SD (0.337, 0.336, 0.403)



RHO (0.966, 0.967, 0.976)



ACF(1) (0.209, 0.215, -0.307)



TAU (6.326, 6.381, 3.088)

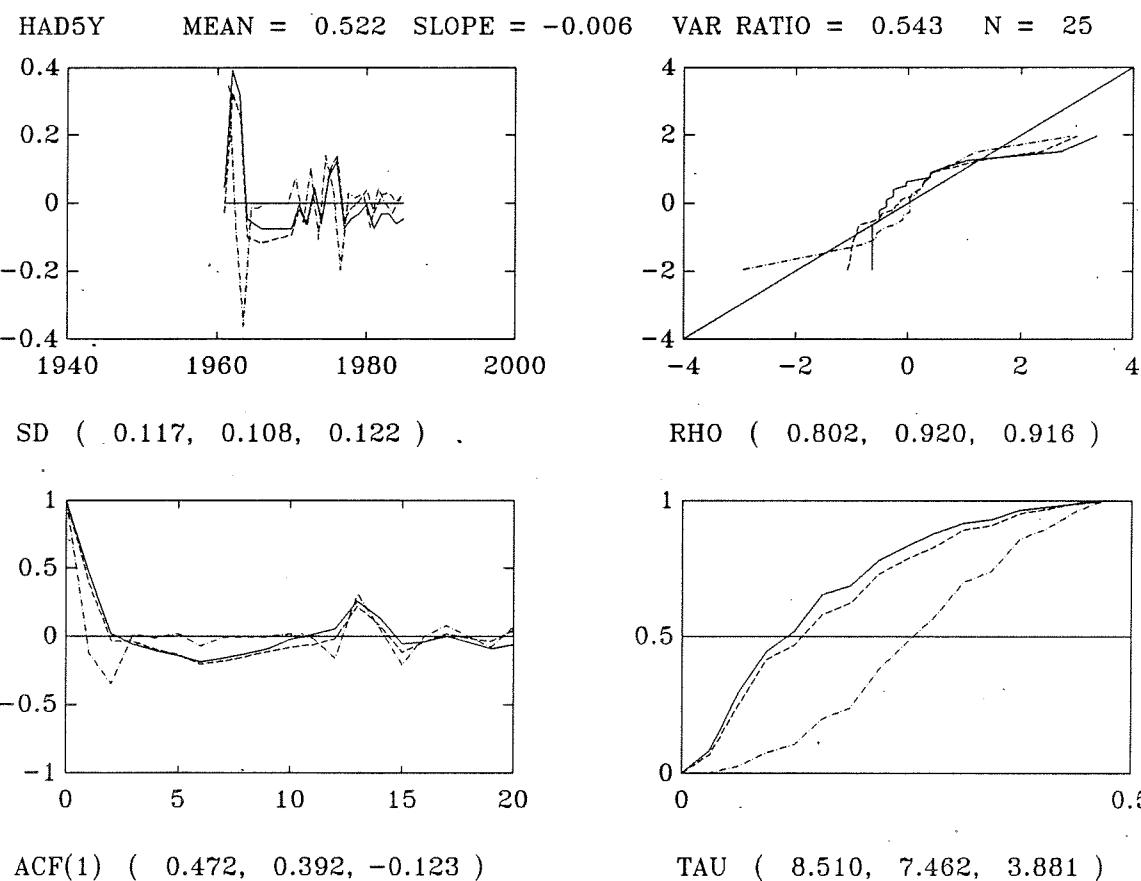
Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | 4.398 | 4.692 | 5.303 | 4.208 | 4.003 | 4.240 | 3.907 | 4.160 | 4.402 | 60-69 | |
| 3.795 | 4.675 | 4.646 | 4.375 | 4.688 | 4.716 | 4.471 | 4.601 | 4.469 | 4.576 | 70-79 | |
| 4.570 | 4.399 | 4.602 | 4.453 | 4.261 | 3.652 | .. | .. | .. | .. | 80-89 | |

HADDOCK 5Y
 START YEAR = 61 END YEAR = 85 NUMBER OF DATA POINTS = 25
 SOURCE: Woods Hole Ref. Doc. 86/09.

HAD5Y

COMMENTS: RV(0-2).

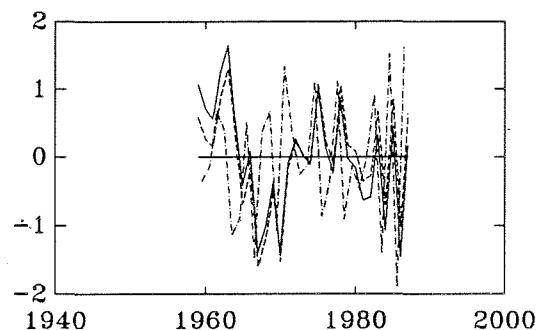


Log Transformed (base 10) Recruitment Data

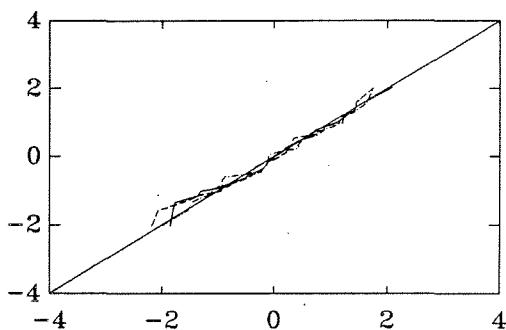
| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | 0.568 | 0.914 | 0.839 | 0.477 | 0.462 | 0.447 | 0.447 | 0.447 | 0.447 | 0.447 | 60-69 |
| 0.447 | 0.519 | 0.462 | 0.568 | 0.462 | 0.602 | 0.643 | 0.447 | 0.477 | 0.491 | 70-79 | |
| 0.519 | 0.447 | 0.491 | 0.491 | 0.462 | 0.477 | .. | .. | .. | .. | .. | 80-89 |

HADDOCK 5Z HAD5Z
START YEAR = 59 END YEAR = 87 NUMBER OF DATA POINTS = 29
SOURCE: 63-85: Gavaris, CAFSAC Res. Doc. 87/101, 59-81: Woods Hole Ref. Doc.
83-23. Updated by Gavaris, CAFSAC Res. Doc. 88/64.
COMMENTS: SPA, 1 year olds in (000 000's).

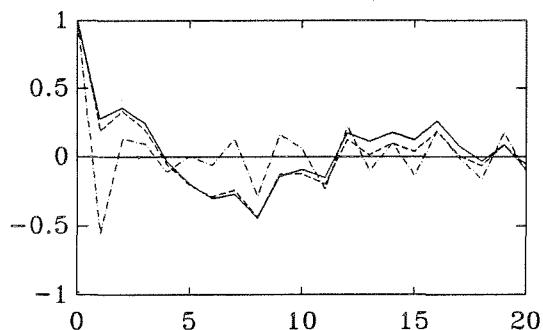
HAD5Z MEAN = 4.026 SLOPE = -0.034 VAR RATIO = 0.710 N = 29



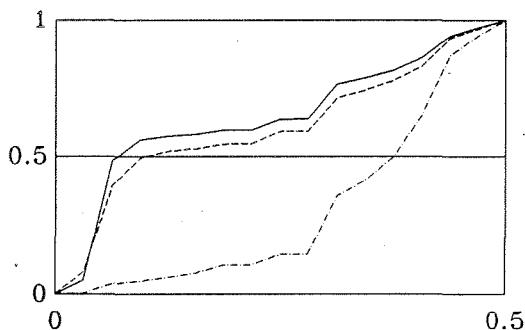
SD (-0.791, 0.737, 0.942)



RHO (0.992, 0.987, 0.993)



ACF(1) (-0.282, 0.187, -0.558)



TAU (14.480, 9.904, 2.663)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 5.090 | 50-59 | |
| 4.732 | 4.588 | 5.275 | 5.670 | 4.524 | 3.610 | 4.113 | 2.627 | 2.995 | 3.670 | 60-69 | | |
| 2.599 | 3.933 | 4.291 | 4.033 | 3.913 | 5.022 | 4.157 | 3.786 | 4.901 | 3.994 | 70-79 | | |
| 3.868 | 3.395 | 3.440 | 4.351 | 2.950 | 4.467 | 2.563 | 4.186 | .. | .. | 80-89 | | |

HADDOCK NORTH-EAST ARCTIC

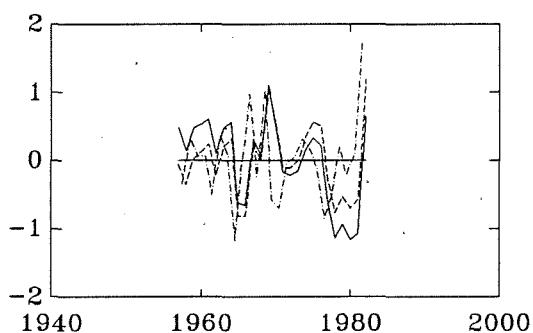
HADNEAR

START YEAR = 57 END YEAR = 82 NUMBER OF DATA POINTS = 26

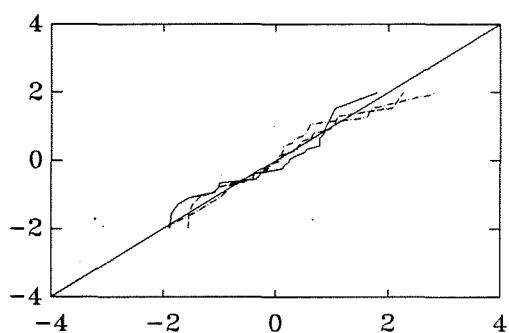
SOURCE: Report of the Arctic Fisheries Working Group, ICES C.M. 1988.

COMMENTS: SPA, 3 year olds in (000's).

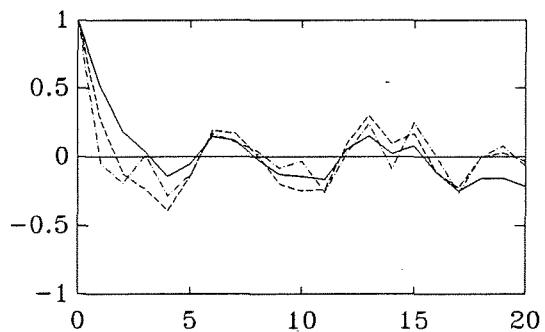
HADNEAR MEAN = 4.901 SLOPE = -0.043 VAR RATIO = 0.480 N = 266



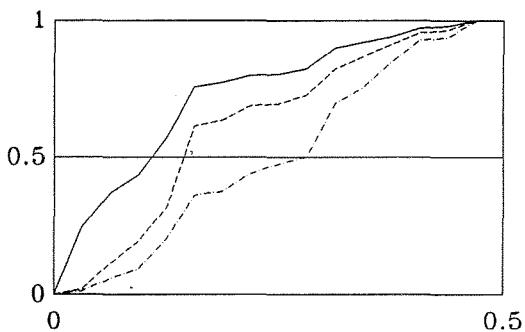
SD (-0.617, 0.526, 0.605)



RHO (0.964, 0.985, 0.967)



ACF(1) (-0.506, 0.262, -0.048)



TAU (9.192, 6.929, 3.567)

Log Transformed (base 10) Recruitment Data

HADDOCK ICELAND

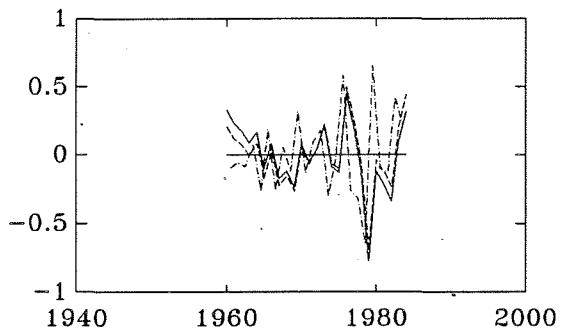
HADICE

START YEAR = 60 END YEAR = 84 NUMBER OF DATA POINTS = 25

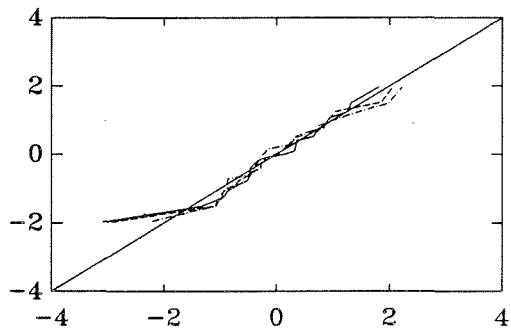
SOURCE: Marine Research Institute, Iceland, Mon Jun 20/1988. from Einar Jonsson.

COMMENTS: SPA, 2 year olds in actual numbers.

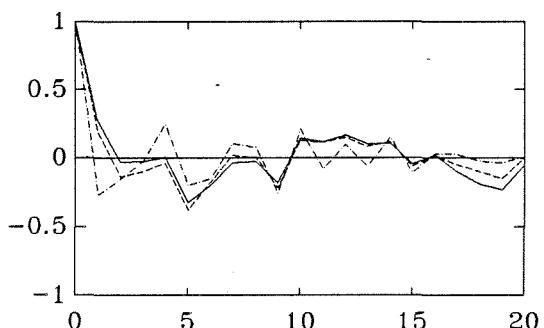
HADICE MEAN = 7.726 SLOPE = -0.010 VAR RATIO = 0.694 N = 25



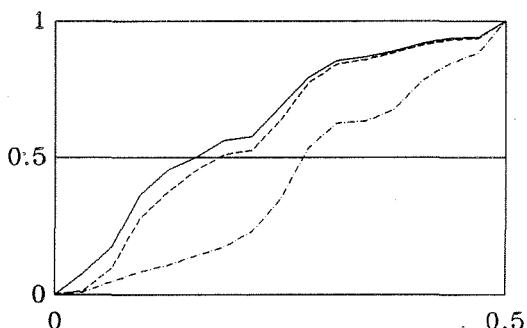
SD (0.251, 0.239, 0.295)



RHO (0.964, 0.969, 0.979)



ACF(1) (0.267, 0.185, -0.275)



TAU (6.387, 5.496, 3.629)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| 8.057 | 7.961 | 7.901 | 7.814 | 7.890 | 7.622 | 7.810 | 7.553 | 7.609 | 7.489 | 60-69 | |
| 7.805 | 7.670 | 7.763 | 7.944 | 7.639 | 7.596 | 8.181 | 7.922 | 7.604 | 6.950 | 70-79 | |
| 7.609 | 7.510 | 7.387 | 7.813 | 8.044 | .. | .. | .. | .. | .. | 80-89 | |

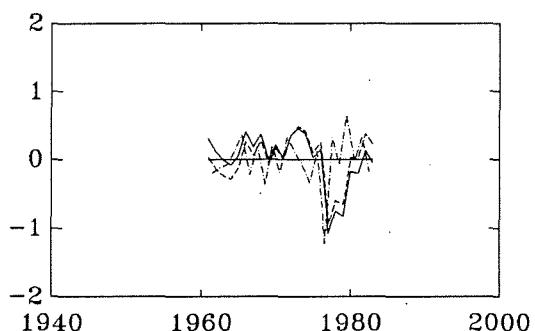
HADDOCK FAROE PLATEAU

HADFAPL

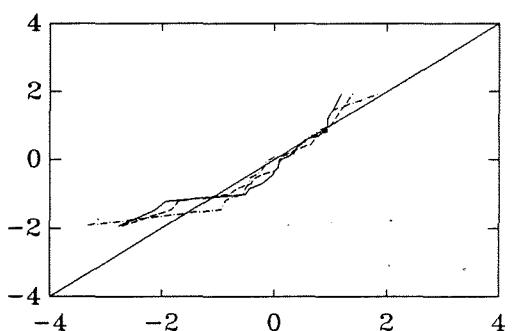
START YEAR = 61 END YEAR = 83 NUMBER OF DATA POINTS = 23
SOURCE: Report of the North-Western Working Group, ICES C.M. 1987.

COMMENTS: SPA, 1 year olds in actual numbers.

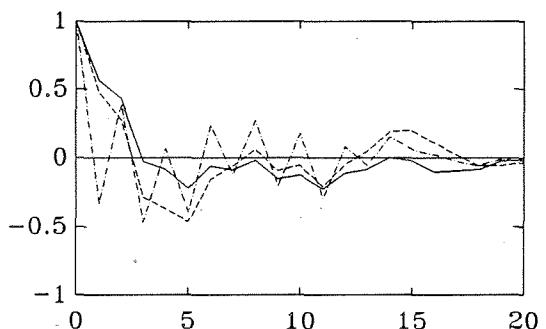
HADFAPL MEAN = 7.460 SLOPE = -0.025 VAR RATIO = 0.440 N = 23



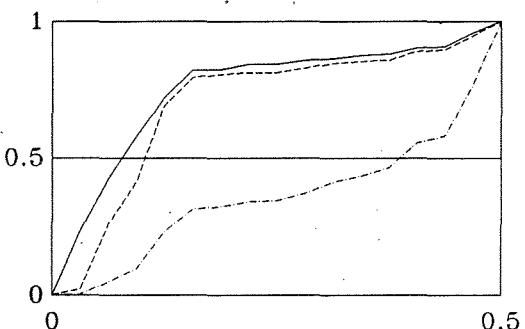
SD (-0.389, 0.352, 0.365)



RHO (0.915, 0.956, 0.930)



ACF(1) (-0.565, 0.474, -0.335)



TAU (12.897, 9.678, 2.585)

Log Transformed (base 10) Recruitment Data

HADDOCK VIa

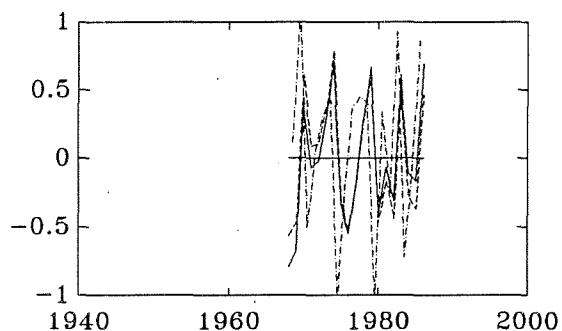
HADVIA

START YEAR = 68 END YEAR = 86 NUMBER OF DATA POINTS = 19

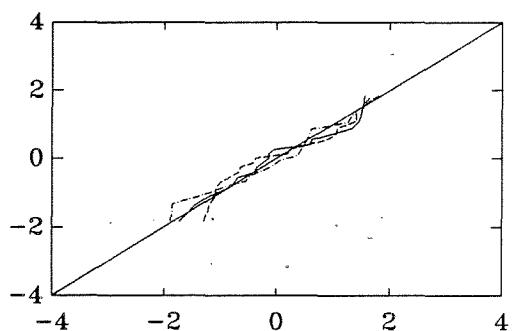
SOURCE: Report of the North Sea Roundfish Working Group. ICES C.M. 1988.

COMMENTS: SPA, 0 year olds in (000's).

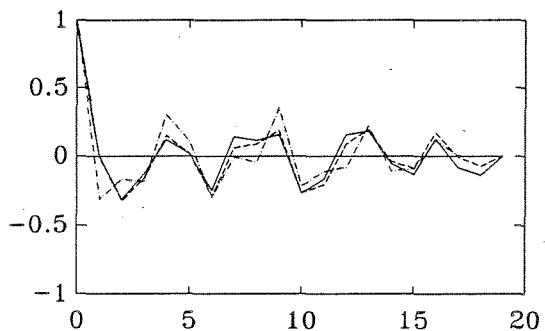
HADVIA MEAN = 5.070 SLOPE = 0.025 VAR RATIO = 0.891 N = 19



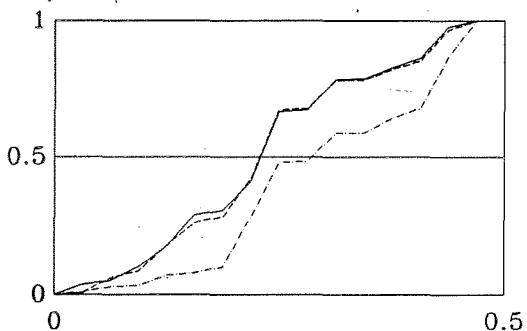
SD (0.459, 0.438, 0.613)



RHO (0.980, 0.963, 0.982)



ACF(1) (0.002, -0.010, -0.310)



TAU (4.353, 4.376, 3.491)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 4.279 | 4.395 | 60-69 |
| 5.505 | 5.004 | 5.048 | 5.357 | 5.783 | 4.725 | 4.518 | 4.889 | 5.342 | 5.737 | 70-79 | | |
| 4.668 | 5.006 | 4.756 | 5.682 | 4.961 | 4.905 | 5.764 | .. | .. | .. | .. | .. | 80-89 |

HADDOCK NORTH SEA

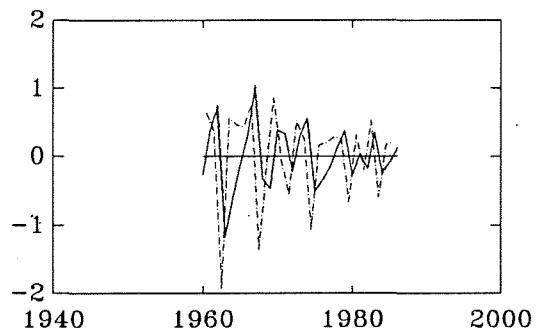
HADNS

START YEAR = 60 END YEAR = 86 NUMBER OF DATA POINTS = 27

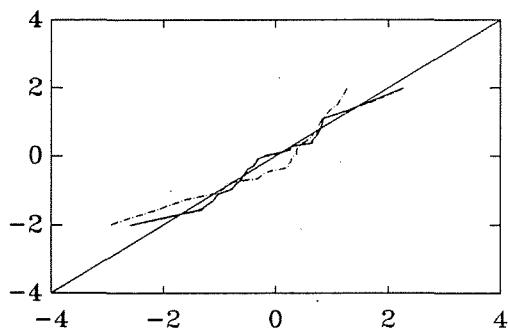
SOURCE: Report of the North Sea Roundfish Working Group. ICES C.M. 1988.

COMMENTS: SPA, 0 year olds in (000's).

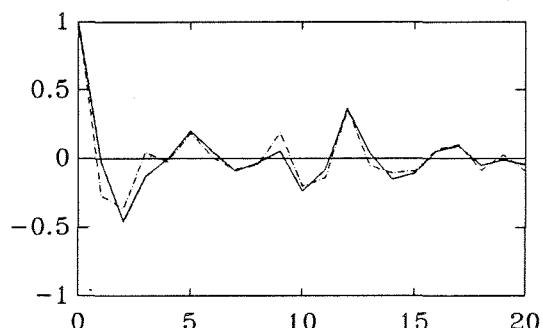
HADNS MEAN = 7.445 SLOPE = 0.001 VAR RATIO = 1.053 N = 27



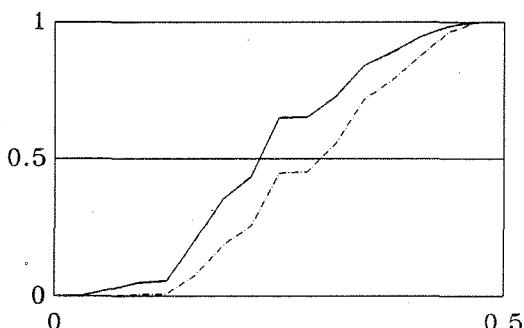
SD (0.456, 0.456, 0.662)



RHO (0.983, 0.983, 0.929)



ACF(1) (-0.022, -0.022, -0.272)



TAU (4.379, 4.385, 3.382)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| 7.176 | 7.808 | 8.188 | 6.267 | 6.830 | 7.291 | 7.730 | 8.476 | 7.118 | 6.972 | 60-69 | | |
| 7.830 | 7.778 | 7.218 | 7.746 | 8.007 | 6.936 | 7.092 | 7.290 | 7.567 | 7.825 | 70-79 | | |
| 7.168 | 7.480 | 7.274 | 7.798 | 7.205 | 7.368 | 7.568 | .. | .. | .. | 80-89 | | |

HERRING 4WX

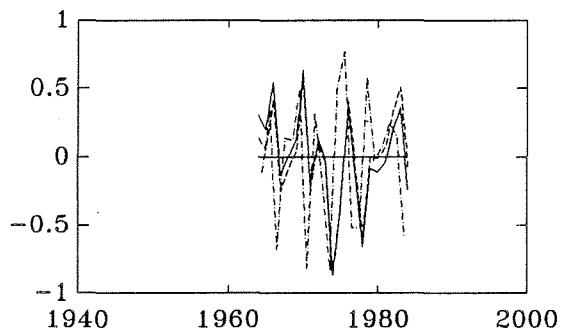
HERR4WX

START YEAR = 64 END YEAR = 84 NUMBER OF DATA POINTS = 21

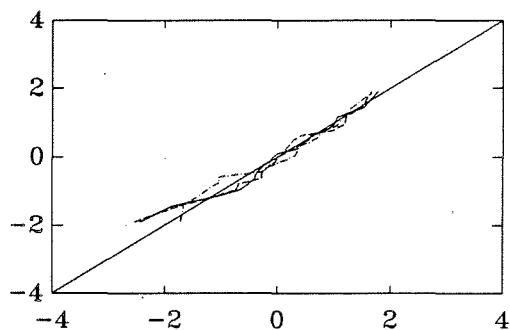
SOURCE: Stephensen et al., CAFSAC 87/75, updated by Stephensen.

COMMENTS: SPA, 1 year olds in (000's).

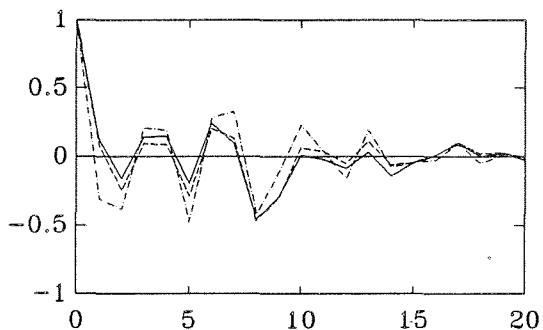
HERR4WX MEAN = 6.245 SLOPE = -0.016 VAR RATIO = 0.884 N = 21



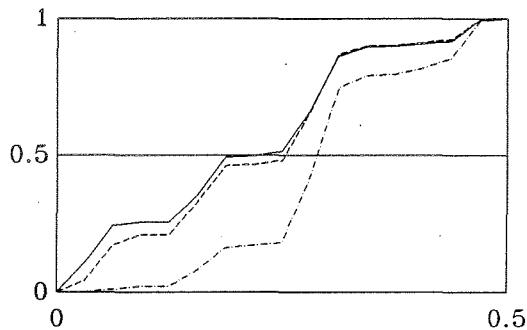
SD (0.356, 0.342, 0.474)



RHO (0.982, 0.975, 0.979)



ACF(1) (0.127, 0.081, -0.309)



TAU (4.514, 3.943, 3.464)

Log Transformed (base 10) Recruitment Data

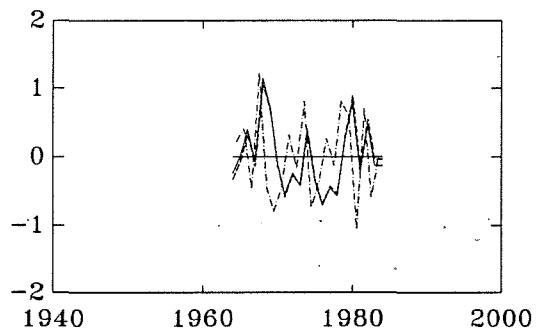
| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | 6.551 | 6.443 | 6.790 | 6.111 | 6.248 | 6.370 | 60-69 | |
| 6.878 | 6.061 | 6.374 | 6.216 | 5.379 | 5.856 | 6.618 | 6.101 | 5.582 | 6.162 | 70-79 | | |
| 6.136 | 6.205 | 6.455 | 6.604 | 6.009 | .. | .. | .. | .. | .. | .. | 80-89 | |

HERRING 4R (Spring spawners)
 START YEAR = 64 END YEAR = 84 NUMBER OF DATA POINTS = 21
 SOURCE: McQuinn, CAFSAC 88/52.

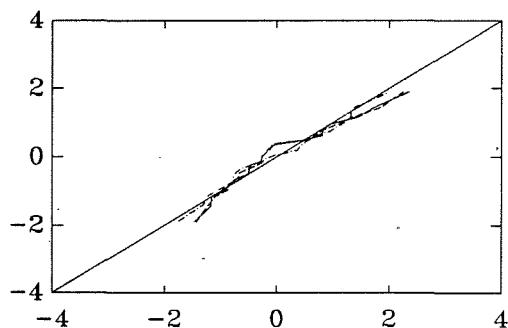
HERR4Rsp

COMMENTS: SPA, 2 year olds in actual numbers.

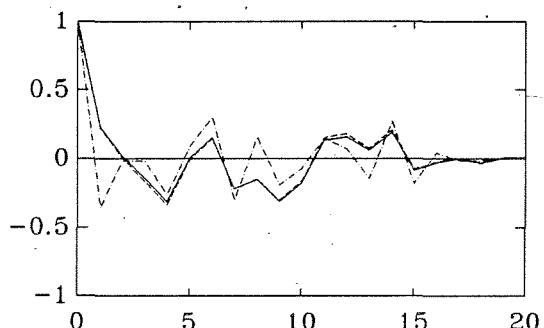
HERR4Rsp MEAN = 7.740 SLOPE = -0.009 VAR RATIO = 0.800 N = 21



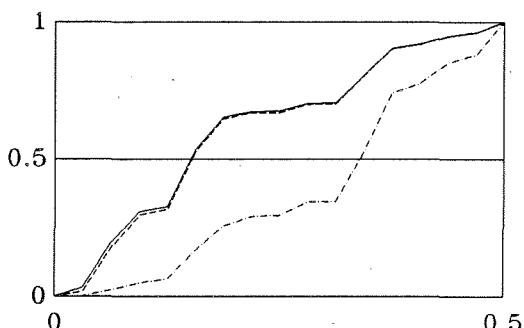
SD (0.485, 0.482, 0.614)



RHO (0.970, 0.970, 0.990)



ACF(1) (0.231, 0.217, -0.358)



TAU (6.616, 6.563, 2.950)

Log Transformed (base 10) Recruitment Data

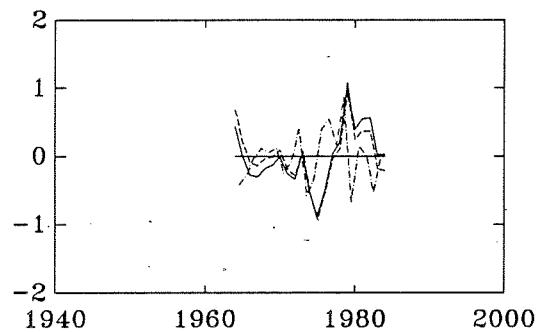
| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | 7.504 | 7.729 | 8.137 | 7.664 | 8.881 | 8.443 | 60-69 |
| 7.645 | 7.176 | 7.498 | 7.332 | 8.139 | 7.398 | 7.029 | 7.293 | 7.170 | 7.987 | 70-79 | |
| 8.579 | 7.508 | 8.208 | 7.609 | 7.609 | .. | .. | .. | .. | .. | .. | 80-89 |

HERRING 4R (Fall spawners)
 START YEAR = 64 END YEAR = 84 NUMBER OF DATA POINTS = 21
 SOURCE: McQuinn, CAFSAC 88/52.

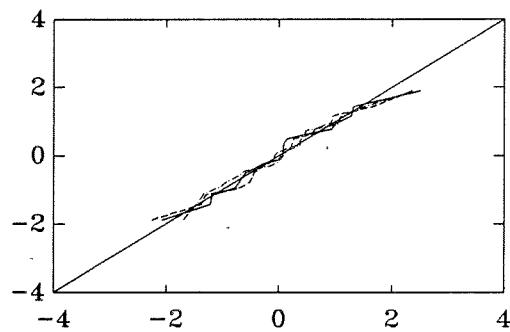
HERR4Rfa

COMMENTS: SPA, 2 year olds in actual numbers.

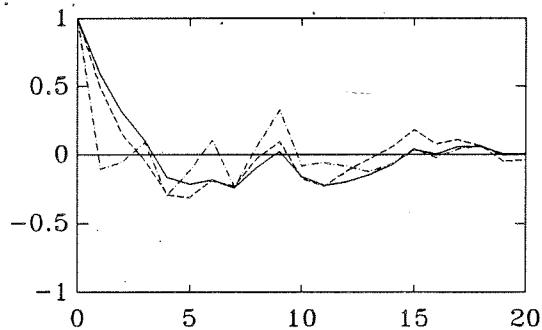
HERR4Rfa MEAN = 7.471 SLOPE = 0.024 VAR RATIO = 0.403 N = 21



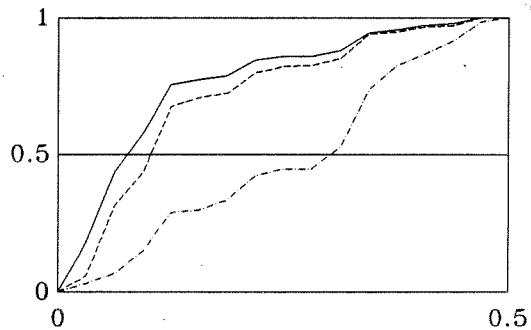
SD (0.430, 0.405, 0.386)



RHO (0.981, 0.982, 0.988)



ACF(1) (0.591, 0.487, -0.106)



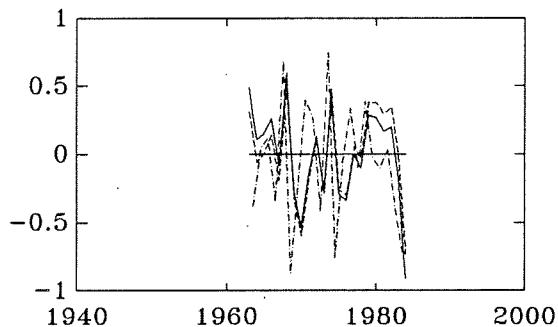
TAU (13.032, 9.771, 3.312)

Log Transformed (base 10) Recruitment Data

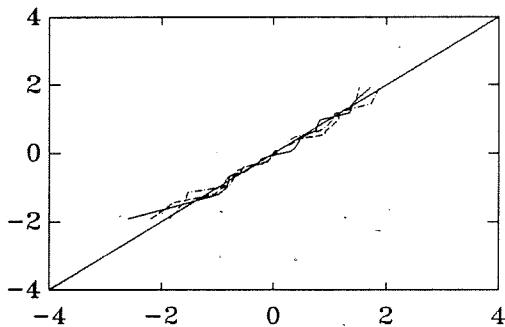
| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | 7.907 | 7.488 | 7.193 | 7.168 | 7.291 | 7.343 | 60-69 | |
| 7.467 | 7.219 | 7.135 | 7.530 | 6.949 | 6.579 | 6.964 | 7.509 | 7.672 | 8.545 | 70-79 | |
| 7.870 | 8.022 | 8.033 | 7.502 | 7.502 | .. | .. | .. | .. | .. | 80-89 | |

HERRING 4T (Spring spawners) HERR4Tsp
 START YEAR = 63 END YEAR = 84 NUMBER OF DATA POINTS = 22
 SOURCE: 67-71: Cleary CAFSAC Res Doc 83/69. 72-84: Chadwick and Cairns,
 CAFSAC Res. Doc. 88/38.
 COMMENTS: SPA, 2 year olds in (000's).

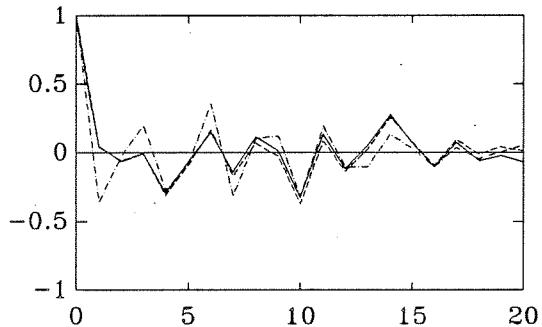
HERR4Tsp MEAN = 5.057 SLOPE = -0.017 VAR RATIO = 0.776 N = 22



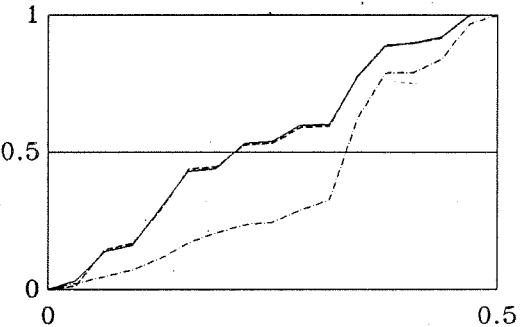
SD (0.350, 0.333, 0.436)



RHO (0.982, 0.985, 0.991)



ACF(1) (0.045, 0.042, -0.364)



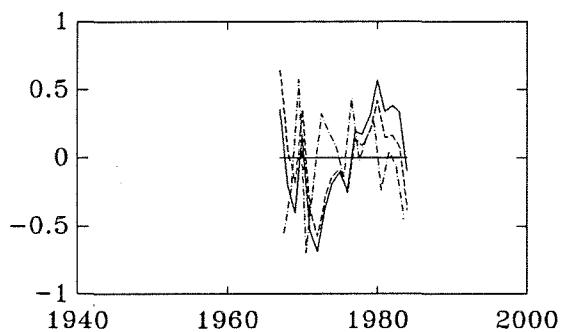
TAU (4.810, 4.798, 3.023)

Log Transformed (base 10) Recruitment Data

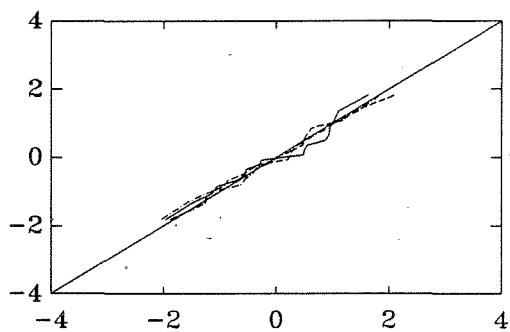
| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | 5.544 | 5.162 | 5.205 | 5.322 | 4.975 | 5.657 | 4.783 | 60-69 | .. | .. |
| 4.519 | 4.918 | 5.191 | 4.779 | 5.527 | 4.768 | 4.716 | 5.054 | 4.959 | 5.345 | 70-79 | .. | .. |
| 5.325 | 5.224 | 5.258 | 4.882 | 4.149 | .. | .. | .. | .. | .. | 80-89 | .. | .. |

HERRING 4T (Fall spawners) HERR4Tfa
 START YEAR = 67 END YEAR = 84 NUMBER OF DATA POINTS = 18
 SOURCE: 67-71: Cleary CAFSAC Res Doc 83/69. 72-84: Chadwick and Cairns,
 CAFSAC Res. Doc. 88/38.
 COMMENTS: SPA, 2 year olds in (000's).

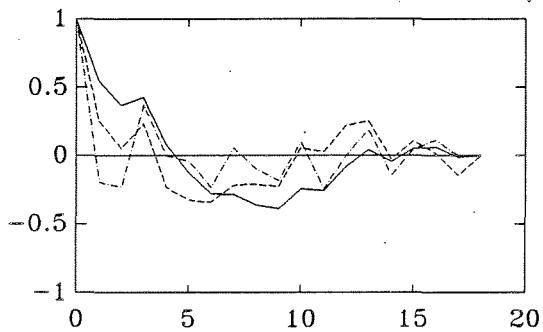
HERR4Tfa MEAN = 5.322 SLOPE = 0.034 VAR RATIO = 0.444 N = 18



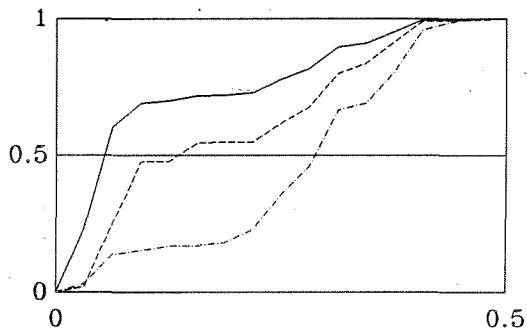
SD (0.351, 0.304, 0.331)



RHO (0.978, 0.990, 0.996)



ACF(1) (0.547, 0.253, -0.194)



TAU (18.651, 7.378, 3.478)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | 5.679 | 5.127 | 4.919 | 60-69 | |
| 5.493 | 4.792 | 4.631 | 4.952 | 5.133 | 5.217 | 5.080 | 5.518 | 5.495 | 5.628 | 70-79 | | |
| 5.895 | 5.657 | 5.705 | 5.652 | 5.228 | .. | .. | .. | .. | .. | .. | 80-89 | |

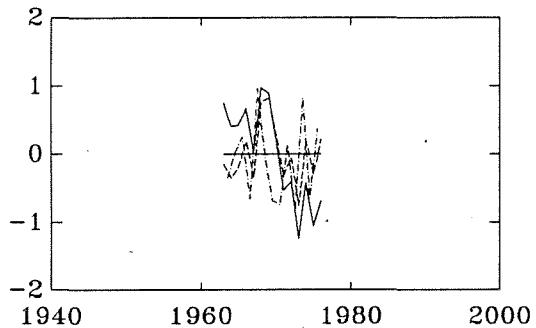
HERRING AB

HERRAB

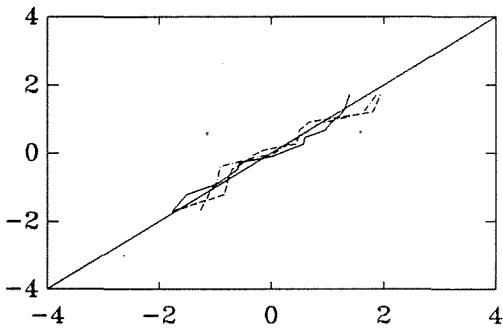
START YEAR = 63 END YEAR = 76 NUMBER OF DATA POINTS = 14
SOURCE: Winters, Wheeler Can. J. Fish and Aquatic Sci. v44, 882-900

COMMENTS: SPA, 2 year olds in (000's).

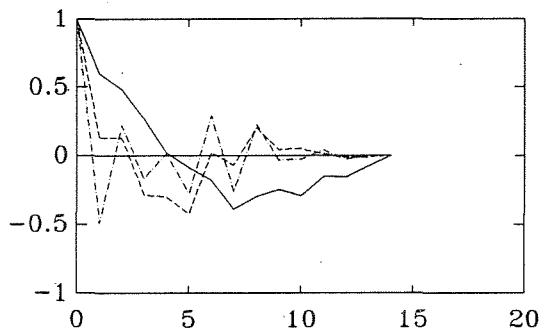
HERRAB MEAN = 4.835 SLOPE = -0.139 VAR RATIO = 0.339 N = 14



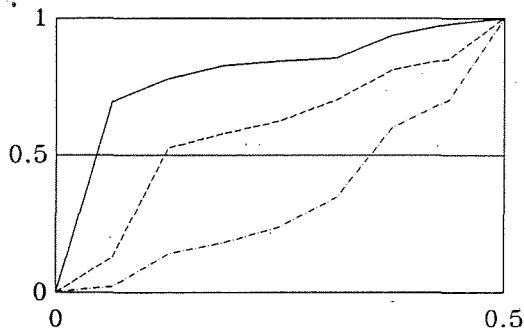
SD (-0.703, 0.425, 0.579)



RHO (0.979, 0.969, 0.967)



ACF(1) (-0.598, 0.126, -0.494)



TAU (22.246, 8.258, 2.855)

Log Transformed (base 10) Recruitment Data

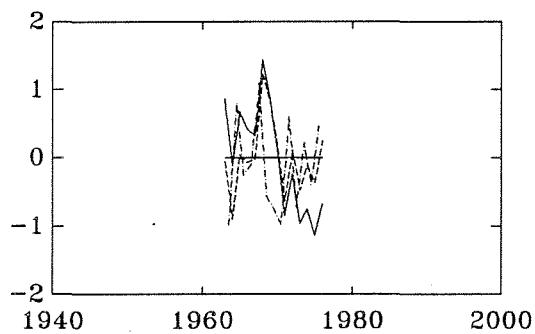
HERRING CD

HERRCD

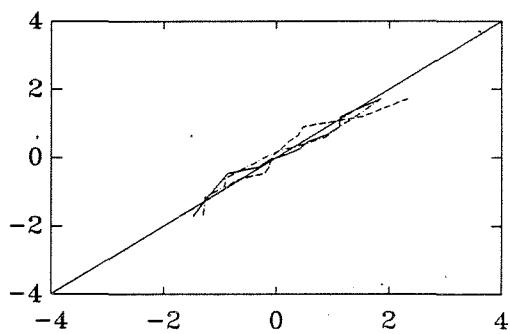
START YEAR = 63 END YEAR = 76 NUMBER OF DATA POINTS = 14
SOURCE: Winters, Wheeler Can. J. Fish and Aquatic Sci. v44, 882-900

COMMENTS: SPA, 2 year olds in (000's).

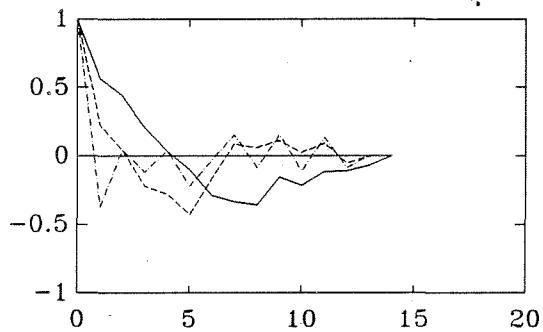
HERRCD MEAN = 4.445 SLOPE = -0.141 VAR RATIO = 0.379 N = 14



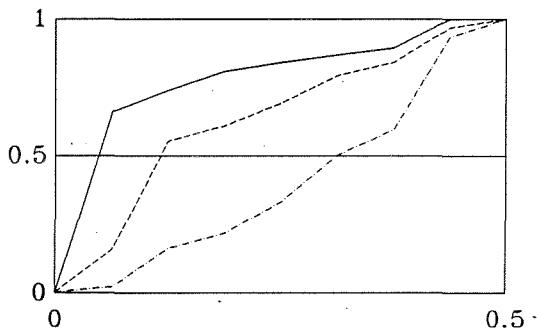
SD (-0.773, 0.523, 0.672)



RHO (0.983, 0.967, 0.976)



ACF(1) (-0.566, 0.224, -0.371)



TAU (21.136, 8.585, 3.207)

Log Transformed (base 10) Recruitment Data

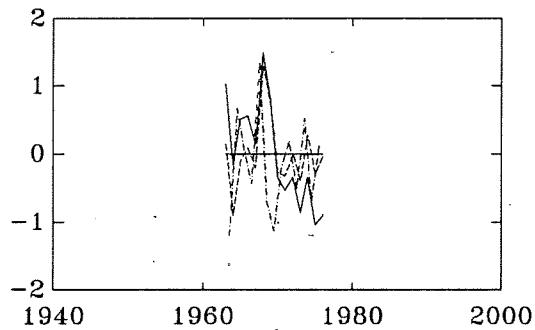
HERRING EF

HERREF

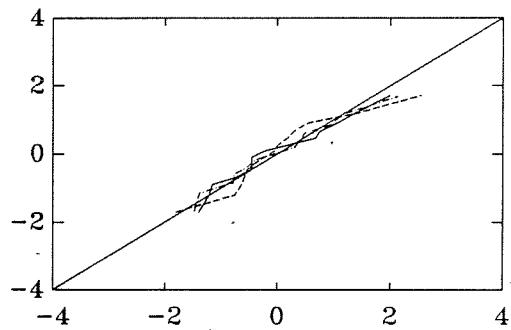
START YEAR = 63 END YEAR = 76 NUMBER OF DATA POINTS = 14
SOURCE: Winters, Wheeler Can. J. Fish and Aquatic Sci. v44, 882-900

COMMENTS: SPA, 2 year olds in (000's).

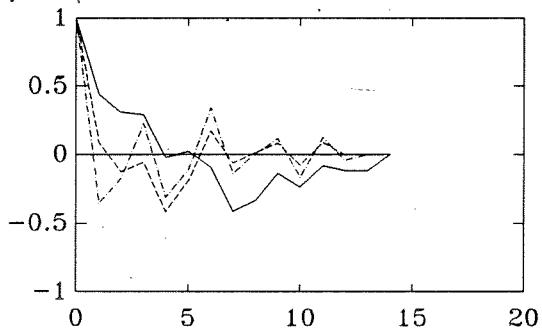
HERREF MEAN = 3.640 SLOPE = -0.136 VAR RATIO = 0.449 N = 14



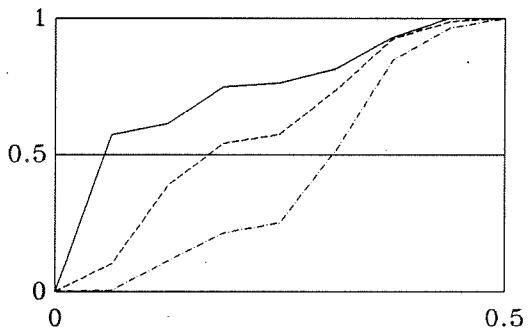
SD (-0.747, 0.506, 0.708)



RHO (0.979, 0.945, 0.986)



ACF(1) (-0.444, 0.088, -0.359)



TAU (18.389, 5.855, 3.243)

Log Transformed (base 10) Recruitment Data

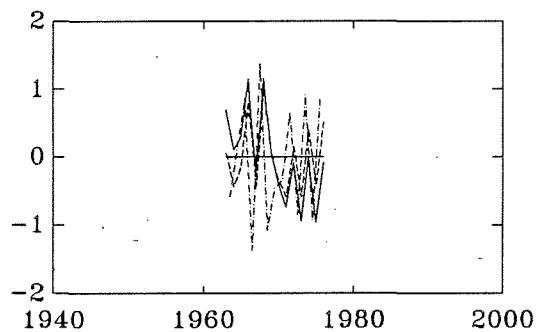
HERRING GH

HERRGH

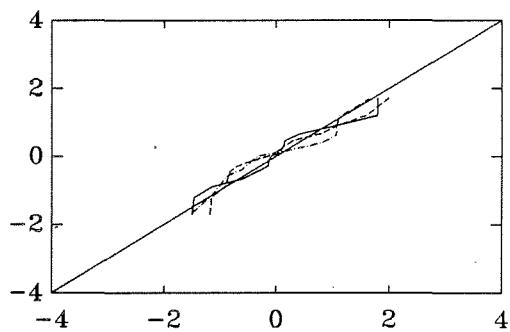
START YEAR = 63 END YEAR = 76 NUMBER OF DATA POINTS = 14
SOURCE: Winters, Wheeler Can. J. Fish and Aquatic Sci. v44, 882-900

COMMENTS: SPA, 2 year olds in (000's).

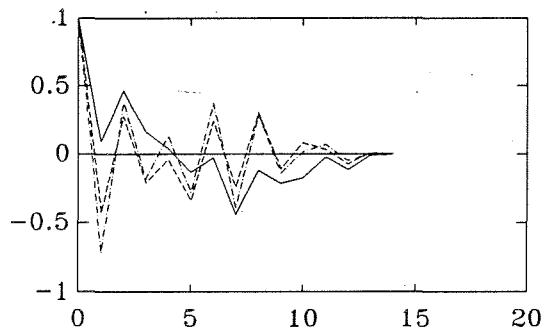
HERRGH MEAN = 4.286 SLOPE = -0.098 VAR RATIO = 0.926 N = 14



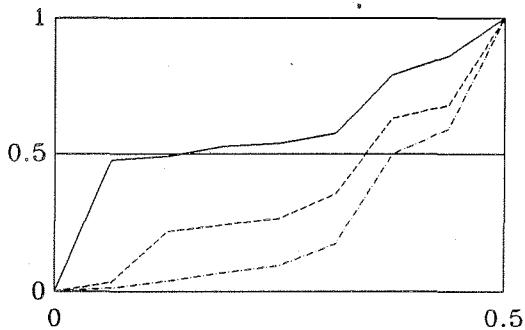
SD (-0.646, 0.509, 0.878)



RHO (0.974, 0.964, 0.969)



ACF(1) (-0.095, -0.428, -0.715)



TAU (7.143, 2.890, 2.656)

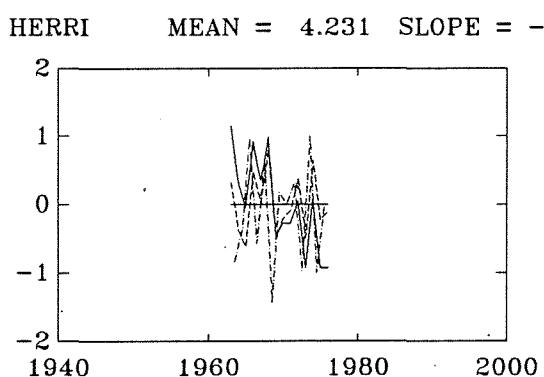
Log Transformed (base 10) Recruitment Data

HERRING I

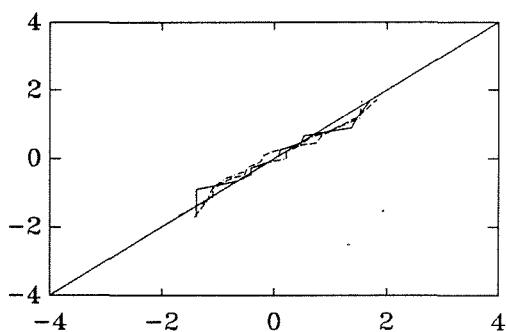
HERRI

START YEAR = 63 END YEAR = 76 NUMBER OF DATA POINTS = 14
SOURCE: Winters, Wheeler Can. J. Fish and Aquatic Sci. v44, 882-900

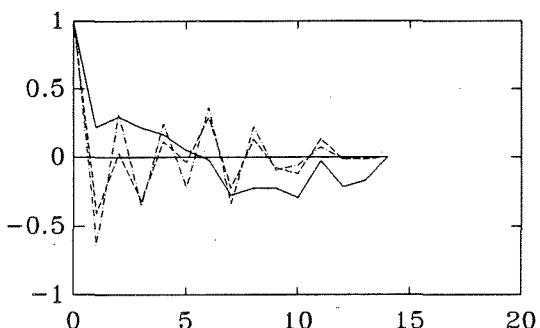
COMMENTS: SPA, 2 year olds in (000's).



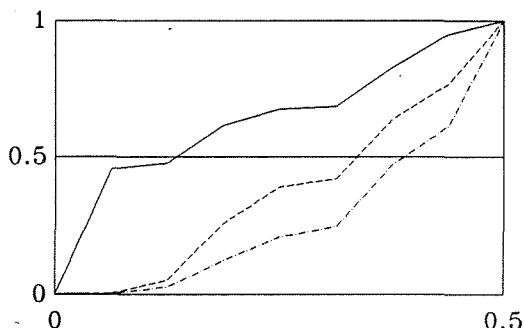
SD (-0.671, 0.436, 0.750)



RHO (0.975, 0.980, 0.987)



ACF(1) (-0.221, -0.402, -0.636)



TAU (7.372, 2.977, 2.574)

Log Transformed (base 10) Recruitment Data

HERRING ICELAND (Summer spawners)

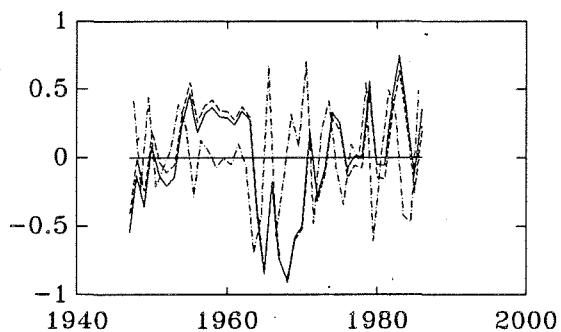
HERRIsum

START YEAR = 47 END YEAR = 86 NUMBER OF DATA POINTS = 40

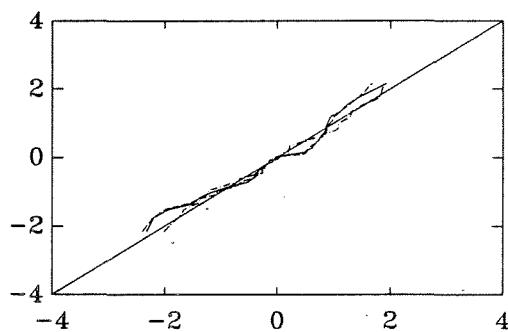
SOURCE: 1947-1969 Jakobsson R.p-v 177; 1969-1985 ICES C.M. 1986/19. Marine Research Institute, Iceland, Mon Jun 20/1988.

COMMENTS: SPA, 1 year olds in (000's).

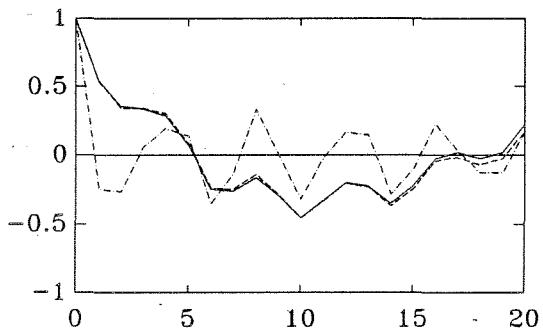
HERRIsum MEAN = 5.427 SLOPE = 0.007 VAR RATIO = 0.433 N = 40



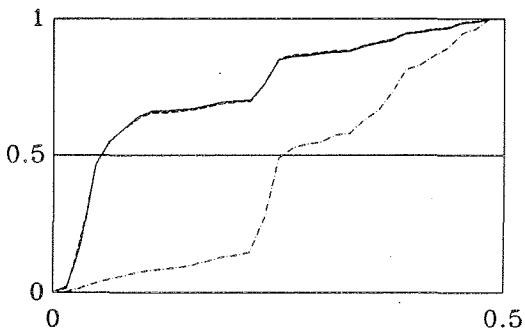
SD (0.388, 0.380, 0.361)



RHO (0.980, 0.976, 0.993)



ACF(1) (0.541, 0.541, -0.242)



TAU (18.914, 18.849, 3.924)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | 4.886 | 5.301 | 5.067 | 40-49 |
| 5.511 | 5.294 | 5.223 | 5.281 | 5.672 | 5.898 | 5.614 | 5.744 | 5.797 | 5.723 | 50-59 |
| 5.720 | 5.669 | 5.769 | 5.705 | 5.004 | 4.580 | 5.253 | 4.680 | 4.529 | 4.846 | 60-69 |
| 4.928 | 5.630 | 5.149 | 5.347 | 5.761 | 5.688 | 5.343 | 5.442 | 5.433 | 5.984 | 70-79 |
| 5.378 | 5.371 | 5.863 | 6.175 | 5.759 | 5.293 | 5.783 | .. | .. | .. | 80-89 |

HERRING ICELAND (Spring spawners)

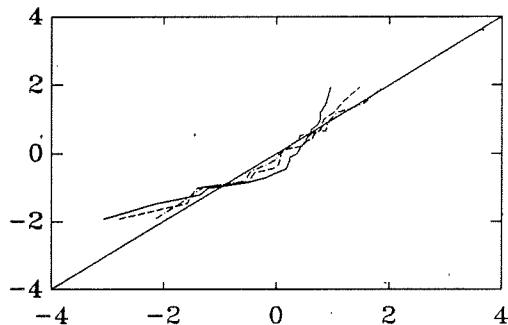
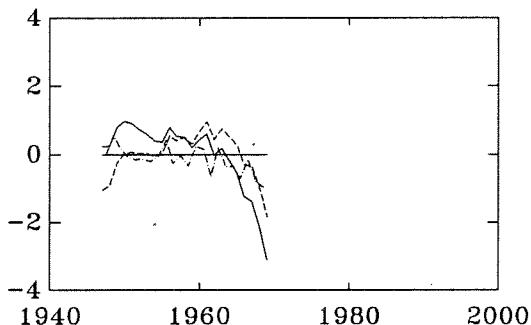
HERRIspr

START YEAR = 47 END YEAR = 69 NUMBER OF DATA POINTS = 23

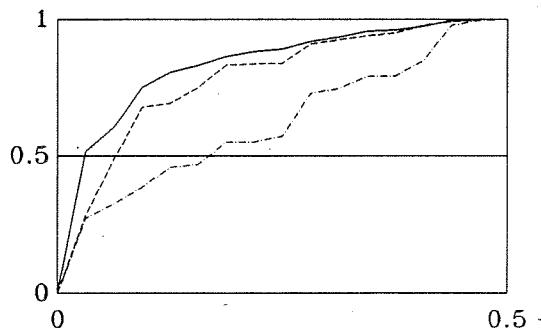
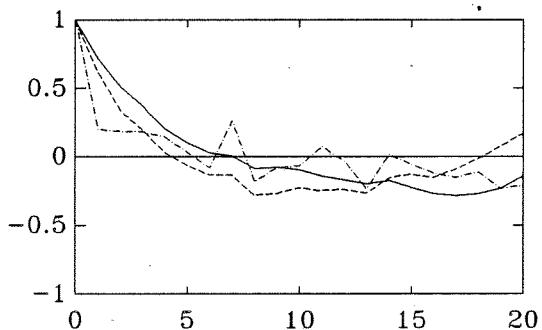
SOURCE: Jakobssen, ICES Rapports et Travaux des Reunions v177, 23-42.

COMMENTS: SPA, 1 year olds in (000 000's).

HERRIspr MEAN = 2.109 SLOPE = -0.116 VAR RATIO = 0.069 N = 23



SD (1.012, 0.657, 0.375)



ACF(1) (-0.717, 0.619, 0.203)

TAU (33.114, 15.551, 5.941)

Log Transformed (base 10) Recruitment Data

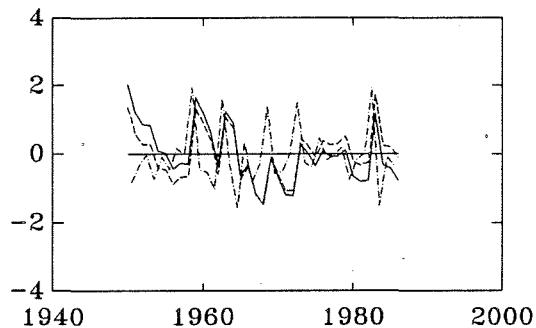
.. 2.346 2.352 2.901 40-49
 3.083 3.006 2.852 2.727 2.524 2.474 2.899 2.640 2.633 2.310 50-59
 2.555 2.727 2.090 2.290 1.934 1.591 0.886 0.740 -0.046 -1.001 60-69
 70-79
 80-89

HERRING NORWAY (spring spawners)
START YEAR = 50 END YEAR = 86 NUMBER OF DATA POINTS = 37
SOURCE: ICES C.M. 1988/10.

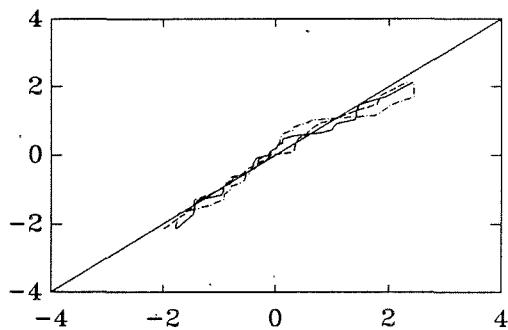
HERRNOR

COMMENTS: SPA, 3 year olds in (000 000's).

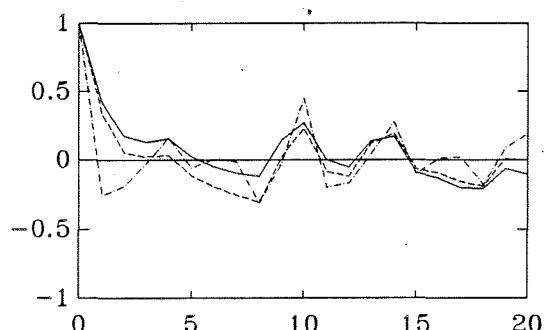
HERRNOR MEAN = 2.675 SLOPE = -0.037 VAR RATIO = 0.489 N = 37



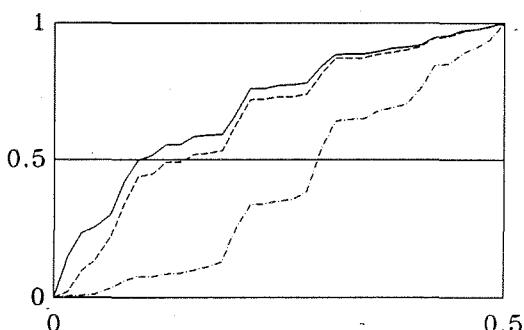
SD (-0.837, 0.741, 0.828)



RHO (0.980, 0.994, 0.943)



ACF(1) (-0.430, 0.344, -0.258)

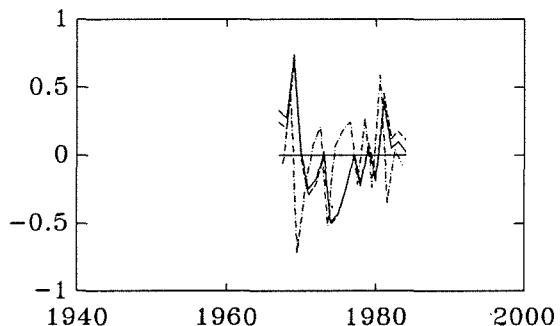


TAU (10.401, 6.858, 3.417)

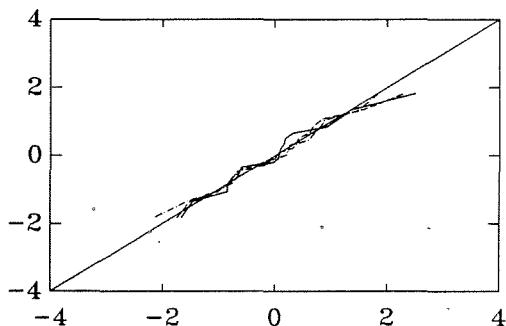
Log Transformed (base 10) Recruitment Data

HERRING VIa (north) HERRVIa
 START YEAR = 67 END YEAR = 84 NUMBER OF DATA POINTS = 18
 SOURCE: Report of the Herring Assessment Working Group for the Area South of
 62N. ICES C.M. 1988/17.
 COMMENTS: SPA, 2 year olds in (000's).

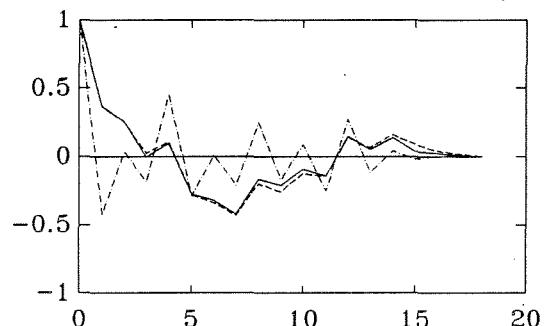
HERRVIa MEAN = 5.816 SLOPE = -0.011 VAR RATIO = 0.627 N = 18



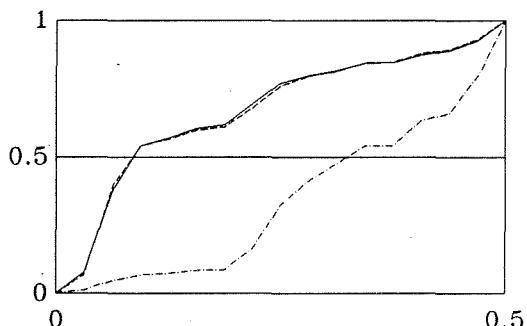
SD (0.297, 0.292, 0.332)



RHO (0.974, 0.988, 0.993)



ACF(1) (0.371, 0.363, -0.429)

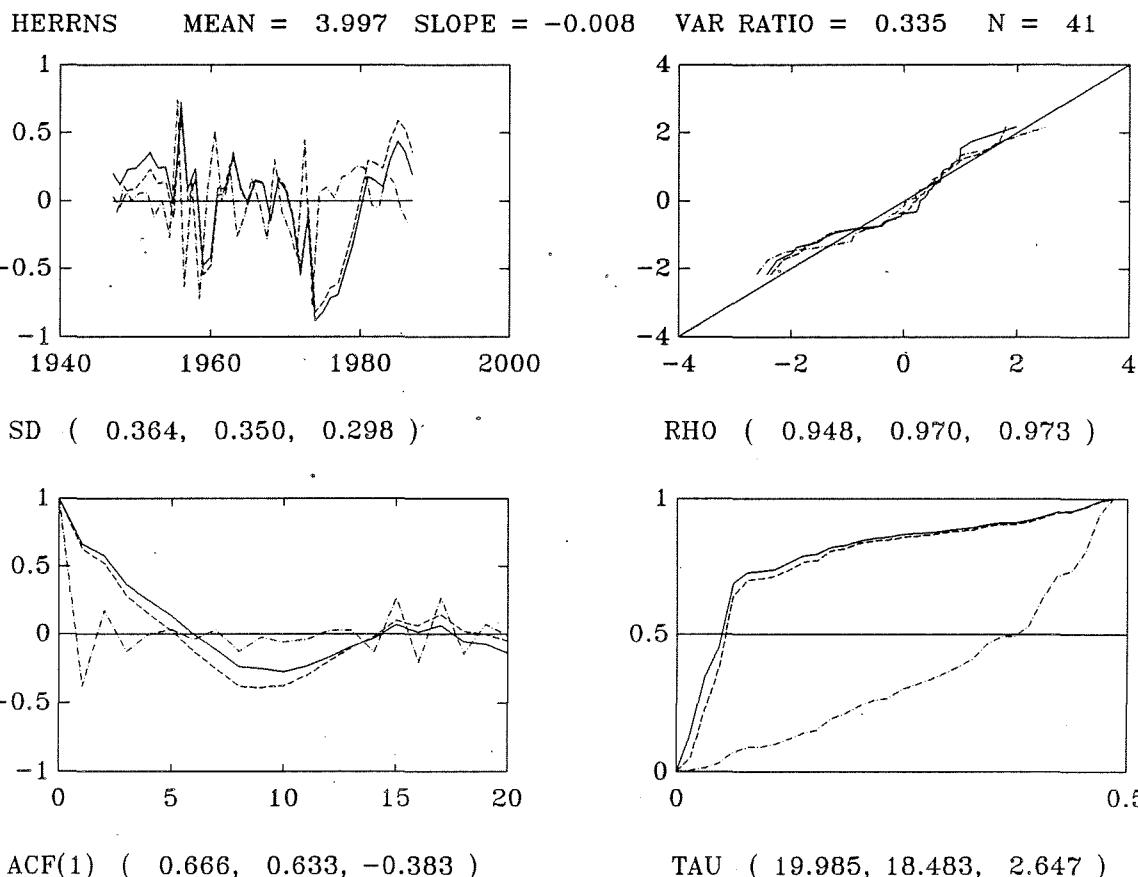


TAU (11.649, 11.819, 3.090)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | 6.150 | 6.092 | 6.557 | 60-69 |
| 5.835 | 5.568 | 5.637 | 5.845 | 5.324 | 5.385 | 5.565 | 5.809 | 5.591 | 5.866 | 70-79 | |
| 5.629 | 6.216 | 5.869 | 5.913 | 5.839 | .. | .. | .. | .. | .. | .. | 80-89 |

HERRING NORTH SEA HERRNS
 START YEAR = 47 END YEAR = 87 NUMBER OF DATA POINTS = 41
 SOURCE: Report of the Herring Assessment Working Group for the Area south of
 62N. ICES C.M. 1988.
 COMMENTS: SPA, 0 year olds in (000 000's).



Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | 4.199 | 4.117 | 4.228 | 40-49 |
| 4.236 | 4.297 | 4.358 | 4.243 | 4.248 | 3.978 | 4.719 | 4.086 | 4.238 | 3.518 | 50-59 |
| 3.580 | 4.093 | 4.090 | 4.358 | 4.097 | 3.987 | 4.152 | 4.130 | 3.851 | 4.155 | 60-69 |
| 4.079 | 3.857 | 3.447 | 3.892 | 3.114 | 3.176 | 3.279 | 3.301 | 3.477 | 3.670 | 70-79 |
| 3.929 | 4.176 | 4.146 | 4.100 | 4.301 | 4.433 | 4.352 | 4.185 | .. | .. | 80-89 |

HERRING NORTHERN IRISH SEA

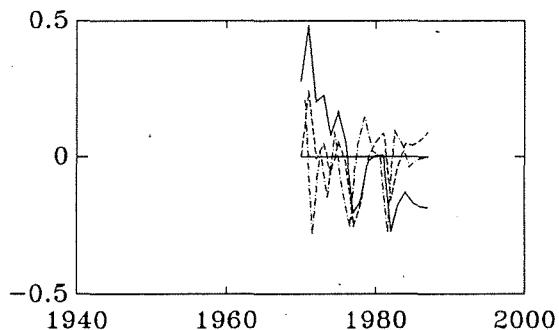
HERRNIRS

START YEAR = 70 END YEAR = 87 NUMBER OF DATA POINTS = 18

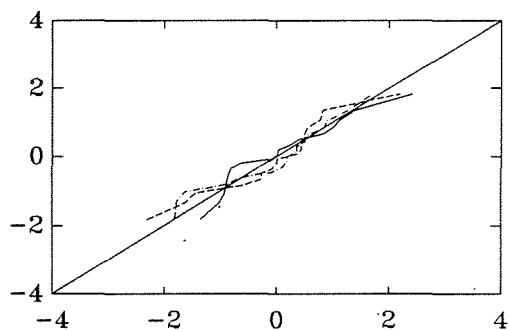
SOURCE: Report of the Herring Assessment Working Group for the Area South of
62N. ICES C.M. 1988/17.

COMMENTS: SPA, 1 year olds in (000's).

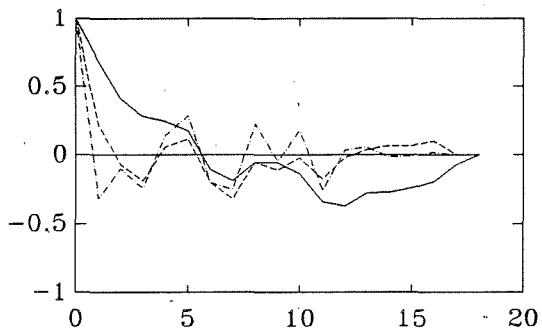
HERRNIRS MEAN = 5.342 SLOPE = -0.032 VAR RATIO = 0.244 N = 18



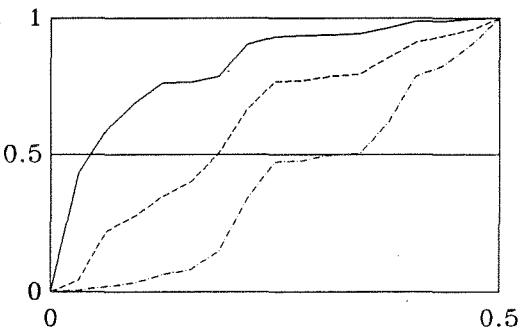
SD (0.200, 0.110, 0.140)



RHO (0.962, 0.955, 0.967)



ACF(1) (0.685, 0.215, -0.319)



TAU (22.595, 5.394, 3.032)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| 5.617 | 5.824 | 5.543 | 5.567 | 5.420 | 5.509 | 5.392 | 5.137 | 5.180 | 5.324 | 70-79 | |
| 5.348 | 5.346 | 5.070 | 5.167 | 5.213 | 5.173 | 5.161 | 5.158 | .. | .. | 80-89 | |

HERRING BALTIC AREAS 22&24

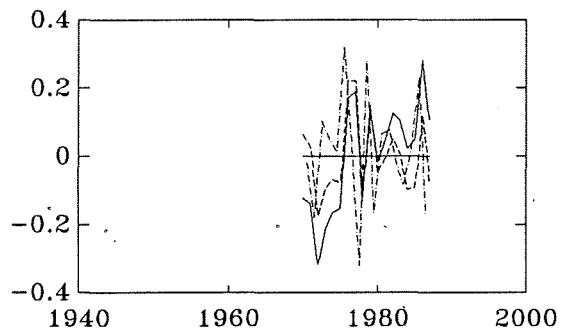
HERR2224

START YEAR = 70 END YEAR = 87 NUMBER OF DATA POINTS = 18

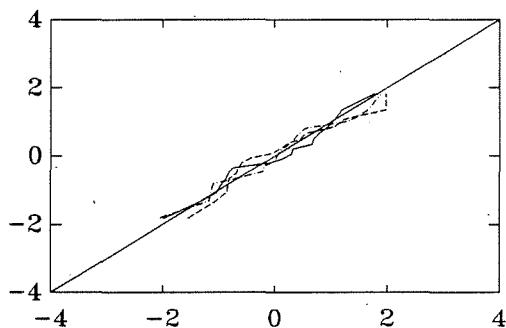
SOURCE: Report of the Working Group on Assessment of Pelagic Stocks in the
Baltic. ICES C.M. 1988/18.

COMMENTS: SPA, 0 year olds in (000 000's).

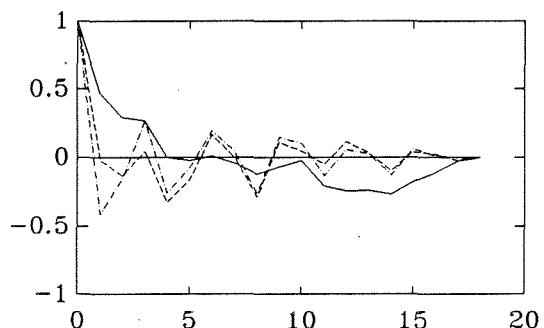
HERR2224 MEAN = 3.526 SLOPE = 0.022 VAR RATIO = 0.528 N = 18



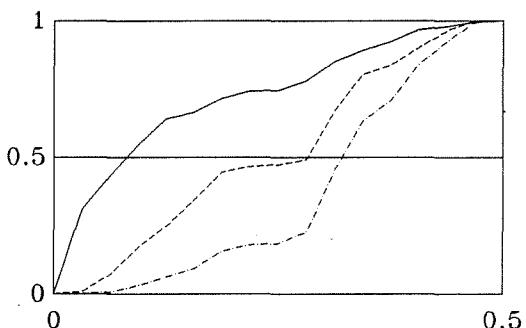
SD (0.159, 0.113, 0.164)



RHO (0.983, 0.967, 0.983)



ACF(1) (0.469, -0.016, -0.415)



TAU (12.358, 3.535, 3.122)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| 3.406 | 3.388 | 3.210 | 3.313 | 3.361 | 3.374 | 3.695 | 3.716 | 3.395 | 3.673 | 70-79 | |
| 3.509 | 3.575 | 3.653 | 3.632 | 3.549 | 3.576 | 3.809 | 3.636 | .. | .. | 80-89 | |

HERRING SOUTHERN CENTRAL BALTIC

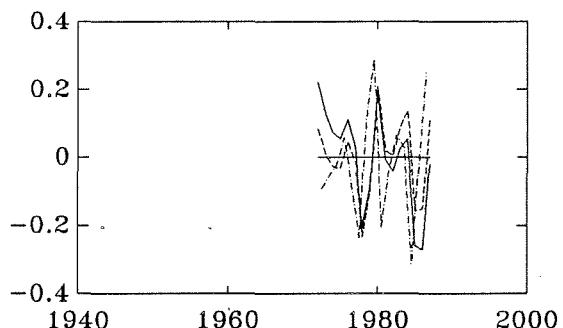
HERRSCB

START YEAR = 72 END YEAR = 87 NUMBER OF DATA POINTS = 16

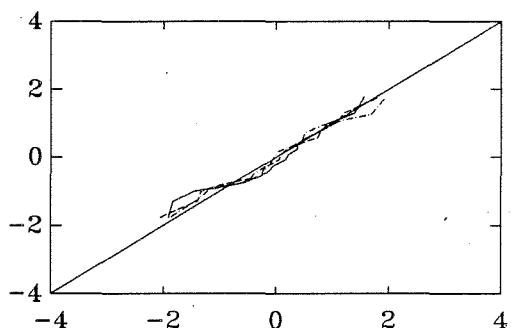
SOURCE: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic. ICES C.M. 1988/18.

COMMENTS: SPA, 0 year olds in (000 000's).

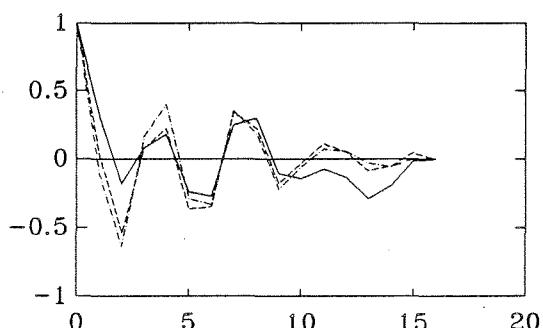
HERRSCB MEAN = 3.839 SLOPE = -0.018 VAR RATIO = 0.625 N = 16



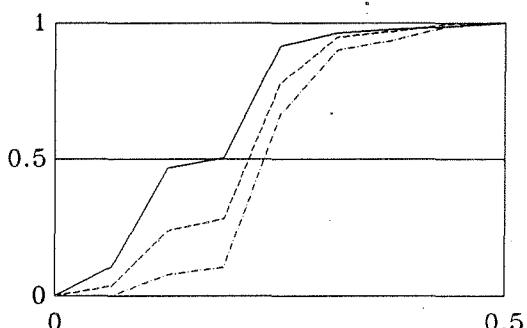
SD (0.142, 0.114, 0.159)



RHO (0.973, 0.989, 0.986)



ACF(1) (0.331, 0.034, -0.112)



TAU (5.620, 4.648, 4.313)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| .. | .. | 4.061 | 3.968 | 3.914 | 3.892 | 3.949 | 3.869 | 3.633 | 3.748 | 70-79 | |
| 4.037 | 3.833 | 3.799 | 3.863 | 3.892 | 3.580 | 3.568 | 3.820 | .. | .. | 80-89 | |

HERRING GULF OF RIGA

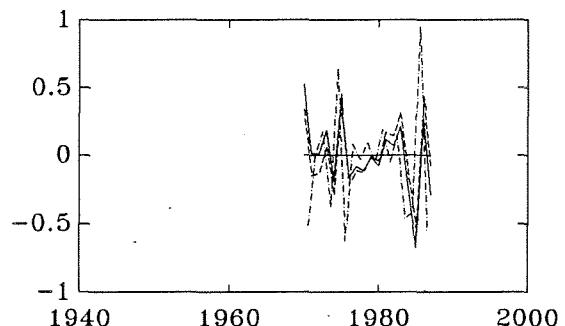
HERRGRIGA

START YEAR = 70 END YEAR = 87 NUMBER OF DATA POINTS = 18

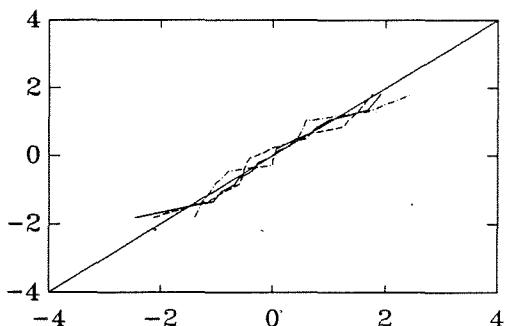
SOURCE: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic. ICES C.M. 1988/18.

COMMENTS: SPA, 0 year olds in (000 000's).

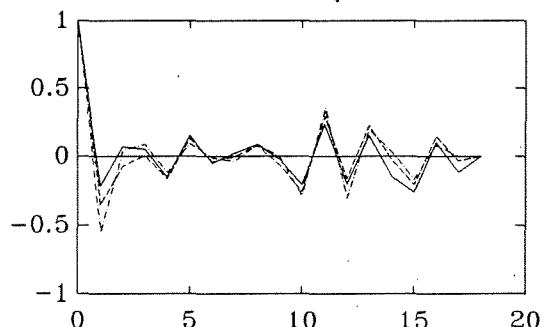
HERRGRIGA MEAN = 3.165 SLOPE = -0.022 VAR RATIO = 1.131 N = 18



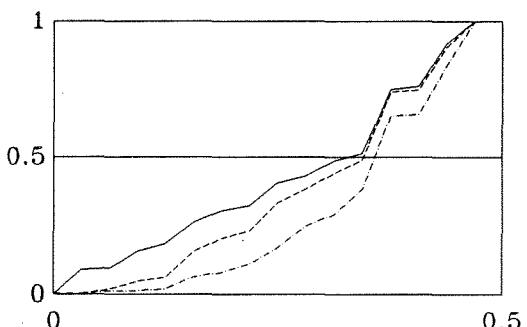
SD (0.274, 0.249, 0.412)



RHO (0.981, 0.977, 0.960)



ACF(1) (-0.216, -0.355, -0.551)



TAU (3.051, 2.898, 2.797)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| 3.690 | 3.182 | 3.176 | 3.352 | 2.978 | 3.623 | 3.000 | 3.083 | 3.051 | 3.146 | 70-79 | |
| 3.090 | 3.281 | 3.233 | 3.378 | 2.908 | 2.491 | 3.439 | 2.875 | .. | .. | 80-89 | |

HERRING BALTIC AREAS 28&29S

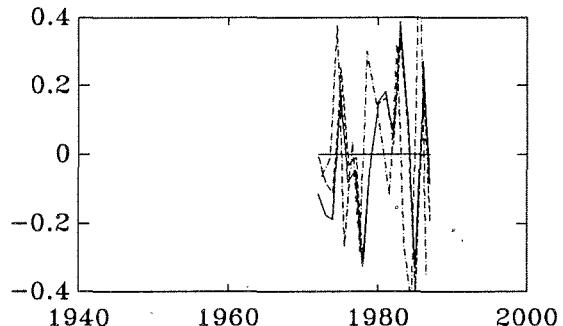
HERR2829S

START YEAR = 72 END YEAR = 87 NUMBER OF DATA POINTS = 16

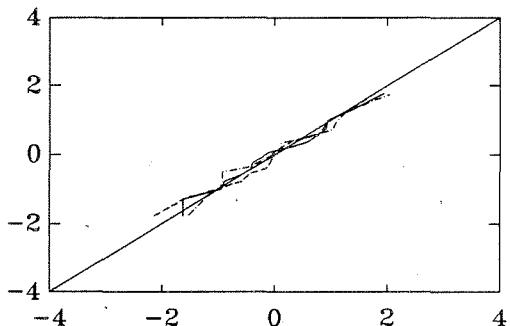
SOURCE: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic. ICES C.M. 1988/18.

COMMENTS: SPA, 0 year olds in (000 000's).

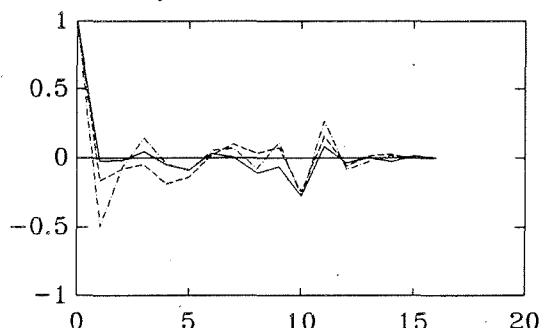
HERR2829S MEAN = 3.757 SLOPE = 0.014 VAR RATIO = 1.076 N = 16



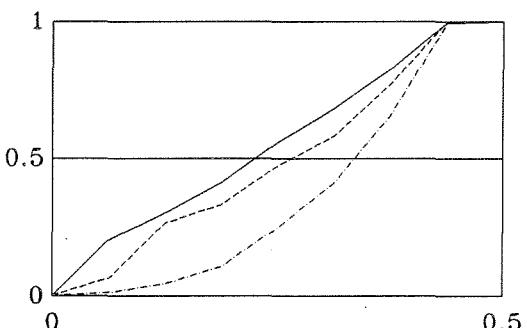
SD (0.200, 0.189, 0.294)



RHO (0.990, 0.988, 0.984)



ACF(1) (-0.024, -0.163, -0.495)



TAU (4.446, 3.764, 2.987)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| .. | .. | 3.643 | 3.580 | 3.568 | 3.944 | 3.677 | 3.712 | 3.431 | 3.731 | 70-79 | |
| 3.908 | 3.940 | 3.820 | 4.143 | 3.875 | 3.431 | 4.029 | 3.672 | .. | .. | 80-89 | |

HERRING ARCHIPELAGO AND BOTHNIAN SEAS

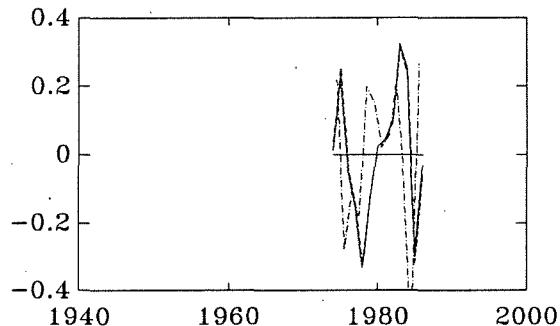
HERRARBO

START YEAR = 74 END YEAR = 86 NUMBER OF DATA POINTS = 13

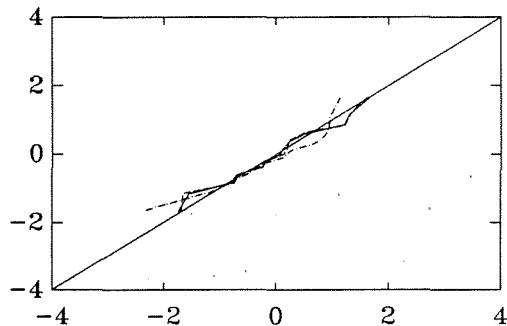
SOURCE: Report of the Working Group on Assessment of Pelagic Stocks in the
Baltic. ICES C.M. 1988/18.

COMMENTS: SPA, 0 year olds in (000 000's).

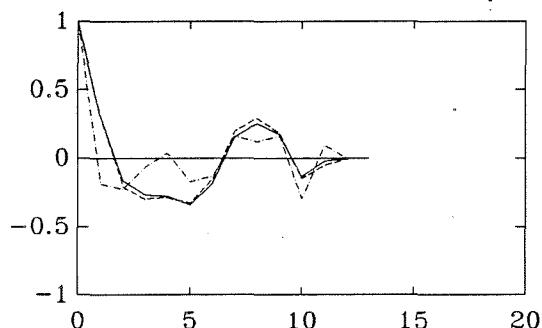
HERRARBO MEAN = 3.668 SLOPE = 0.004 VAR RATIO = 0.750 N = 13



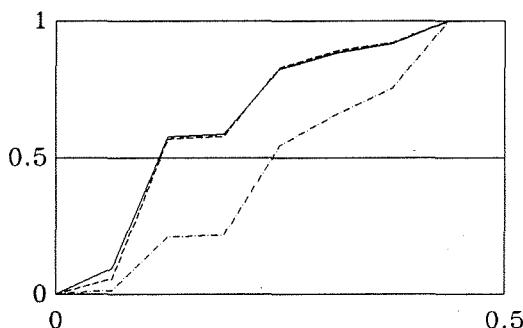
SD (0.192, 0.191, 0.235)



RHO (0.988, 0.983, 0.955)



ACF(1) (0.307, 0.298, -0.185)



TAU (8.687, 8.567, 4.140)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| .. | .. | .. | .. | 3.682 | 3.901 | 3.622 | 3.514 | 3.335 | 3.535 | 70-79 | |
| 3.692 | 3.715 | 3.770 | 3.992 | 3.920 | 3.371 | 3.637 | .. | .. | .. | .. | 80-89 |

HERRING BOTHNIAN BAY

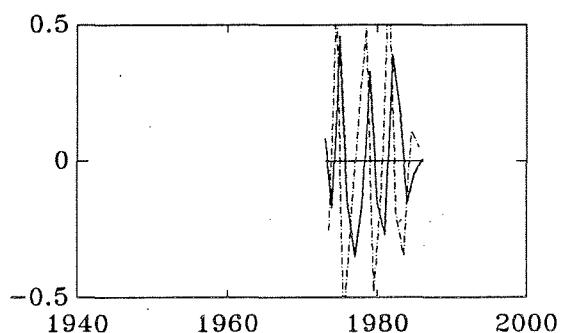
HERRBOTB

START YEAR = 73 END YEAR = 86 NUMBER OF DATA POINTS = 14

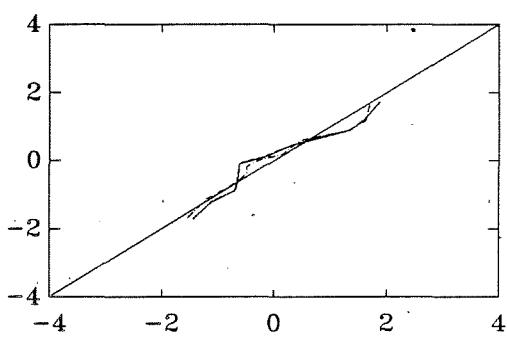
SOURCE: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic. ICES C.M. 1988/18.

COMMENTS: SPA, 1 year olds in (000 000's).

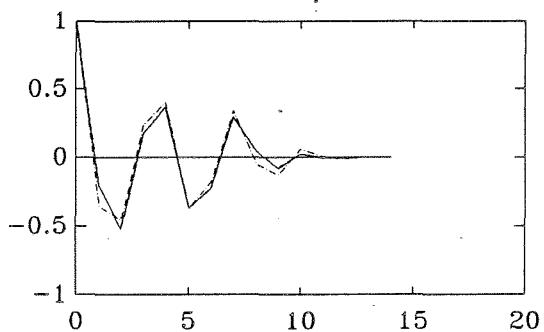
HERRBOTB MEAN = 2.618 SLOPE = 0.001 VAR RATIO = 1.287 N = 14



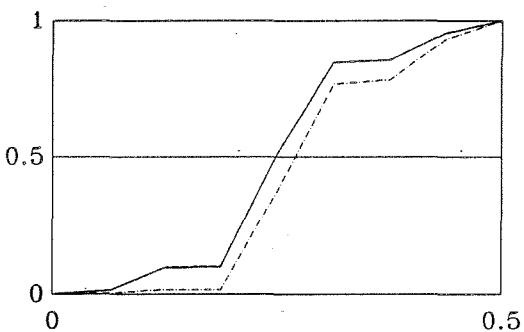
SD (0.244, 0.244, 0.391)



RHO (0.961, 0.960, 0.979)



ACF(1) (-0.199, -0.200, -0.356)



TAU (4.023, 4.023, 3.700)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| .. | .. | .. | 2.697 | 2.446 | 3.072 | 2.467 | 2.267 | 2.459 | 2.947 | 70-79 | |
| 2.467 | 2.348 | 3.007 | 2.814 | 2.464 | 2.574 | 2.624 | .. | .. | .. | .. | 80-89 |

HERRING GULF OF FINLAND

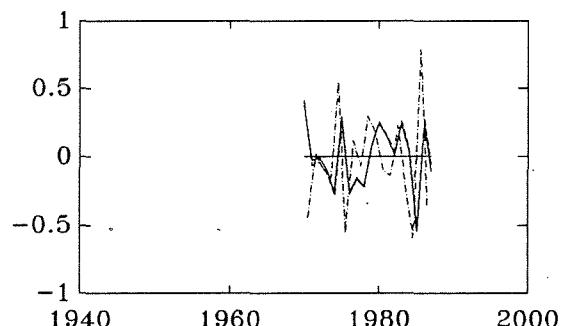
HERRGFIN

START YEAR = 70 END YEAR = 87 NUMBER OF DATA POINTS = 18

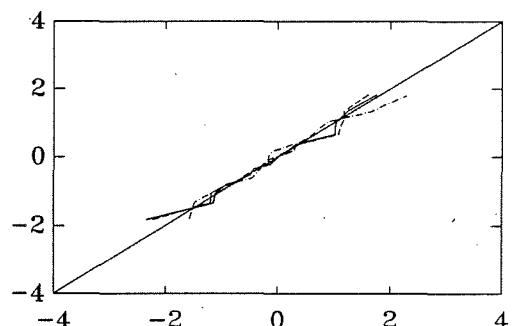
SOURCE: Report of the Working Group on Assessment of Pelagic Stocks in the Baltic. ICES C.M. 1988/18.

COMMENTS: SPA, 0 year olds in (000 000's).

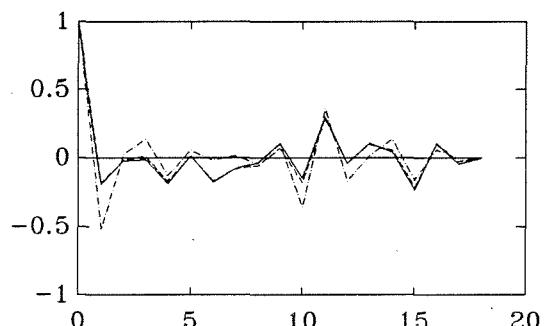
HERRGFIN MEAN = 3.502 SLOPE = -0.004 VAR RATIO = 1.158 N = 18



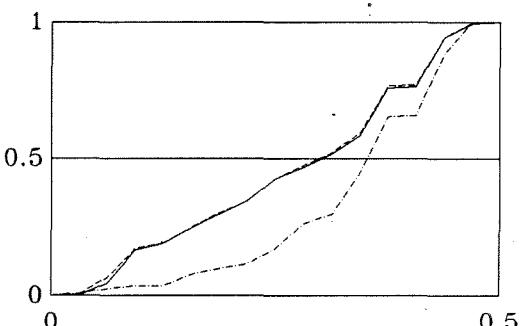
SD (0.235, 0.234, 0.357)



RHO (0.987, 0.985, 0.983)



ACF(1) (-0.193, -0.184, -0.520)



TAU (3.316, 3.356, 2.845)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| 3.914 | 3.473 | 3.491 | 3.400 | 3.243 | 3.792 | 3.236 | 3.350 | 3.281 | 3.574 | 70-79 | |
| 3.748 | 3.650 | 3.512 | 3.740 | 3.545 | 2.954 | 3.741 | 3.391 | .. | .. | 80-89 | |

MACKEREL Areas 2 to 6

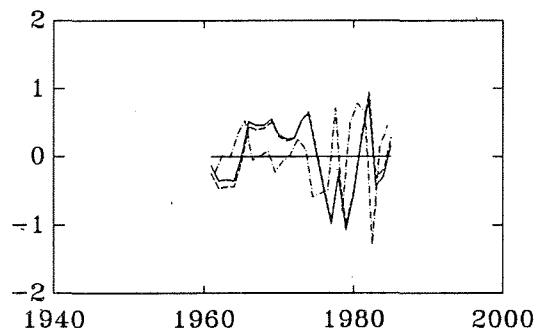
MACK2-6

START YEAR = 61 END YEAR = 85 NUMBER OF DATA POINTS = 25

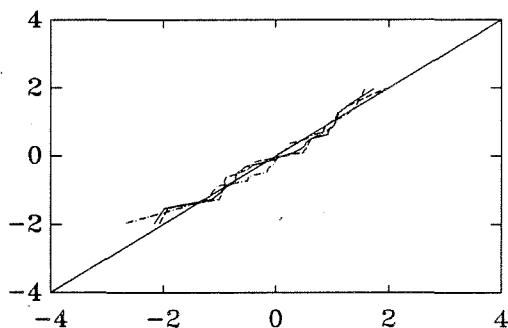
SOURCE: Castonguay and Landry, CAFSAC Res. Doc. 87/47.

COMMENTS: SPA, 1 year olds in (000 000's).

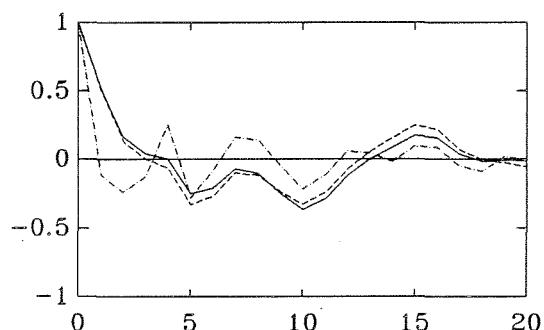
MACK2-6 MEAN = 3.105 SLOPE = -0.010 VAR RATIO = 0.491 N = 25



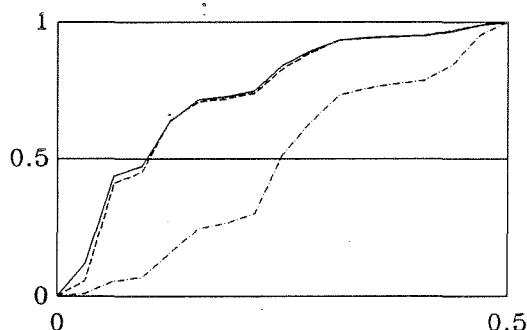
SD (0.496, 0.491, 0.492)



RHO (0.983, 0.982, 0.978)



ACF(1) (0.525, 0.506, -0.116)



TAU (10.122, 9.827, 4.031)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | 2.980 | 2.744 | 2.762 | 2.751 | 3.091 | 3.619 | 3.563 | 3.570 | 3.655 | .. | 50-59 |
| 3.428 | 3.360 | 3.375 | 3.638 | 3.748 | 3.165 | 2.621 | 2.124 | 2.834 | 2.034 | 70-79 | 60-69 |
| 2.541 | 3.327 | 3.965 | 2.671 | 2.804 | 3.260 | .. | .. | .. | .. | .. | 80-89 |

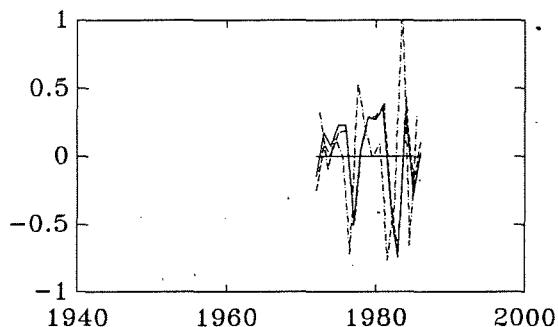
MACKEREL WESTERN

MACKWS

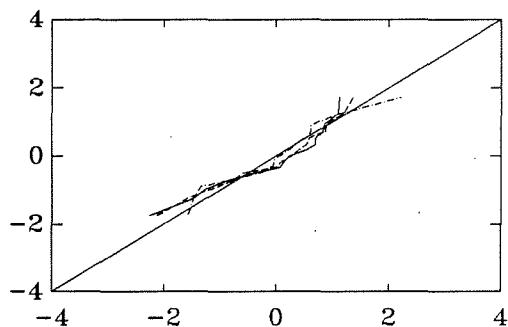
START YEAR = 72 END YEAR = 86 NUMBER OF DATA POINTS = 15
SOURCE: Report of the Mackerel working Group, ICES C.M. 1988/12.

COMMENTS: SPA, 0 year olds in (000 000's).

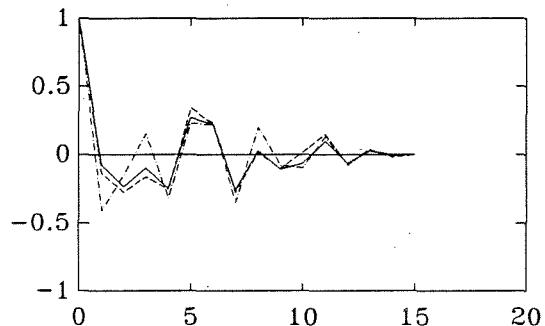
MACKWS MEAN = 3.462 SLOPE = -0.014 VAR RATIO = 1.140 N = 15



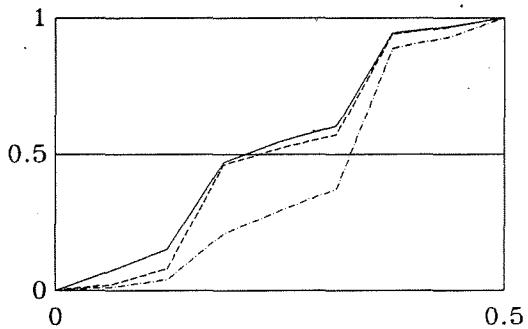
SD (0.330, 0.324, 0.498)



RHO (0.949, 0.972, 0.974)



ACF(1) (-0.071, -0.131, -0.409)



TAU (4.721, 4.376, 3.050)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| .. | .. | 3.317 | 3.637 | 3.537 | 3.693 | 3.694 | 2.975 | 3.507 | 3.746 | 70-79 | |
| 3.736 | 3.822 | 3.053 | 2.715 | 3.829 | 3.174 | 3.488 | .. | .. | .. | 80-89 | |

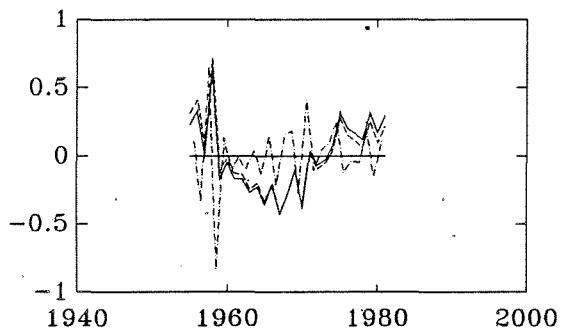
MENHADEN US ATLANTIC

MENHADEN

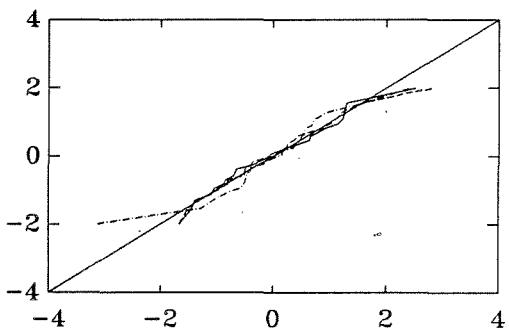
START YEAR = 55 END YEAR = 81 NUMBER OF DATA POINTS = 27
SOURCE: Vaughan et al. NMFS-SPEC-178

COMMENTS: SPA, 1 year olds in (000 000's).

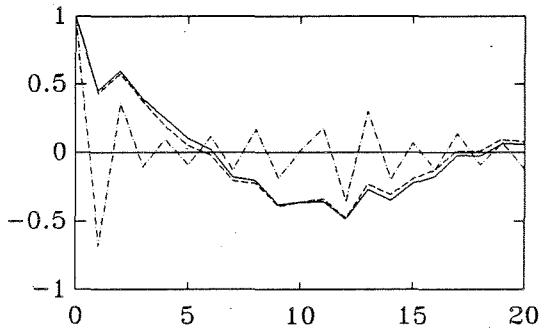
MENHADEN MEAN = 3.516 SLOPE = 0.006 VAR RATIO = 0.531 N = 27



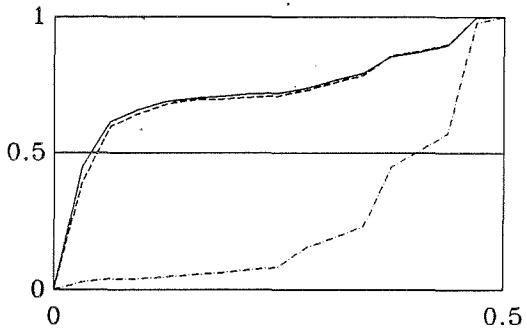
SD (0.261, 0.256, 0.269)



RHO (0.987, 0.983, 0.954)



ACF(1) (-0.450, 0.429, -0.678)



TAU (24.305, 21.003, 2.485)

Log Transformed (base 10) Recruitment Data

PLAICE NORTH SEA

PLAICENS

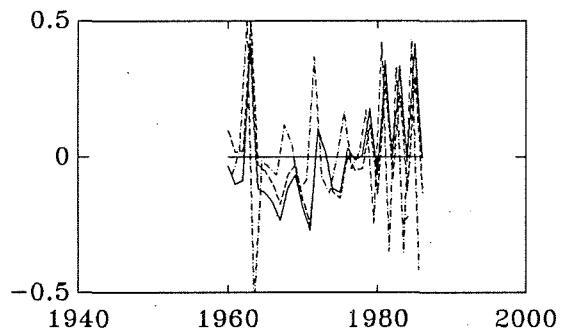
START YEAR = 60 END YEAR = 86 NUMBER OF DATA POINTS = 27

SOURCE: Report of the North Sea Flatfish Working Group, ICES C.M. 1988.

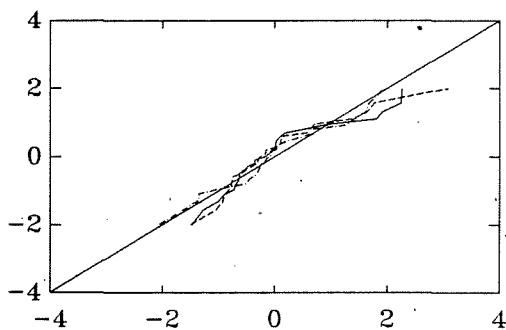
Data could be updated using recruitment series.

COMMENTS: SPA, 1 year olds in actual numbers.

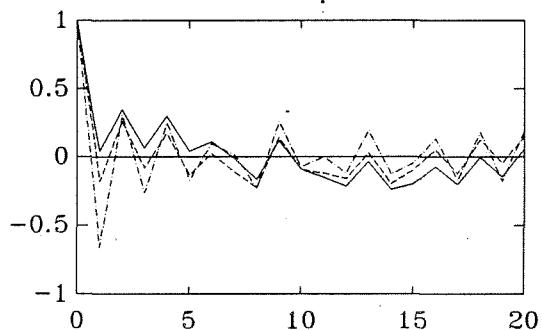
PLAICENS MEAN = 8.637 SLOPE = 0.010 VAR RATIO = 0.994 N = 27



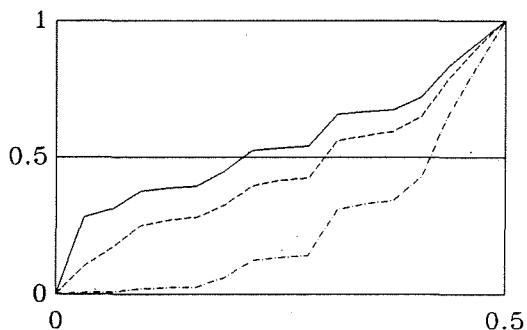
SD (0.184, 0.167, 0.260)



RHO (0.937, 0.940, 0.983)



ACF(1) (0.042, -0.179, -0.661)



TAU (4.803, 3.347, 2.405)

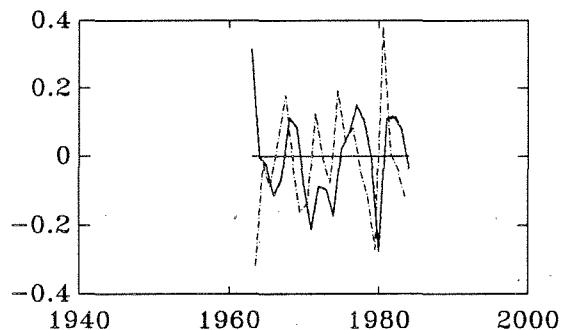
Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| 8.604 | 8.535 | 8.549 | 9.053 | 8.520 | 8.507 | 8.470 | 8.403 | 8.521 | 8.570 | 8.521 | 8.570 | 60-69 |
| 8.453 | 8.366 | 8.732 | 8.655 | 8.521 | 8.505 | 8.670 | 8.626 | 8.642 | 8.813 | 8.642 | 8.813 | 70-79 |
| 8.571 | 8.989 | 8.641 | 8.970 | 8.619 | 9.051 | 8.635 | .. | .. | .. | .. | .. | 80-89 |

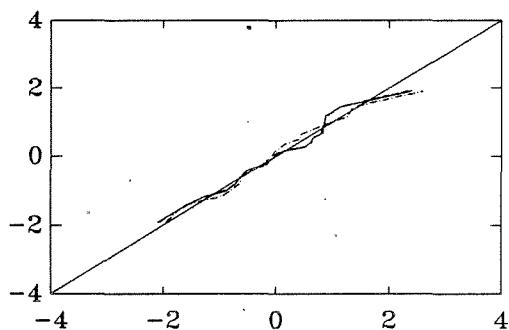
PLAICE IRISH SEA (VIIa)
 START YEAR = 63 END YEAR = 84 NUMBER OF DATA POINTS = 22
 SOURCE: Report of the Irish Sea and Bristol Channel Working Group,
 ICES C.M. 1987.
 COMMENTS: SPA, 1 year olds in actual numbers.

PLACIS

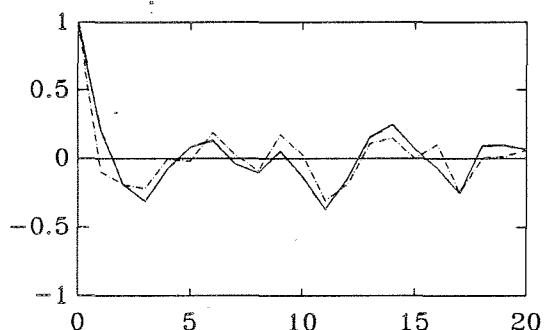
PLACIS MEAN = 7.217 SLOPE = -0.000 VAR RATIO = 0.684 N = 22



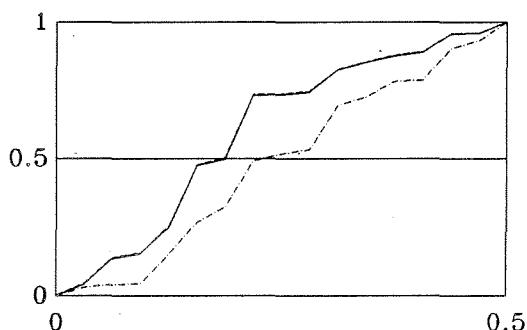
SD (0.132, 0.132, 0.154)



RHO (0.985, 0.986, 0.981)



ACF(1) (0.207, 0.212, -0.095)



TAU (5.330, 5.466, 4.353)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | 7.533 | 7.217 | 7.194 | 7.104 | 7.153 | 7.331 | 7.303 | 60-69 | |
| 7.141 | 7.005 | 7.131 | 7.123 | 7.045 | 7.237 | 7.285 | 7.367 | 7.325 | 7.211 | 70-79 | |
| 6.941 | 7.324 | 7.332 | 7.297 | 7.182 | .. | .. | .. | .. | .. | 80-89 | |

PLAICE KATTEGAT

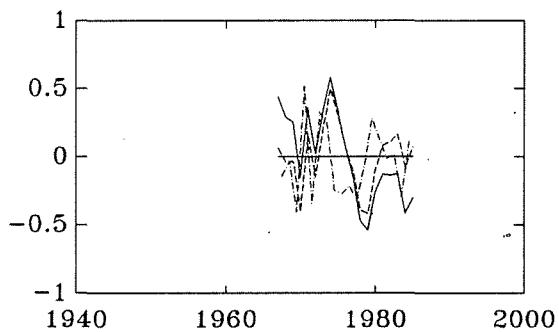
PLAIKAT

START YEAR = 67 END YEAR = 85 NUMBER OF DATA POINTS = 19

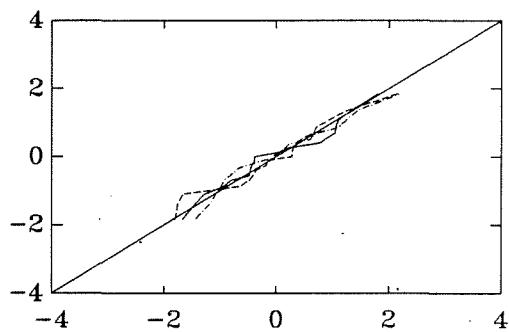
SOURCE: Report of the Division IIIa Demersal Stocks Working Groups, ICES
C.M.1987.

COMMENTS: SPA, 1 year olds in (000's).

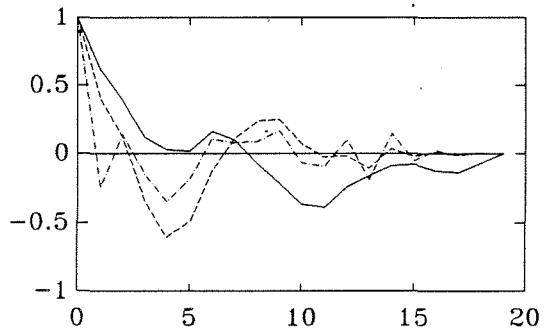
PLAIKAT MEAN = 4.393 SLOPE = -0.042 VAR RATIO = 0.315 N = 19



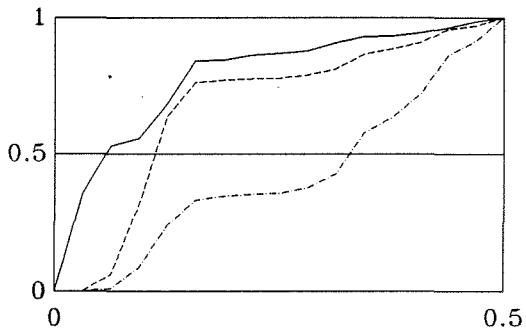
SD (0.324, 0.230, 0.257)



RHO (0.981, 0.977, 0.980)



ACF(1) (0.622, 0.406, -0.248)



TAU (17.531, 8.972, 3.051)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | 4.831 | 4.684 | 4.644 | .. | 60-69 |
| 4.236 | 4.753 | 4.410 | 4.737 | 4.975 | 4.734 | 4.458 | 4.240 | 3.925 | 3.852 | 70-79 | |
| 4.132 | 4.267 | 4.254 | 4.268 | 3.976 | 4.088 | .. | .. | .. | .. | .. | 80-89 |

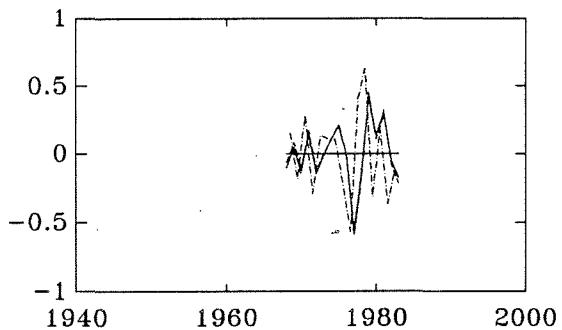
POLLOCK 4VWX5

POLL4VWX5

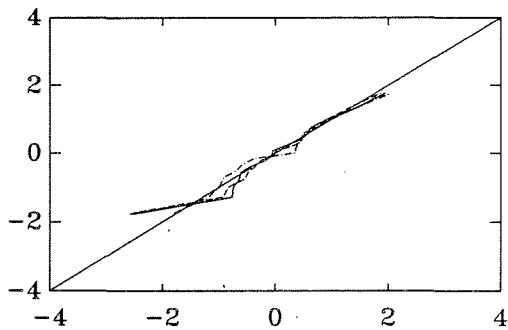
START YEAR = 68 END YEAR = 83 NUMBER OF DATA POINTS = 16
SOURCE: Annand et al., CAFSAC Res. Doc. 88/71.

COMMENTS: SPA, 2 year olds in (000's).

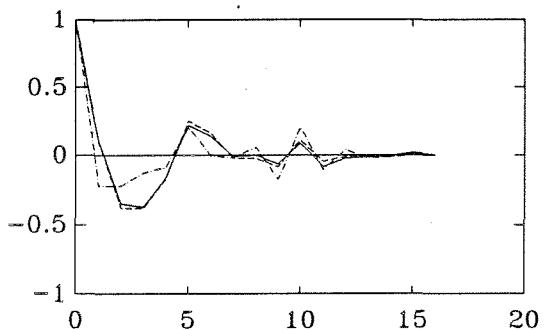
POLL4VWX5 MEAN = 4.570 SLOPE = 0.006 VAR RATIO = 0.926 N = 16



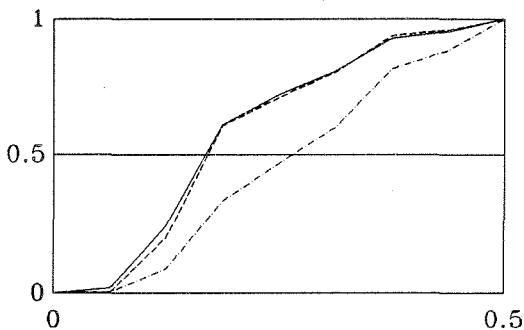
SD (-0.232, 0.230, 0.315)



RHO (0.969, 0.972, 0.987)



ACF(1) (-0.108, 0.091, -0.225)



TAU (5.934, 5.847, 3.777)

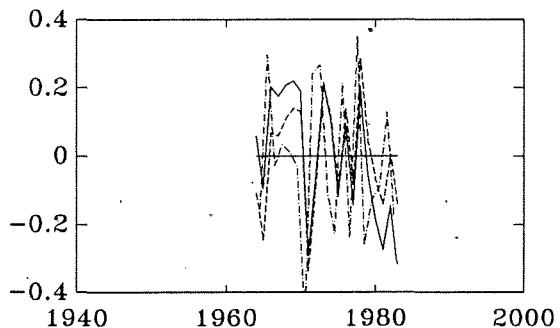
Log Transformed (base 10) Recruitment Data

POLLOCK (SAITHE) NORTH EAST ARCTIC
START YEAR = 64 END YEAR = 83 NUMB
SOURCE: Report of the Arctic Fisheries

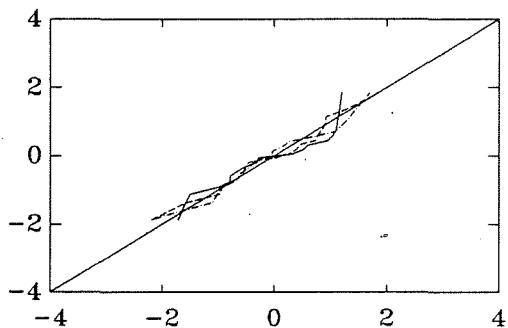
POLLNEAR

COMMENTS: SPA, 1 year olds in actual numbers.

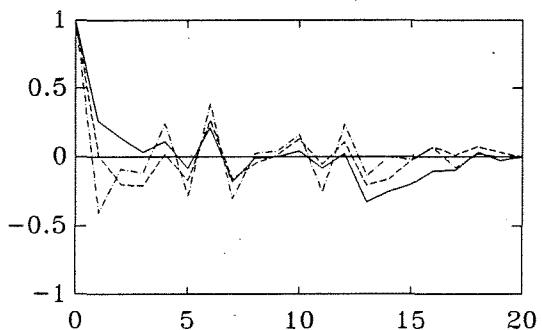
POLLINEAR MEAN = 8.459 SLOPE = -0.018 VAR RATIO = 0.696 N = 20



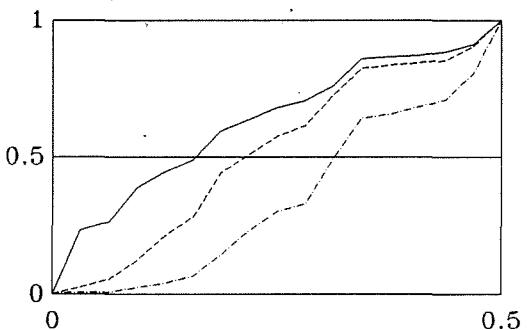
SD (0.184, 0.153, 0.217)



RHO (0.955, 0.987, 0.984)



ACF(1) (-0.257, 0.009, -0.402)



TAU (-6.275, 4.643, 3.191)

Log Transformed (base 10) Recruitment Data

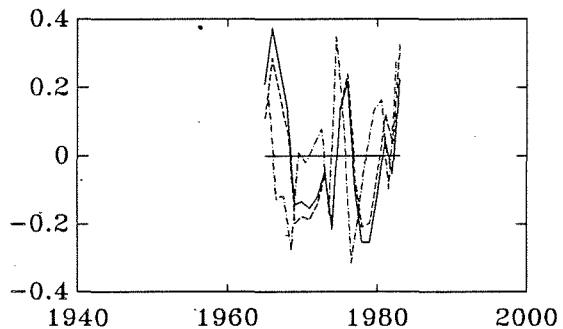
POLLOCK ICELAND (SAITHE)

POLICE

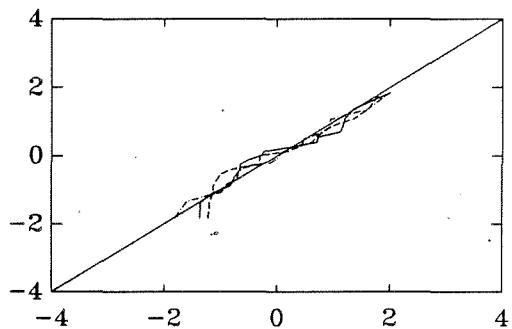
START YEAR = 65 END YEAR = 83 NUMBER OF DATA POINTS = 19
SOURCE: Marine Research Institute, Iceland, Mon Jun 20/1988.

COMMENTS: SPA, 3 year olds in actual numbers.

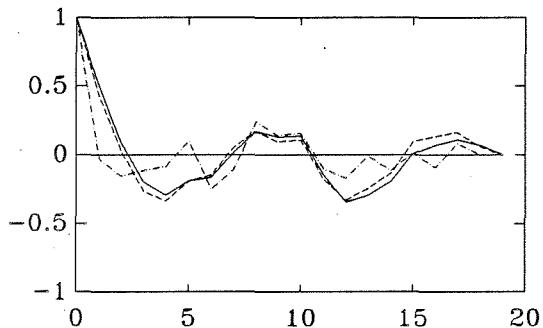
POLICE MEAN = 7.571 SLOPE = -0.011 VAR RATIO = 0.440 N = 19



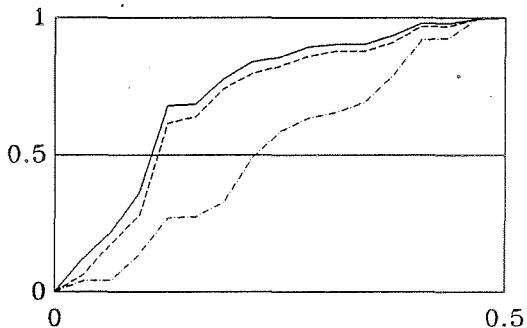
SD (0.187, 0.177, 0.175)



RHO (-0.967, -0.964, 0.994)



ACF(1) (-0.513, 0.435, -0.027)



TAU (9.326, 8.747, 4.496)

Log Transformed (base 10) Recruitment Data

POLLOCK (SAITHE) FAROE

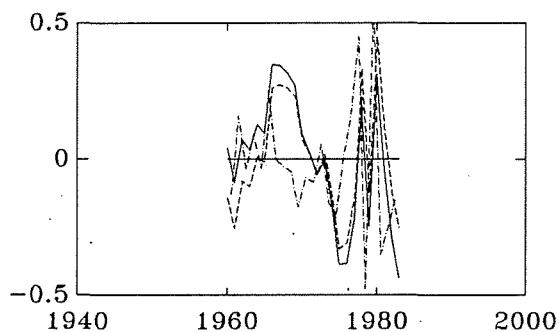
POLLFA

START YEAR = 60 END YEAR = 83 NUMBER OF DATA POINTS = 24

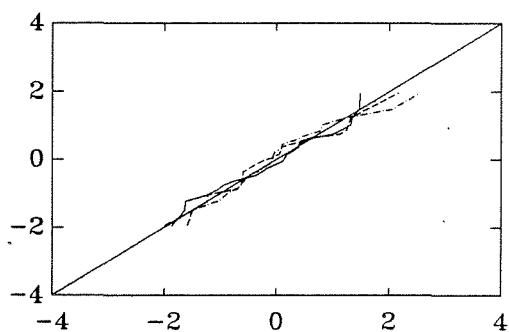
SOURCE: Report of the North-Western Working Group, ICES C.M. 1987.

COMMENTS: SPA, 1 year olds in actual numbers.

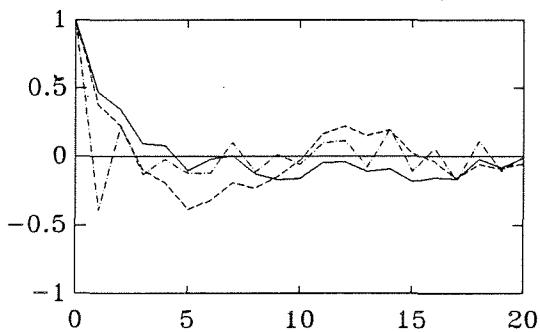
POLLFA MEAN = 7.461 SLOPE = -0.016 VAR RATIO = 0.473 N = 24



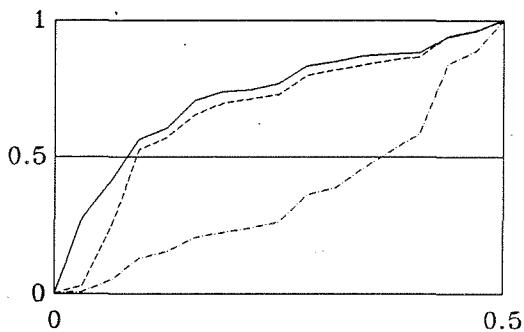
SD (0.235, 0.208, 0.229)



RHO (0.983, 0.980, 0.974)



ACF(1) (0.470, 0.377, -0.391)



TAU (12.438, 10.990, 2.747)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| 7.502 | 7.375 | 7.533 | 7.497 | 7.590 | 7.555 | 7.809 | 7.807 | 7.779 | 7.733 | 60-69 | |
| 7.556 | 7.487 | 7.401 | 7.456 | 7.297 | 7.075 | 7.078 | 7.244 | 7.692 | 7.216 | 70-79 | |
| 7.773 | 7.422 | 7.170 | 7.024 | .. | .. | .. | .. | .. | .. | 80-89 | |

POLLOCK (SAITHE) VIa

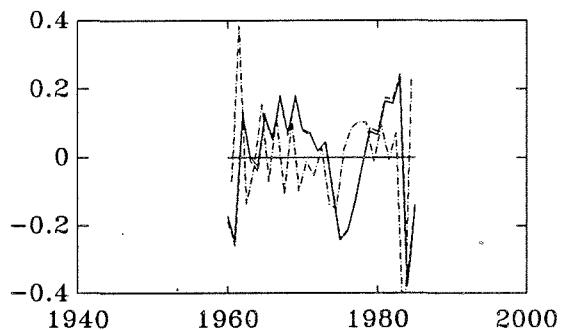
POLLVIA

START YEAR = 60 END YEAR = 85 NUMBER OF DATA POINTS = 26

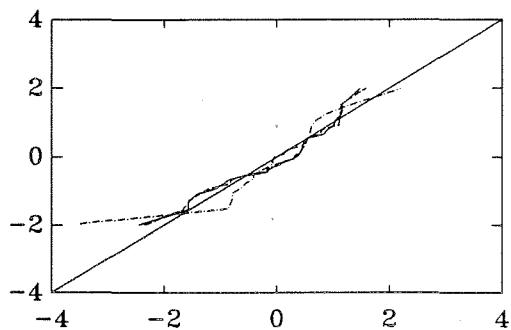
SOURCE: Report of the North Sea Roundfish Working Group. ICES C.M. 1988.

COMMENTS: SPA, 1 year olds in actual numbers.

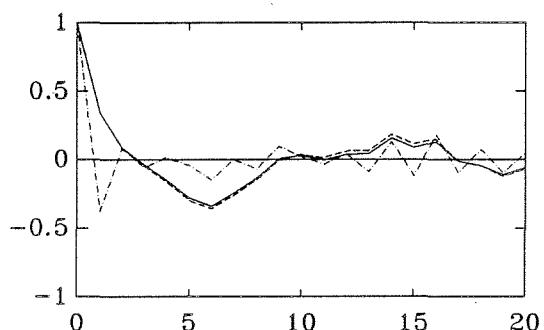
POLLVIA MEAN = 7.473 SLOPE = -0.001 VAR RATIO = 0.631 N = 26



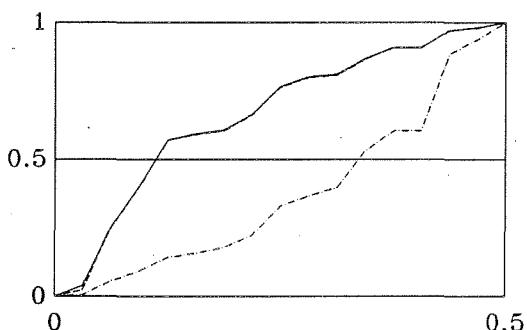
SD (0.155, 0.155, 0.174)



RHO (0.970, 0.974, 0.922)



ACF(1) (0.352, 0.347, -0.376)



TAU (8.951, 8.951, 2.970)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|----|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| 7.301 | 7.230 | 7.613 | 7.477 | 7.447 | 7.602 | 7.531 | 7.653 | 7.544 | 7.652 | .. | .. | 50-59 |
| 7.556 | 7.544 | 7.491 | 7.518 | 7.380 | 7.230 | 7.255 | 7.343 | 7.447 | 7.549 | .. | .. | 60-69 |
| 7.540 | 7.636 | 7.630 | 7.702 | 7.095 | 7.325 | .. | .. | .. | .. | .. | .. | 70-79 |

80-89

POLLOCK (SAITHE) NORTH SEA

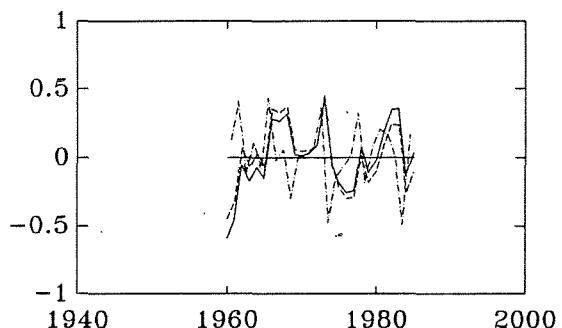
POLLNS

START YEAR = 60 END YEAR = 85 NUMBER OF DATA POINTS = 26

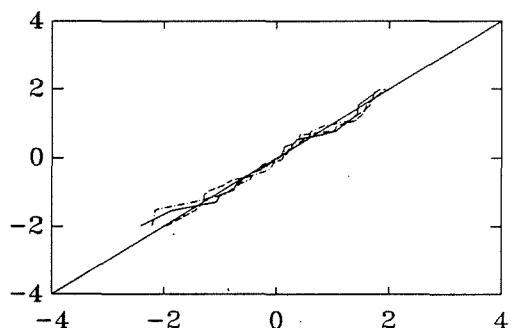
SOURCE: Report of the North Sea Roundfish Working Group. ICES C.M. 1988.

COMMENTS: SPA, 1 year olds in (000's).

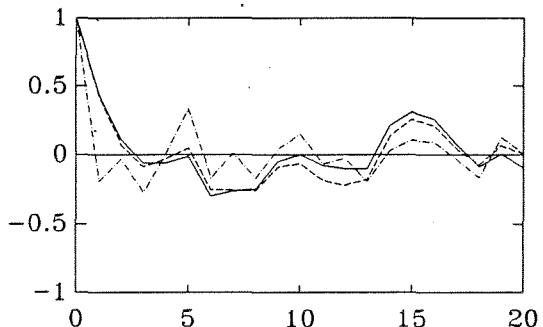
POLLNS MEAN = 5.353 SLOPE = 0.011 VAR RATIO = 0.453 N = 26



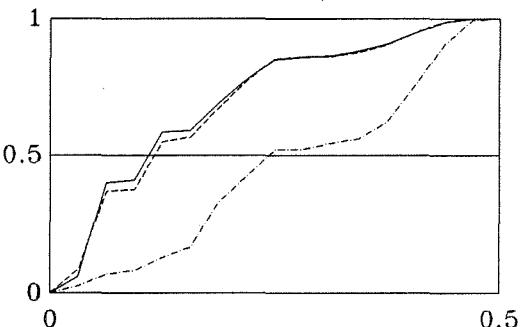
SD (0.245, 0.230, 0.233)



RHO (0.986, 0.991, 0.983)



ACF(1) (0.449, 0.427, -0.193)



TAU (9.115, 8.621, 4.105)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| 4.763 | 4.892 | 5.303 | 5.176 | 5.286 | 5.201 | 5.634 | 5.614 | 5.670 | 5.372 | 5.244 | 60-69 | |
| 5.369 | 5.386 | 5.439 | 5.802 | 5.324 | 5.167 | 5.093 | 5.108 | 5.431 | 5.244 | 70-79 | | |
| 5.334 | 5.541 | 5.703 | 5.708 | 5.219 | 5.383 | .. | .. | .. | .. | .. | 80-89 | |

POUT NORWAY

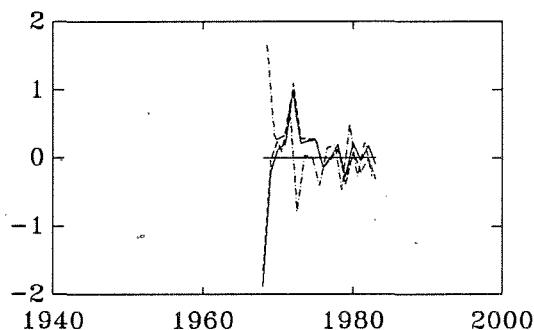
POUTNOR

START YEAR = 68 END YEAR = 83 NUMBER OF DATA POINTS = 16

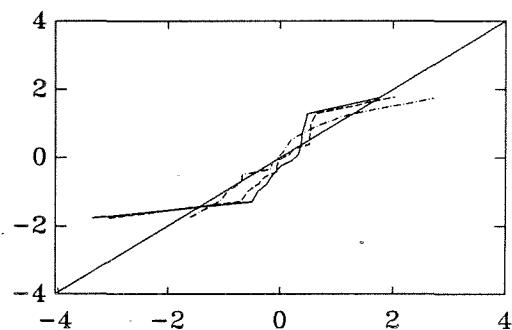
SOURCE: Report of the Working Group on Industrial Fisheries, ICES C.M., 1987.

COMMENTS: RV (1).

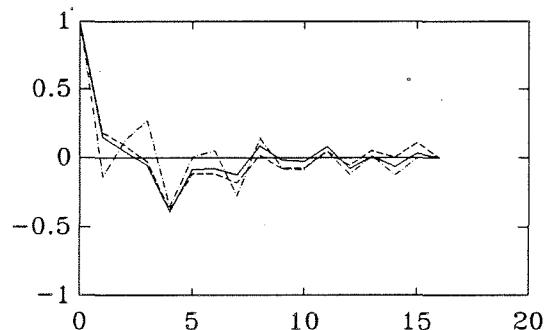
POUTNOR MEAN = 3.416 SLOPE = 0.030 VAR RATIO = 0.506 N = 16



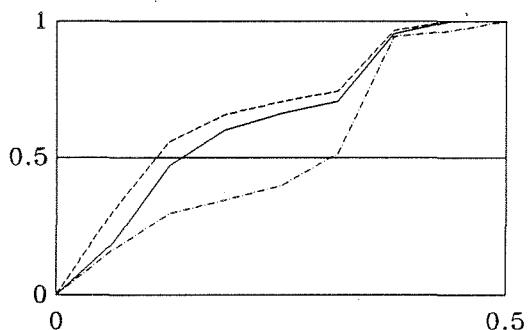
SD (-0.559, -0.542, -0.562)



RHO (0.823, 0.892, 0.952)



ACF(1) (-0.153, 0.183, -0.137)



TAU (7.193, 9.039, 3.284)

Log Transformed (base 10) Recruitment Data

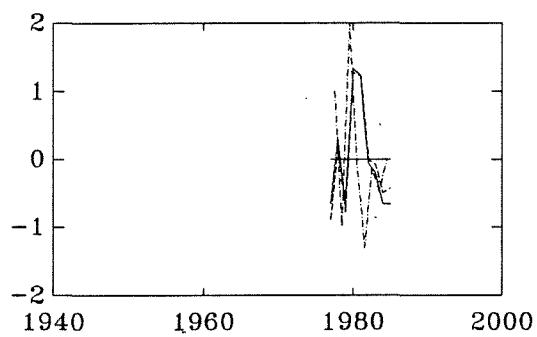
REDFISH 3NO

START YEAR = 77 END YEAR = 85 NUMBER OF DATA POINTS = 9
SOURCE: Atkinson and Power, NAFO SRC Doc. 86/38.

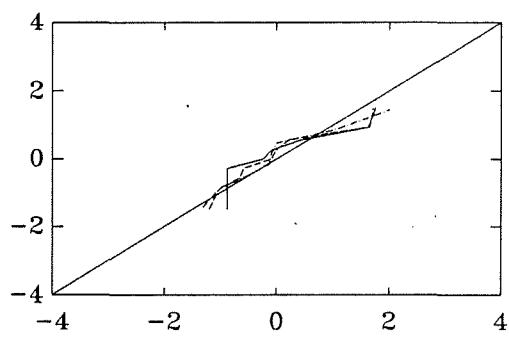
RED3NO

COMMENTS: RV(1+2).

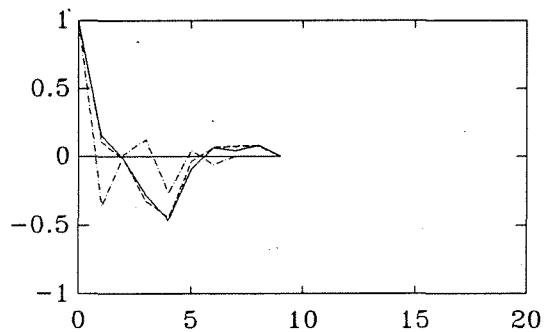
RED3NO MEAN = -0.335 SLOPE = -0.057 VAR RATIO = 0.854 N = 9



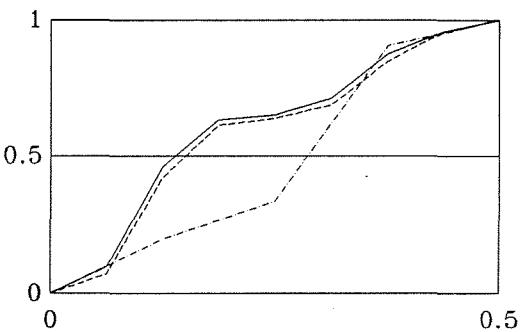
SD (0.763, 0.748, 0.997)



RHO (0.908, 0.946, 0.961)



ACF(1) (0.157, 0.111, -0.358)



TAU (7.177, 6.644, 3.495)

Log Transformed (base 10) Recruitment Data

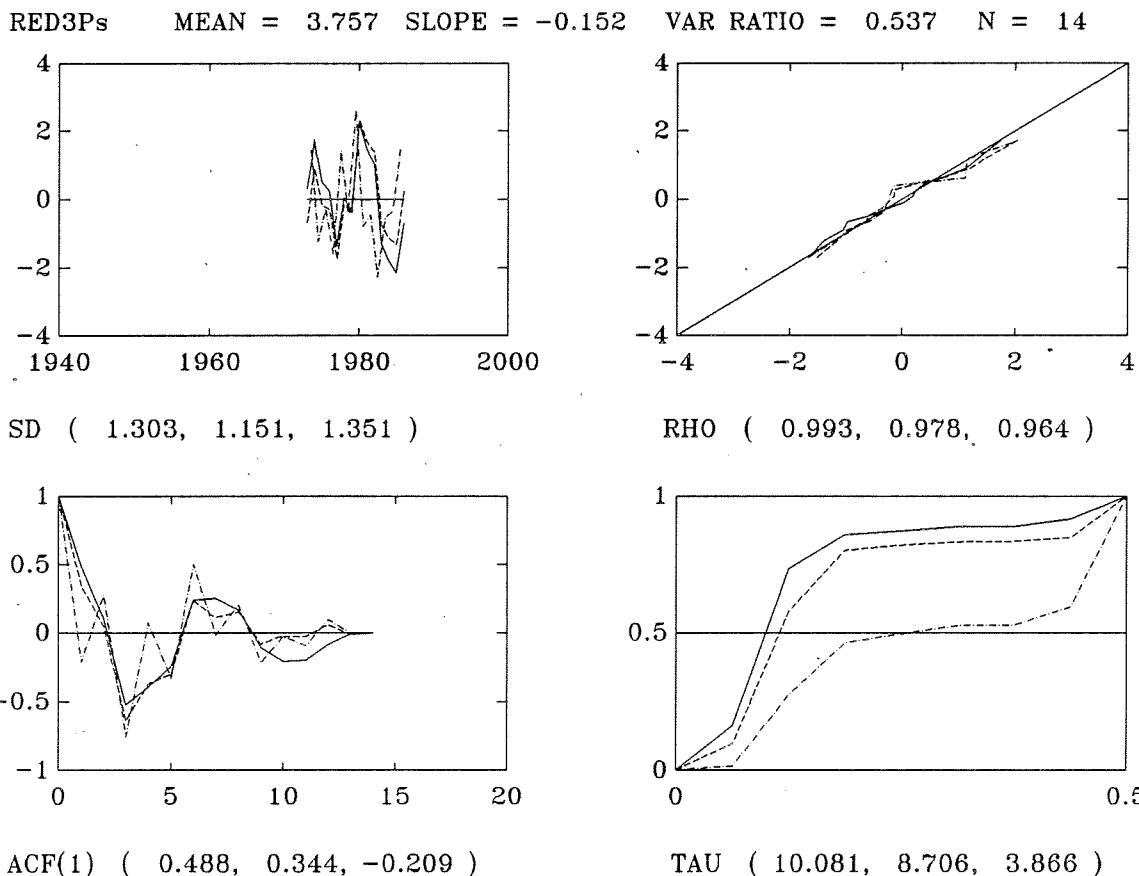
| | | | | | | | | | | | | |
|-------|-------|--------|--------|--------|--------|----|----|--------|-------|--------|----|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| .. | .. | .. | .. | .. | .. | .. | .. | -1.000 | 0.000 | -1.001 | .. | 70-79 |
| 1.000 | 0.903 | -0.398 | -0.523 | -1.000 | -1.000 | .. | .. | .. | .. | .. | .. | 80-89 |

REDFISH 3Ps

RED3Ps

START YEAR = 73 END YEAR = 86 NUMBER OF DATA POINTS = 14
SOURCE: Atkinson and Power, NAFO SRC Doc. 86/38.

COMMENTS: RV(1+2), index * 1000.



Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 60-69 |
| .. | .. | .. | 4.073 | 5.510 | 4.282 | 4.000 | 2.398 | 3.818 | 3.411 | 70-79 | |
| 6.019 | 5.226 | 4.763 | 2.477 | 1.954 | 1.602 | 3.061 | .. | .. | .. | 80-89 | |

REDFISH 4VWX

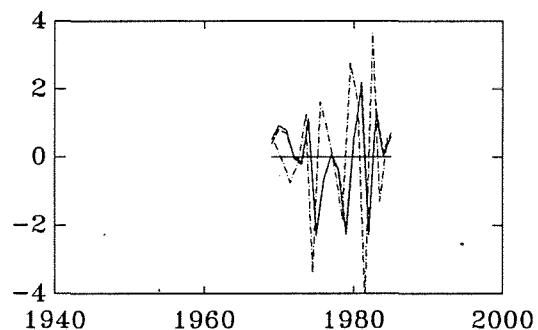
RED4VWX

START YEAR = 69 END YEAR = 85 NUMBER OF DATA POINTS = 17

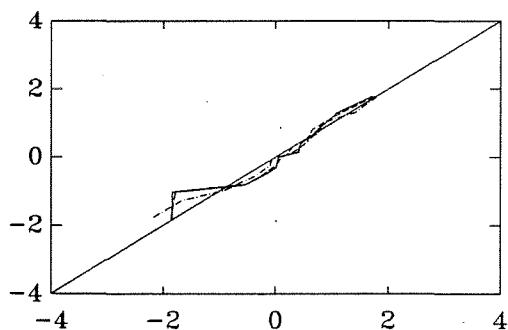
SOURCE: Zwanenburg and Hurley, CAFSAC Res. Doc. 87/35.

COMMENTS: RV(1+2).

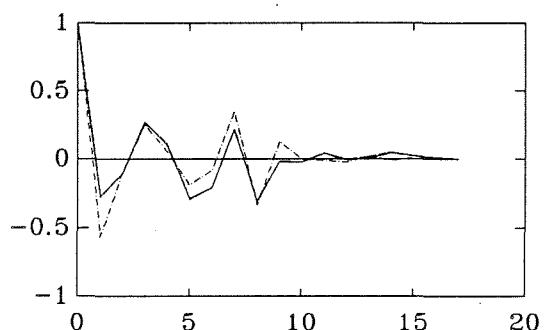
RED4VWX MEAN = 5.276 SLOPE = -0.015 VAR RATIO = 1.338 N = 17



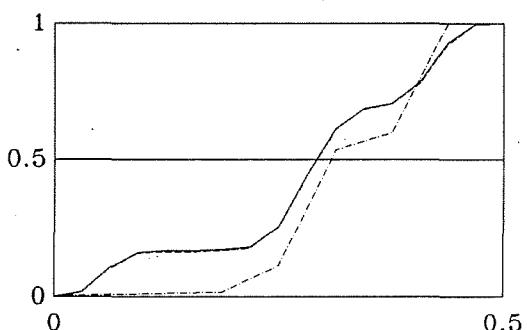
SD (1.239, 1.237, 2.027)



RHO (0.955, 0.961, 0.986)



ACF(1) (-0.271, -0.277, -0.569)



TAU (3.426, 3.423, 3.252)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 5.786 60-69 |
| 6.199 | 6.065 | 5.306 | 5.122 | 6.400 | 3.000 | 4.615 | 5.346 | 4.874 | 3.000 | 70-79 | |
| 5.790 | 7.398 | 3.000 | 6.623 | 5.311 | 5.863 | .. | .. | .. | .. | .. | 80-89 |

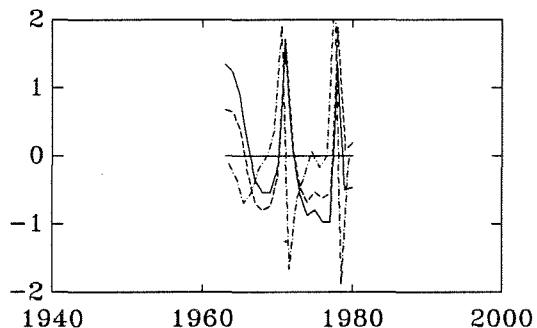
REDFISH 5YZ

RED5YZ

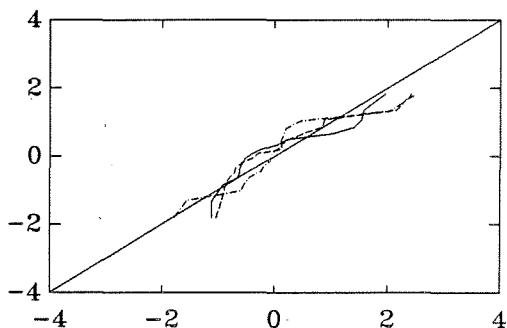
START YEAR = 63 END YEAR = 80 NUMBER OF DATA POINTS = 18
SOURCE: Woods Hole Ref. Doc. 86-09, JNWA FS, 2:13.

COMMENTS: SPA, 1 year olds in (000's).

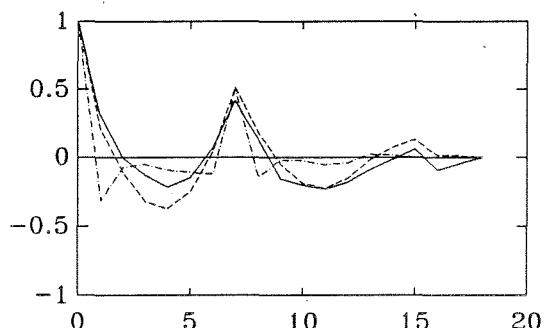
RED5YZZ MEAN = 0.580 SLOPE = -0.078 VAR RATIO = 0.645 N = 18



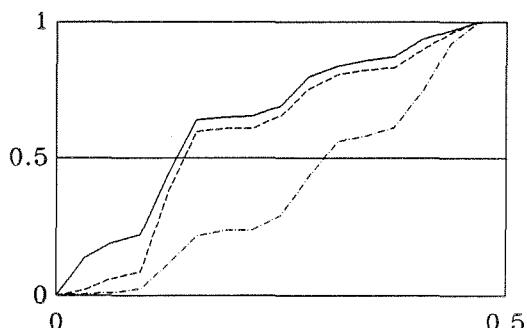
SD (-0.878, 0.780, 0.998)



RHO (0.935, 0.926, 0.923)



ACF(1) (-0.310, 0.204, -0.311)



TAU (-7.473, -7.028, -3.361)

Log Transformed (base 10) Recruitment Data

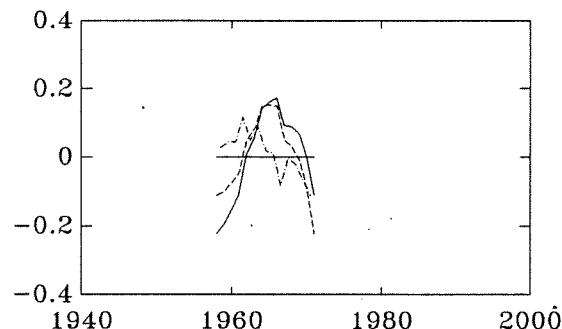
REDFISH ICELAND

START YEAR = 58 END YEAR = 71 NUMBER OF DATA POINTS = 14
SOURCE: Marine Research Institute, Iceland, Mon Jun 20/1988.

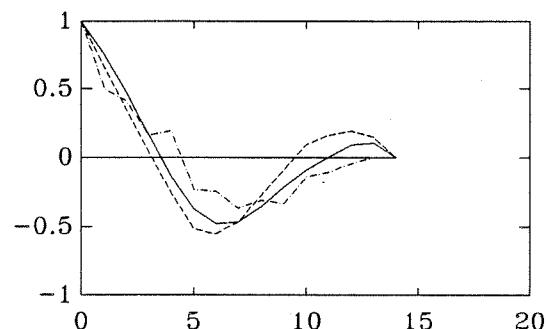
REDICE

COMMENTS: SPA, 11 year olds in actual numbers.

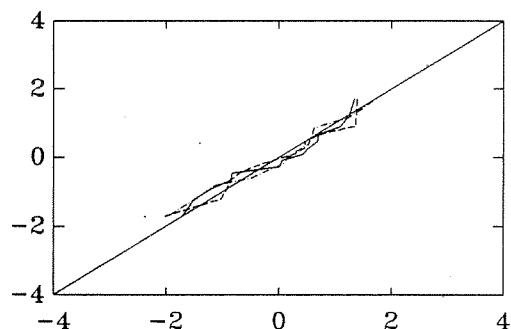
REDICE MEAN = 8.306 SLOPE = 0.017 VAR RATIO = 0.118 N = 14



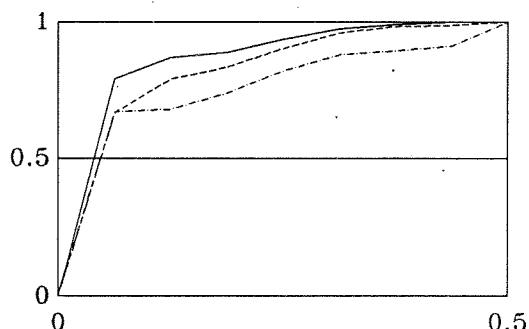
SD (-0.130, 0.110, -0.063)



ACF(1) (-0.757, -0.662, -0.507)



RHO (0.971, 0.978, 0.983).



TAU (25.250, 21.327, 21.419)

Log Transformed (base 10) Recruitment Data

REDFISH I&II

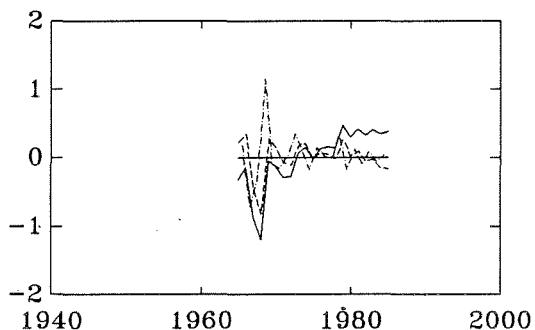
REDI&II

START YEAR = 65 END YEAR = 85 NUMBER OF DATA POINTS = 21

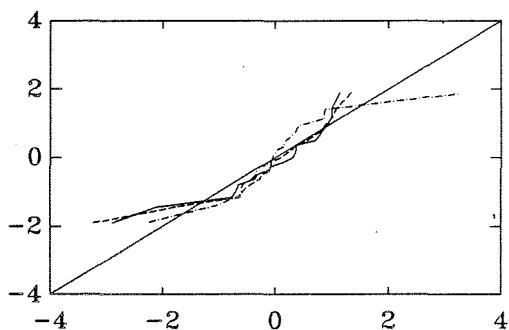
SOURCE: Report of the Arctic Fisheries Working Group, ICES C.M. 1988.

COMMENTS: RV(0), 0-group survey abundance indices.

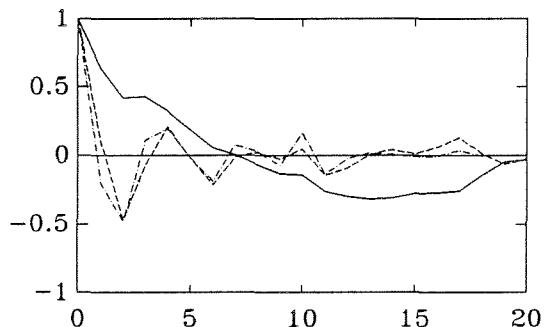
REDI&II MEAN = 2.519 SLOPE = 0.054 VAR RATIO = 0.341 N = 21



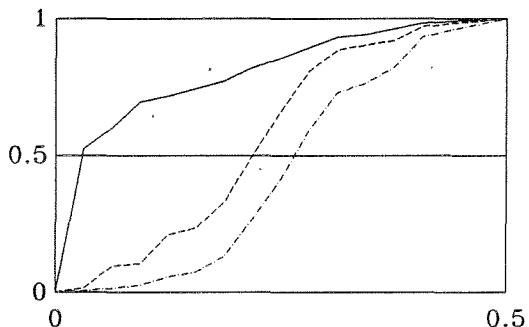
SD (0.414, 0.253, 0.342)



RHO (0.926, 0.920, 0.904)



ACF(1) (0.638, 0.103, -0.202)



TAU (33.586, 4.572, 3.772)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | .. | .. | .. | .. | .. | 2.201 | 2.373 | 1.643 | 1.322 | 2.469 | 60-69 |
| 2.393 | 2.236 | 2.248 | 2.585 | 2.670 | 2.498 | 2.650 | 2.674 | 2.663 | 2.990 | 70-79 | |
| 2.814 | 2.935 | 2.841 | 2.930 | 2.865 | 2.900 | .. | .. | .. | .. | .. | 80-89 |

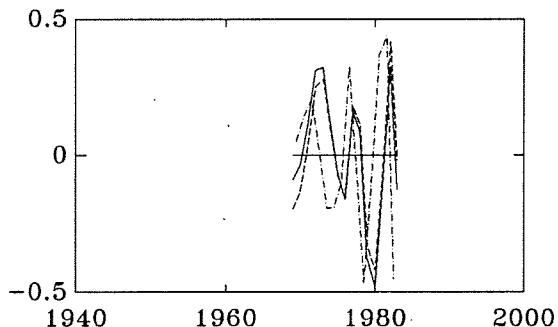
SCALLOPS 5Ze

SCALL5Ze

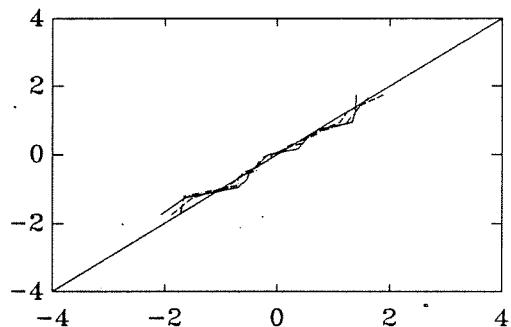
START YEAR = 69 END YEAR = 83 NUMBER OF DATA POINTS = 15
SOURCE: Mohn et al., CAFSAC Res. Doc. 87/9.

COMMENTS: SPA, 3 year olds in (000 000's).

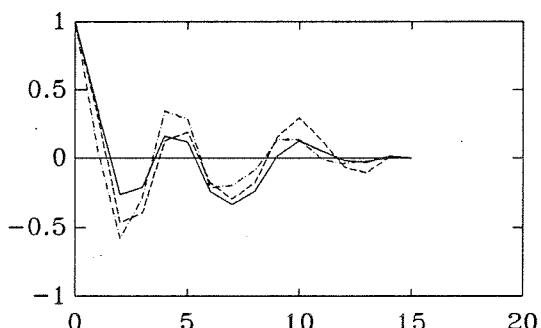
SCALL5Ze MEAN = 2.764 SLOPE = -0.015 VAR RATIO = 0.672 N = 15



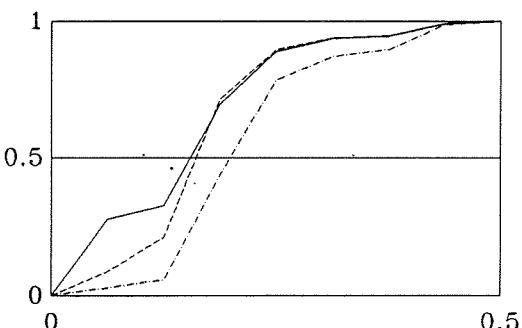
SD (-0.232, 0.222, 0.269)



RHO (0.977, 0.997, 0.986)



ACF(1) (-0.358, -0.289, 0.045)



TAU (-6.484, -6.223, -5.034)

Log Transformed (base 10) Recruitment Data

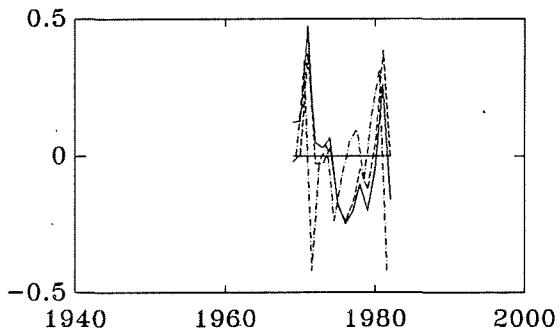
SILVER HAKE 4VWX

SHAKE4VWX

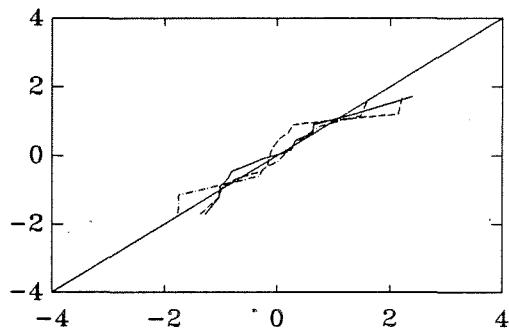
START YEAR = 69 END YEAR = 82 NUMBER OF DATA POINTS = 14
SOURCE: Fanning et al., NAFO SCR Doc. 87/56.

COMMENTS: SPA, 1 year olds in (000's).

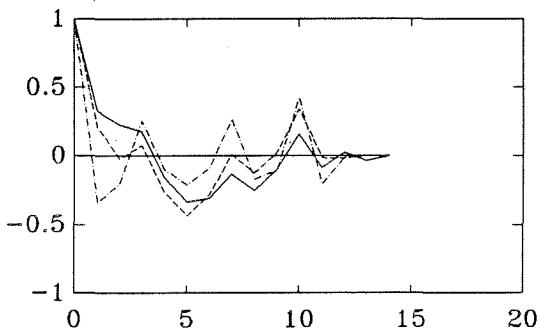
SHAKE4VWX MEAN = 6.107 SLOPE = -0.022 VAR RATIO = 0.671 N = 14



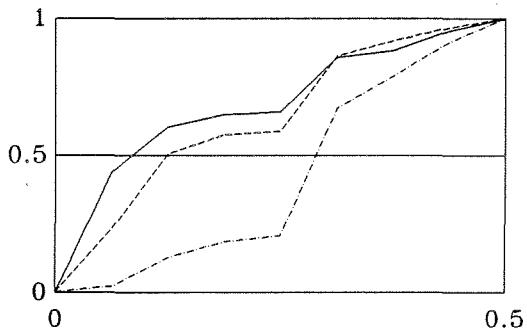
SD (0.196, 0.174, 0.227)



RHO (0.962, 0.916, 0.977)



ACF(1) (-0.334, 0.210, -0.345)



TAU (11.714, 8.074, 3.457)

Log Transformed (base 10) Recruitment Data

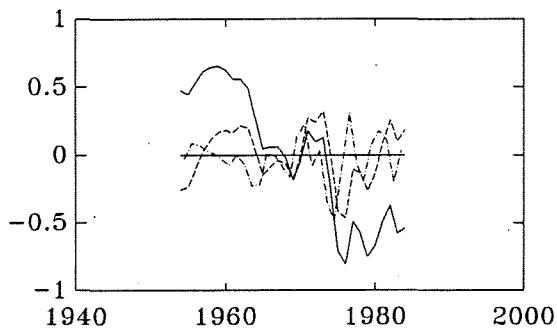
SILVER HAKE 5Ze

START YEAR = 54 END YEAR = 84 NUMBER OF DATA POINTS = 31
SOURCE: Almeida, Woods Hole Ref. Doc. 87-03.

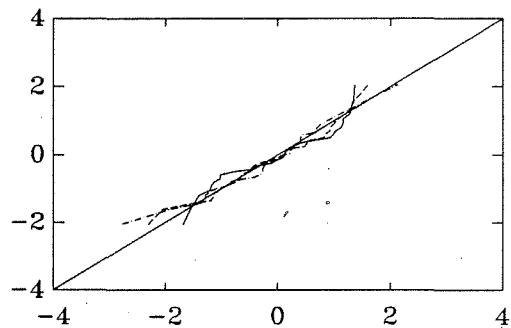
SHAKE5Ze

COMMENTS: SPA, 1 year olds in (000 000's).

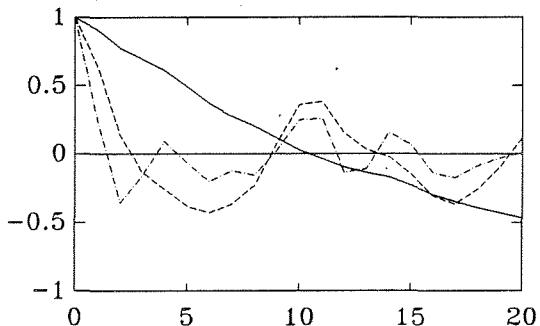
SHAKE5Ze MEAN = 2.451 SLOPE = -0.049 VAR RATIO = 0.058 N = 31



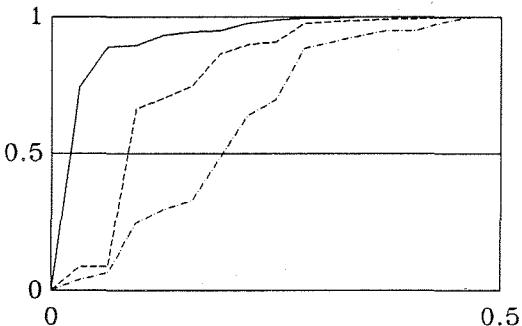
SD (0.480, 0.201, 0.163)



RHO (0.966, 0.985, 0.983)



ACF(1) (0.905, 0.638, 0.237)



TAU (47.571, 11.788, 5.245)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | 2.924 | 2.897 | 2.987 | 3.064 | 3.096 | 3.105 | 50-59 | |
| 3.076 | 3.007 | 3.008 | 2.945 | 2.718 | 2.498 | 2.510 | 2.512 | 2.435 | 2.267 | 60-69 | |
| 2.408 | 2.631 | 2.548 | 2.580 | 2.233 | 1.747 | 1.646 | 1.960 | 1.883 | 1.704 | 70-79 | |
| 1.781 | 1.961 | 2.077 | 1.874 | 1.907 | .. | .. | .. | .. | .. | 80-89 | |

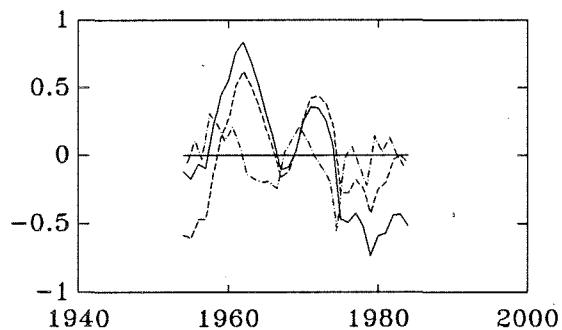
SILVER HAKE MAB (5Zw6)

SHAKEMAB

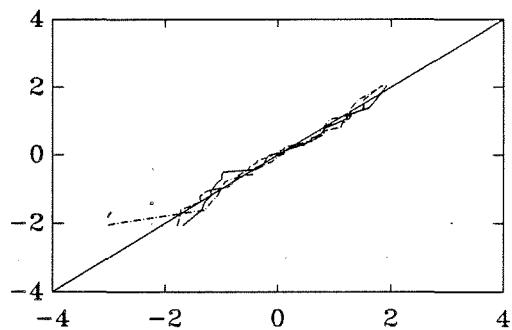
START YEAR = 54 END YEAR = 84 NUMBER OF DATA POINTS = 31
SOURCE: Almeida, Woods Hole Ref. Doc. 87-03.

COMMENTS: SPA, 1 year olds in (000 000's).

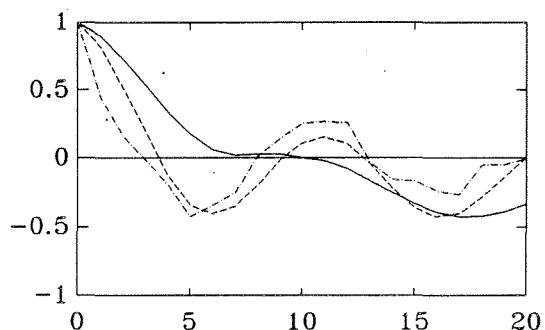
SHAKEMAB MEAN = 2.793 SLOPE = -0.031 VAR RATIO = 0.080 N = 31



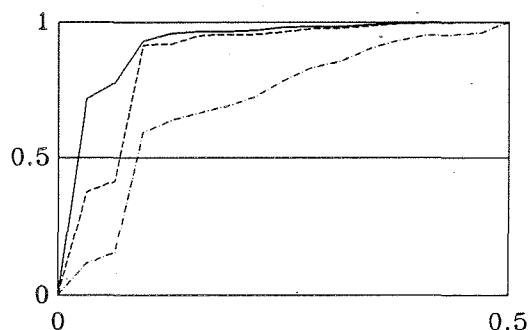
SD (0.438, 0.339, 0.175)



RHO (0.983, 0.989, 0.977)



ACF(1) (0.898, 0.822, 0.446)



TAU (45.794, 14.742, 11.468)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | 2.673 | 2.620 | 2.728 | 2.696 | 3.007 | 3.238 | 50-59 |
| 3.344 | 3.552 | 3.632 | 3.493 | 3.319 | 3.120 | 2.929 | 2.688 | 2.705 | 2.825 | 60-69 | |
| 3.038 | 3.153 | 3.143 | 3.053 | 2.866 | 2.327 | 2.302 | 2.369 | 2.277 | 2.059 | 70-79 | |
| 2.203 | 2.224 | 2.357 | 2.361 | 2.276 | .. | .. | .. | .. | .. | 80-89 | |

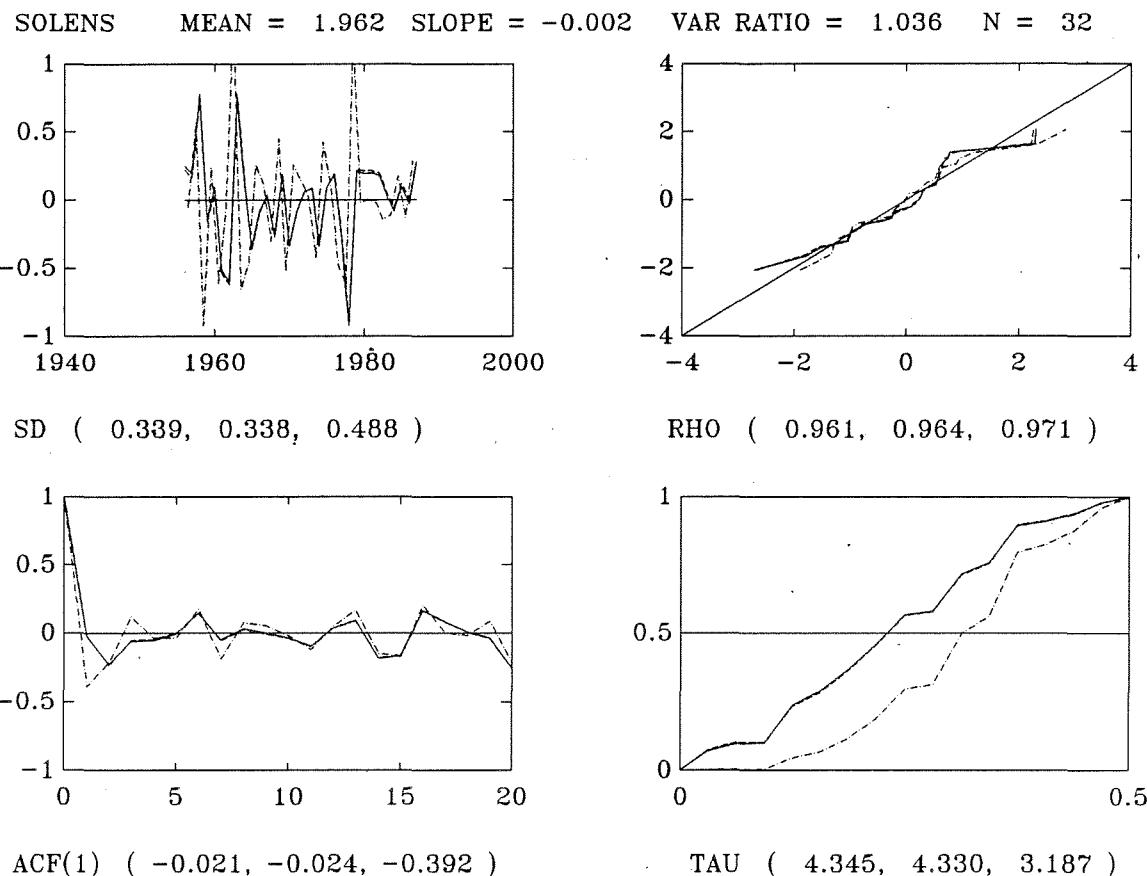
SOLE NORTH SEA

SOLENS

START YEAR = 56 END YEAR = 87 NUMBER OF DATA POINTS = 32

SOURCE: Report of the North Sea Flatfish Working Group ICES C.M. 1988.

COMMENTS: SPA, 1 year olds in (000 000's).



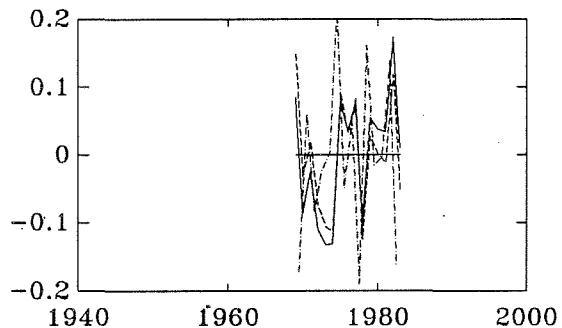
Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| 2.061 | 1.447 | 1.362 | 2.742 | 2.083 | 1.613 | 1.875 | 2.212 | 2.158 | 2.738 | 1.820 | 50-59 |
| 1.623 | 1.881 | 2.025 | 2.045 | 1.623 | 2.053 | 2.146 | 2.000 | 1.672 | 1.699 | 2.150 | 60-69 |
| 2.155 | 2.158 | 2.140 | 1.996 | 1.881 | 2.057 | 1.929 | 2.220 | .. | .. | 2.176 | 70-79 |

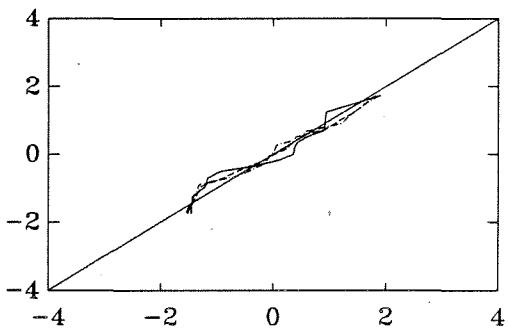
SOLE CELTIC SEA (VIIe & VIIg)
START YEAR = 69 END YEAR = 83 NUMBER OF DATA POINTS = 15
SOURCE: Report of the Irish Sea and Bristol Channel Working Group,
ICES C.M. 1987.
COMMENTS: SPA, 2 year olds in actual numbers.

SOLECS

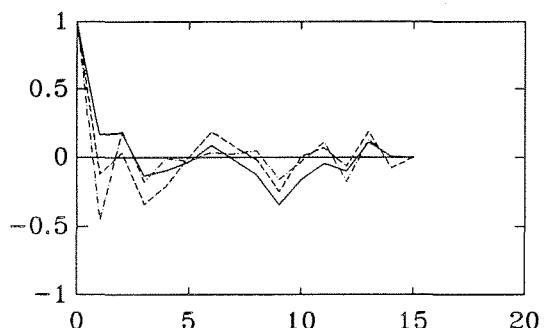
SOLECS MEAN = 6.616 SLOPE = 0.009 VAR RATIO = 0.859 N = 15



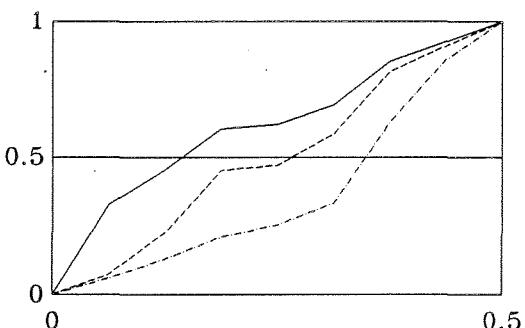
SD (-0.091, 0.082, 0.119)



RHO (. 966, . 990, . 985)



ACF(1) (-0.167, -0.122, -0.457)



TAU (-6.953, 3.754, 2.877)

Log Transformed (base 10) Recruitment Data

SOLE IRISH SEA (VIIa)

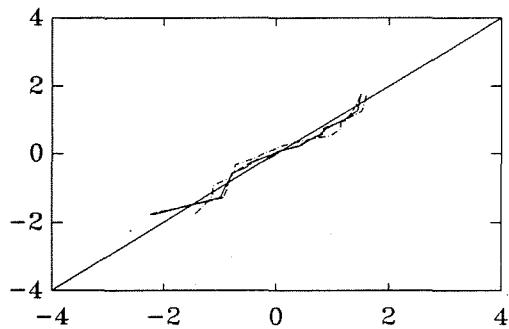
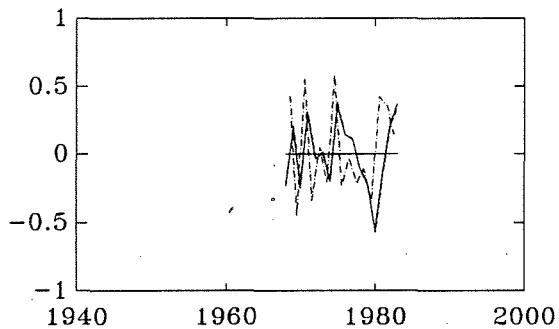
SOLEIS

START YEAR = 68 END YEAR = 83 NUMBER OF DATA POINTS = 16

SOURCE: Report of the Irish Sea and Bristol Channel Working Group, ICES C.M. 1987.

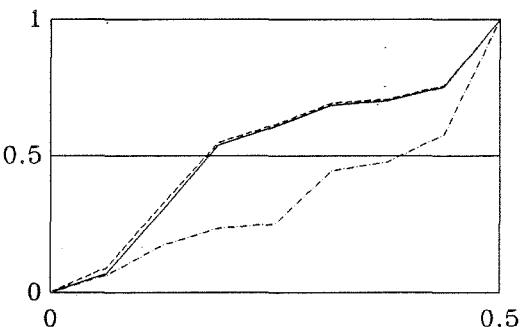
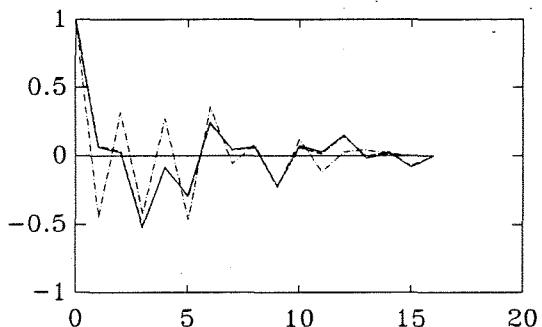
COMMENTS: SPA. 2 year olds in acutal numbers.

SOLEIS MEAN = 6.830 SLOPE = 0.003 VAR RATIO = 0.887 N = 16



SD (0.255, 0.255, 0.340)

RHO (0.982, 0.978, 0.968)



ACF(1) (-0.065, 0.076, -0.451)

TAU (5.642, 5.756, 2.568)

Log Transformed (base 10) Recruitment Data

SOLE IIIa

SOLIIIa

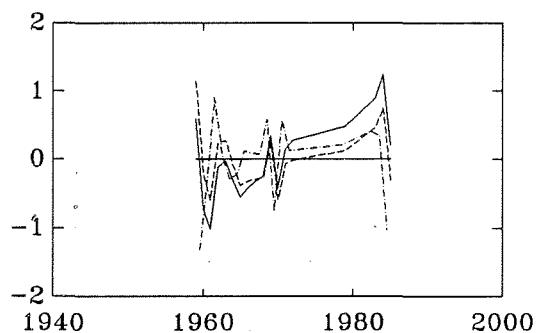
START YEAR = 59 END YEAR = 85 NUMBER OF DATA POINTS = 18

SOURCE: Report of the Division IIIa Demersal Stocks Working Groups

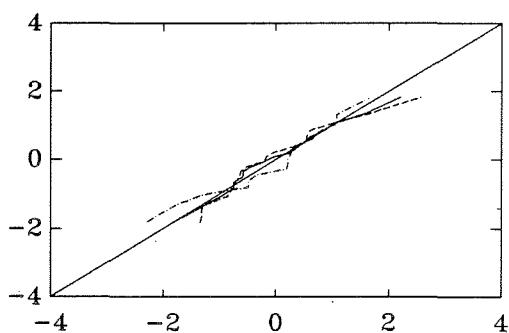
ICES C.M.1987.

COMMENTS: RV (1).

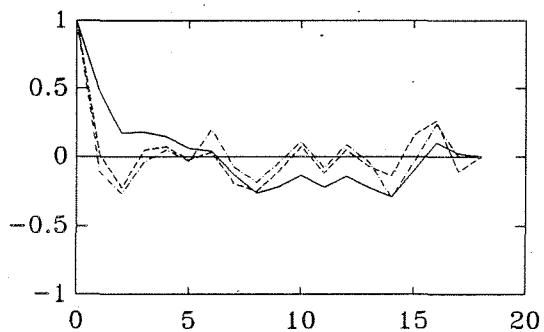
SOLIIIa MEAN = 0.024 SLOPE = 0.065 VAR RATIO = 0.509 N = 18



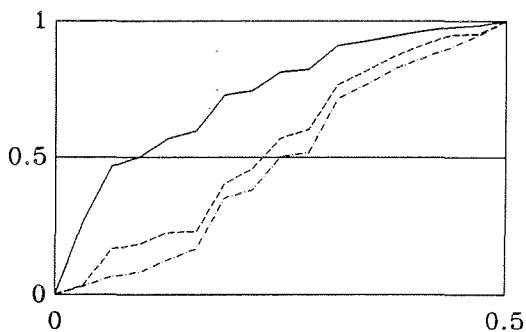
SD (0.561, 0.447, .567)



RHO (0.991, 0.962, 0.966)



ACF(1) (0.484, 0.023, -0.107)



TAU (11.006, 4.340, 4.007)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|--------|--------|--------|-------|--------|--------|--------|--------|--------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 0.613 | 50-59 |
| -0.699 | -1.000 | -0.097 | 0.000 | -0.301 | -0.523 | -0.398 | -0.301 | -0.222 | 0.362 | 0.362 | 0.362 | 60-69 |
| -0.398 | 0.176 | 0.301 | .. | .. | .. | .. | .. | .. | .. | 0.504 | 70-79 | 70-79 |
| .. | .. | .. | 0.914 | 1.262 | 0.230 | .. | .. | .. | .. | .. | .. | 80-89 |

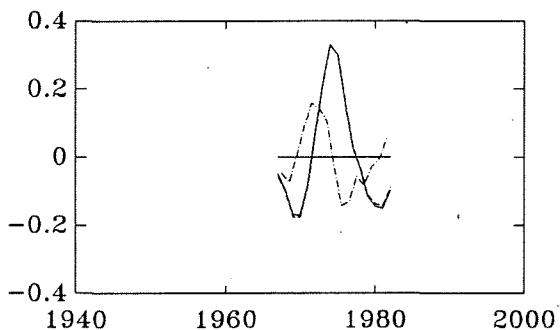
WHITE HAKE 4T

WHAKE4T

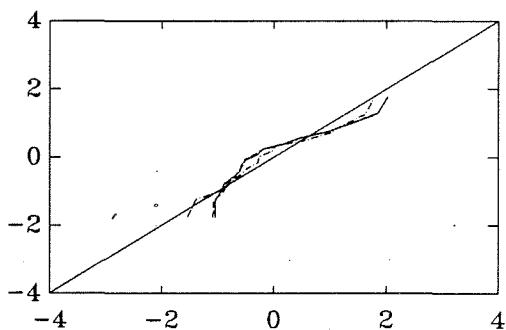
START YEAR = 67 END YEAR = 82 NUMBER OF DATA POINTS = 16
SOURCE: Clay CAFSAC Res. Doc. 87/81.

COMMENTS: SPA, 3 year olds in (000's).

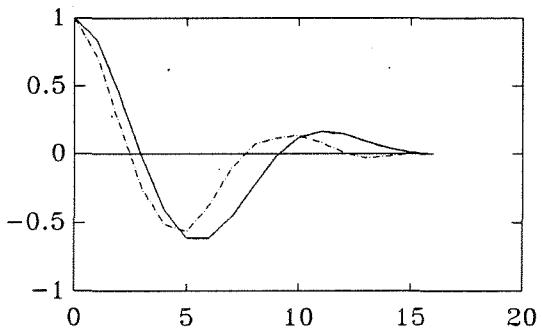
WHAKE4T MEAN = 3.746 SLOPE = -0.001 VAR RATIO = 0.158 N = 16



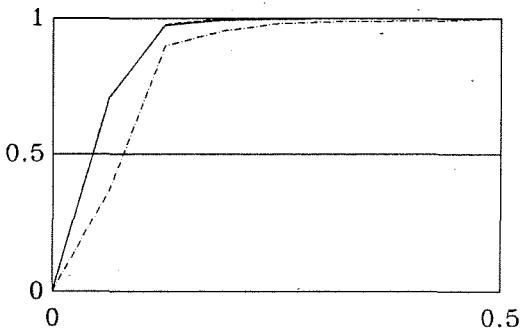
SD (-0.163, 0.162, 0.091)



RHO (0.938, 0.940, 0.981)



ACF(1) (-0.837, -0.838, -0.719)



TAU (22.684, 22.732, 12.787)

Log Transformed (base 10) Recruitment Data

WHITING VIa

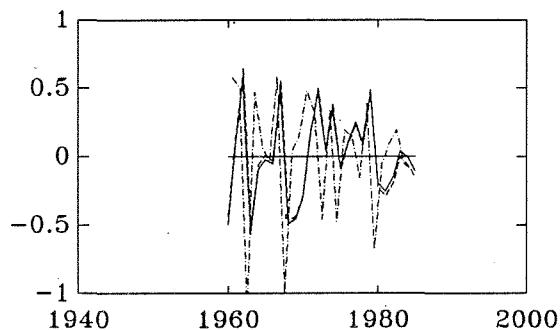
WHITVIA

START YEAR = 60 END YEAR = 85 NUMBER OF DATA POINTS = 26

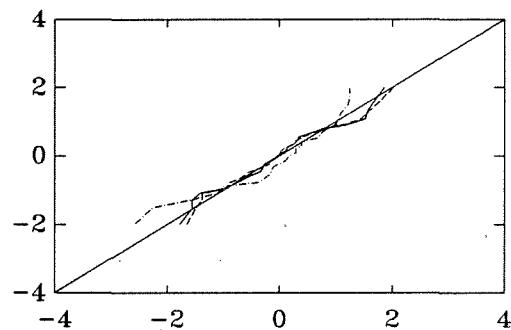
SOURCE: Report of the North Sea Roundfish Working Group. ICES C.M. 1988.

COMMENTS: SPA, 1 year olds in (000's).

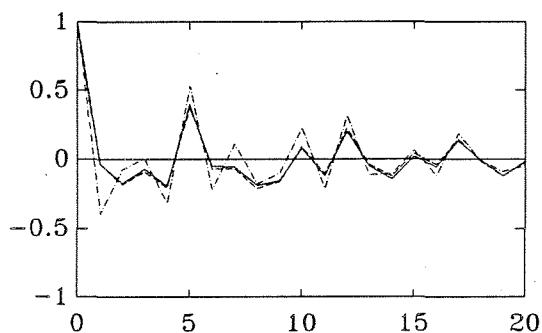
WHITVIA MEAN = 4.795 SLOPE = 0.005 VAR RATIO = 1.022 N = 26



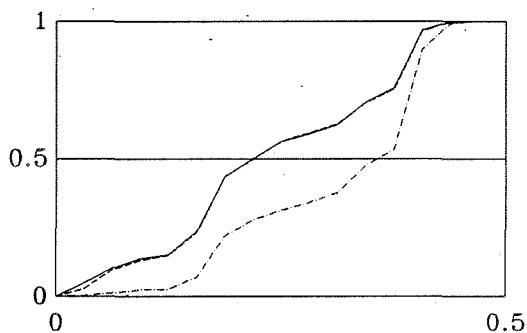
SD (0.319, 0.317, 0.456)



RHO (0.987, 0.988, 0.950)



ACF(1) (-0.032, -0.036, -0.397)



TAU (4.569, 4.561, 2.808)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|----|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| 4.301 | 4.875 | 5.386 | 4.230 | 4.699 | 4.771 | 4.740 | 5.322 | 4.301 | 4.341 | .. | .. | 50-59 |
| 4.491 | 4.969 | 5.290 | 4.833 | 5.179 | 4.708 | 4.903 | 5.050 | 4.896 | 5.282 | .. | .. | 60-69 |
| 4.600 | 4.544 | 4.643 | 4.838 | 4.789 | 4.692 | .. | .. | .. | .. | .. | .. | 70-79 |

80-89

WHITING NORTH SEA

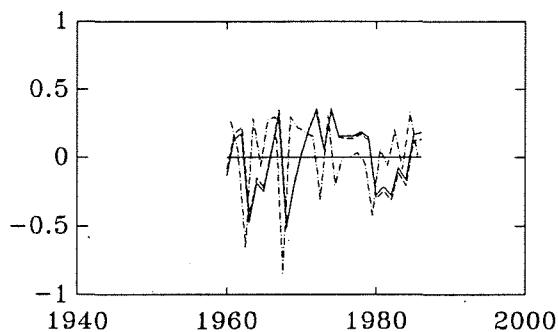
WHITNS

START YEAR = 60 END YEAR = 86 NUMBER OF DATA POINTS = 27

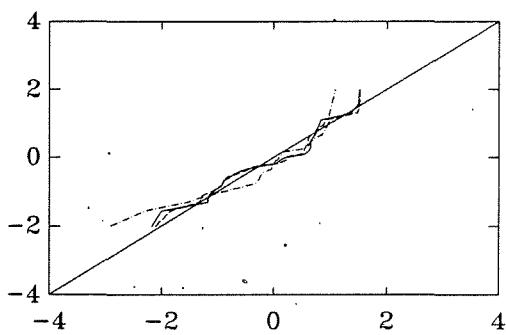
SOURCE: Report of the North Sea Roundfish Working Group. ICES C.M. 1988.

COMMENTS: SPA, 0 year olds in actual numbers.

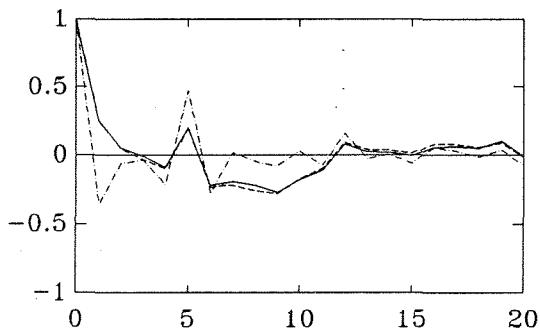
WHITNS MEAN = 10.593 SLOPE = 0.004 VAR RATIO = 0.758 N = 27



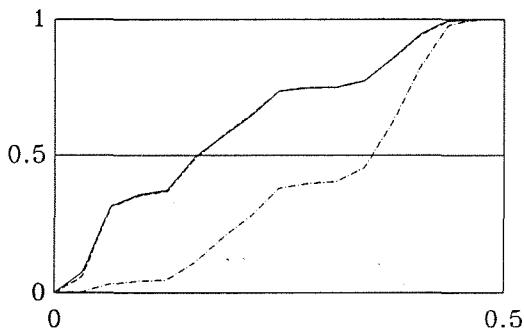
SD (0.238, 0.236, 0.293)



RHO (0.971, 0.977, 0.929)



ACF(1) (0.252, 0.249, -0.358)



TAU (6.337, 6.241, 2.838)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| 10.459 | 10.724 | 10.770 | 10.120 | 10.407 | 10.344 | 10.619 | 10.919 | 10.079 | 10.379 | 60-69 | |
| 10.602 | 10.792 | 10.949 | 10.643 | 10.954 | 10.748 | 10.748 | 10.748 | 10.783 | 10.739 | 70-79 | |
| 10.317 | 10.376 | 10.316 | 10.518 | 10.429 | 10.759 | 10.775 | .. | .. | .. | 80-89 | |

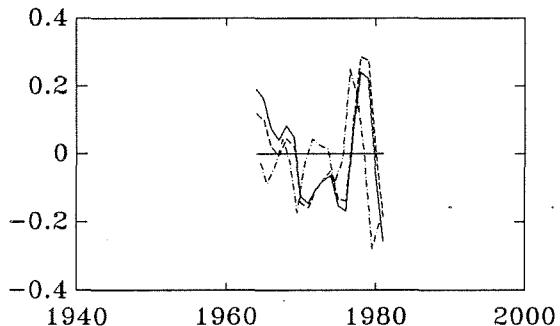
YELLOWTAIL FLOUNDER 3NO

YELL3NO

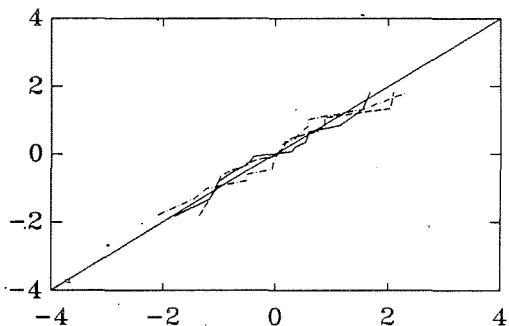
START YEAR = 64 END YEAR = 81 NUMBER OF DATA POINTS = 18
SOURCE: Brodie NAFO SRC Doc. 86/40.

COMMENTS: SPA, 5 year olds in (000's).

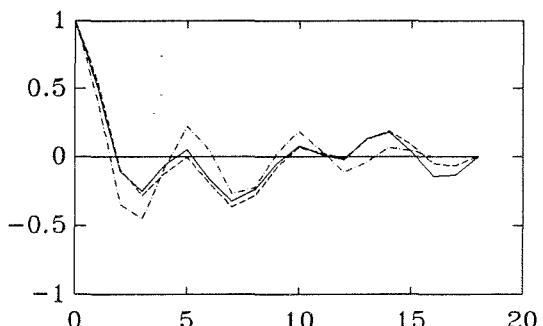
YELL3NO MEAN = 5.003 SLOPE = -0.009 VAR RATIO = 0.352 N = 18



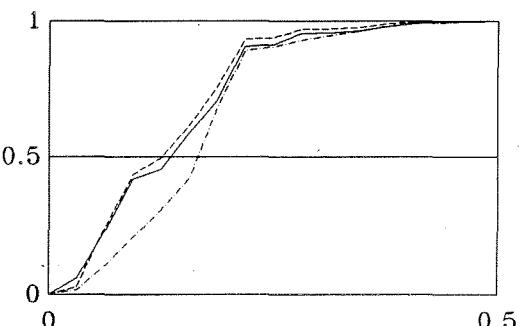
SD (0.144, 0.137, 0.121)



RHO (0.982, 0.967, 0.968)



ACF(1) (-0.513, 0.553, 0.404)



TAU (7.355, 7.925, 6.023)

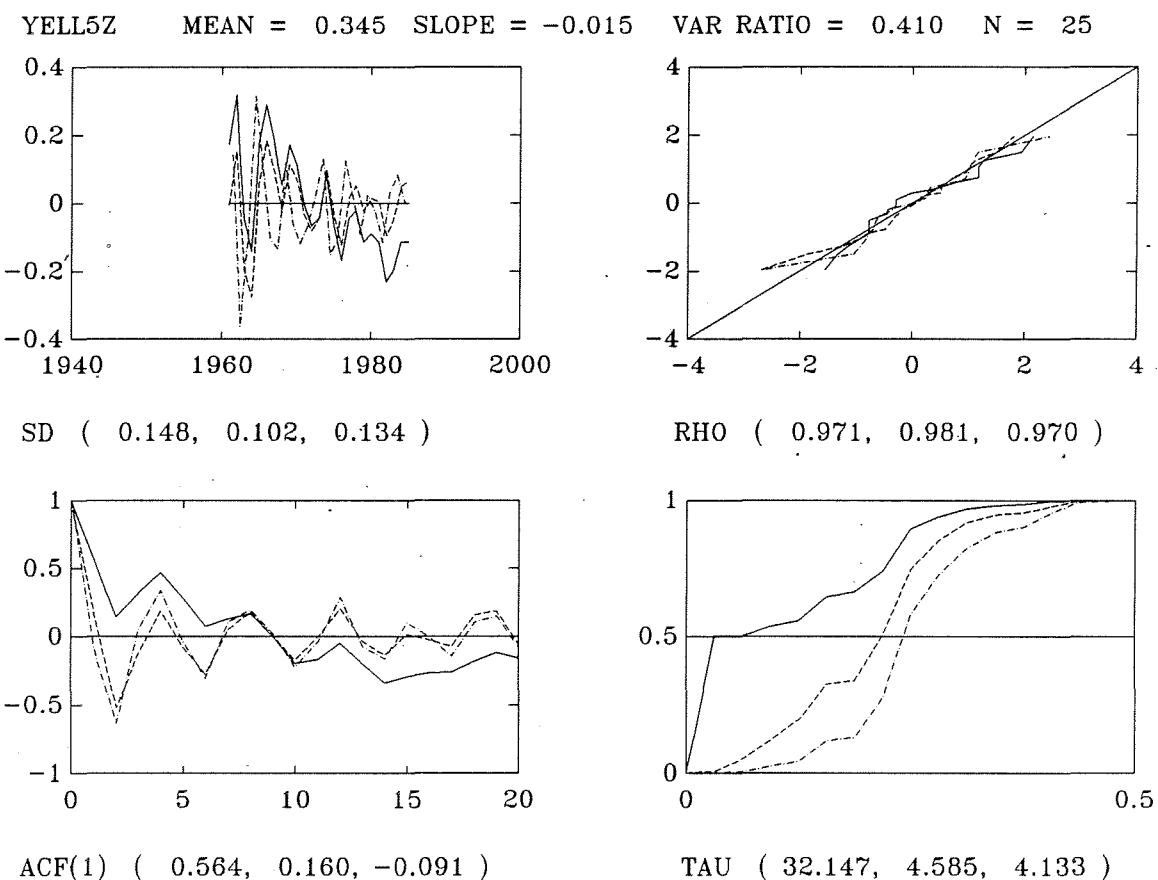
Log Transformed (base 10) Recruitment Data

YELLOWTAIL FLOUNDER 5Z

YELL5Z

START YEAR = 61 END YEAR = 85 NUMBER OF DATA POINTS = 25
SOURCE: Woods Hole Ref. Doc. 86-09.

COMMENTS: RV(1+2).



Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | 0.519 | 0.663 | 0.301 | 0.204 | 0.519 | 0.633 | 0.531 | 0.398 | 0.518 | 0.609 | 60-69 |
| 0.462 | 0.342 | 0.279 | 0.301 | 0.431 | 0.279 | 0.176 | 0.301 | 0.322 | 0.230 | 0.707 | 70-79 |
| 0.255 | 0.230 | 0.114 | 0.146 | 0.230 | 0.230 | .. | .. | .. | .. | .. | 80-89 |

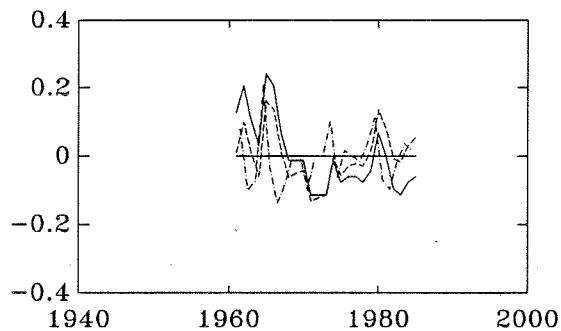
YELLOWTAIL FLOUNDER S.N.E.

START YEAR = 61 END YEAR = 85 NUMBER OF DATA POINTS = 25
SOURCE: Woods Hole Ref. Doc. 86-09.

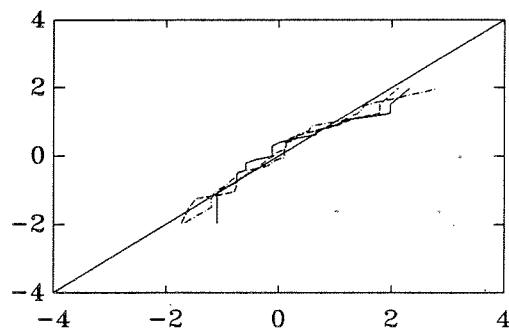
YELLSNE

COMMENTS: RV(1+2).

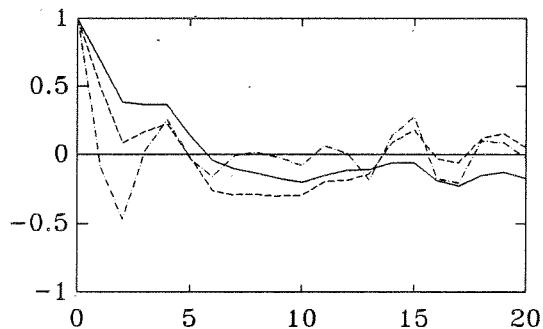
YELLSNE MEAN = 0.475 SLOPE = -0.010 VAR RATIO = 0.280 N = 25



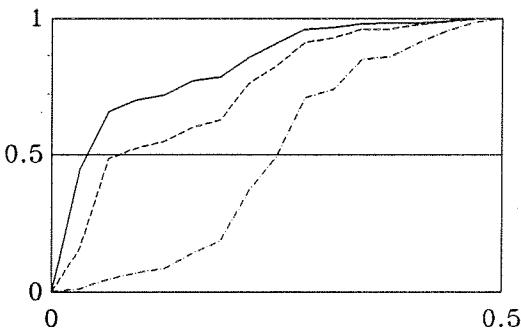
SD (0.104, 0.077, 0.078)



RHO (0.942, 0.981, 0.970)



ACF(1) (0.692, 0.494, -0.092)



TAU (25.403, 13.234, 3.989)

Log Transformed (base 10) Recruitment Data

| | | | | | | | | | | | |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|-------|
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 40-49 |
| .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | 50-59 |
| .. | 0.602 | 0.681 | 0.580 | 0.505 | 0.716 | 0.681 | 0.544 | 0.462 | 0.461 | 0.430 | 60-69 |
| 0.462 | 0.362 | 0.362 | 0.362 | 0.462 | 0.398 | 0.415 | 0.415 | 0.398 | 0.430 | 0.70-79 | |
| 0.544 | 0.477 | 0.380 | 0.362 | 0.398 | 0.415 | .. | .. | .. | .. | .. | 80-89 |