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Fishery on pelagic redfish (*S.mentella*, Travin): Information based on log-book data from Faroe Island, Germany, Greenland, Iceland, Norway and Russia.

By
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Introduction

The pelagic fishery for redfish in the Irminger sea and adjacent waters is a multinational fishery, with vessels from up to 15 different nations participating in some years and up to 80 vessels participating in some years. Iceland, Germany and Russia have in recent years been major participants in the fishery in recent years and Fareo Island and Norway have participated for many years. These nations have, on average fished over 80% of the total catches in 1999-2003. In addition, Greenland has recently started to participate in the fishery and we have access to the whole logbook series from the Greenland vessel participating since 1999. Therefore, in 1999-2003 logbooks are available representing nearly 80% of the reported catches.

Most nations that have participated in the fishery have collected various fishery related data from different stocks and made some of these available to ICES in reports as figures and tables (i.a. ICES 2003). However, we think that it is important to make the raw data available in electronic format in one location for detailed comparisons vessel types, nations etc.

Catch data and catch composition are some of the most important input elements for assessments of fish stocks. Therefore, the objectives with the work presented here is to establish a database for fishery related data of the oceanic redfish fishery in the Irminger Sea and adjacent waters. This is done in order to improve fishery related data in the assessment work. Taking the uncertainty in stock structures of redfish stocks into account, detailed information on exploitation activities for as many fleets as possible is an important step forward in improving the assessment of the stock or each possible stock component.

This paper is a continuation of a paper presented at the NWWG meetings since 2001. It describes briefly the structure of a fishery-related database for pelagic redfish fishery in the Irminger Sea and adjacent waters and we are presenting results for the based on data already in the database. This database will, in future allow an appropriate annual analysis of the trend in catch rates standardised and corrected for national, vessel, area and seasonal effects. The results will therefore hopefully contribute significantly to the estimation of the quantitative reaction of the redfish stocks to the removed biomass by the fishing fleet of many nationalities.

Structure of the database

The data in the database is on haul by haul basis, but data on individual vessels have been coded so they can not be recognised.

Name	Descr	Type (no of char)
NATION	ICES code of Nation	NUMBER(2)
VESSEL	ID for vessel	NUMBER(4)
GROUP	Type of vessel	NUMBER(3)
DAY	no. of day within the month	NUMBER(2)
MONTH	number of the month	NUMBER(2)
YEAR		NUMBER(4)
LATTITUDE		NUMBER(4)
LONGITUTE		NUMBER(4)
GEAR_TYPE	Name of the gear	VARCHAR2(10)
CIRCUMPHERENCE	Circumference of the trawl in m	NUMBER(4)
DEPTH OF HEADLINE	Trawling depth as registered by depth sensor on the headrope of the trawl (in m)	NUMBER(4)
BOTTOM_DEPTH	in m	NUMBER(4)
TIME	Time of day	NUMBER(4)
TRAWLING DURATION(MIN)		NUMBER(4)
CATCH (KG)		NUMBER(7)

Results

Overview of data currently within the database

Following textable gives the overview of the database as it is now. A total of 52 thous hauls have been inserted to it, including all log-books the German activity since 1995, from the Icelandic fishery since Iceland started its fishery in 1989, all the activity of the Greenland vessel (since 1999), hauls from selected Norwegian and Faroes vessels since 1995 and Russian fleet since 1997.

Nation	Period	Hauls	Catch
Faroes	1995-2003	2160	31.568
Germany	1995-2003	8659	141.559
Iceland*	1989-2003	21815	444.200
Norway	1990-2003	3783	57.269
Russia	1997-2003	15109	210.415
Grand Total		51526	885.020

- Including the Greenland data in 1999-2003, as there is only one vessel from Greenland.

Overview of available information by nation is given below. Except for the depth, the information given are very similar.

Name	Type	Germany	Iceland	Greenland	Norway	Faroese	Russia
NATION	NUMBER(2)	X	x	x	x	X	x
VESSEL	NUMBER(4)	X	x	x	x	X	x
GROUP	NUMBER(3)			x		X	x
DAY	NUMBER(2)	X	x	x	x	X	x
MONTH	NUMBER(2)	X	x	x	x	X	x
YEAR	NUMBER(4)	X	x	x	x	X	x
LATTITUDE	NUMBER(4)	X	x	x	x	X	x
LONGITUTE	NUMBER(4)	X	x	x	x	X	x
GEAR_TYPE	VARCHAR2(10)	X	x	x	x	X	x
CIRCUMPHERENCE	NUMBER(4)	X	x	x			
DEPTH OF HEADLINE	NUMBER(4)		x	x	x		
BOTTOM_DEPTH	NUMBER(4)		x	x	x		
TIME	NUMBER(4)	X	x	x	x		
Discard	NUMBER(7)	x	incl. in C	incl. in C			incl. in C
TRAWLING DURATION(MIN)	NUMBER(4)	x	x	x	x	X	x
CATCH (KG)	NUMBER(7)	x	x	x	x	X	x

Location of the fishing activity.

Figure 1gives the locations of the fishery, year by year since 1997 and **Figure 2 - Figure 6** by month for the years 2000-2003 where the first are for each year but **Figure 6** shows the catches for the period from 1997-2003. As can been seen from the figures, the fishing pattern has changed during the last years towards a two areas fishing areas.
In the first months of the fishing season (which usually starts in early April) the fishery is conducted in area west of 32°W and north of 61°N. In May and June the fishery is more or less at same areas, but in July-August, the fleet moves to areas south of 60°N and west of about 32°W where the fishery continues until October. There is very little fishing activity in the period from November until late March/early April when the next fishing season starts. The depth by time of the year for those nations that reports depth of the trawling is shown in Figure 7. The general trend is that the fleet fish at depths below 600 m until the middle of the year when they shift towards fishing at depths shallower than 400 m.

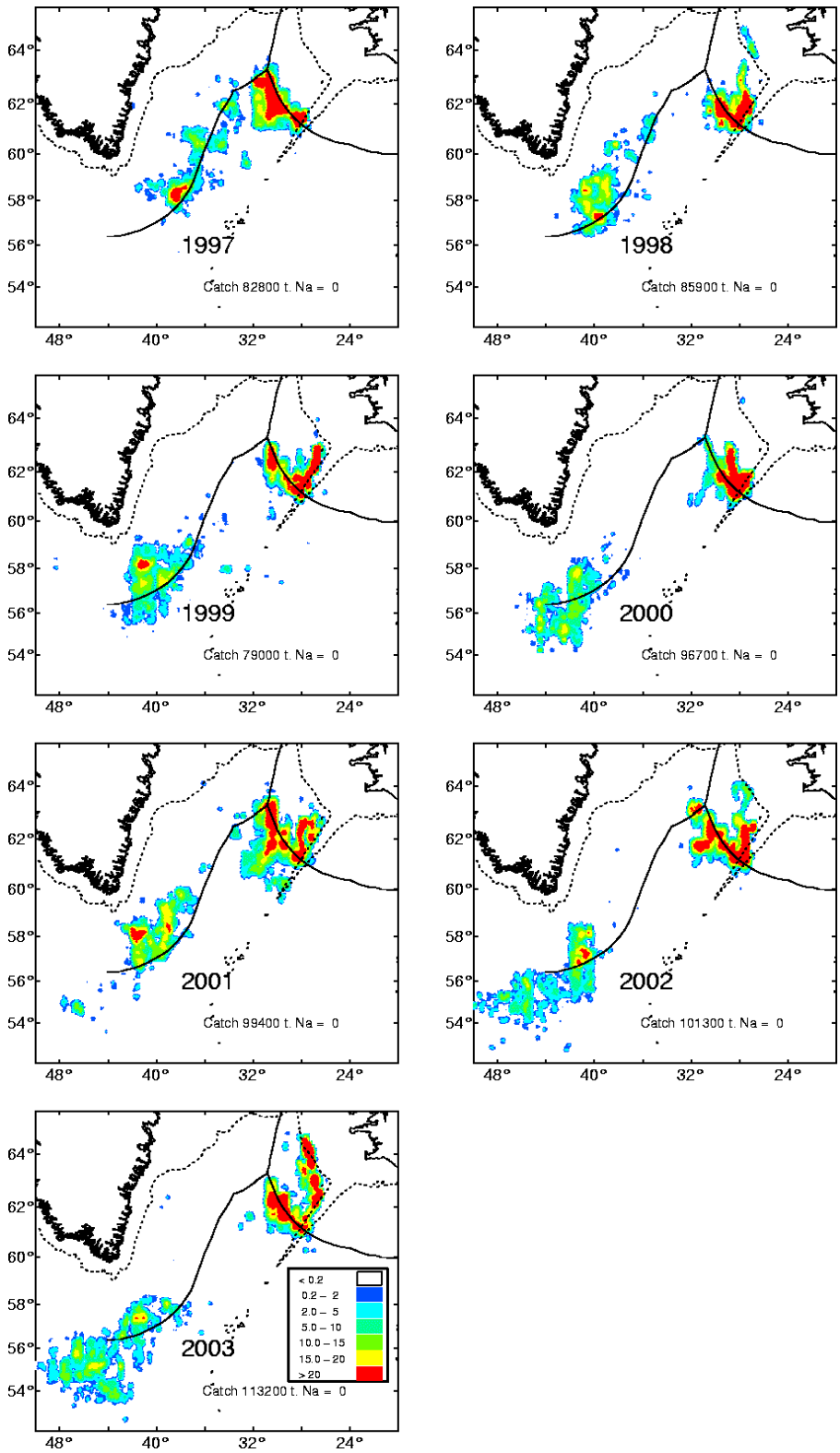

Figure 1. Fishing areas of the pelagic redfish by year from 1997-2003. Data from Germany (1995-2003), Norway (1995-2003) Greenland (1999-2003), Russia (1997-2003), Faroese (1995-2003) and Iceland (1995-2003). The scale given on the pictures indicates the catches in tonnes per square nautical mile.

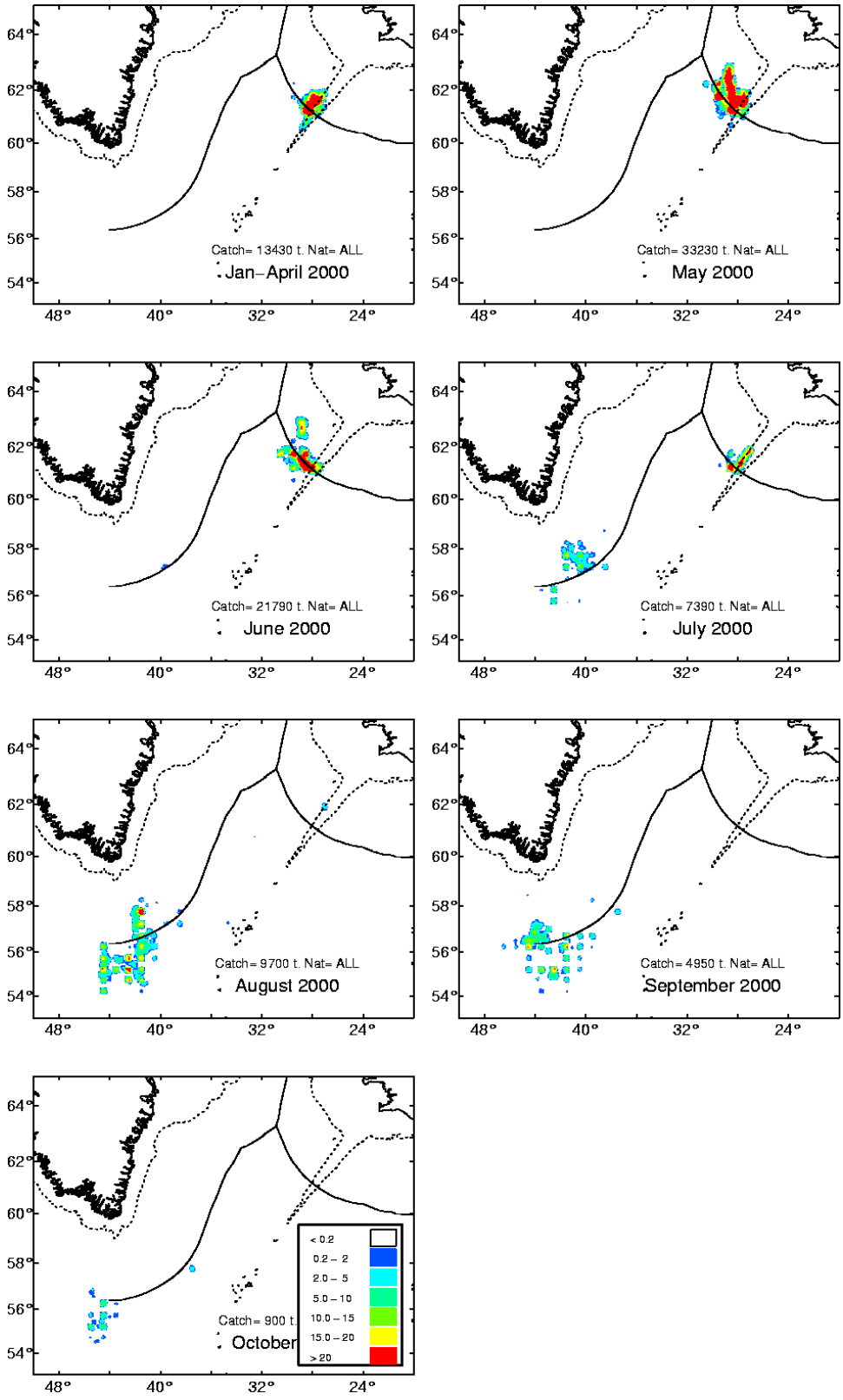

Figure 2. Fishing areas of the pelagic redfish by periods in 2000, including data from Germany, Iceland, Greenland, Fareose, Russia and Norway. The scale given on the pictures indicates the catches in tonnes per square nautical mile. Total catch registered for each period is also shown on the figures.

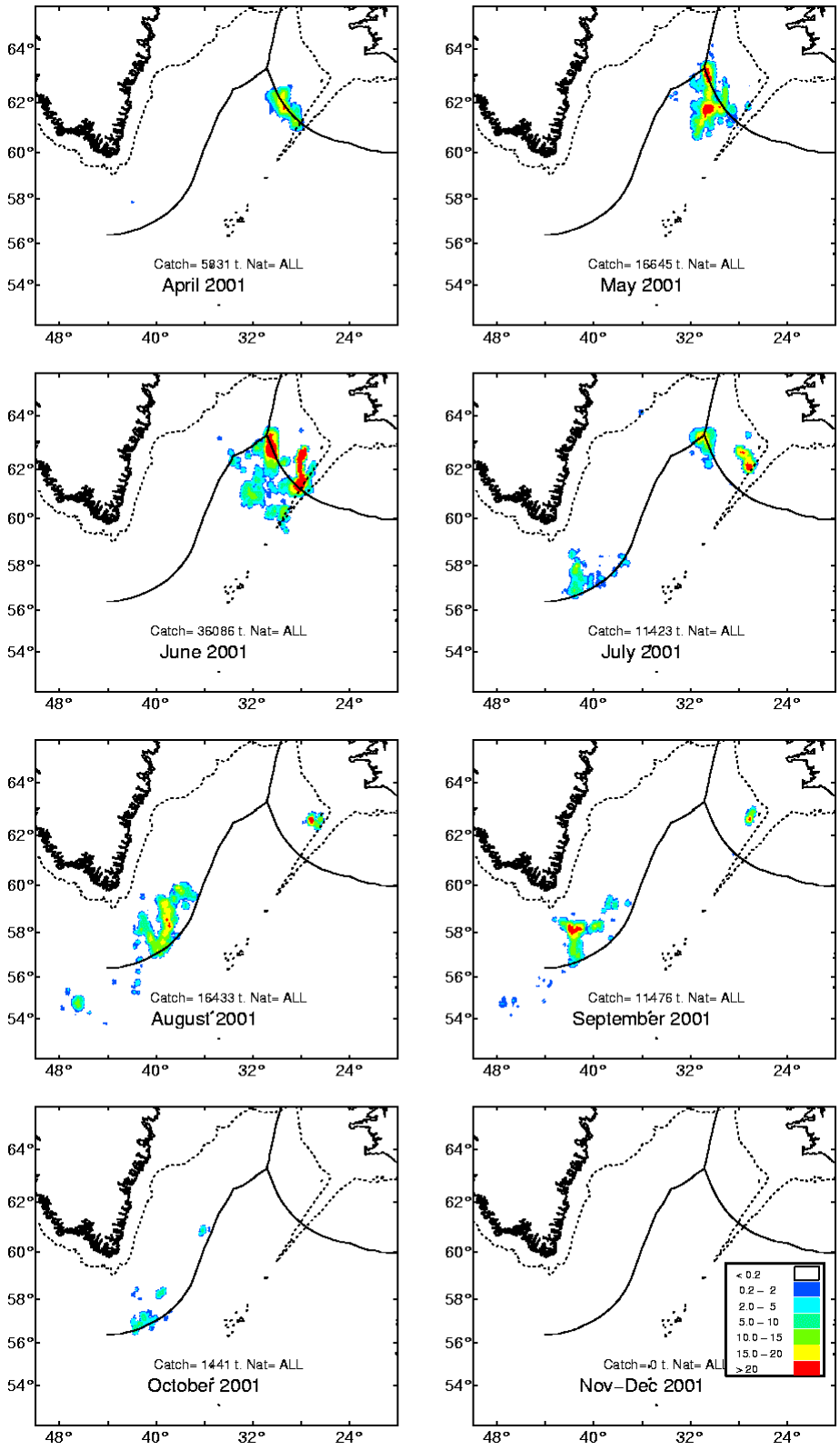

Figure 3. Fishing areas of the pelagic redfish by periods in 2001, including data from Germany, Iceland, Norway, Russia, Faroese and Greenland. The scale given on the pictures indicates the catches in tonnes per square nautical mile. Total catch registered for each period is also shown on the figures.

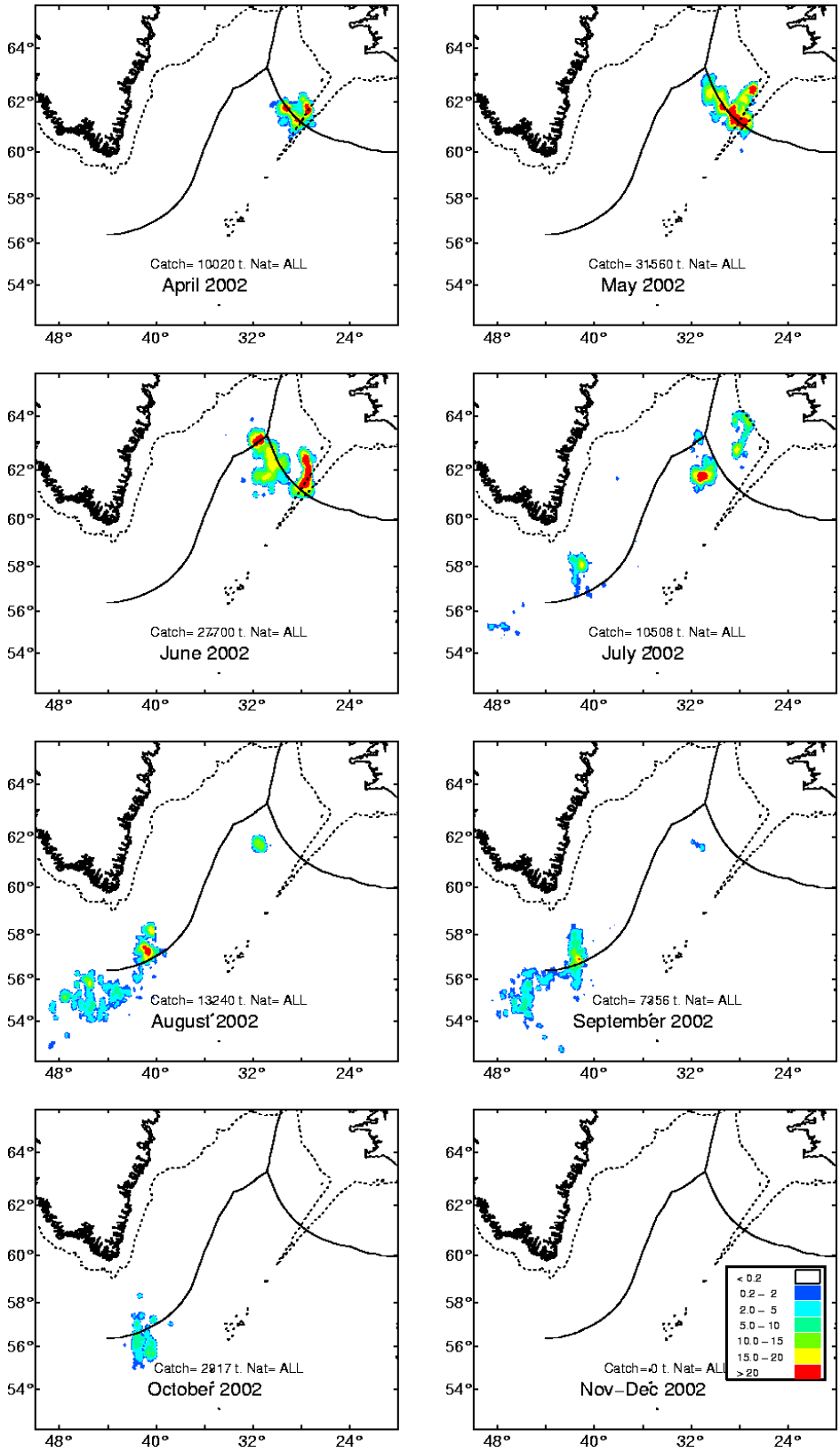

Figure 4. Fishing areas of the pelagic redfish by periods in 2002, including data from Germany, Norway, Iceland and Greenland. The scale given on the pictures indicates the catches in tonnes per square nautical mile. Total catch registered for each period is also shown on the figures.

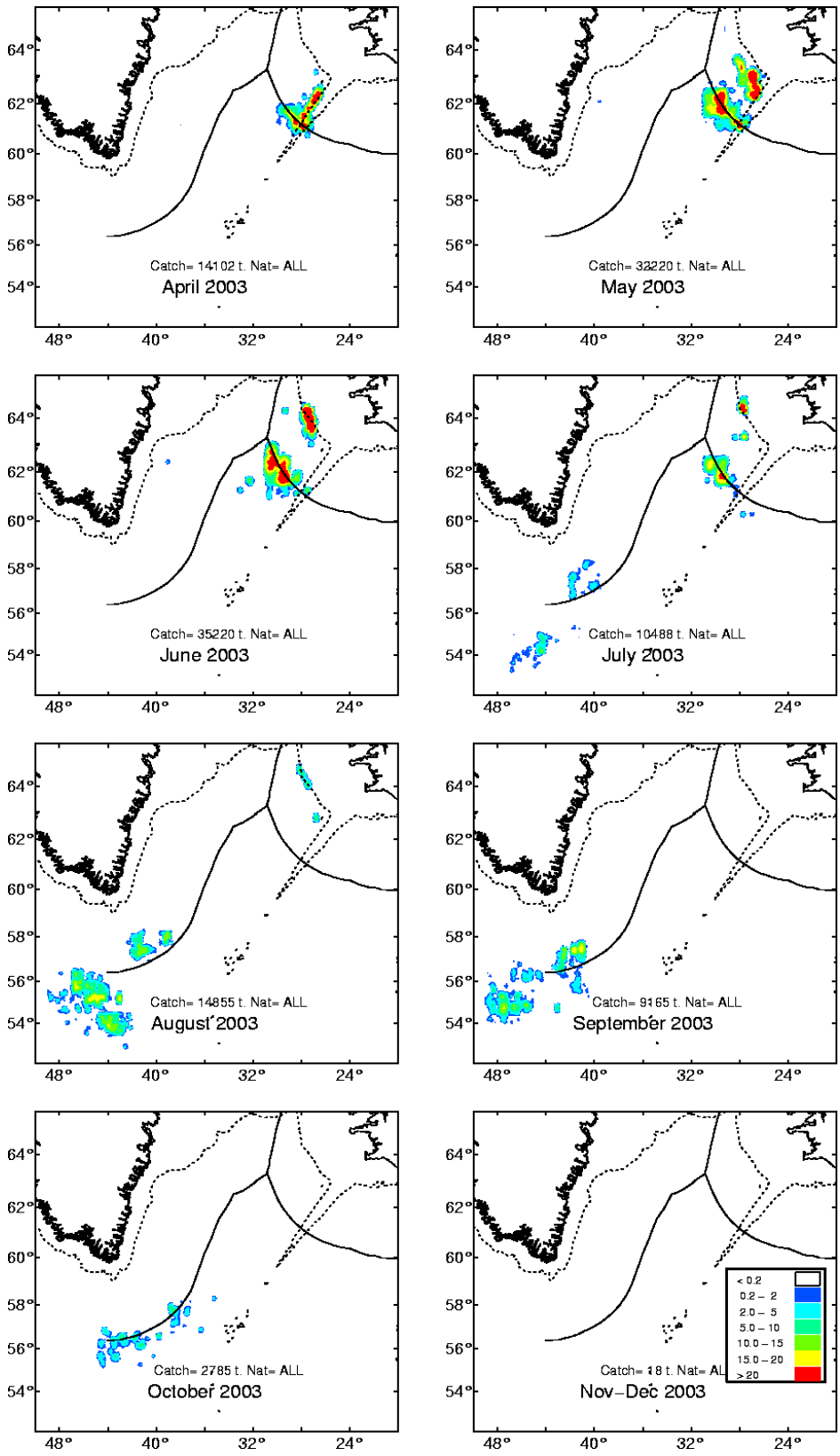

Figure 5. Fishing areas of the pelagic redfish by periods in 2003, including data from Germany, Iceland, Norway, Russia, Faroese and Greenland. The scale given on the pictures indicates the catches in tonnes per square nautical mile. Total catch registered for each period is also shown on the figures.

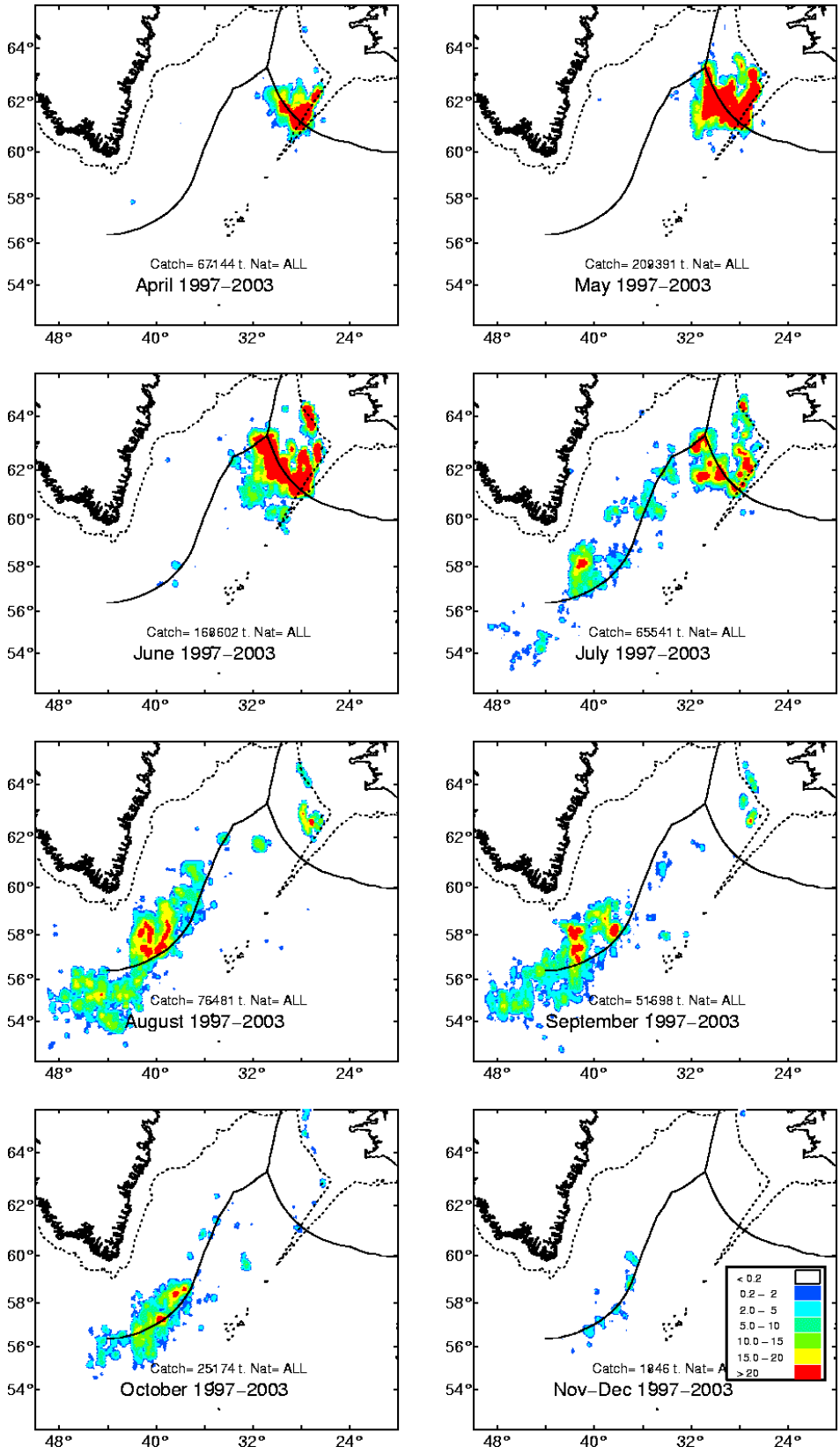

Figure 6. Fishing areas of the pelagic redfish by periods in 1997-2003, including data from Germany, Iceland, Norway, Russia, Faroese and Greenland. The scale given on the pictures indicates the catches in tonnes per square nautical mile. Total catch registered for each period is also shown on the figures.

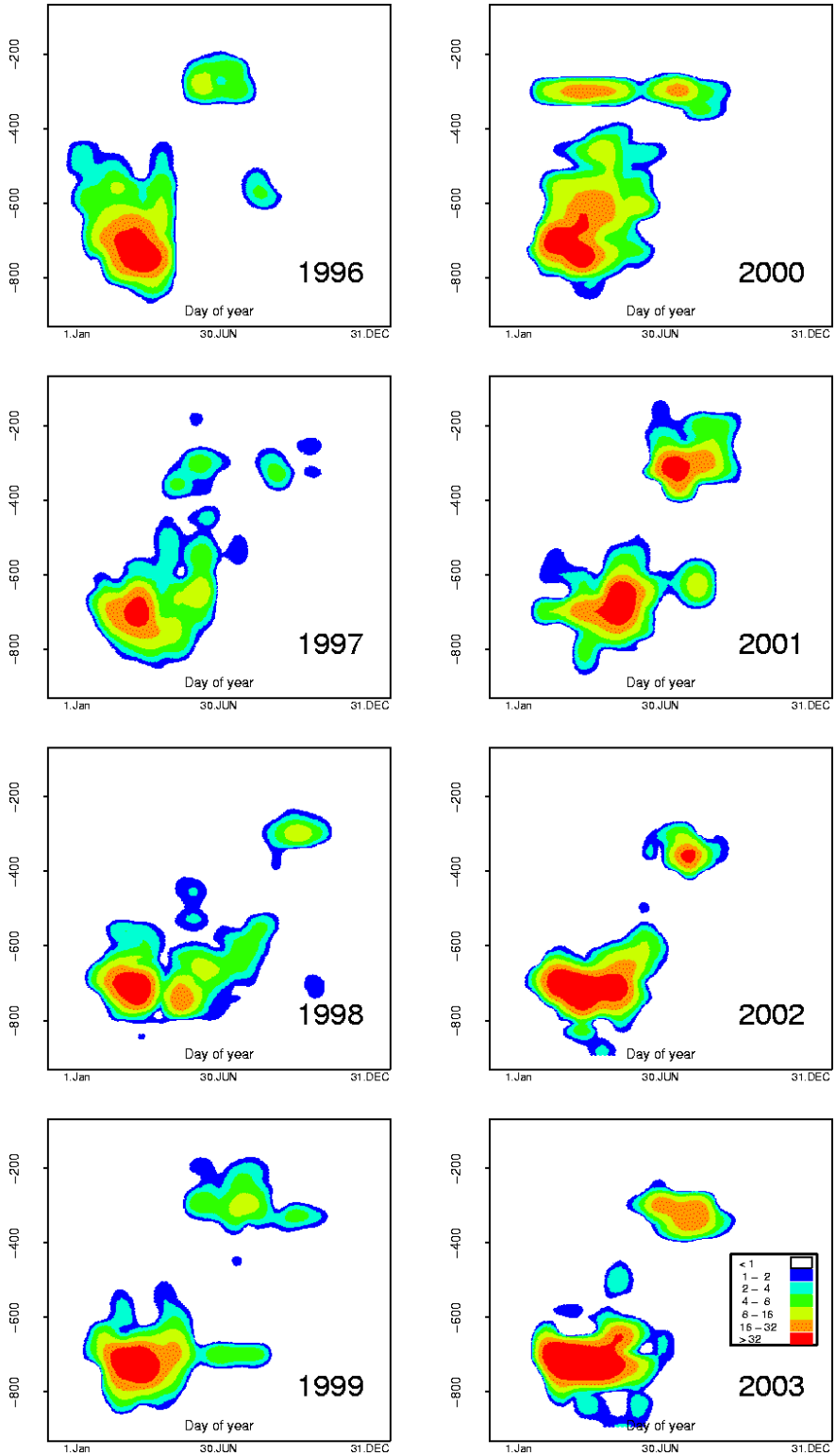

Figure 7. Depth distribution of trawl hauls for pelagic redfish as reported in the logbooks since 1996. X-axis = day of year; Y-axis = depth.

Catch per unit of effort

Based on all data available in the database we have calculated standardised CPUE for the whole period, using the following formula:

glm(formula = log(catch) ~ log(trawling_time) + factor(year) + factor(month) + factor(vessel), family = gaussian(), data = tmp.data)

for both northern and southern area and the model:

glm(formula = log(catch) ~ log(trawling_time) + factor(year) + factor(month) + factor(vessel) + factor(area), family = gaussian(), data = tmp.data),

for the combined data where the area factor is north or south, based on the division given in Figure 8. Graphical output of the standardized CPUE models are shown in Figure 9 -Figure 14 and the Anova for each model is given in Appendix 1. **Figure 15 - Figure 17** Gives the unstandardized CPUE, reported catch and hours trawled.

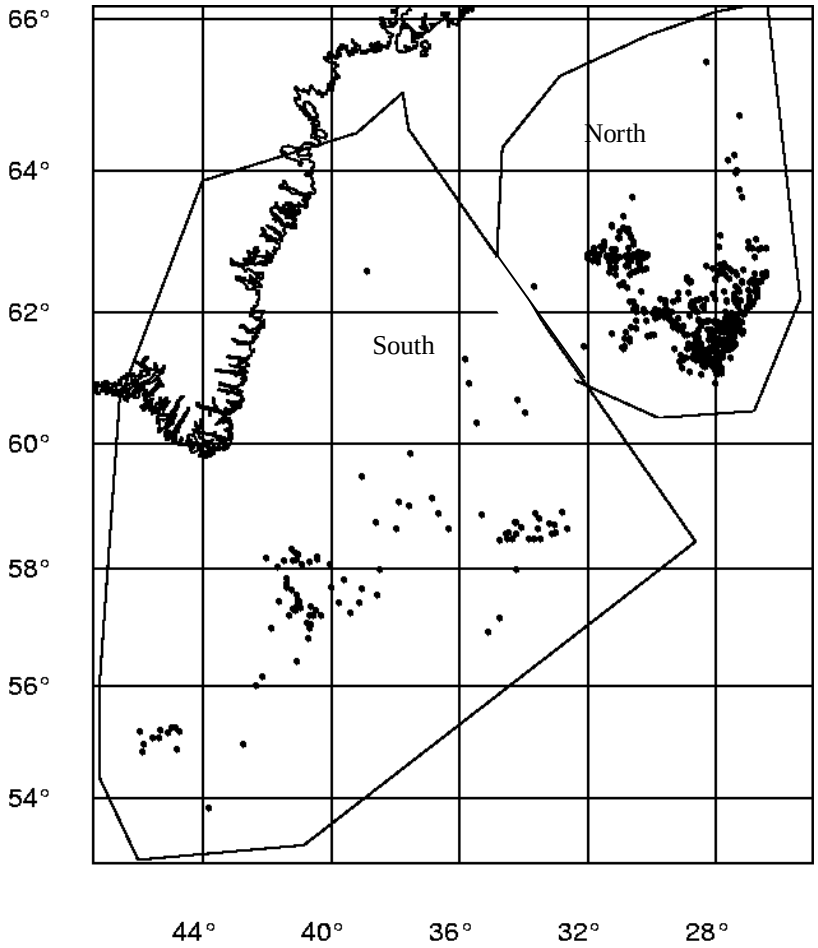

Figure 8. Division of areas between south an north. The points indicate positions of available samples from the catches.

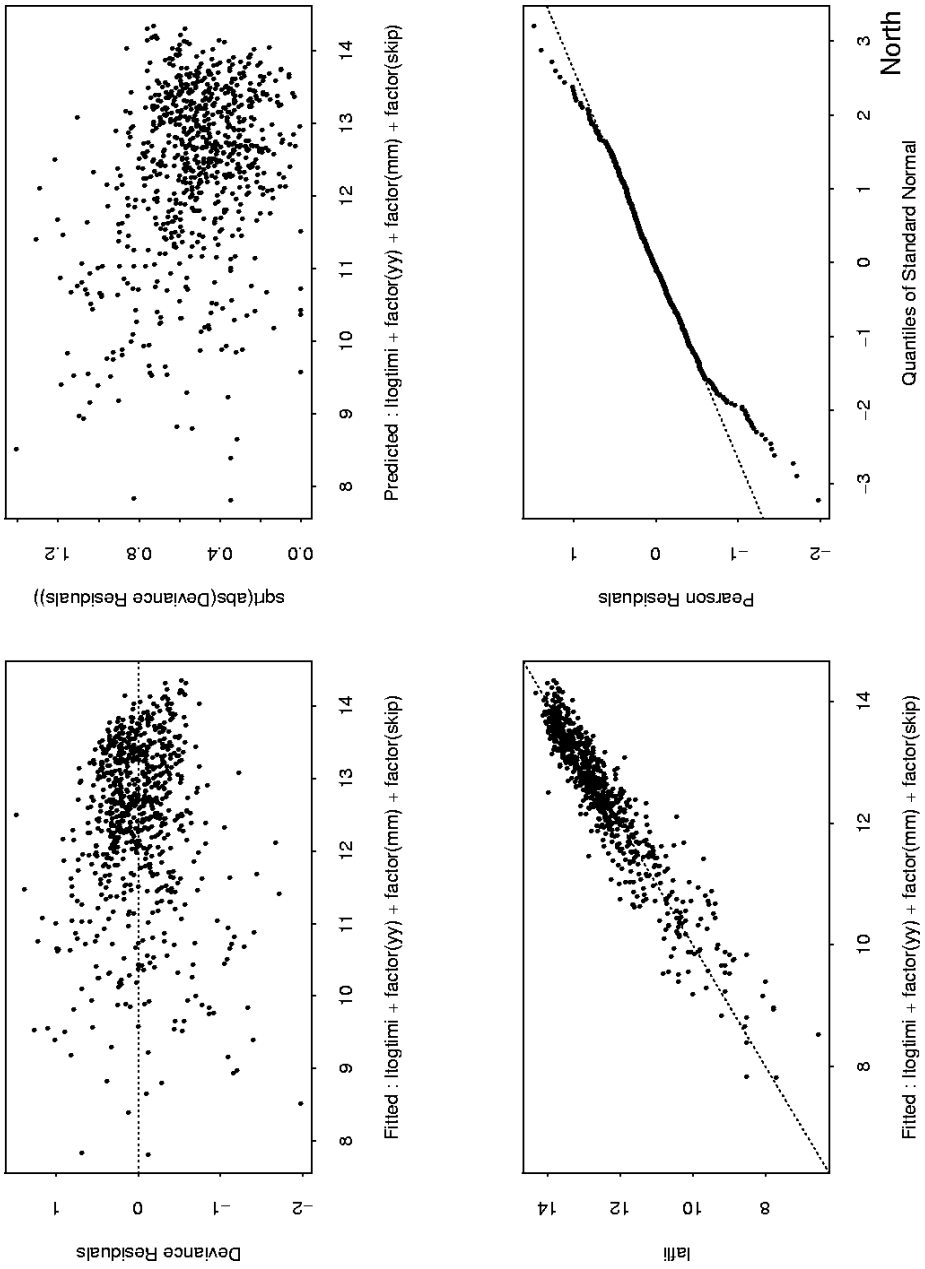

Figure 9. Combined data, northern area. Glm CPUE model. Graphical display of the fitted values and residuals. a) plot of deviance rsiduals versus the fitted values, b) plot of the square root of the absolute deviance residuals versus the linear predictor values. c) plot of the response versus the fitted values and d) normal quantile plot of the Pearson residuals.

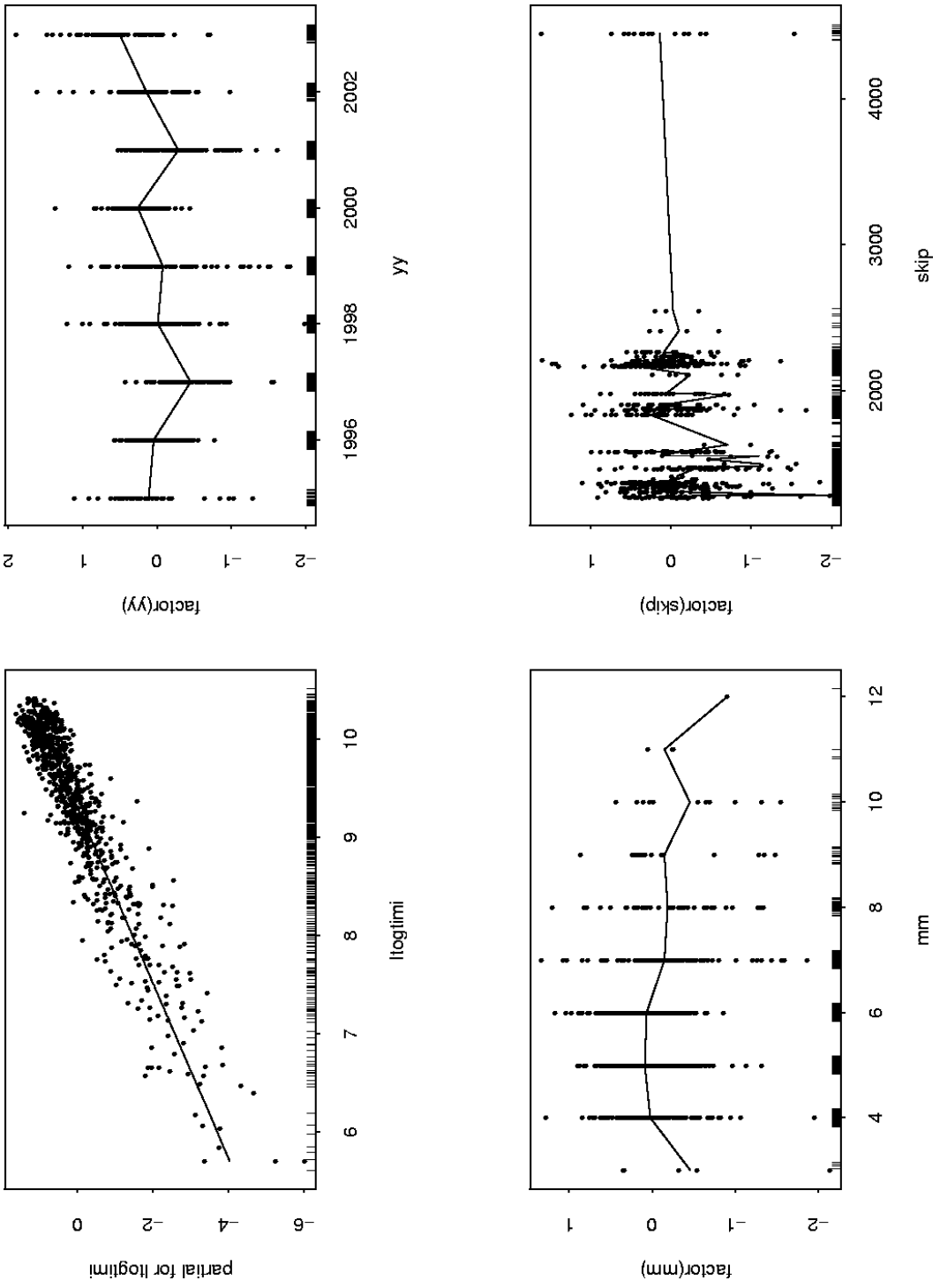

Figure 10. Diagnostic of the CPUE data, northern area. Glm CPUE model. Graphical display of the fitted values and residuals. Estimated relationship between the individual fitted terms and each of the corresponding prdictors.

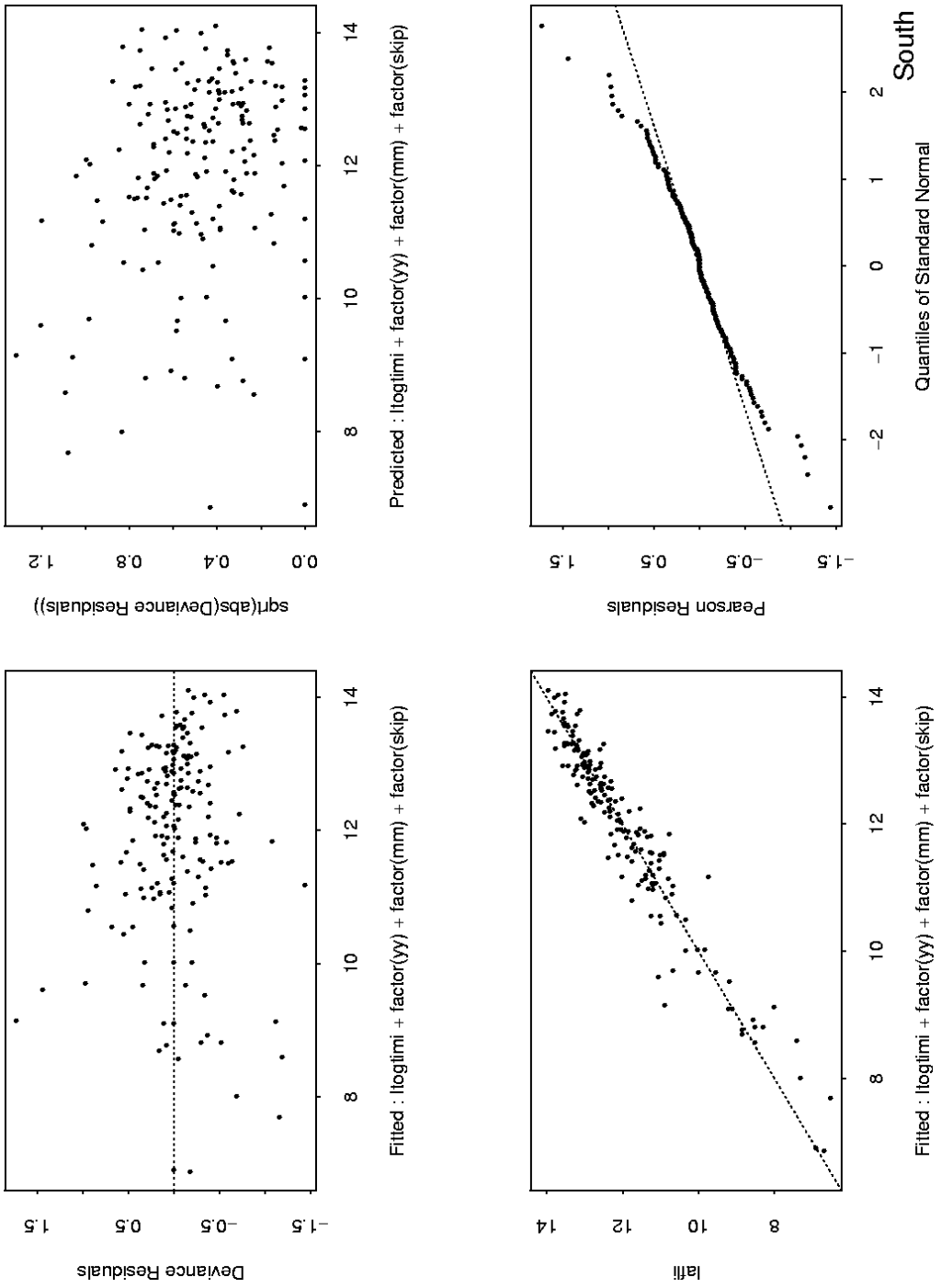

Figure 11. Combined data, southern area. Glm CPUE model. Graphical display of the fitted values and residuals. a) plot of deviance rsiduals versus the fitted values, b) plot of the square root of the absolute deviance residuals versus the linear predictor values. c) plot of the response versus the fitted values and d) normal quantile plot of the Pearson residuals.

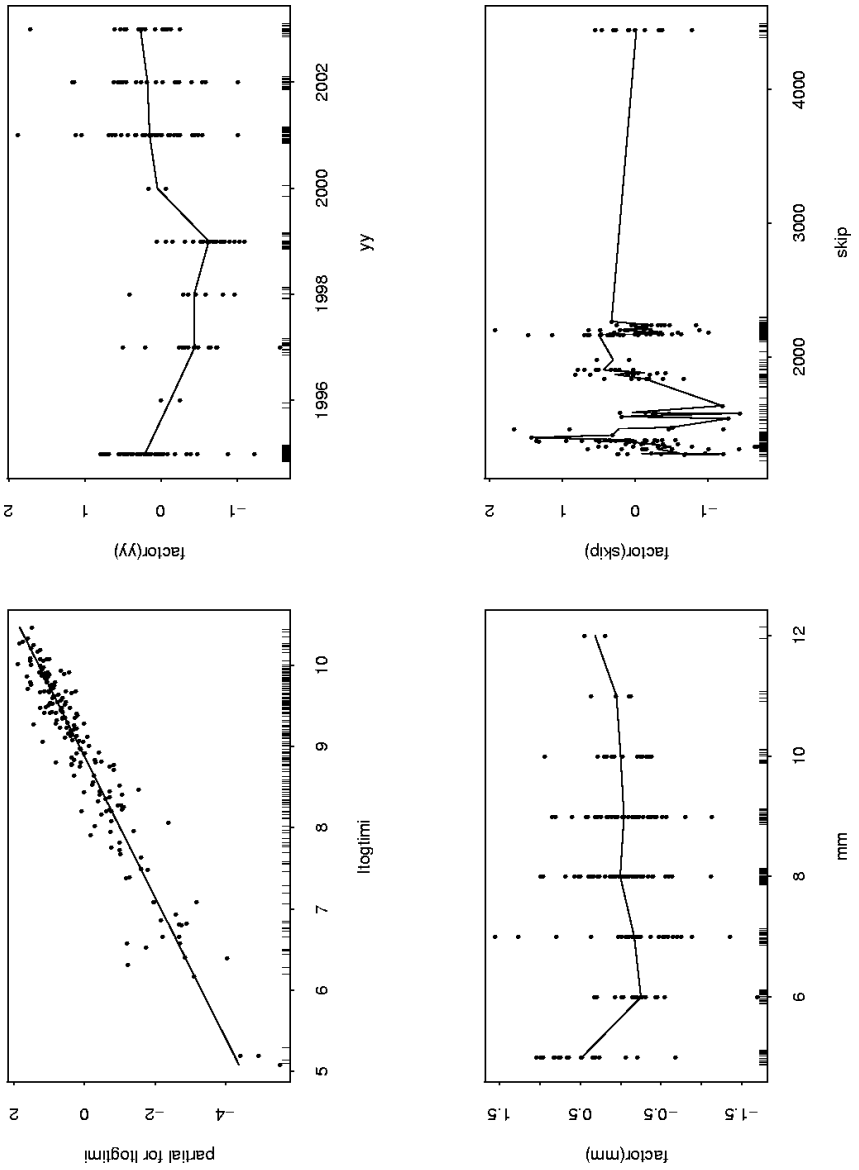

Figure 12. Diagnostic of the CPUE data, southern area. Glm CPUE model. Graphical display of the fitted values and residuals. Estimated relationship between the individual fitted terms and each of the corresponding prdictors.

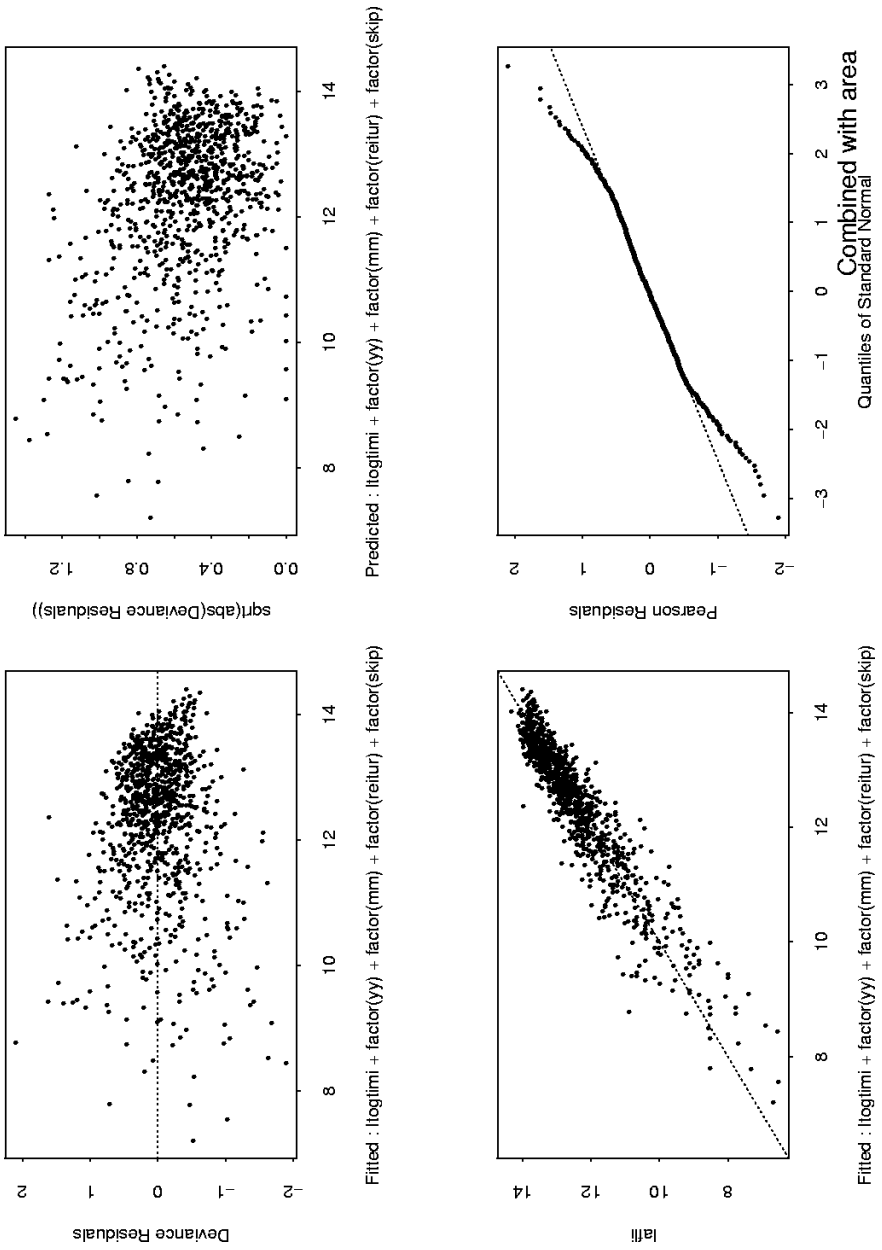

Figure 13. Combined data, both areas. Glm CPUE model. Graphical display of the fitted values and residuals. a) plot of deviance rsiduals versus the fitted values, b) plot of the square root of the absolute deviance residuals versus the linear predictor values. c) plot of the response versus the fitted values and d) normal quantile plot of the Pearson residuals.

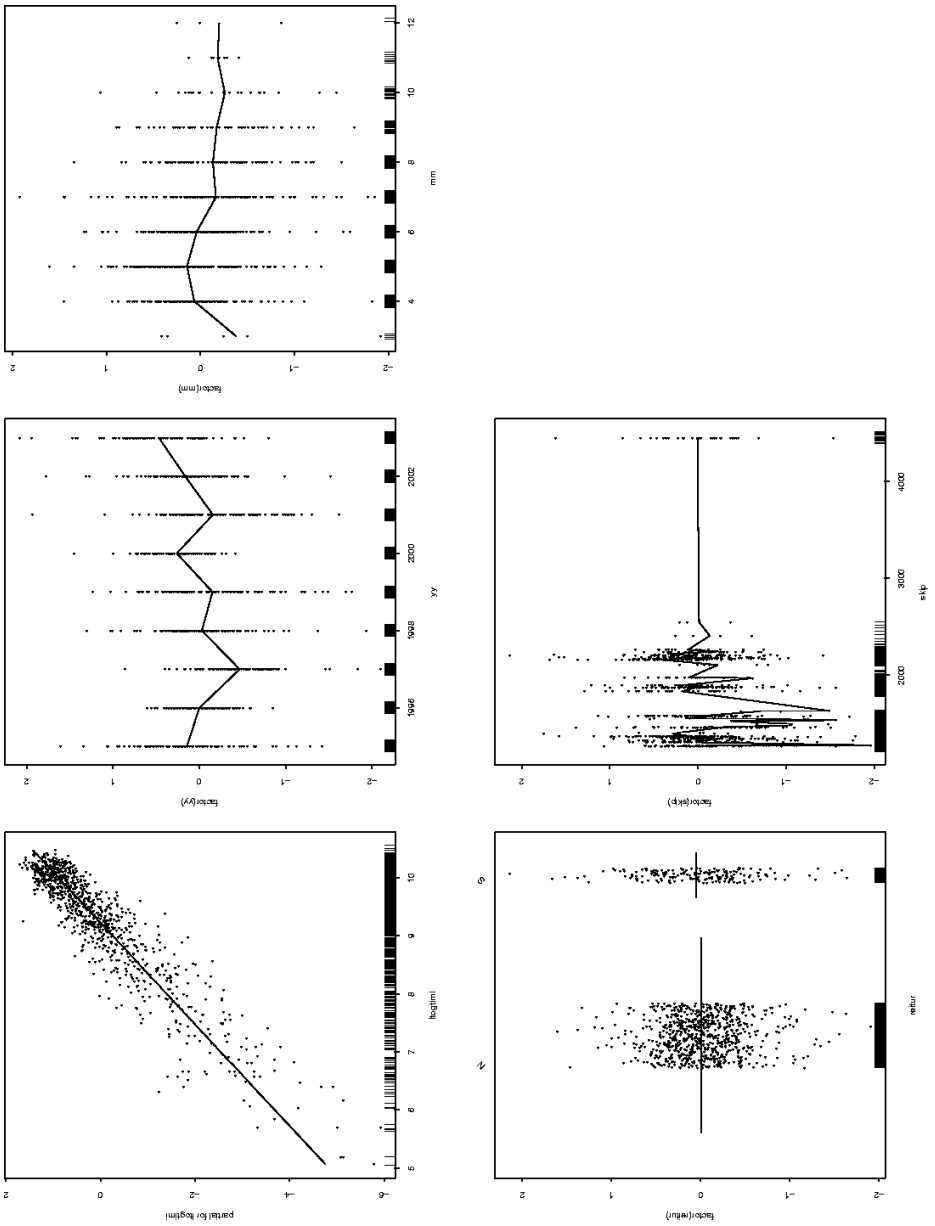

Figure 14. Diagnostic of the CPUE data, both areas. Glm CPUE model. Graphical display of the fitted values and residuals. Estimated relationship between the individual fitted terms and each of the corresponding prdictors.

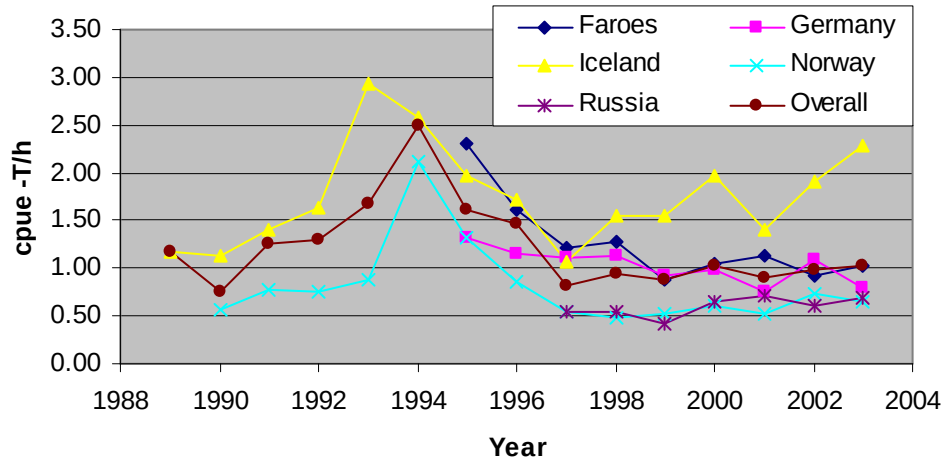

Figure 15. Unstandardised CPUE, based on information in the joint database. All data.

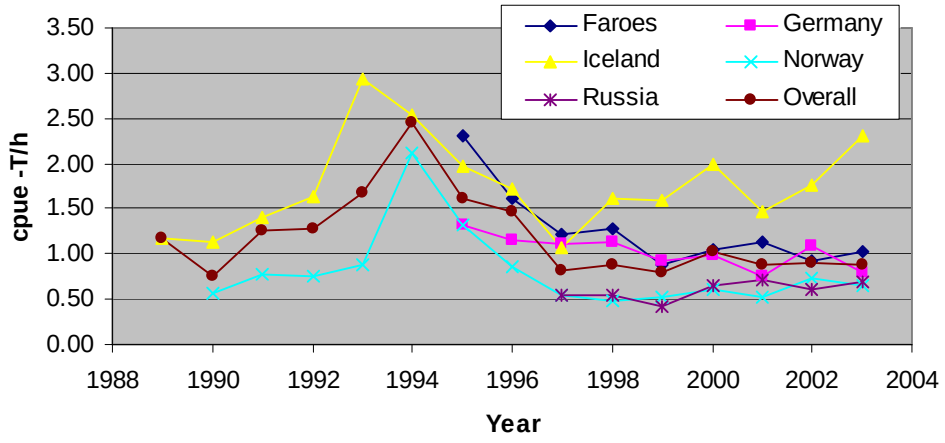

Figure 16. Unstandardised CPUE northern area, based on information in the joint database.

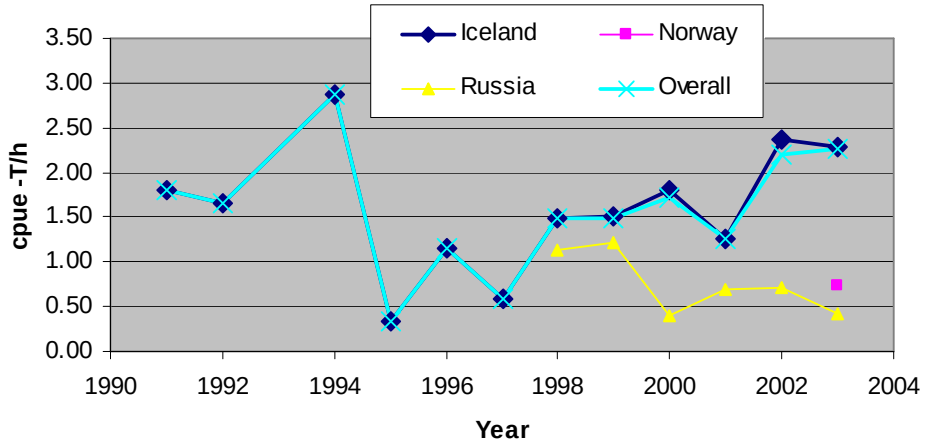

Figure 17. Unstandardised CPUE southern area, based on information in the joint database.

Further information and acknowledgement

More detailed information from the data are available www.hafro.is/~steini :The present study was realised within the REDFISH project (QLK5-CT1999-01222), financially supported by the European Commission within the research framework QUALITY OF LIFE AND MANAGEMENT OF LIVING RESOURCES, Key Action 5: Sustainable Agriculture, Fisheries and Forestry.

Appendix 1. Results of the Glm cpue models.

```
 1] "föstudagur apríl 23 kl. 13:48:38 GMT 2004"
[1] "NORDURSVAEDI"
$call:
glm(formula = lafli ~ ltogtimi + factor(yy) + factor(mm) + factor(skip),
family = gaussian(), data = north)

$coefficients:
numeric matrix: 67 rows, 3 columns.
                        Value Std. Error      t value
     (Intercept)  1.576500058 0.32607943   4.83471172
        ltogtimi  1.121223147 0.02156032  52.00401604
  factor(yy)1996 -0.071380794 0.10063355  -0.70931411
  factor(yy)1997 -0.566502348 0.10002940  -5.66335860
  factor(yy)1998 -0.122213145 0.09837585  -1.24230838
  factor(yy)1999 -0.192084909 0.10216113  -1.88021511
  factor(yy)2000  0.147768646 0.10240081   1.44304180
  factor(yy)2001 -0.398029874 0.10175933  -3.91148297
  factor(yy)2002  0.027289479 0.10359679   0.26342013
  factor(yy)2003  0.392908384 0.10474597   3.75105982
     factor(mm)4  0.480517819 0.20949717   2.29367215
     factor(mm)5  0.547501151 0.21044941   2.60158083
     factor(mm)6  0.525220493 0.21045656   2.49562421
     factor(mm)7  0.313809190 0.21304185   1.47299319
     factor(mm)8  0.276283933 0.22095886   1.25038628
     factor(mm)9  0.310914141 0.23292742   1.33481127
    factor(mm)10  0.006389222 0.24831043   0.02573078
    factor(mm)11  0.313756697 0.33548362   0.93523701
    factor(mm)12 -0.441939716 0.49747140  -0.88837212
factor(skip)1268  0.269996563 0.35707981   0.75612387
factor(skip)1270  0.211238398 0.19763110   1.06885201
factor(skip)1273 -0.128773546 0.19116980  -0.67360819
factor(skip)1279 -0.177206423 0.25140362  -0.70486823
factor(skip)1281 -1.896011605 0.47598983  -3.98330274
factor(skip)1308  0.175317163 0.18784888   0.93328832
factor(skip)1328  0.108404727 0.19237758   0.56349981
factor(skip)1345 -0.159287694 0.19666408  -0.80994806
factor(skip)1351 -0.070253903 0.19430798  -0.36155954
factor(skip)1360  0.166730696 0.19049706   0.87524023
factor(skip)1365  0.016259319 0.19513960   0.08332147
factor(skip)1369  0.301303778 0.19003858   1.58548745
factor(skip)1376  0.194451007 0.18800938   1.03426225
factor(skip)1395 -0.023392511 0.27933910  -0.08374234
factor(skip)1412  0.006466382 0.35695244   0.01811553
factor(skip)1459 -0.194448124 0.18899616  -1.02884697
factor(skip)1471 -0.362329949 0.22938143  -1.57959586
```

```
factor(skip)1472 -0.208856512 0.20913175  -0.99868388
factor(skip)1473 -0.491657178 0.24166806  -2.03443178
factor(skip)1484 -1.053832180 0.47553111  -2.21611616
factor(skip)1497 -1.030471732 0.35694838  -2.88689283
factor(skip)1530 -0.386212694 0.47517040  -0.81278777
factor(skip)1552 -1.013291033 0.30871489  -3.28228754
factor(skip)1553  0.177904547 0.30810741   0.57741079
factor(skip)1578 -0.013564500 0.19463012  -0.06969373
factor(skip)1579  0.248539436 0.19003116   1.30788782
factor(skip)1585 -0.086262526 0.21586381  -0.39961551
factor(skip)1628 -0.624896072 0.35899880  -1.74066341
factor(skip)1833  0.33562912  0.1890113  1.77570943
factor(skip)1868  0.10928650  0.1878519  0.58176948
factor(skip)1880 -0.04703765  0.1913585 -0.24580908
factor(skip)1902  0.16601660  0.1889926  0.87842898
factor(skip)1972 -0.64009070  0.4756585 -1.34569391
factor(skip)1976 -0.40621088  0.3572483 -1.13705465
factor(skip)1977  0.14618219  0.1965767  0.74363959
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factor(skip)2165  0.47875332  0.1898331  2.52197003
factor(skip)2170  0.27235375  0.1855978  1.46744024
factor(skip)2182  0.05375508  0.1886937  0.28488007
factor(skip)2184  0.29612690  0.1924442  1.53876743
factor(skip)2203  0.04382617  0.1868041  0.23461039
factor(skip)2212  0.30396749  0.2294148  1.32496890
factor(skip)2236  0.05758305  0.2072660  0.27782200
factor(skip)2248 -0.13206449  0.3567984 -0.37013754
factor(skip)2265  0.16902363  0.2063644  0.81905412
factor(skip)2410 -0.02135616  0.2823573 -0.07563522
factor(skip)2549  0.05327191  0.3121252  0.17067480
factor(skip)4449  0.21774969  0.2058466  1.05782503


[1] "RESULTS north"
                     Value Std..Error    t.value   ar     index
factor(yy)1996 -0.07138079 0.10063355 -0.7093141 1996 0.9311073
factor(yy)1997 -0.56650235 0.10002940 -5.6633586 1997 0.5675069
factor(yy)1998 -0.12221315 0.09837585 -1.2423084 1998 0.8849597
factor(yy)1999 -0.19208491 0.10216113 -1.8802151 1999 0.8252368
factor(yy)2000  0.14776865 0.10240081  1.4430418 2000 1.1592447
factor(yy)2001 -0.39802987 0.10175933 -3.9114830 2001 0.6716420
factor(yy)2002  0.02728948 0.10359679  0.2634201 2002 1.0276652
factor(yy)2003  0.39290838 0.10474597  3.7510598 2003 1.4812827
Analysis of Deviance Table

Gaussian model

Response: lafli

Terms added sequentially (first to last)
             Df Deviance Resid. Df Resid. Dev  F Value        Pr(F)
         NULL                  762   1140.460                      
    ltogtimi  1 899.6022       761    240.858 4604.402 0.0000000000
  factor(yy)  8  63.0390       753    177.819   40.331 0.0000000000
  factor(mm)  9   5.7954       744    172.024    3.296 0.0006011669
factor(skip) 48  36.0399       696    135.984    3.843 0.0000000000
```

[1] "Southern area"
[1] "results south"

	Value	Std..Error	t.value	ar	index
factor(yy)1996	-0.33012164	0.4117571	-0.8017388	1996	0.7188363
factor(yy)1997	-0.64945750	0.2095247	-3.0996696	1997	0.5223291
factor(yy)1998	-0.64866037	0.2693599	-2.4081552	1998	0.5227456
factor(yy)1999	-0.83699939	0.1998579	-4.1879723	1999	0.4330079
factor(yy)2000	-0.16118827	0.4398311	-0.3664777	2000	0.8511318
factor(yy)2001	-0.05927498	0.1774959	-0.3339513	2001	0.9424476
factor(yy)2002	-0.03400139	0.2063239	-0.1647962	2002	0.9665702
factor(yy)2003	0.06035551	0.2111911	0.2857862	2003	1.0622141

Analysis of Deviance Table

Gaussian model

Response: lafli

Terms added sequentially (first to last)

	Df	Deviance	Resid. Df	Resid. Dev	F Value	Pr(F)
NULL			177	415.2040		
ltogtimi	1	335.4143	176	79.7898	1276.200	0.0000000000
factor(yy)	8	13.3318	168	66.4579	6.341	0.0000006882
factor(mm)	7	12.8688	161	53.5891	6.995	0.0000004940
factor(skip)	36	20.7363	125	32.8528	2.192	0.0007738355

[1] "**COMBINED**"
[1] "Tekið er tillit til norður suður svæðanna.."
$call:
glm(formula = lafli ~ ltogtimi + factor(yy) + factor(mm) + factor(area) +
factor(skip), family = gaussian(), data = testdata)

$coefficients:
numeric matrix: 71 rows, 3 columns.

	Value	Std. Error	t value
(Intercept)	1.36597607	0.32671225	4.18097600
ltogtimi	1.14384200	0.01868130	61.22924026
factor(yy)1996	-0.13943597	0.08242894	-1.69158995
factor(yy)1997	-0.60843305	0.07874127	-7.72699057
factor(yy)1998	-0.17308937	0.08134633	-2.12780811
factor(yy)1999	-0.29257132	0.08017791	-3.64902676
factor(yy)2000	0.11806692	0.08515714	1.38645934
factor(yy)2001	-0.29757889	0.08029215	-3.70620159
factor(yy)2002	0.02333415	0.08202884	0.28446276
factor(yy)2003	0.32581609	0.08413331	3.87261727
factor(mm)4	0.44316396	0.22741734	1.94868152
factor(mm)5	0.51846172	0.22752347	2.27871755
factor(mm)6	0.41756030	0.22737256	1.83645858
factor(mm)7	0.21346859	0.23005743	0.92789261
factor(mm)8	0.24688325	0.23448979	1.05285286
factor(mm)9	0.20606402	0.23816488	0.86521580
factor(mm)10	0.11935966	0.24870626	0.47992221
factor(mm)11	0.19566726	0.29530451	0.66259489
factor(mm)12	0.17779034	0.36979146	0.48078542
factor(area)	0.05806133	0.05476538	1.06018299
factor(skip)1268	0.41134239	0.38580439	1.06619416
factor(skip)1270	0.24616377	0.20455576	1.20340668
factor(skip)1273	-0.03213454	0.19475583	-0.16499911
factor(skip)1279	-0.14226495	0.24731639	-0.57523461

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factor(skip)1281 -1.77853300 0.51732940  -3.43791207
factor(skip)1308  0.20036335 0.19075850   1.05035080
factor(skip)1328  0.11225420 0.19410024   0.57833110
factor(skip)1345 -0.05553613 0.20058595  -0.27686948
factor(skip)1351  0.03379361 0.19840717   0.17032455
factor(skip)1360  0.26391244 0.19697731   1.33981136
factor(skip)1365  0.12332728 0.19906377   0.61953656
factor(skip)1369  0.43041992 0.19224443   2.23892008
factor(skip)1376  0.28741027 0.19062175   1.50775172
factor(skip)1395  0.46431375 0.27884268   1.66514594
factor(skip)1412  0.37937653 0.33001494   1.14957380
factor(skip)1459 -0.05686001 0.19357117  -0.29374212
factor(skip)1471 -0.25810338 0.23038823  -1.12029757
factor(skip)1472 -0.12081826 0.21897397  -0.55174710
factor(skip)1473 -0.35856466 0.25616354  -1.39974900
factor(skip)1484 -0.85850300 0.51668786  -1.66155055
factor(skip)1497 -0.89265225 0.38568429  -2.31446362
factor(skip)1530 -0.19914081 0.51638846  -0.38564149
factor(skip)1536 -1.38303505 0.51830943  -2.66835787
factor(skip)1552 -0.48293686 0.29936643  -1.61319645
factor(skip)1553  0.31804143 0.33124450   0.96014099
factor(skip)1578  0.01944464 0.20127709   0.09660633
factor(skip)1579  0.31539336 0.19493968   1.61790234
factor(skip)1585  0.07363902  0.2195589  0.3353953
factor(skip)1628 -0.52945957  0.3859179 -1.3719489
factor(skip)1634 -1.31033352  0.5189431 -2.5250043
factor(skip)1833  0.36130531  0.1918767  1.8830074
factor(skip)1868  0.23037852  0.1918566  1.2007852
factor(skip)1880  0.03936954  0.1943826  0.2025363
factor(skip)1902  0.32094373  0.1912605  1.6780451
factor(skip)1972 -0.44239466  0.5167902 -0.8560430
factor(skip)1976 -0.26122994  0.3859512 -0.6768471
factor(skip)1977  0.28647157  0.2021729  1.4169634
factor(skip)2107 -0.04362148  0.2537843 -0.1718841
factor(skip)2165  0.61509324  0.1887180  3.2593241
factor(skip)2170  0.30077831  0.1878558  1.6011128
factor(skip)2182  0.10016680  0.1927313  0.5197224
factor(skip)2184  0.36690479  0.1974017  1.8586706
factor(skip)2203  0.22709958  0.1881736  1.2068623
factor(skip)2212  0.33893468  0.2274590  1.4900910
factor(skip)2220  0.51893409  0.5182767  1.0012684
factor(skip)2236  0.12088850  0.2028083  0.5960729
factor(skip)2248 -0.04598506  0.3855559 -0.1192695
factor(skip)2265  0.28938305  0.2134861  1.3555122
factor(skip)2410  0.04436623  0.3017015  0.1470534
factor(skip)2549  0.16798599  0.3343973  0.5023545
factor(skip)4449  0.18629997  0.2003228  0.9299988
```

[1] "RESULTS combinded"

```
                    Value Std..Error    t.value   ar     index
factor(yy)1996 -0.13943597 0.08242894 -1.6915899 1996 0.8698487
factor(yy)1997 -0.60843305 0.07874127 -7.7269906 1997 0.5442029
factor(yy)1998 -0.17308937 0.08134633 -2.1278081 1998 0.8410624
factor(yy)1999 -0.29257132 0.08017791 -3.6490268 1999 0.7463420
factor(yy)2000  0.11806692 0.08515714  1.3864593 2000 1.1253194
factor(yy)2001 -0.29757889 0.08029215 -3.7062016 2001 0.7426140
factor(yy)2002  0.02333415 0.08202884  0.2844628 2002 1.0236085
factor(yy)2003  0.32581609 0.08413331  3.8726173 2003 1.3851606
Analysis of Deviance Table

Gaussian model

Response: lafli

Terms added sequentially (first to last)
               Df Deviance Resid. Df Resid. Dev  F Value     Pr(F)
          NULL                  940   1591.243                    
      ltogtimi  1 1270.140       939    321.103 5412.735 0.0000000
    factor(yy)  8   65.688       931    255.415   34.991 0.0000000
    factor(mm)  9    6.832       922    248.583    3.235 0.0007132
factor(area)  1    0.498       921    248.085    2.121 0.1456679  
  factor(skip) 51   43.933       870    204.152    3.671 0.0000000
```