6 Greenland Halibut in Subareas V, VI, XII, and XIV

Greenland halibut in ICES Subareas V, XII and XIV are assessed as one stock unit. New information on catches at Hatton Bank (XIIb and VIb) were made available to the group this year. Therefore catches from this area are tabled in the report, although it is recognised that there is at present no information on stock affinity for the Greenland halibut at Hatton Bank in relation to the main stock complex in areas V, XIIa and XIV.

6.1 Excecutive summary

There have been no changes in **input data** to the assessment this year: current surveys have continued and sampling intensity and coverage remains also unchanged. For the second time no age readings of otoliths were available from the main fishing areas.

It was not possible to conduct either **ASPIC** or **age-disaggregated models**. The assessment relies entirely on indices from surveys and the fishery.

Indices from the different divisions within the entire distribution area of Greenland halibut are less conflicting as it was in former years.

The logic behind the catch advice is apparently initiated from elaborations in the **technical minutes**; the logic assumes that the development in landings and effort has been similar in the remaining two fishing areas Vb and XIVb which is not the case.

6.2 Landings, Fisheries, Fleet and Stock Perception

Landings

Total annual landings in Divisions Va, Vb, and Subareas VI, XII and XIV are presented for the years 1981–2004 in Tables 6.1.1–6.1.6 and since 1961 in Figure 6.1.1. Catches taken within the Icelandic EEZ in Division XIVb have historically been registrated in Division Va. Landings during the decade prior to the extension of the EEZ to 200 nm by coastal nations in 1976 were in the order of 20-35 000 t. From 1976 landings increased from a low of 5 000 t to a record high of about 61 000 t in 1989. Since then landings have decreased markedly to a low in 1998-99, followed by an increase to about 30 000 t in 2003. Landings decreased to about 28 000 t in 2004. Landings not officially reported to ICES have been included in the assessment.

Landings in Icelandic waters have historically predominated the total landings in areas V+XIV. In the year 1989 with record high landings Iceland took 97% of the total . Since then fisheries developed in Div. XIVb and Vb and these areas have increased their share of the total landings and have in the past decade varied from about 20% to 50%. From 2003 to 2004 landings increased in XIV and decreased in V.

Fisheries and fleets

In 2004 quotas in Greenland and Icelandic EEZ's were not fully utilized (about 70%) and in Faroese EEZ only by-catch regulations is limiting the individual trawlers.

Most of the fishery for Greenland halibut in Divisions Va, Vb and XIVb is a directed fishery only minor catches in Va by Iceland, and in XIVb by Germany and the UK comes partly from a redfish fishery and south of Iceland. No major changes were observed in 2004. Table 6.1.6 describes the Working Group's best landing estimates for the year 2004 with respect to area and gear.

The major fishing grounds in Icelandic waters are located west of Iceland (64º30-66ºN, 27º-29ºW), where approximately 75% of the annual trawl catch in Icelandic waters has been taken in recent years. The Icelandic trawlers moved to deeper waters around 1988, but the average depth of fishing on the western grounds has remained at approximately 900 meters since 1990. A fishery also occurs north of Iceland (67º-68ºN, 19º-24ºW, at approximately 500 m), and along the narrow continental slope northeast and east of Iceland (63º30-66ºN, 11º–16ºW, between 400 and 700 meter depth). The main fishing season in Division Va formerly occurred during the spawning season in spring, but in recent years, the fishing season has expanded and the present fishery is conducted in late winter to early summer, with the bulk of the catches taken in April through June.

The trawlers (single trawlers > 1000 Hp) fishing in Division Vb operate on relatively shallow parts of the continental slope, mainly in summer. The gillnet fishery in Division Vb started in 1993, and since then the fishing grounds have expanded. This fishery is carried out during the whole year with a peak activity in the spring.

The fishing grounds in Division XIVb are found on the continental slopes (61ºN-65ºN, 36º-41ºW). Trawling was formerly concentrated in a narrow belt of the continental slope at depths of 500–1000 meters in the north-easternmost area of XIVb, but since 1997 expanded to a southerly area between 61°40-62°30N, 40°00-40°30W at depths of 1000–1400 meters, where longliners are also fishing. In 2004 most of the landings derived from the southern area. The main fishing season is from April to November for both longliners and trawlers with the bulk of the catches taken in July. Both freezer trawlers and fresh fish trawlers operate in the area.

Since 1994 a longline fishery developed on new fishing grounds along the western slope of the Reykjanes Ridge (60ºN-62ºN, 27º-29ºW), both inside and outside the 200 mile EEZ (XIVb and XII). This fishery has ceased since 2000. The same fleet has continued as a gillnet fleet since, only accounting for small catches.

Since 1996 a Greenland halibut has been taken as bycatch in the Spanish trawl fishery in the Hatton Bank area of Division VIb. Further a Norwegian longline fishery has been developing in the deeper waters of the western continental slope of the same area since 2000 (deeper than 1 000m) also stretching into Div. XIIb. Landings in table 6.1.5-6.1.6 derives from the Hatton Bank area. This fishery is considered to be in a period of learning.

Bycatch and discard

Bycatches in the Greenland halibut trawl fisheries is mainly redfish, sharks and cod. Southeast of Iceland the cod fishery and Greenland halibut fishery are coinciding spatially.

Previous reports based on measurements from a Greenlandic shrimp trawler operating in Denmark Strait (XIVb), indicated that Greenland halibut, mainly pre recruits below 40 cm, did constitute a significant bycatch. (0.48 kg and 0.81 individuals of Greenland halibut were caught per 1 kg shrimp). The mandatory use of sorting grids operated since 2000 is expected to have reduced these bycatches.

Only little information is presently available on discard in the fisheries. Discard records from logbooks that suggest discard less than 1% of the catches are considered incomplete.

Stock perception

The current definition of the Greenland halibut in East Greenland, Iceland, and Faroe waters as one stock, specified by ICES in 1976 was "based on a strong probability that the spawning grounds [for Greenland halibut in these waters] are the same". A summary of the current state of knowledge on Greenland halibut in the above-mentioned waters shows that key information on the life cycle is lacking (Woll 2000). Information on the spawning location and spawning

time of the stock is very limited. It is hypothesised, based on information from one scientific bottom trawl cruise in 1977, that the major spawning grounds are located on the continental slopes west of Iceland at depths around and below 1000 m (Magnusson 1977; Sigurdsson 1977; Sigurdsson and Magnusson 1980). In recent years (1995 and 2000), some spawning has been observed in East Greenland waters (62°N and 64°N) in August (Gundersen *et al*. 1997; Fossen and Gundersen 2000).

Standard 0-group fish surveys have been carried out annually in late summer (mainly in August) in Icelandic and in East Greenland waters since 1970. Larvae are mainly observed along the shelf region off East Greenland and are in some years abundant all over the shelf area south to 60° N, which is the southernmost limit of the survey area. Highest abundance is observed on the continental shelf north of 64° N and just east off the continental shelf south of 64° N. 0-group larvae are only occasionally observed on the Icelandic shelf in very limited numbers. Nursery grounds for young Greenland halibut (ages 1-3, fish less than 45 cm long) are well known in West Greenland waters, where they are most abundant from Store Hellefiske Bank to Disko and in Disko Bay between 66^{o}-69^{o} latitude at depths of about 200 m (Riget and Boje, 1988). When it comes to knowledge on young fish in East Greenland and Icelandic waters, information is very sparse. A gillnet survey targeting young Greenland halibut, modelling of advection of eggs and larvae with currents from assumed spawning areas in Icelandic and East Greenland waters (Woll 2000), and results of historic Greenland ichtyoplankton surveys (Boje 1997), indicated that larvae were transported to Southwest Greenland waters before settling, mixing with specimens from the Greenland-Canadian stock complex. Analyses of shrimp surveys in Icelandic and Greenland waters (Boje and Hjørleifsson 2000) concluded that nursery grounds were neither to be found in Icelandic nor in East Greenland waters.

The highest aggregation of commercial-sized Greenland halibut is found just south of the Greenland-Iceland ridge. In this area the major portion of the annual catch in the past 10 to 15 years has been taken mainly at depths between 500 and 1000 meters. Other locations of Greenland halibut in exploitable densities (for trawl fisheries) are found along the north and east coast of Iceland, mainly at depths between 500 to 700 meters, in waters of Faroe Islands, as well as along the continental slope off East Greenland. The sizes of the Greenland halibut in the trawl fisheries depend largely on location and depth, and to some extent on the season. In Icelandic waters, smaller fish are found along the east and north coast, with somewhat larger fish in the deeper waters south of the Faroe-Iceland ridge. The largest fish are, however, always found on the main fishing grounds between Iceland and Greenland.

Greenland halibut in Hatton Bank (Divisions VIb and XIIb) have until now not been considered in the current stock definition. Recent investigations in the Hatton Bank area (both VIb and XIIb) show that Greenland halibut in the area have sizes comparable to the exploited stock in V and XIV and catches are dominated by old females (Hareide et al 2002, Fossen 2003, 2004, WD 17). Spawning has been reported in the area in spring and maturity studies conducted (histological examinations of ovaries) from September indicate spawning to occur in the following autumn/winter (Tuene et al 2002). Considering the oceanic current system in this area it is likely that eggs and larvae will be transported out of the Hatton Bank area. Early development studies of Greenland halibut have shown an egg development phase of nearly two moths before hatching (2 dg C) (Stene et al 1999). Further the larval drift period is long, indicating settling after at least 5-6 months (results from the Barents Sea ,e.g Ådlandsvik et al 2004). Greenland halibut eggs have been described to be pelagic untill gastrulation (6-26 days after spawning) and then sink to deeper water masses. They are then transported bathypelagic (Ådlandsvik et al 2004). A model simulation made on anglerfish originating from the Hatton Bank area (Hislop et al 2001) show that anglerfish are likely to drift westwards towards Faroe Islands and Iceland. Keeping this in mind it is possible that Greenland halibut eggs and larvae

originating from the Hatton Bank area may drift into the waters around Faroe Island, Iceland and East Greenland indicating a different stock perception than the current.

6.3 Trends in Effort and CPUE

Division Va

Indices of CPUE for the Icelandic trawl fleet directed at Greenland halibut for the period 1985–2004 (Table 6.2.1, Fig. 6.2.1) were estimated from a GLM multiplicative model, taking into account changes in the Icelandic trawl catch due to vessel, statistical square, month, and year effects. All hauls with Greenland halibut exceeding 50% of the total catch were included in the CPUE estimation. The CPUE indices from the trawling fleets in Divisions Va, Vb and XIVb were used to estimate the total effort for each year (y) for each of the divisions according to:

$$E_{y,div} = Y_{y,div} / CPUE_{y,div}$$

where E is the total effort and Y is the total reported landings (Table 6.2.1).

Catch rates of Icelandic bottom trawlers decreased for all fishing grounds during 1990–1995 (Fig. 6.2.2.), but stabilised in 1995–1997. Catch rates increased until 1999-2001 and has since decreased continuously to a record low in 2004. The derived effort has increased from a low in 1998 to a level similar to that prior to 1998. The directly measured effort from logbook information covering the entire fishery, suggest an effort pattern with a more pronounced maximum in 1996 and further that effort was stable from 2003 to 2004. (Fig. 6.2.1).

Division Vb

Information from logbooks from the Faroese otterboard trawl fleet (>1000 hp) was available for the years 1991-2004 (Table 6.2.1, Fig. 6.2.3). The location of the bulk of fishery has changed from the eastern side of the islands in 1995-1998, to the western side since 2000. Only hauls where G.halibut consisted of more than 50% of the catches and conducted on depths more than 450 meters were selected for the analyses. The logbooks were standardised in the same way (GLM) as the Va fleet. CPUE decreased drastically in the early period by more than 50 % coinciding with a significant increase in effort. Since 1994 CPUE has been slightly decreasing reaching a record low in 2004.

Division XIVb

For Division XIVb, logbook data was available from both Greenland and foreign fleets. In the time series a variable proportion of all logbooks have been available for analysis (on average 40%, in 2004 75%). Hauls where targeted species was G.halibut and where catch weight exceeds 100 kg were selected, as no information on other species caught was available. CPUE from logbooks in the years 1991–2004 were standardised in the same way as described for fleets in Va and so was effort (Table 6.2.1, Fig.6.2.4). CPUE increased significantly from 1992 to 1998, from about 125 kg/hr to more than 400 kg/hr. CPUE declined significantly from 1998 to 2001 and again from 2002 to 2004. Effort has increased considerably in the time series. The fishery in XIVb is relatively new and annual catches have increased from below 500 tons before 1991 to 10 000 t in 2004. The fishery was therefore assumed to be in the process of learning in the beginning of the CPUE series. A breakdown of the CPUE series into main fleet (nation) components, show that for all fleets apart from the German, that CPUE decreased from 2002 to 2004. (Fig. 6.2.5). The German fleet, which takes the main part of the catches in XIV, have had stable catch rates since 1999.

The CPUE series from Divisions Va, Vb and XIVb do not develop similar in the period where time series are comparable. (Fig.6.2.1-6.2.4). This might indicate different population developments in the areas, but could also be artefacts, i.e. due to different behaviour of the fleets, fish migration between areas or difference in availability to the fishery.

Divisions VI and XIIb

In recent years a fishery has been developing in divisions VIb and XIIb in the Hatton Bank area. Limited fleet information is available (ref to deep sea wg). Norway has been targeting Greenland halibut in the Hatton Bank area using longlines since 2000 (Hareide et al 2002). Catches are reported in both VIb and XIIb. Unstandardised catch rates (kg/1000 hooks) based on available logbooks do not show any consistent patterns. Average catch per 1000 hooks has varied between 33 (1999) and 234 (2003) (Fossen 2004). Greenland halibut has been reported as bycatchs from the Spanish fleet since 1998 (WD17). Unstandardised CPUE series indicate that Greenland halibut catches are low compared to V and XIV; between 10 and 90 kg / h in VIb and below 14 kg/h in XIIb (WD17). In addition to the fishery in the Hatton bank area Greenland halibut has also been caught in the Reykjanes Ridge area of area XII. (Table 6.1.5-6.1.6).

6.4 Catch-at-age

Otoliths have been sampled from the Icelandic fishery in 2004 but due to changes in the age-reading staff at MRI no readings were available at the time the WG met. The only available aged otoliths were from the Greenland survey in East Greenland. As this survey mainly catches younger fish than the commercial fishery, i.e. below age 8-9 and as length composition by age in the survey is expected to differ from the commercial fishery, attempts were not made to establish catch-at-age for the total catches. Since 2000 no age-disaggregated assessment have been conducted for Greenland halibut and the lack of a catch-at-age matrix do thus not prevent an update of stock assessment. When the otoliths sampled by Iceland is age-read, the catch-at-age matrix will be updated accordingly.

Length compositions of catches from the commercial trawl fishery in Div. Va are incredibly stable from year to year. In Fig. 6.3.1 is shown length distributions since 1985 from the western area of Iceland, comprising the most important fishing grounds. For all the years catches were in the range 40 – 100 cm with a mode at about 60 cm. The 2004 distribution do obviously not differ form the long-term average. Fig. 6.3.2. and 6.3.3 show length compositions of catches in XIVb from German and Norwegian trawl and longline fisheries, respectively. Most distribution are stable from year to year, only the Norwegian trawl fishery in 2004 catches smaller fish than previous years.

6.5 Weight-at-age

Due to lack of age-readings as described in Sec. 6.3 no weight-at-age is provided.

6.6 Maturity-at-age

Due to lack of age-readings as described in Sec. 6.3 no maturity-at-age is provided.

6.7 Survey information

Division Va

An October groundfish survey in Icelandic waters (Fig. 6.6.1), covering the distributional area of Greenland halibut within the Icelandic EEZ, was started in 1996. The survey is a fixed sta-

tion stratified random survey consisting of 300 stations on the continental shelf and slope down to a depth of 1300 m. Since 2001 the fishable biomass of Greenland halibut (fish of length equal to or greater than 50 cm) has decreased significantly (Figure 6.6.2). Abundance indices of smaller fish (<50 cm) indicated signs of improved recruitment in 1998 and 1999, but a significant decrease in abundance of 40-60cm fish has been seen since 2002 (Fig. 6.6.2-6.6.3). The decrease in biomass and abundance in 2004 has occurred for the entire surveyed area (Fig.6.6.1)

Division Vb

Since 1995, a Faroese Greenland halibut survey has been carried out on the southern and eastern slope on the Faroe Plateau at depths of 400-600 m (Fig. 6.6.4). The survey is designed as an exploratory fishery where the skipper decides haul location; the survey is limited to the Faroe Plateau within the period 28 May to 10 June. Depth and area coverage has varied substantially in time and as both location and depth have a considerable effect on catch rates (cpue increases by depth), it was decided to analyse the catch rates from the survey similar to a commercial fleet, i.e. by means of a GLM. The GLM takes into account the area (as shown in Fig. 6.6.4) and depth. Usually the total number of hauls has been around 40, except in 1995 and 2003 when only about 24 stations were taken. Although the unstandardised catch rates (arith. mean in Fig. 6.6.5) show a sharp decline in the time series, the standardised catch rates have been stable since 1996. The discrepancy between the unstandardised and standardised catch rates is partly due to the survey moving to shallower depth over time.

Division XIVb

Since 1998, a Greenland survey for Greenland halibut has been carried out in East Greenland waters from 60°N to 67°N at the main commercial fishing grounds at depths of 400-1500 m in late June/early July (Fig. 6.6.6). No survey took place in 2001. In 2004 a total of 51 of the planned 70 stations were hauled. Total estimated biomass in 2004 was estimated at 16 000 t, which is a slight increase from 2003 (14 000 t). (Fig. 6.6.7). Compared to the period 1999-2001, biomass estimates for the period 2002-2004 is somewhat lower, although not significant at the 5% level. The deep-water survey is mainly catching Greenland halibut in the length range 30-70cm (Fig. 6.6.8). Abundance estimates by age show that catches mainly consist of 4-8 year olds. From the short time series available it is not possible to identify consistent strong cohorts . (Fig. 6.6.8).

SURVEY /DIVISION	NO HAULS IN 2004 (PLANNED HAULS)	DEPTH RANGE (M)	COVERAGE (KM^2)
Va	150 (150)	500-1300	130 000
Vb	42 (40)	400-500	3 300
XIVb	51 (70)	400-1500	37 000

6.8 Stock Assessment

Age-disaggregated CPUE values for age groups 7–12 from the Icelandic trawling fleet operating in Division Va have in former times been used for an XSA tuning assessments. Since 2000 the XSA assessment has been considered unreliable due to poor diagnostics mainly caused by inconsistent sampling and age readings (see section 6.9), and was thus rejected as a basis for advice. No attempt was made this year to run an age-based assessment due to lack of age readings.

A stock-production model approach, ASPIC, have been performed from 2000 to 2002, when the age-disaggregated assessment was considered unreliable. ASPIC requires series of catch

data and indices of stock biomass, either corresponding effort, CPUE, or survey catch rates. Corresponding catch and effort data is available for Div. Va, (formerly used as a tuning fleet in the XSA), Vb and XIVb, and in addition several survey series were available. Attempts was made to fit the model to catch and effort data, but the model did not fit any of the indices satisfactory. Therefore ASPIC most be considered a poor performer of the recent biomass dynamics that the CPUE and survey indices are considered to reflect.

6.8.1 Summary of the various observation data

A number of indices from surveys and from the commercial fishery are available as indicators for the biomass development.

The surveys in Va and XIV are considered to cover the adult stock distribution in the two division adequately, while the survey/exploratory fishery in Vb has an insufficient coverage of the stock component in Vb due to the survey design.

The main fishing grounds are covered well by the logbook data in Va and XIV, while in Vb the logbook information does not include the principal fleet, gill netters, that covers other areas within Vb. The fleet behaviour is likely influenced by a number of factors, such as weather conditions and sea ice in the northwestern areas. Therefore CPUE series is considered less qualified as biomass indicators than surveys.

- **Div. Va:** The fall groundfish survey in Va (1996-2003) indicate a decline in biomass in the last three years for all sizes of fish and in all surveyed areas. Icelandic trawl CPUE (1985-2003) show that catch rates in 1993-2004 are less than half that observed in 1985-1989. CPUE declined in the last three years and are currently 1/4 of that in 1985. Effort has increased significantly since 1998.
- **Div. Vb:** Catch rates from an exploratory fishery/survey (1995-2004) shows stable catch rates since 1996. Faroese trawl CPUE (1991-2004) show a slight but continuous decrease in catch rates since 1994, following a significant decrease in the early years.
- **Div. XIVb:** The Greenland survey in XIV have signs of slight increasing biomass index since 2002, but compared to an earlier period (1998-2000) recent estimates are lower. Trawl CPUE's from the various fleets in XIVb show an overall stable pattern since 1993, but a decrease in the last two years. Among the main fleets in the area, the German fleet accounting for 70% of catches have maintained catch rates stable in recent years, while Norwegian, Greenland and Faroese trawlers decreased their catch rates.

6.8.2 State of the stock

The present state of the stock cannot be evaluated in with regard to biological reference points. All indices, however, suggest that present biomass is low compared to historic levels. CPUE indices from Division Va suggest a low biomass in recent years compared to the mid-1980s, and survey indices support a declining trend in the past two years. (Fig. 6.2.1 and 6.6.2). In Div Vb indices suggest a decreasing biomass being at a low level (Fig. 6.2.3 and 6.6.8). In Div. XIVb indices suggest that biomass is low in recent years compared to the period 1996-98 (Fig. 6.6.5 and 6.2.4). There are no signs of strong year classes entering the stock from survey information (Fig. 6.6.3 and 6.6.6).

6.8.3 Biological reference points

No biological reference points is adopted.

6.9 Management Considerations

No formal agreement on the management of the Greenland halibut exists among the three coastal states, Greenland, Iceland, and the Faroe Islands. The regulation schemes of those states have previously resulted in catches well in excess of TAC's advised by ICES.

Although the overall status of Greenland halibut in the assessment area is unknown, there are clear decreases in the CPUE from the Icelandic fishery since 1985. Normally, if a reduction in abundance of this magnitude is caused by high fishing mortality, larger fish would be expected to become progressively less abundant over time. In the Greenland halibut case, however, the size composition of the Icelandic catch on the principal fishing ground off the west coast have remained stable from 1985-2003 suggesting that fishing mortality is not affecting markedly the size composition of Greenland halibut in the area of the fishery. Such a discrepancy could be explained if the Icelandic fishing ground were regularly re-supplied by fish from neighbouring areas that are more lightly fished. Under this hypothesis, the decrease in abundance could be the result of the removal rate on the Icelandic ground being in excess of the re-supplying rate. If this hypothesis were true, the decrease in the survey index and in the CPUE would not necessarily cause concern for the conservation of the resource, but from a management perspective, however, there could be advantages in reducing fishing mortality to better match it with the hypothesised re-supplying rates from neighbouring areas. Given the uncertainties about overall stock size, stock structure, and abundance in the area of the fishery, a better mean to reduce fishing mortality could be through effort reductions rather than through TAC reductions.

6.10 Comments on the Assessment

The assessment relies on a number of indices from surveys and the commercial fishery in absence of material to age-disaggregate the catches. As the stock dynamics as well as stock structure in the entire distribution areas is not fully understood, input to stock production models (i.e. ASPIC) are not easily selected. In order to improve the quality of the assessment of the stock, age-disaggregation of catches must therefore be recommenced. This will require that the main labs must continue sampling otoliths from Greenland halibut and put higher priority to age-reading work.

Given the likely poor state of the stock, it is proposed that effort should be reduced to the lowest observed in the time-series (1998), at which time the stock increased. The landings at that time were around 20 000 t. In order to allow the stock to rebuild the catch in the total areas should be less than 20 000 t in 2005.

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Table 6.1.1 GREENLAND HALIBUT. Nominal landings (tonnes) by countries, in Sub-areas V, VI, XII and XIV 1981-2004, as officially reported to ICES and estimated by WG

Country	1981	1982	1983	1984	1985	1986	1987	1988	1989
Denmark	-	-	-	-	-	-	6	+	-
Faroe Islands	767	1,532	1,146	2,502	1,052	853	1,096	1,378	2,319
France	8	27	236	489	845	52	19	25	-
Germany	3,007	2,581	1,142	936	863	858	565	637	493
Greenland	+	1	5	15	81	177	154	37	11
Iceland	15,457	28,300	28,360	30,080	29,231	31,044	44,780	49,040	58,330
Norway	-	-	2	2	3	+	2	1	3
Russia	-	-	-	-	-	-	-	-	-
UK (Engl. and Wales)	-	-	-	-	-	-	-	-	-
UK (Scotland)	-	-	-	-	-	-	-	-	-
United Kingdom	-	-	-	-	-	-	-	-	-
Total	19,239	32,441	30,891	34,024	32,075	32,984	46,622	51,118	61,156
Working Group estimate	-	-	-	-	-	-	-	-	61,396

Country	1990	1991	1992	1993	1994	1995	1996 [1]	1997 [1]	1998 [1]
Denmark	-	-	-	-	-	-	1	-	
Faroe Islands	1,803	1,566	2,128	4,405	6,241	3,763	6,148	4,971	3,817
France	-	-	3	2	-	-	29	11	8
Germany	336	303	382	415	648	811	3,368	3,342	3,056
Greenland	40	66	437	288	867	533	1,162	1,129	747
Iceland	36,557	34,883	31,955	33,987	27,778	27,383	22,055	18,569	10,728
Norway	50	34	221	846	1,173 [1]	1,810	2,164	1,939	1,367
Russia	-	-	5	-	-	10	424	37	52
Spain									89
UK (Engl. and Wales)	27	38	109	811	513	1,436	386	218	190
UK (Scotland)	-	-	19	26	84	232	25	26	43
United Kingdom									
Total	38,813	36,890	35,259	40,780	37,305	36,006	35,762	30,242	20,360
Working Group estimate	39,326	37,950	35,423	40,817	36,958	36,300	35,825	30,267 9	20,449

Country	1999 [1]	2000 [1]	2001 [1]	2002 [1]	2003 [1]	2004 [1]
Denmark		-	0	0	0	0
Faroe Islands	3,884	-	0	0	0	1,860
France	-	21	25	20	33	0
Germany	3,082	3,271	2,807	2,148	2,948	6,906
Greenland	200	1,740	1,553	0 0	0	1,420
Iceland	11,180	14,537	16,590	2,277	20,371	15,478
Ireland		-	7			
Norway	1,187	1,272	1,483	1,328	1,114	1,250
Poland						206
Portugal			6			0
Russia	138	183	186	44 0	0	265
Spain		8	10	0 0	0	256
UK (Engl. and Wales)	261	370	227	71 0	0	
UK (Scotland)	69	121	130	157 0	0	
United Kingdom	-	-		239	1,205	20
Total	20,001	21,523	23,024	6,284	25,671	27,660
Working Group estimate	20,371	26,839	28,021	30,574	31,133	27,788

1) Provisional data

Table 6.1.2 GREENLAND HALIBUT. Nominal landings (tonnes) by countries, in Division Va 1981-2004, as officially reported to ICES and estimated by WG.

Country	1981	1982	1983	1984	1985	1986	1987	1988	1989
Faroe Islands	325	669	33	46			15	379	719
Germany									
Greenland									
Iceland	15,455	28,300	28,359	30,078	29,195	31,027	44,644	49,000	58,330
Norway			+	+	2				
Total	15,780	28,969	28,392	30,124	29,197	31,027	44,659	49,379	59,049
Working Group estimate									59,272 [2]

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998
Faroe Islands	739	273	23	166	910	13	14	26	6
Germany					1	2	4		9
Greenland					1				[1]
Iceland	36,557	34,883	31,955	33,968	27,696	27,376	22,055	16,766	10,580
Norway								[1]	[1]
Total	37,296	35,156	31,978	34,134	28,608	27,391	22,073	16,792	10,595
Working Group estimate	37,308 [2]	35,413 [2]							

Country	1999	2000	2001	2002	2003 [1]	2004 [1]
Faroe Islands	9					
Germany	13	22	50	31	23	10
Greenland	[1]					
Iceland	11,087	14,507	2,310 [4]	2,277	20,371	15,478
Norway			6			
UK (E/W/I)	26	73	50	21		
UK Scottland	3	5	12	16		
UK				37	21	10
Total	11,138	14,607	2,428	2,382	20,415	15,497
Working Group estimate		14,519 [3]	16,752	19,714		

1) Provisional data

2) Includes 223 t catch by Norway.

3) Includes 12 t catch by Norway.

4) 14280 t fished in Icelandic EEZ, previously reported in Va, are in 2002 moved to ICES XIV b.

Table 6.1.3 GREENLAND HALIBUT. Nominal landings (tonnes) by countries, in Division Vb 1981-2004 as officially reported to ICES and estimated by WG.

Country	1981	1982	1983	1984	1985	1986	1987	1988	1989
Denmark	-	-	-	-	-	-	6	+	-
Faroe Islands	442	863	1,112	2,456	1,052	775	907	901	1,513
France	8	27	236	489	845	52	19	25	...
Germany	114	142	86	118	227	113	109	42	73
Greenland	-	-	-	-	-	-	-	-	-
Norway	2	+	2	2	2	+	2	1	3
UK (Engl. and Wales)	-	-	-	-	-	-	-	-	-
UK (Scotland)	-	-	-	-	-	-	-	-	-
United Kingdom	-	-	-	-	-	-	-	-	-
Total	566	1,032	1,436	3,065	2,126	940	1,043	969	1,589
Working Group estimate	-	-	-	-	-	-	-	-	1,606 [2]

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998
Denmark	-	-	-	-	-	-	-	-	
Faroe Islands	1,064	1,293	2,105	4,058	5,163	3,603	6,004	4750	3660
France [6]	...	...	3 [1]	2	1	28	29	11	8 [1]
Germany	43	24	71	24	8	1	21	41	
Greenland	-	-	-	-	-	-	-	-	
Norway	42	16	25	335	53	142	281	42 [1]	114 [1]
UK (Engl. and Wales)	-	-	1	15	-	31	122		
UK (Scotland)	-	-	1	-	-	27	12	26	43
United Kingdom	-	-	-	-	-				
Total	1,149	1,333	2,206	4,434	5,225	3,832	6,469	4,870	3825
Working Group estimate	1,282 [2]	1,662 [2]	2,269 [2]	-	-		-	-	0

Country	1999	2000 [1]	2001 [1]	2002 [1]	2003 [1]	2004 [1]
Denmark						
Faroe Islands	3873					1,717
France		21	25 [1]	20	33	
Germany	22	6	7			
Iceland						
Ireland			+			
Norway	87	110 [1]	53 [1]	48	2	
UK (Engl. and Wales)	9	35	77	50		
UK (Scotland)	66	116	118	141		
United Kingdom					197	128
Total	4057	288	280 2	259	232	1,845
Working Group estimate	2694 [2]	5092 [3]	3,951	2,694	2,426	1,845

1) Provisional data
2) WG estimate includes additional catches as described in Working Group reports for each year and in the report from 2001.

Table 6.1.4 GREENLAND HALIBUT. Nominal landings (tonnes) by countries, in Sub-area XIV 1981-2004, as officially reported to ICES and estimated by WG.

Country	1981	1982	1983	1984	1985	1986	1987	1988	1989
Faroe Islands	-	-	-	-	-	78	74	98	87
Germany	2,893	2,439	1,054	818	636	745	456	595	420
Greenland	+	1	5	15	81	177	154	37	11
Iceland	-	-	1	2	36	17	136	40	+
Norway	-	-	-	+	-	-	-	-	-
Russia	-	-	-	-	-	-	-	-	+
UK (Engl. and Wales)	-	-	-	-	-	-	-	-	-
UK (Scotland)	-	-	-	-	-	-	-	-	-
United Kingdom	-	-	-	-	-	-	-	-	-
Total	2,893	2,440	1,060	835	753	1,017	820	770	518
Working Group estimate	-	-	-	-	-	-	-	-	-

Country	1990	1991	1992	1993	1994	1995	1996	1997	1998
Denmark	-	-	-	-	-	-	1	+	+
Faroe Islands	-	-	-	181	168	147	130	148	151
Germany	293	279	311	391	639	808	3,343	3,301	3,399
Greenland	40	66	437	288	866	533	1,162	1,129	747 [1,7]
Iceland	-	-	-	19	82	7	-	1,803	148
Norway	8	18	196	511	1,120	1,668	1,881	1,897 [1]	1,253 [1]
Russia	-	-	5	-	-	10	424	37	52
UK (Engl. and Wales)	27	38	108	796	513	1405	264	218	190
UK (Scotland)	-	-	18	26	84	205	13		
United Kingdom	-	-	-	-	-	-	-		
Total	368	401	1,075	2,212	3,472	4,783	7,218	8,533	5940
Working Group estimate	736 [2]	875 [3]	1,176 [4]	2,249 [5]	3,125 [6]	5,077 [7]	7,283 [8]	8,558 [9]	

Country	1999	2000	2001 [1]	2002 [1]	2003 [1]	2004 [1]
Denmark						
Faroe Islands	2					143
Germany	3047	3243	2,750	2,117	2,925	6,896
Greenland	200 [1,4]	1740 [8]	1,553 [9]			1,420
Iceland	93	30	14,280			
Ireland			7			
Norway	1100	1162 [1]	1,424	1,280	1,112	1,131
Poland						205
Portugal			6			
Russia	138	183	186	44		264
Spain		8	10			
UK (Engl. and Wales)	226	262	100			
UK (Scotland)						
United Kingdom				202	987	
Total	4806	6628	20,316	3,643 0	5,024	10,059
Working Group estimate	5376 [11]	6588 [5]	6,588 [6]	6,750 #	8,017	

1) Provisional data

2)WG estimate includes additional catches as described in working Group reports for each year and in the report from 2001.

3) Includes 125 t by Faroe Islands and 206 t by Greenland.

4) Excluding 4732 t reported as area unknown.

5) Includes 1523 t by Norway, 102 t by Faroe Islands, 3343 t by Germany, 1910 t by Greenland, 180 t by Russia, as reported to Greenland authorities.

6) Includes 2849 t by Greenland, 142 t by Norway, 2750 t by Germany. Does not include 14280 t by Iceland as those are included in WG estimate of Va.

7) Excluding 138 t reported as area unknown.

8) Excluding 16 t reported as area unknown.

9) Excluding 20 t reported as area unknown

10) Includes 3370 t by Greenland, 3552 t as total for Germany and 959 t for Norway.

Table 6.1.5 GREENLAND HALIBUT. Nominal landings (tonnes) by countries in Sub-area XII, as officially reported to the ICES and estimated by WG

Country	1996	1997	1998	1999	2000	2001	2002	2003 [1]	2004 [1]
Faroe Islands		47							
Norway	2								119
Poland									1
Spain 2	2	42	67	137	299	102	28	35	86
Total	2	47							120
WG estimate	4	89	67	137	299	102	28	35	206

[1] Provisional data

[2] Based on estimates by observers onboard vessels

Table 6.1.6 GREENLAND HALIBUT. Nominal landings (tonnes) by countries in Division VIb, as officially reported to the ICES and estimated by WG.

Country	1996	1997	1998	1999	2000	2001	2002	2003 [1]	2004 [1]
Faroe Islands									
Norway							21	26	
Poland									1
Russia									1
Spain [2]			22	88	20	350	1367	214	170
UK									10
Total	0	0	22	88	20	350	1388	240	182
WG estimate									

[1] Provisional data

[2] Based on estimates by observers onboard vessels

Table 6.1.7. 2004 Catch statistics for Greenland halibut in V and XIV.
Working Groups best estimates.

Va	Long line	Trawl	Gill Net	Unknown	SUM	"Official"
Faroe Islands					0	
Germany, Fed. Rep.					0	23
Greenland					0	
Iceland	170	13,914	1,393	1	15,478	20371
Norway					0	
UK (E/W/NI)					0	
UK (Scotland)					0	
UK					21	21
Total	170	13,914	1,393	1	15,478	20,415

Vb	Long line	Trawl	Gill Net	Unknown	SUM	"Official"
Faroe Islands				1,717	1,717	
France						33
Germany Fed. Rep.						
Norway						2
UK (England & Wales)						
UK (Scotland)						
United Kingdom						197
Total	0	0	0	1,717	1,717	232

VI	Long line	Trawl	Gill Net	Unknown	SUM	SUM
Faroe Islands					0	
Total	0	0	0	0	0	0

XII	Long line	Trawl	Gill Net	Unknown	SUM	SUM
Faroe Islands					0	
Total	0	0	0	0	0	0

XIV	Long line	Trawl	Gill Net	Unknown	SUM	"Official"
Denmark					0	
Faroe Islands		143			143	
EU (GER)		6,896			6,896	2,925
Greenland		1,420			1,420	
Iceland (outside 200 EEZ)					0	
Norway (inside 200 EEZ)	586	545			1,131	1,112
Norway (outside 200 EEZ)					0	
Russia					0	
Ireland					0	
UK (England & Wales)					0	
UK (Scotland)					0	
United Kingdom					0	987
Total	586	9,004	0	0	9,590	5,024

Summary of catch by gear	Long line	Trawl	Gill Net	Unknown	SUM	SUM
	756	22,918	1,393	1,718	**26,785**	25,671

Table 6.2.1. CPUE indices of trawler fleets in Div Va, Vb and XIVb as derived from GLM

area	year	cpue(t/hr)	% change in CPUE between years	landings	derived effort	% change in effort between years
Iceland Va	1985	1.000		29,197	29	
	1986	0.915	-8	31,027	34	16
	1987	0.884	-3	44,659	51	49
	1988	0.967	9	49,379	51	1
	1989	0.918	-5	59,049	64	26
	1990	0.752	-18	37,308	50	-23
	1991	0.763	1	35,413	46	-6
	1992	0.656	-14	31,978	49	5
	1993	0.509	-22	34,134	67	38
	1994	0.412	-19	28,608	69	3
	1995	0.314	-24	27,391	87	25
	1996	0.260	-17	22,073	85	-2
	1997	0.289	11	16,792	58	-32
	1998	0.466	61	10,595	23	-61
	1999	0.535	15	11,138	21	-8
	2000	0.589	10	14,607	25	19
	2001	0.613	4	16,755	27	10
	2002	0.466	-24	19,714	42	55
	2003	0.324	-30	20,415	63	49
	2004	0.243	-25	15,477	64	1
Greenland, XIVb	1991	0.12		875	7	
	1992	0.12	-7	1,176	10	44
	1993	0.34	197	2,249	7	-36
	1994	0.25	-27	3,125	12	91
	1995	0.30	20	5,077	17	35
	1996	0.39	29	7,283	19	11
	1997	0.43	10	8,558	20	7
	1998	0.43	1	5,940	14	-31
	1999	0.33	-24	5,376	16	19
	2000	0.29	-12	6,958	24	47
	2001	0.25	-12	7,216	29	18
	2002	0.34	33	6,750	20	-30
	2003	0.32	-4	8,017	25	23
	2004	0.28	-15	9,854	36	44
Faroe Islands, Vb	1991	0.25		1,662	7	
	1992	0.27	9	2,269	8	26
	1993	0.20	-24	4,434	22	157
	1994	0.13	-35	5,225	39	80
	1995	0.14	5	3,832	27	-30
	1996	0.14	2	6,469	45	65
	1997	0.14	-6	4,870	36	-20
	1998	0.11	-19	3,825	35	-3
	1999	0.11	4	4,265	38	7
	2000	0.13	17	5,079	38	2
	2001	0.12	-12	3,245	28	-27
	2002	0.11	-8	2,694	25	-9
	2003	0.13	23	2,426	18	-33
	2004	0.10	-25	1,771	18	-28

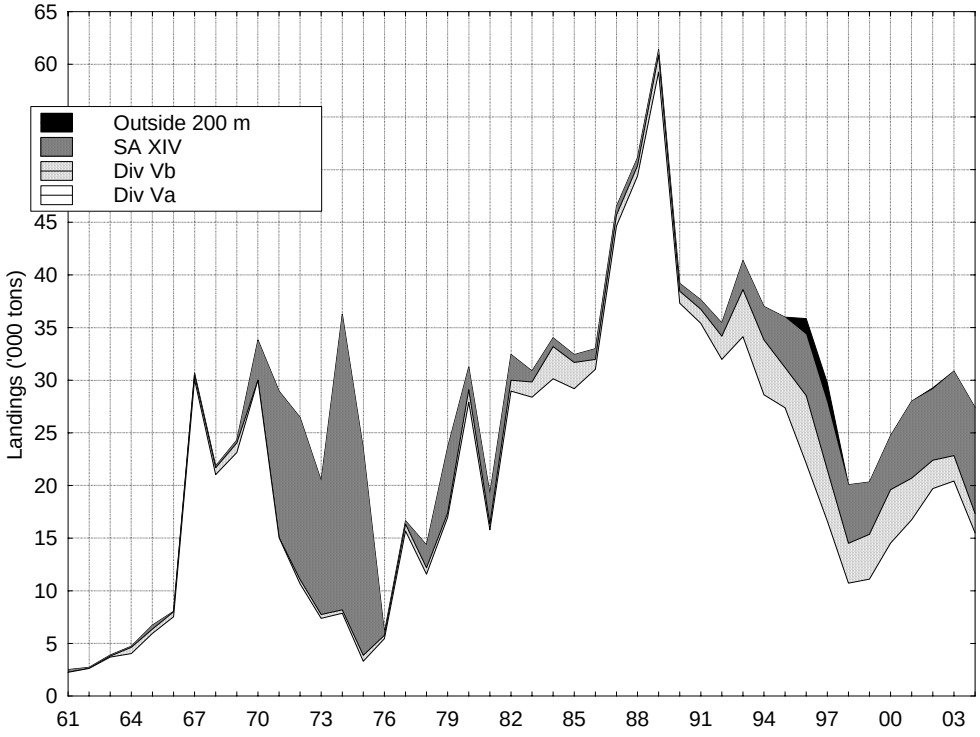


Figure. 6.1.1. Landings of Greenland halibut in Divisions Va, Vb and Subarea XIV. As the landings within Icelandic waters, since 1976, have not officially been separated and reported according to the defined ICES statistical areas, they are set under area Va by the North Western Working Group.

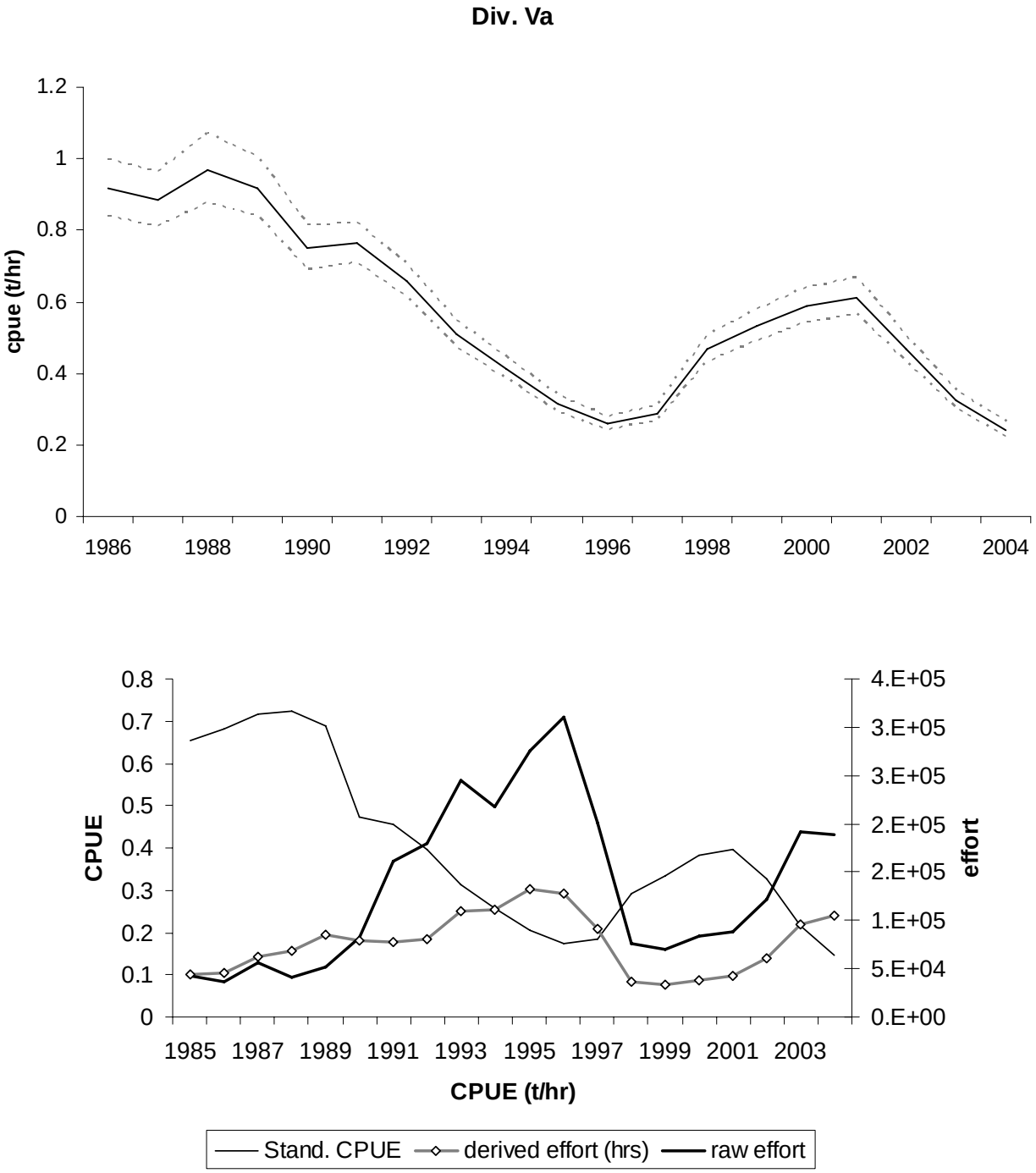


Figure 6.2.1 Upper:Standardised CPUE from the Icelandic trawler fleet. 95% CI indicated. Lower: Stand. CPUE and effort derived from GLM and effort summarized from logbooks (raw effort).

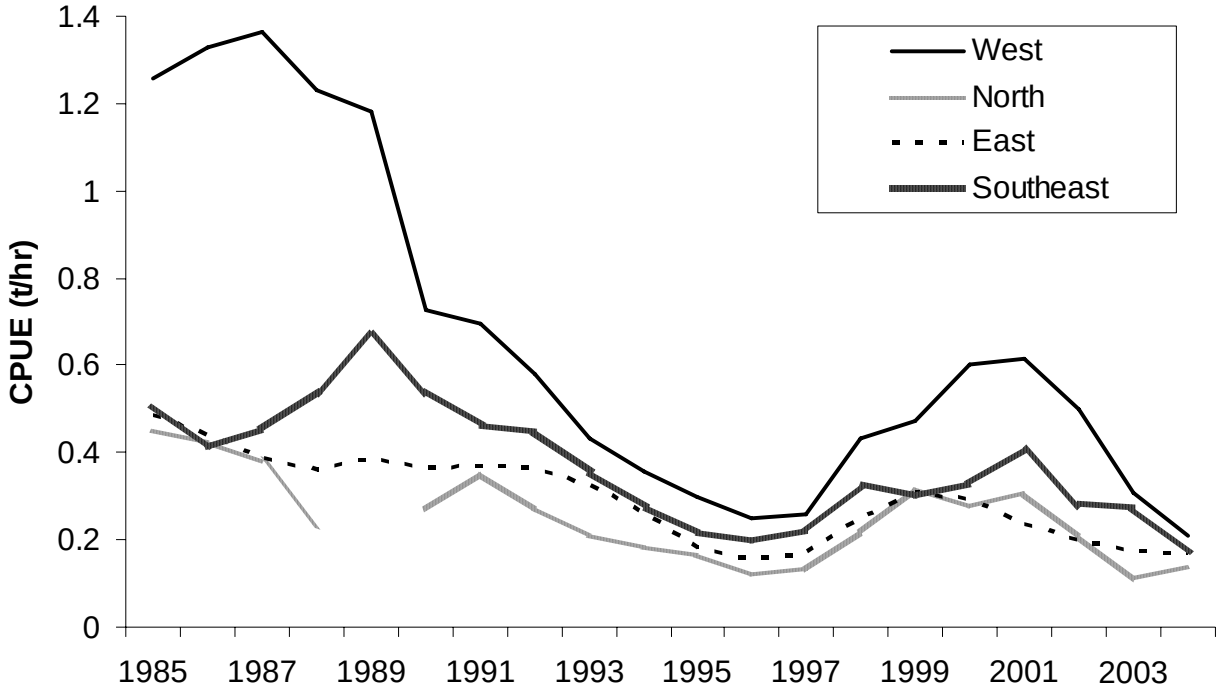


Figure 6.2.2. Standardised CPUE series from Icelandic trawlers from 4 areas around Iceland.

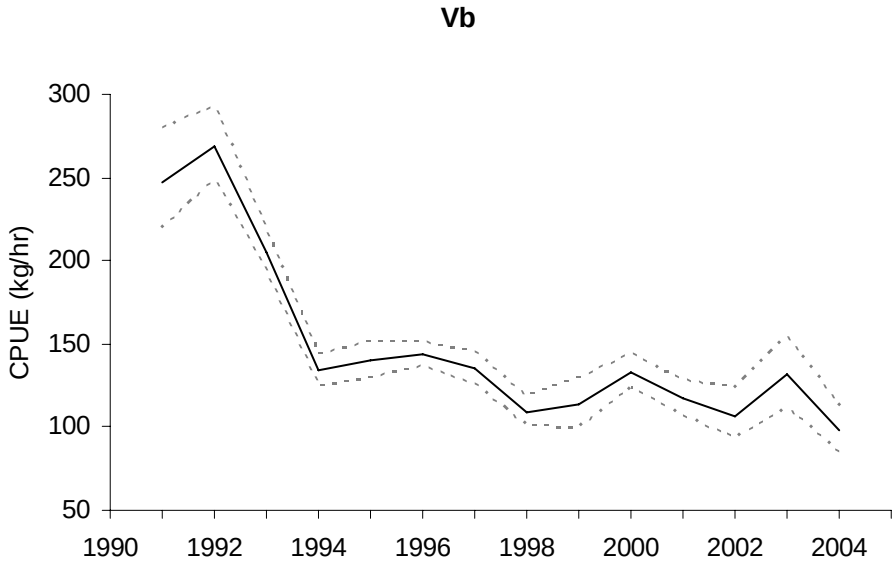


Figure 6.2.3. Standardised CPUE from the Faroese trawler fleet. 95% CI indicated.

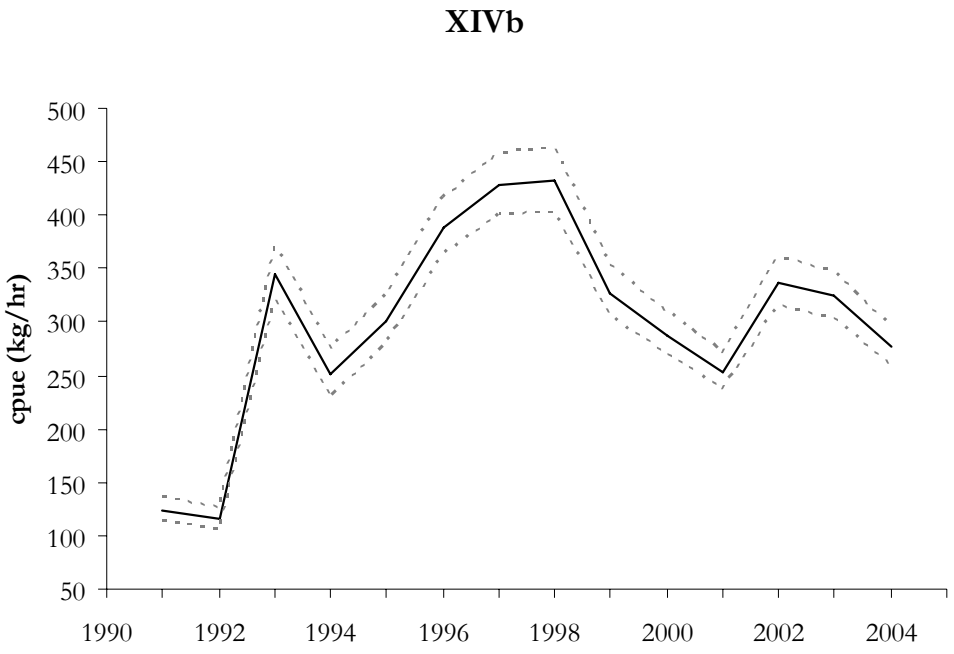


Figure 6.2.4. Standardised CPUE from trawler fleets in XIVb. 95% CI indicated.

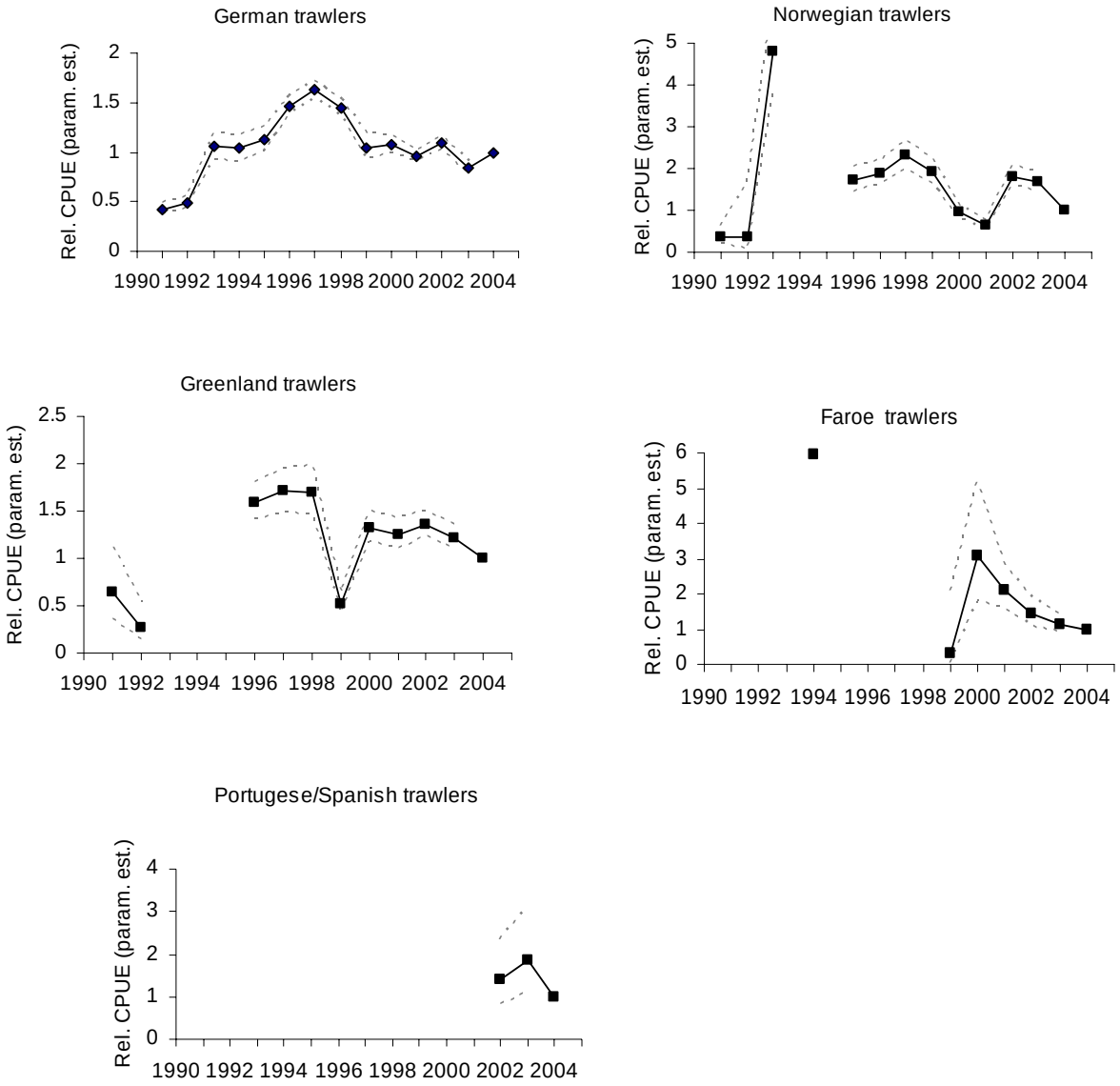


Figure. 6.2.5. Standardised CPUE series from the main fleets in Div. XIVb . 95% CI indicated

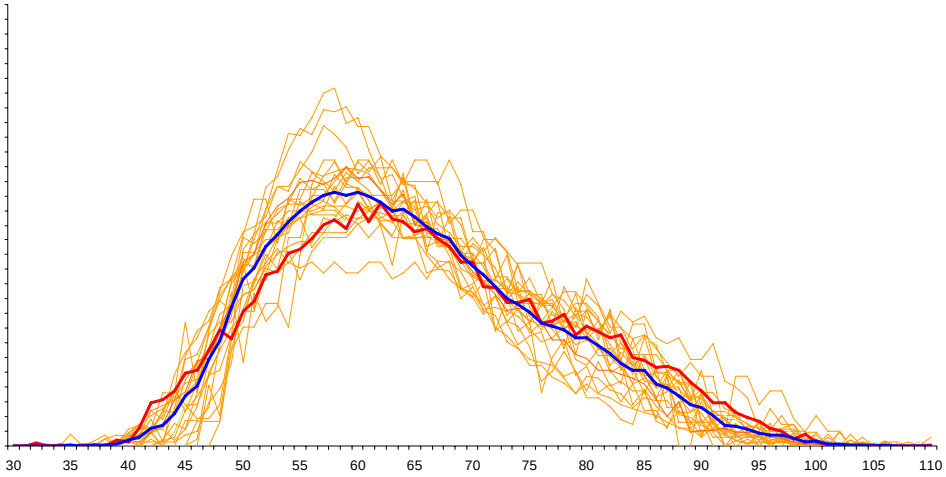
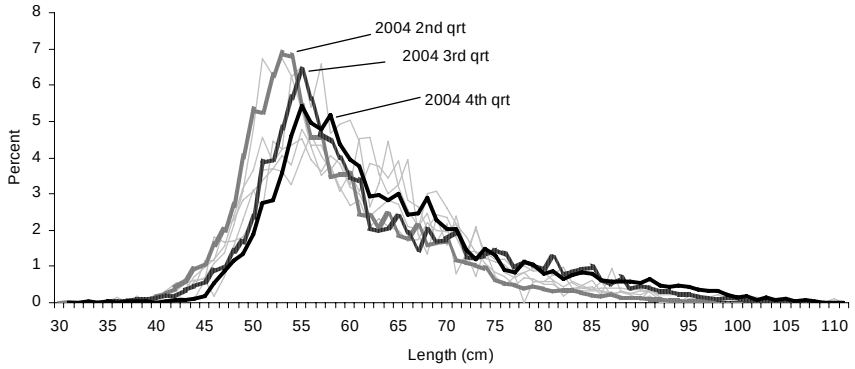


Figure 6.3.1 Length distributions from the commercial trawlfishery in the western fishing grounds of Iceland (Va) in the years 1985 – 2004. The thin solid line is average of 1985-2004 and the thick solid line is 2004 distribution



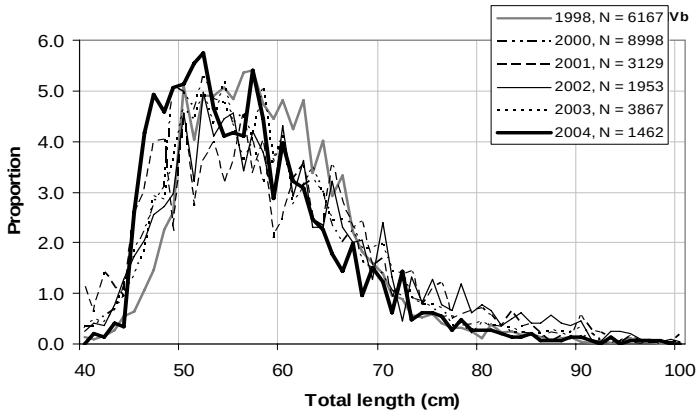


Figure 6.3.2. Length distributions from the commercial trawlfishery in East Greenland (XIVb) . Upper: German trawl fishery 1999-2004 with indication of 2004. Lower: Norwegian trawl fishery 1998-2004.

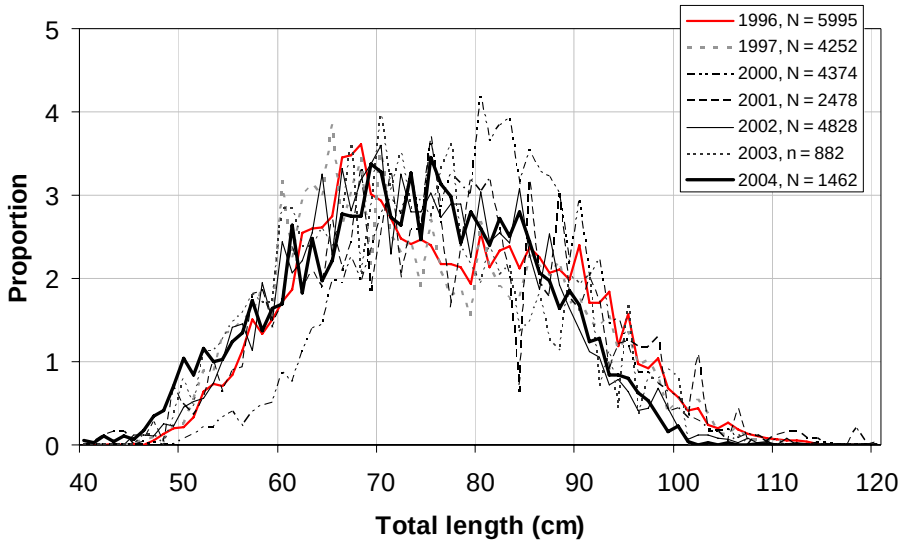


Figure 6.3.3. Length distributions from commercial longline fishery in East Greenland (XIVb) by Norway 1996-2004.

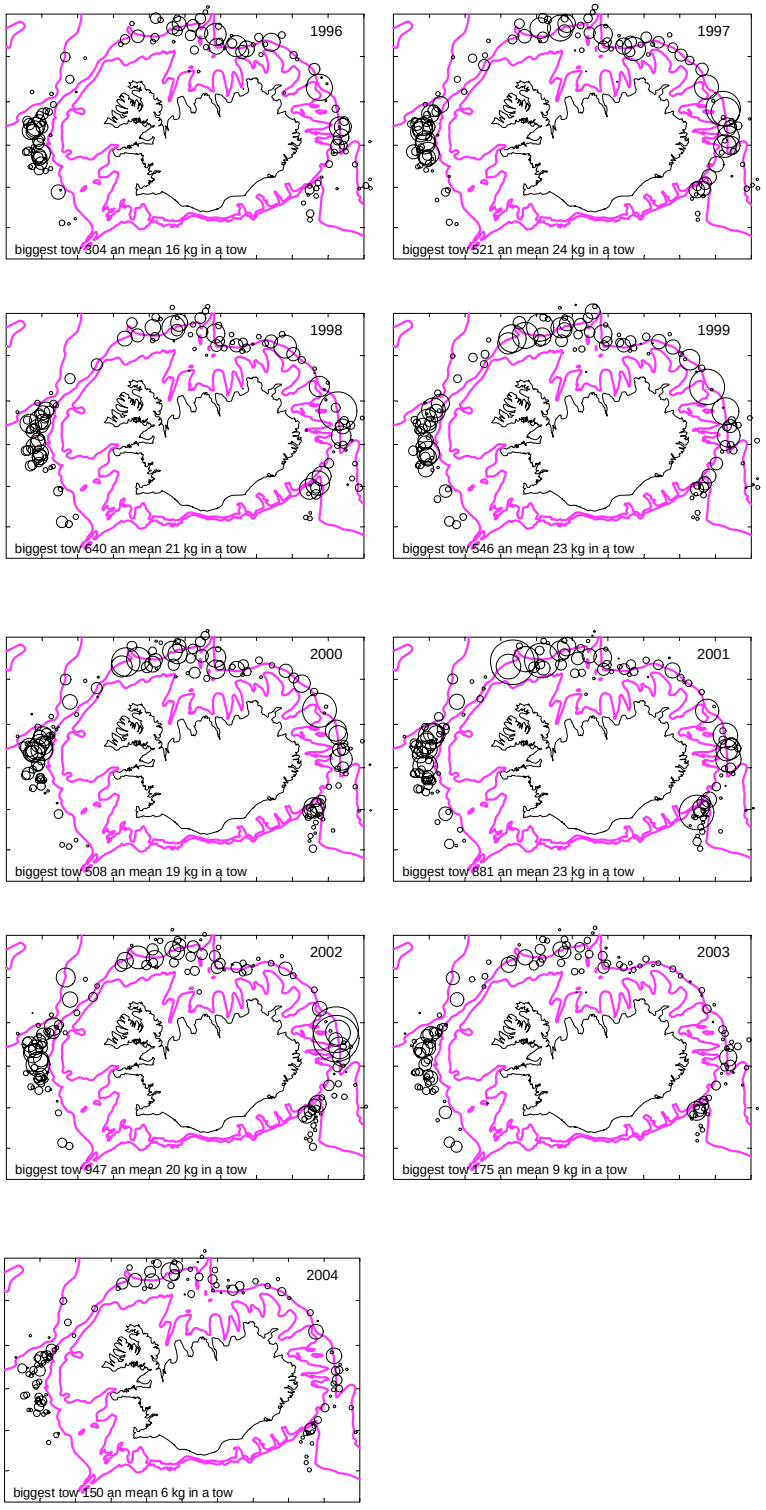


Figure 6.6.1. Distribution of catches from the Icelandic fall survey 1996-2004.

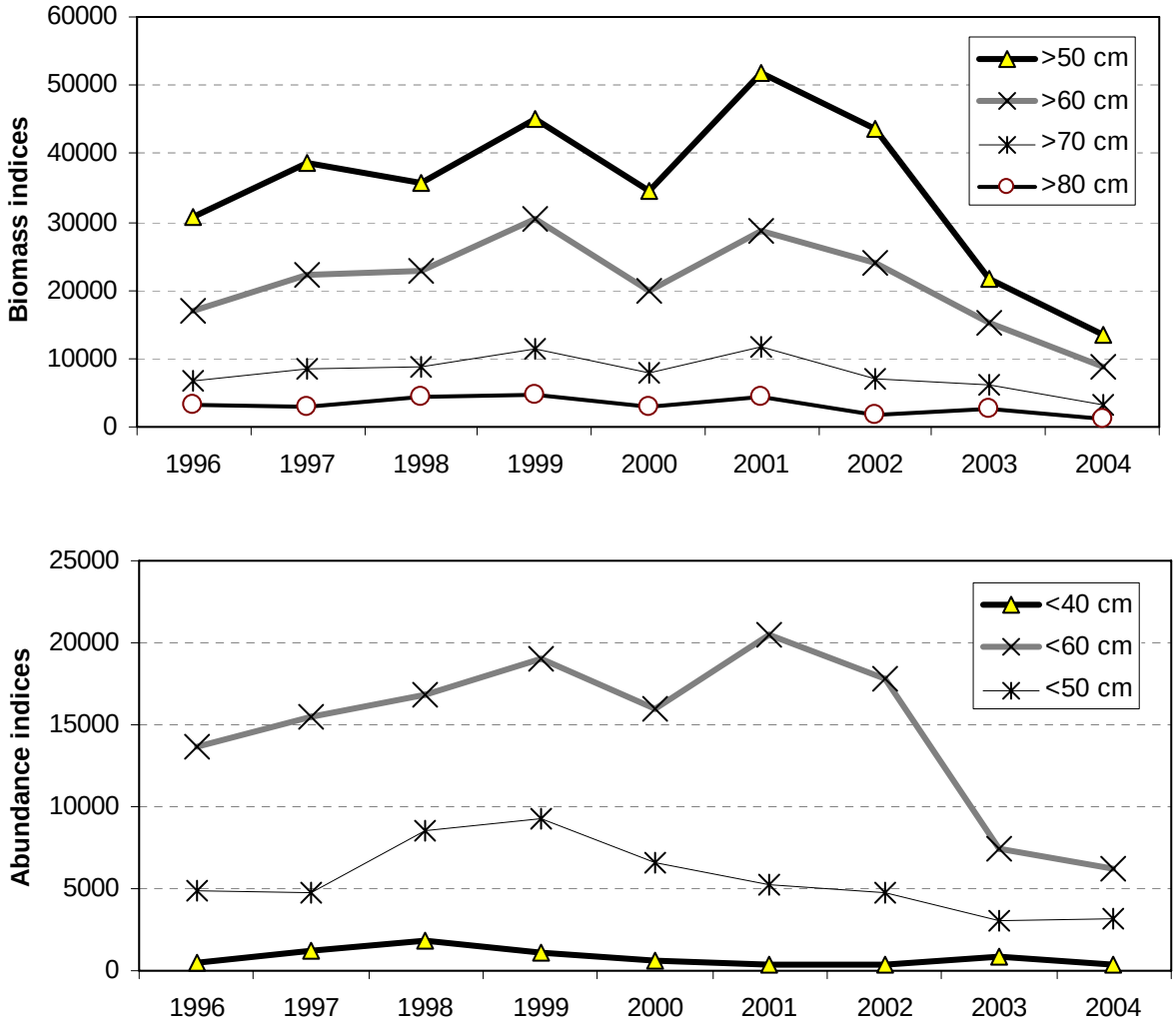


Figure 6.6.2. Greenland halibut in Icelandic fall groundfish survey; UPPER: biomass indices of lengths larger than indicated and ,LOWER: abundance indices by length smaller than indicated.

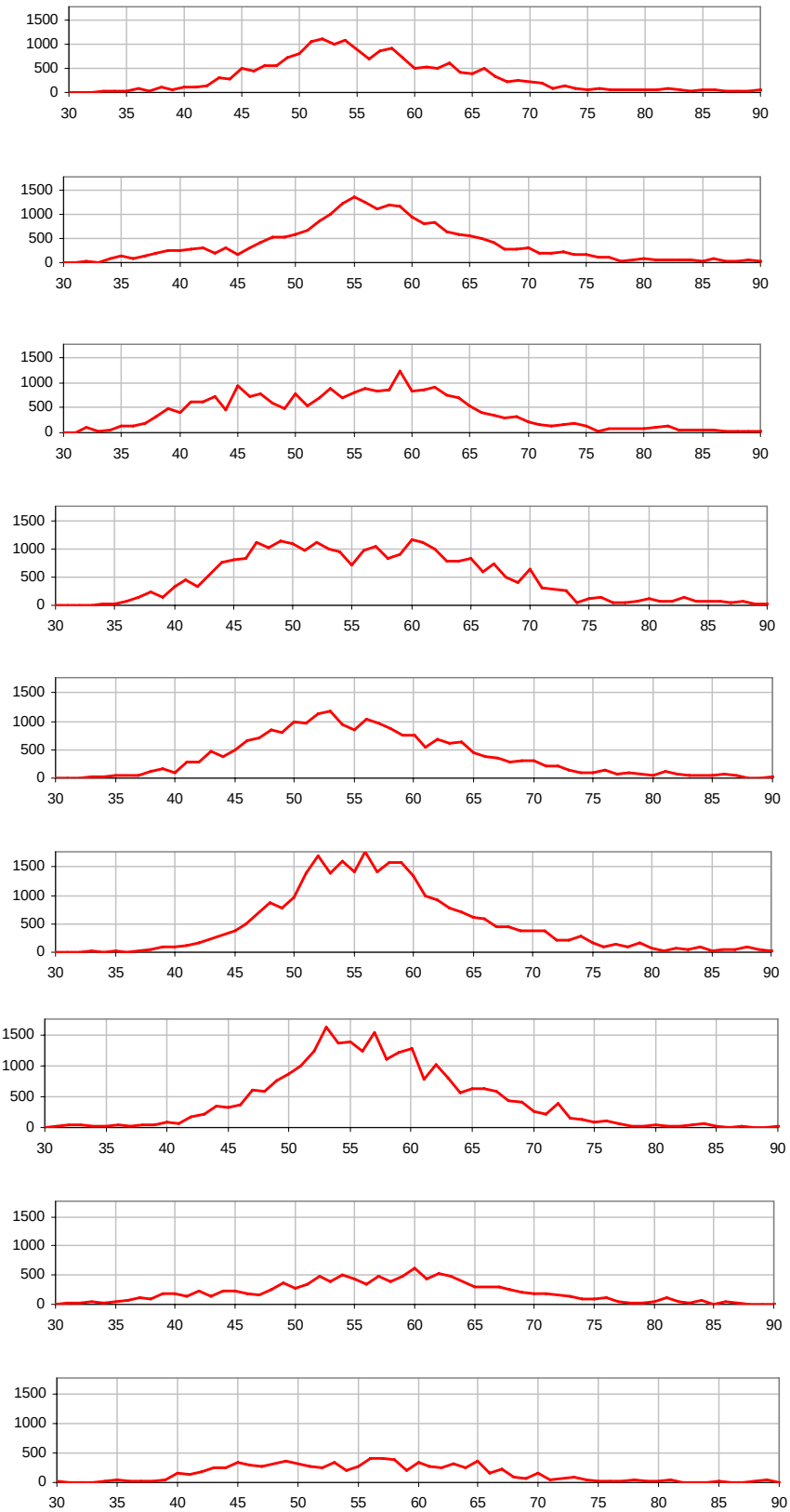


Figure 6.6.3. Abundance indices by length for the Icelandic fall survey.

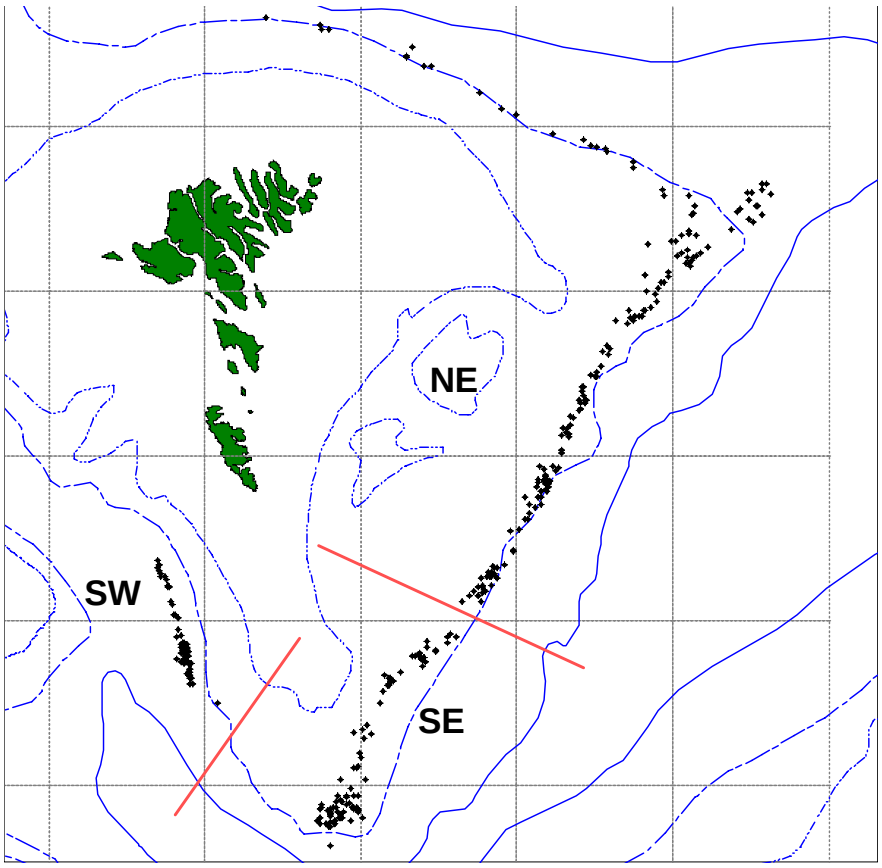


Figure 6.6.4. Hauls conducted by the Faroese deep-water survey in 1995-2004; area separation indicated for use in GLM procedure.

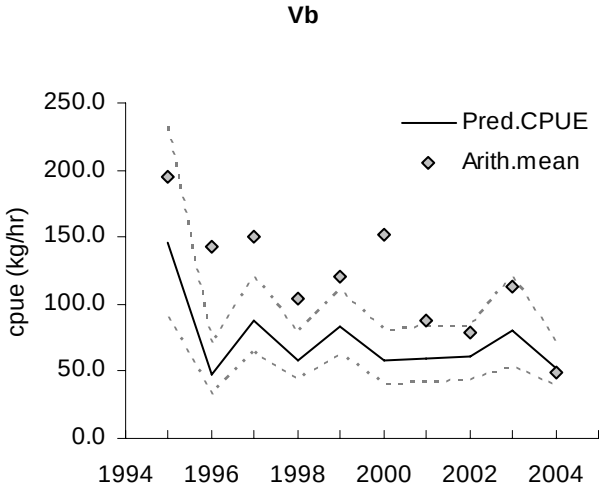


Figure 6.6.5. CPUE from Faroese deep-water survey. Predicted CPUE is estimates from a GLM taking into account area (Fig.6.6.7) and depth of survey. Arith.mean is mean of raw CPUE.

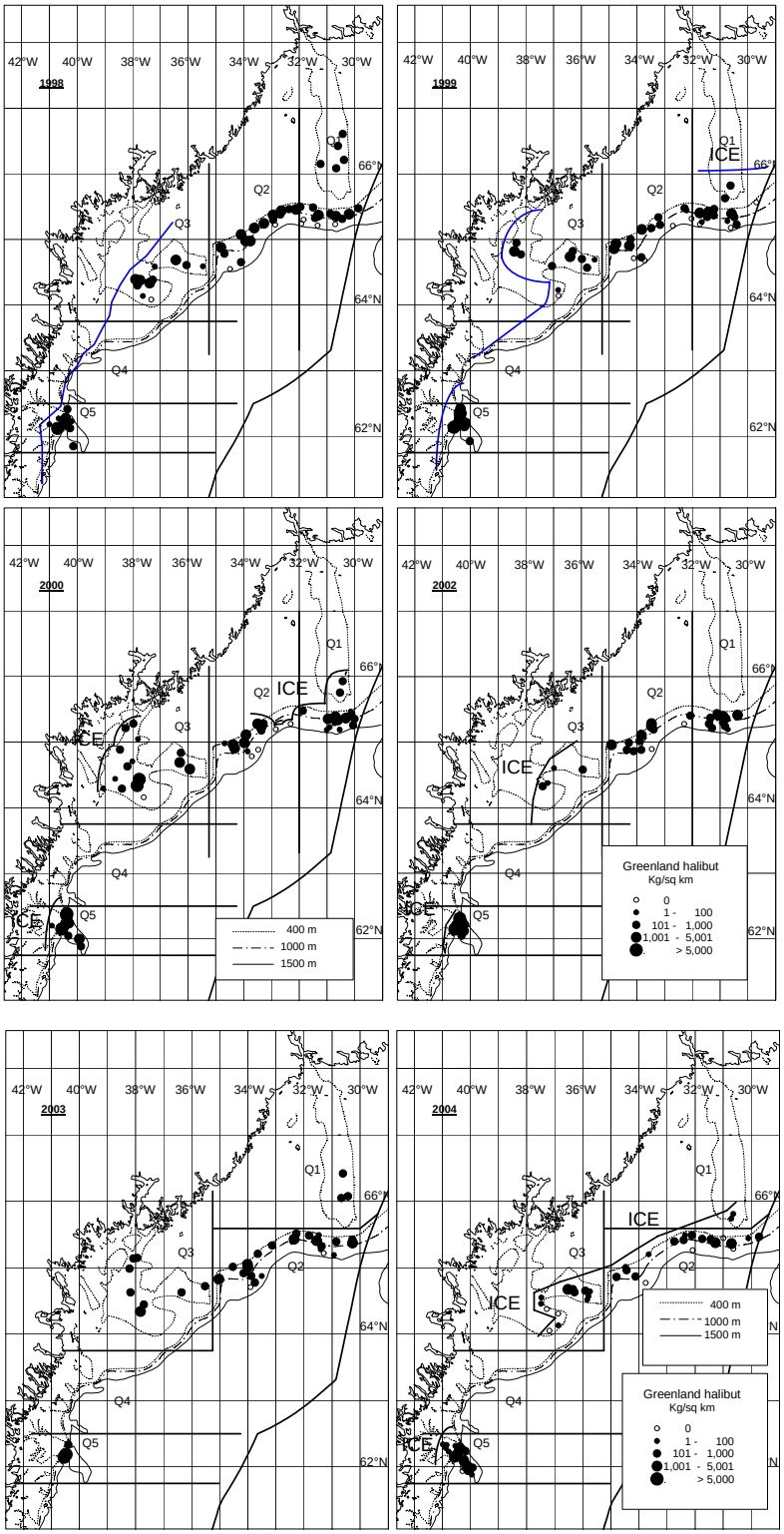


Figure 6.6.6. Distribution of catches of Greenland halibut at East Greenland in 1998 – 2002 in the Greenland deep-water survey.

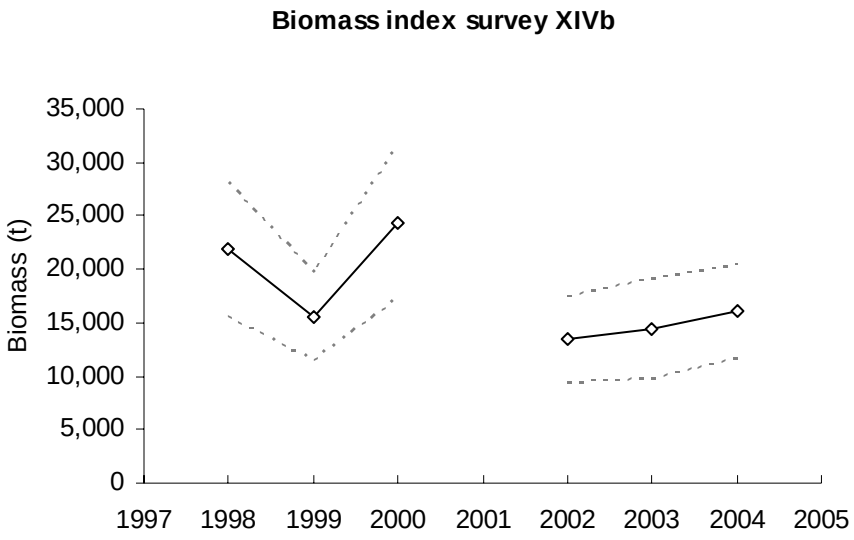


Figure 6.6.7. Estimated Biomass (t) in div. XIVb from the Greenland deep-water trawl survey with 95% CI indicated.

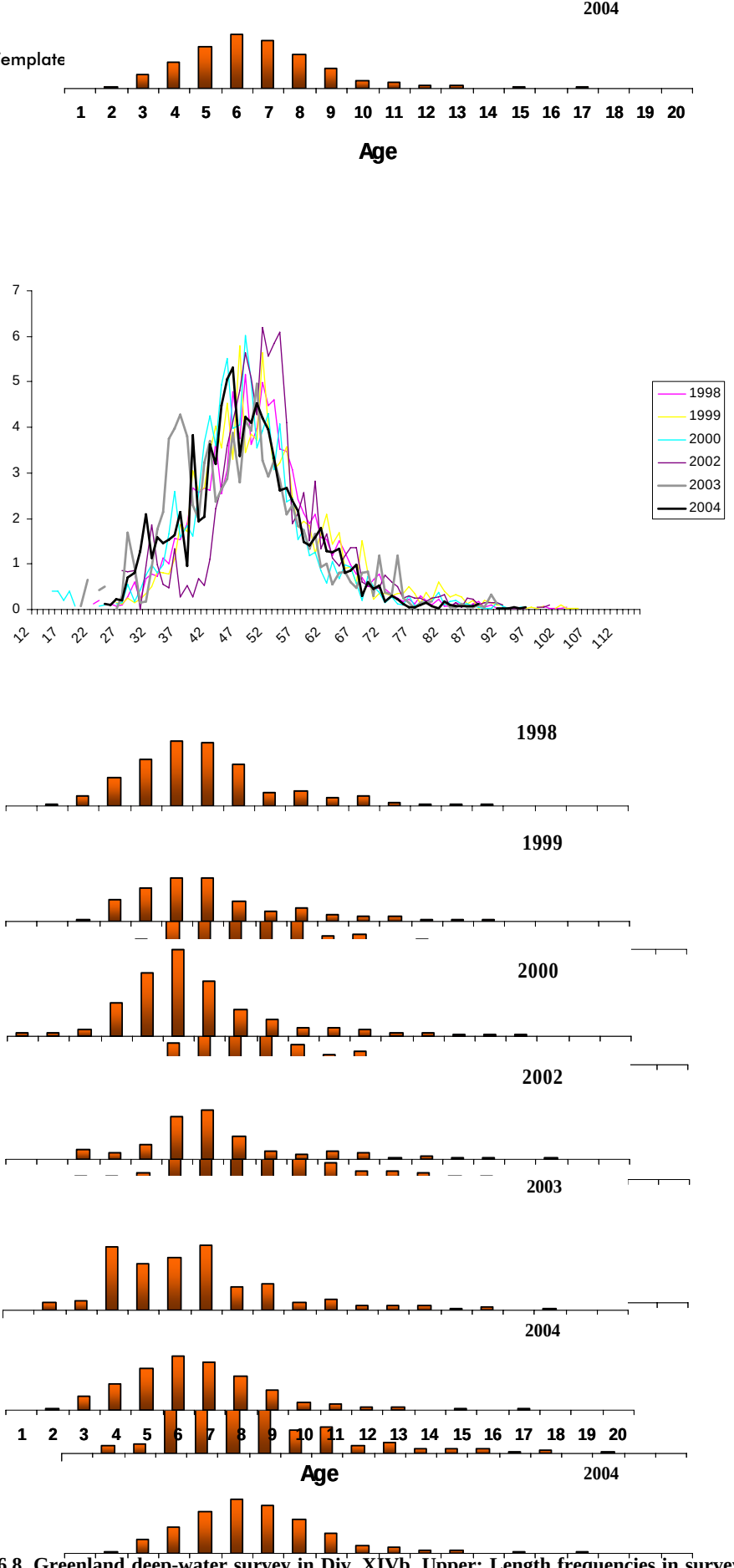


Fig.6.6.8. Greenland deep-water survey in Div. XIVb. Upper: Length frequencies in survey 1998-2004; Lower: Abundance estimates by age.