Greenland halibut
Reinhardtius hippoglossoides

GENERAL INFORMATION

Greenland halibut in ICES Subareas 5, 6 12 and 14 (East-Greenland, Iceland, Faroe-islands) are assessed as one stock. In Icelandic waters, it is found on the continental shelf and slope around Iceland with the highest abundance west, north, and east off the coast in deeper and colder waters. It is mainly found on a muddy substrate at depths ranging from 200-1500 m. The main spawning grounds are located west off the coast at around 1000 m depth and eggs and larvae drift between Iceland and the east coast of Greenland until juveniles seek bottom post metamorphosis. After spawning, Greenland halibut migrates further north and east to their main feeding grounds. No juvenile grounds are known within the assessment area, and migration is known to occur from adjacent management units.

In the water east of Greenland it is mainly found at depths greater than 600 m on the steep continental slope, whereas in the Faroe Islands it is mainly found North and East of the islands at 200 to 600 m.

FISHERY

Spatial distribution of the 2022 fishery and historic catch and effort in the trawl fishery in Subareas 5, 6, 12 and 14 is provided in Figures 1 and 2. Fishery in the entire area did in the past occur in a seemingly continuous belt on the continental slope from the slope of the Faroe plateau to southeast of Iceland extending north and west of Iceland and further south to southeast Greenland. Fishing depth ranges from 350-500 m southeast, east, and north of Iceland to about 1500 m at East Greenland.

In 2001–2008 a directed and a by-catch fishery by Spain, France, Lithuania, UK, and Norway developed in the Hatton Bank area of Division 6.b, however, most of these fisheries ceased after 2008. Presently UK and France have a small fishery in the area. All catches in Subareas 6 and 12 are assumed to derive from the fishing on Hatton Bank area.

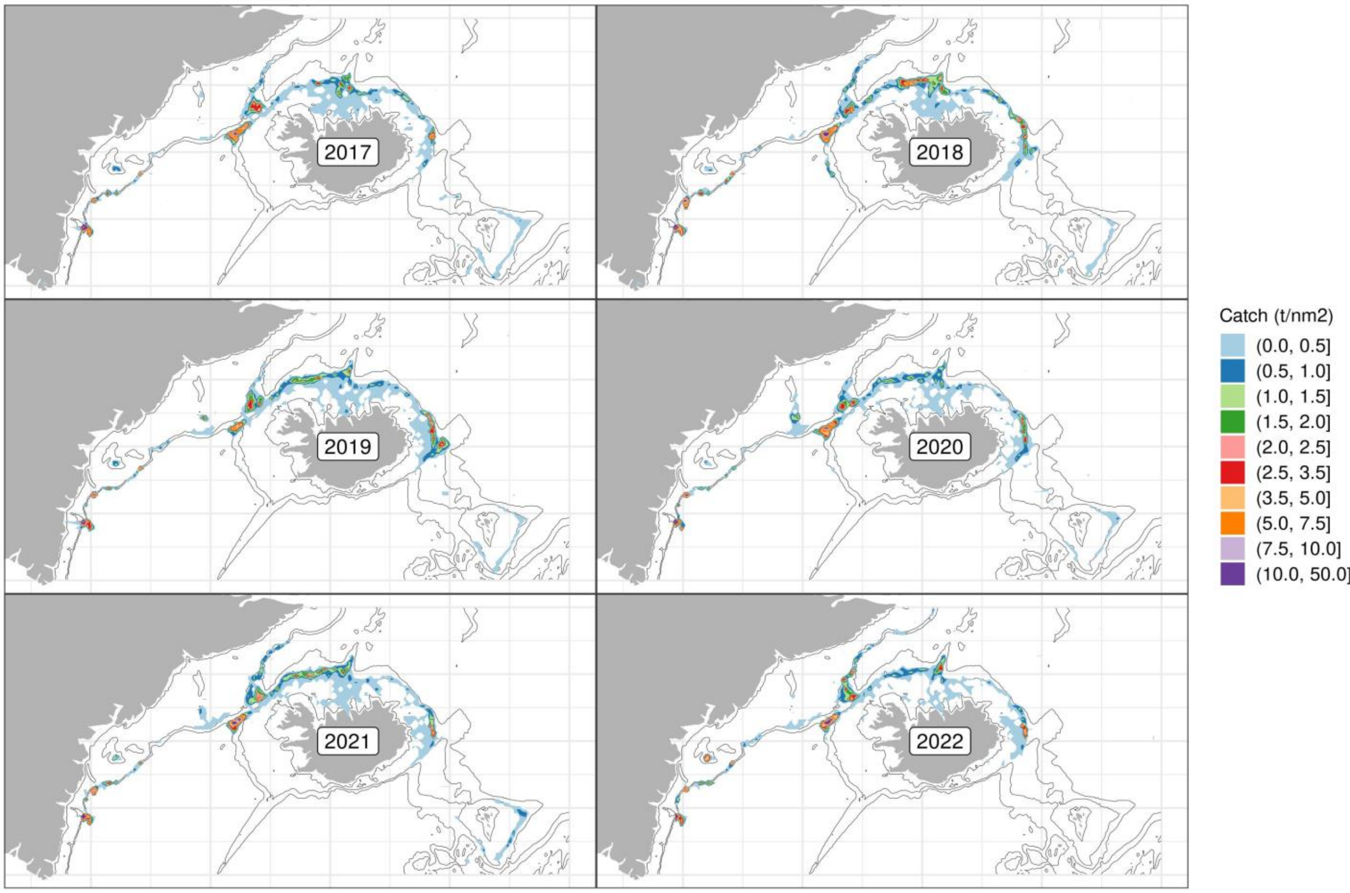

Figure 1: Greenland halibut. Geographical distribution of the fishery in division 5, 6, 12 and 14 from last six years. The 100 m, 500 m and 1000 m depth contours are shown. Reported catch from logbooks, note that logbook data from the Faroe Islands is incomplete.

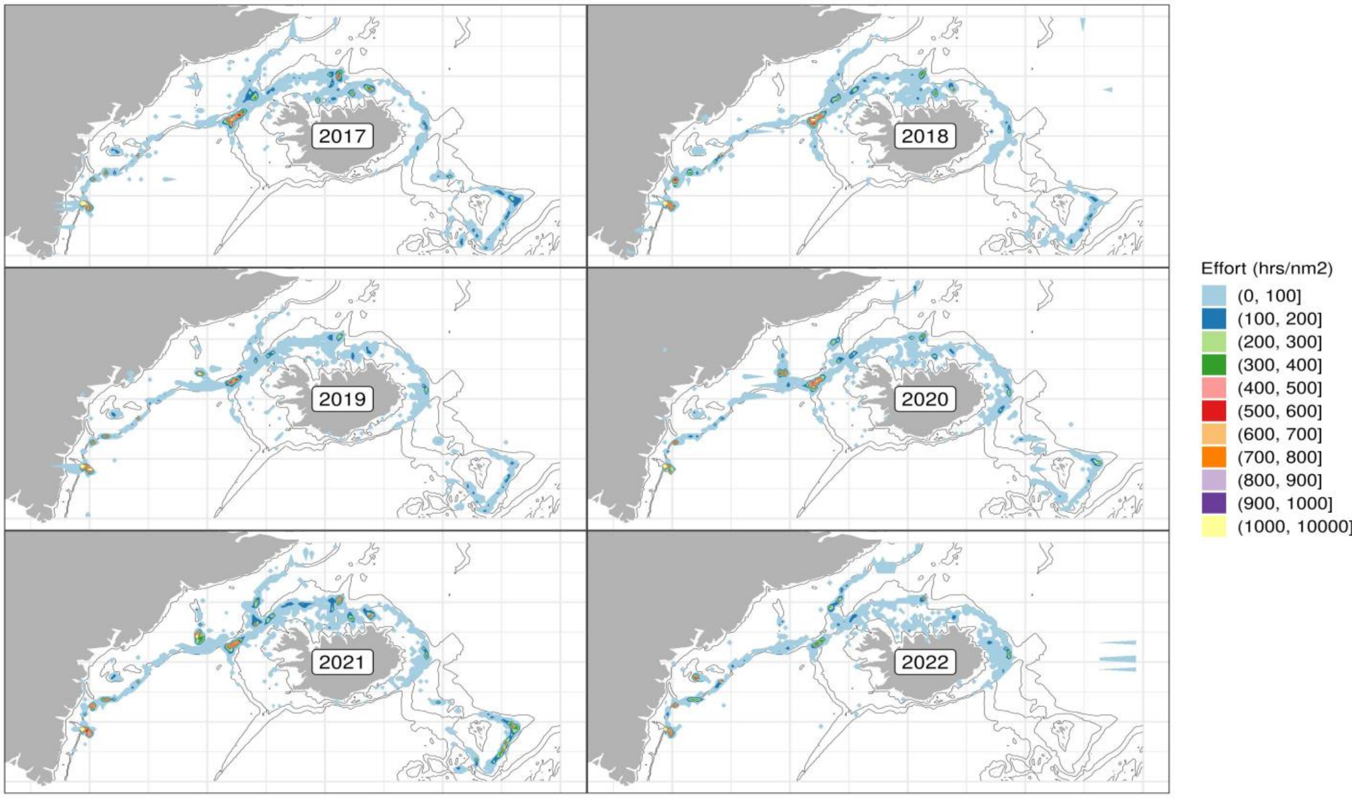

Figure 2: Greenland halibut. Geographical distribution of the fishery in division 5, 6, 12 and 14 from last six years. The 100 m, 500 m and 1000 m depth contours are shown. Reported effort from logbooks, note that logbook data from the Faroe Islands is incomplete.

LANDING TRENDS

In 1980–1990, about 75–90% of catches were caught by Iceland (Figure 3). Since 1990, the Icelandic proportion has decreased, and has in recent years been 50–60%. Highest catches were recorded in 1986, about 60 thous. tonnes. Landings in Icelandic waters (usually allocated to Division 5a) have historically been predominated by the total landings in areas 5+14 (Icelandic waters), but since the mid-1990s fisheries in Subarea 14 and Division 5b have developed. Landings have since 1997 been 20-31 thous. tonnes (Figure 4).

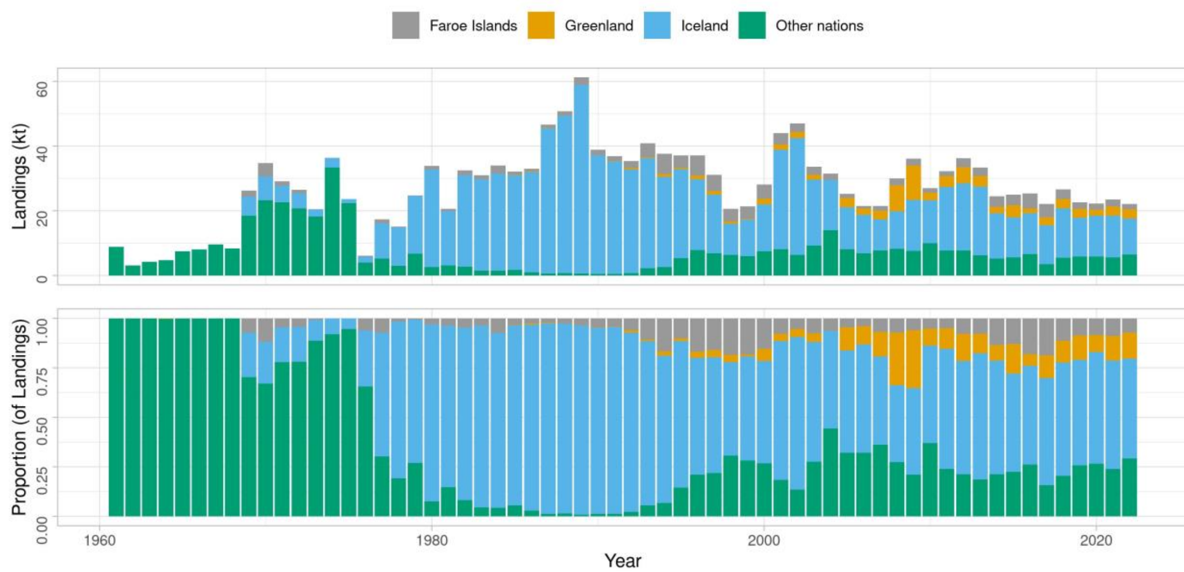

Figure 3: Greenland halibut. Landings from ICES Subareas 5,6,12 and 14 by nations (Greenland, Iceland, and Faroe Islands) in 1961-2020. All gears combined.

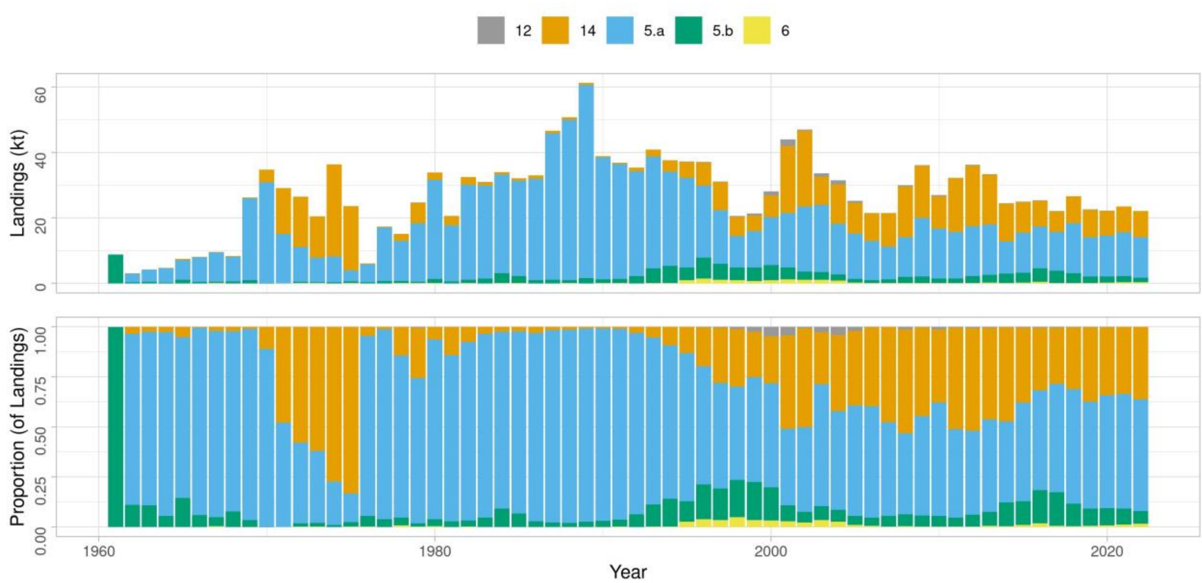

Figure 4: Greenland halibut. Spatial distribution of catch between ICES subareas 5.a, 5.b, 6, 12 and 14 in 1961-2020. All gears combined.

Demersal trawl has been the main fishing gear for Greenland halibut in Icelandic waters, followed by gillnets, while a small proportion of the catch is taken on longlines and in shrimp trawls. Since 2015, landings by gillnets have, however, increased, reaching 62% of total catch in 2019 (Figure 5). The Greenland halibut trawl fishery is considered clean with respect to by-catches. The mandatory use of sorting grids in the shrimp fishery in Icelandic and Greenland waters since 2002 is observed to have reduced by-catches of Greenland halibut considerably. Greenland halibut is caught in relatively deep waters, with most of the catch (70%) taken between 400-800 meters depth. In 2003, most of Greenland halibut was caught at 800 meters or deeper (73%), but since then, catch has increased steadily in more shallow waters (Figure 6). Changes in depth range where Greenland halibut was caught seem to be reasonably synchronized with changes in fleet and therefore gear structure that target Greenland halibut in most recent years (Figures 5 and 6).

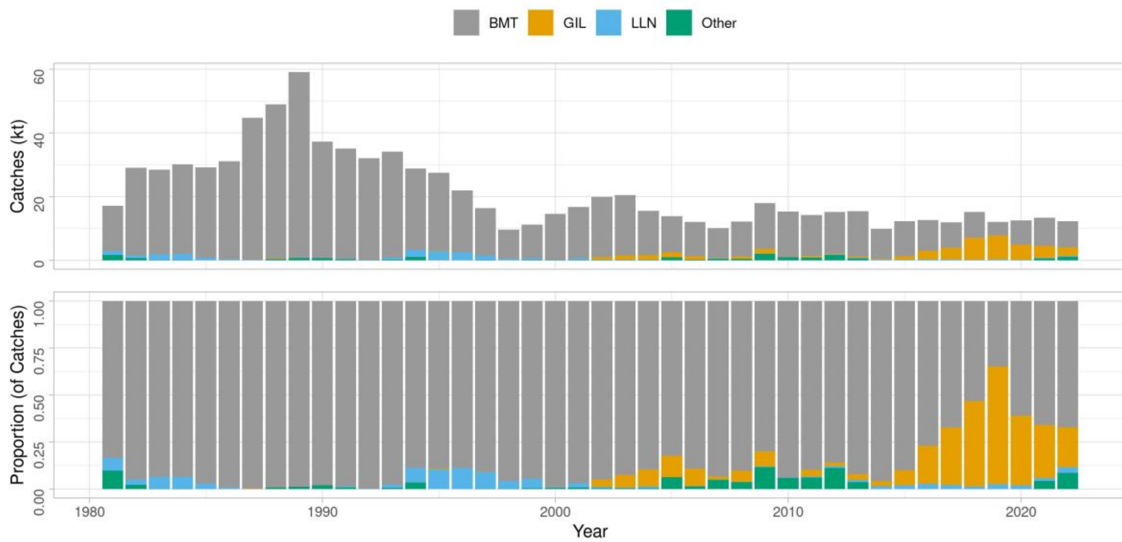

Figure 5: Greenland halibut. Total catch (landings) by fishing gear since 1994 in Icelandic waters, according to statistics from the Directorate of Fisheries.

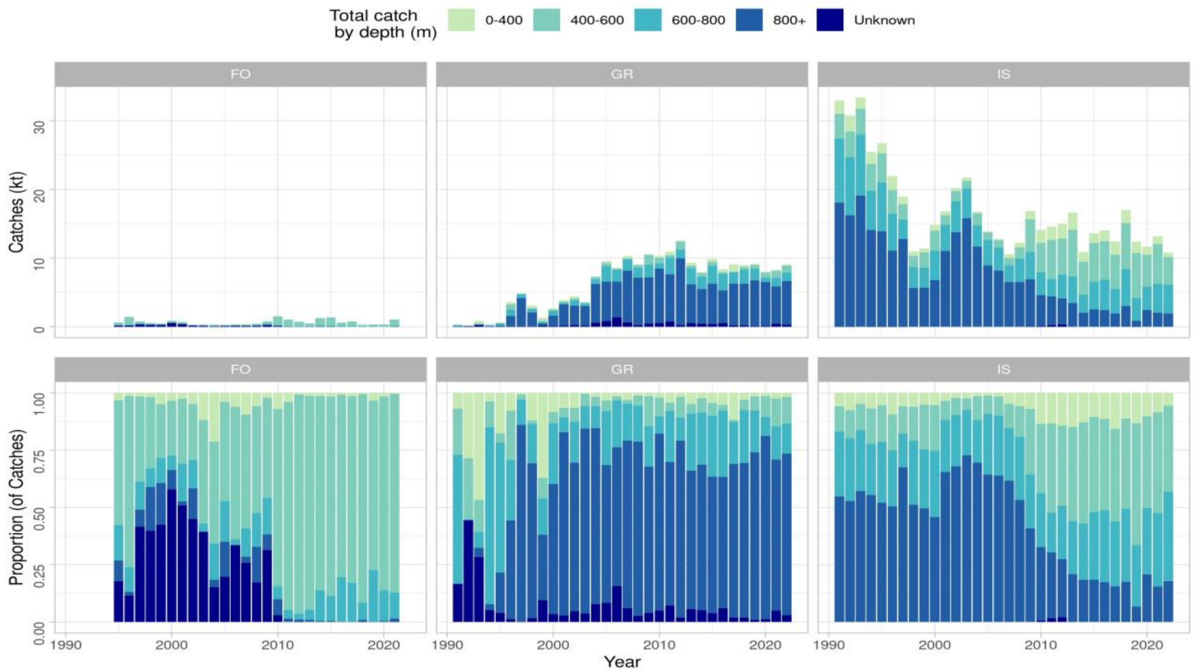

Figure 6: Greenland halibut. Depth distribution of catches in Faroese (FO), Greenlandic (GR) and Icelandic (IS) waters according to combined logbooks, note that logbook data from the Faroe Islands is incomplete.

The number of vessels accounting for 95% of the catch of Greenland halibut in Icelandic waters changed from about 75 vessels in 1994-1998 to little less than 20 (Figure 7). This change coincided with reduced catches. Since 1998,the number of vessels accounting for 95% of the catch has been relatively constant despite variable annual catches, with the lowest number of vessels observed in 2018

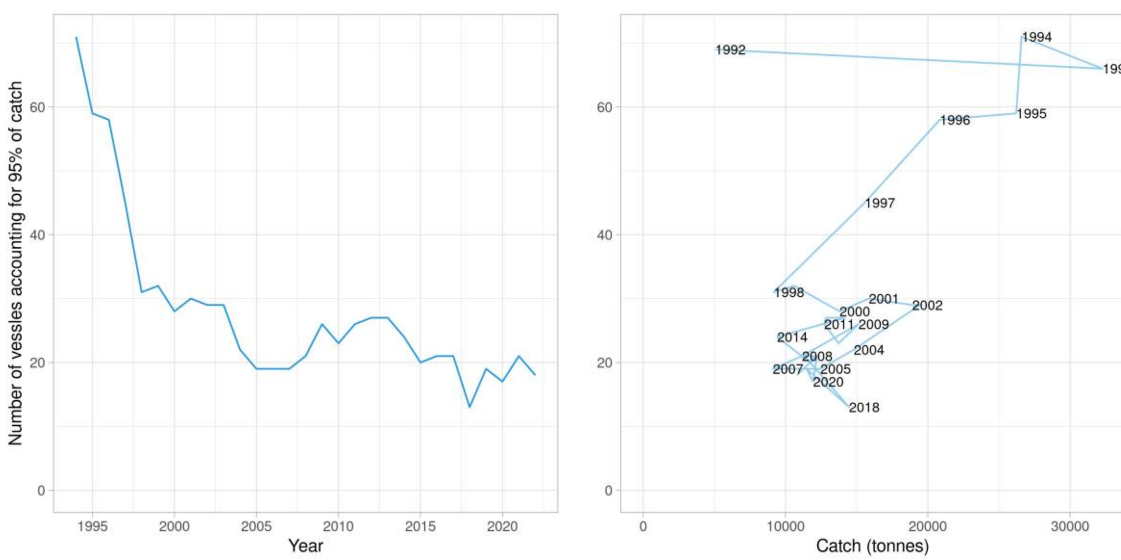

Figure 7: Greenland halibut. Number of vessels (all gear types) accounting for 95% of the total catch in Icelandic waters annually since 1994. Left: Plotted against year. Right: Plotted against total catch. Data from the Directorate of Fisheries.

CATCH PER UNIT EFFORT

Estimates of catch per unit effort (CPUE) for the Icelandic trawl fleet directed at Greenland halibut for the period 1985–onwards is provided in Figure 8. The overall CPUE index for the Icelandic fishery is compiled as the average of the standardized indices from the whole area. Catch rates of Icelandic bottom trawlers decreased for all fishing grounds during 1990–1996 but peaked again in 2001. Since 2003, CPUE has been relatively stable. The Icelandic CPUE series was, until the benchmark in 2023 (WKBNORTH 2023), used for many years as one of the biomass indicators in the assessment of the stock. The CPUE from trawlers in subareas 12, 14 (Greenland), shown in Figure 10, and 5b (Faroese waters) have not been used in the assessment, as the stock production model that was used was not able to accommodate the contrasting indices (Icelandic CPUE and Greenlandic/Icelandic autumn surveys) and these CPUE series are therefore not used.

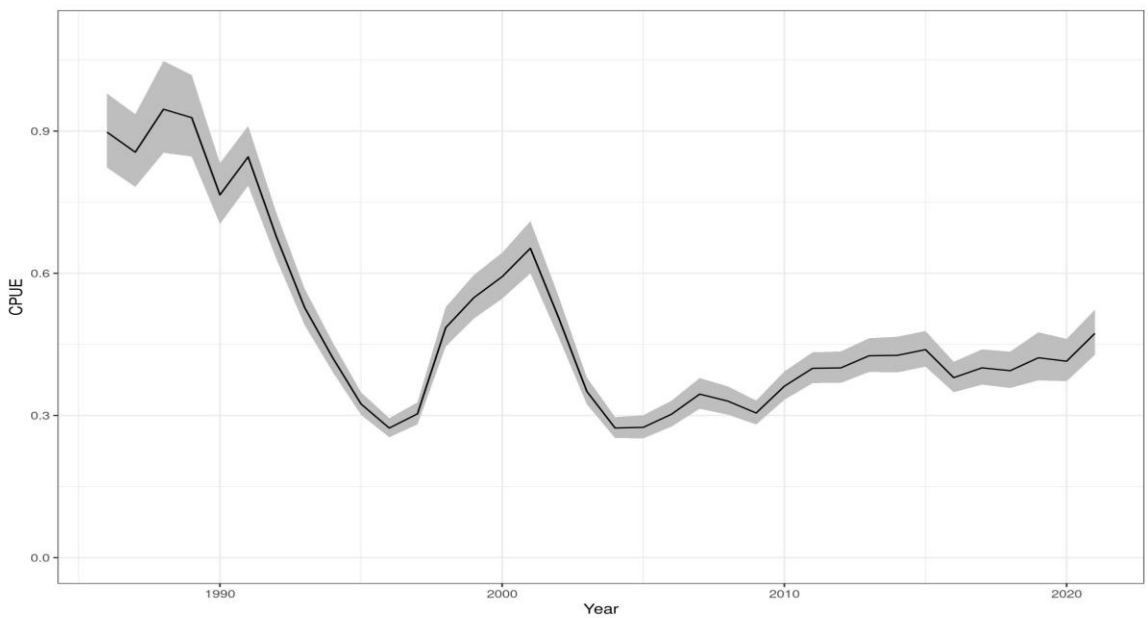

Figure 8: Greenland halibut. Catch per unit effort (CPUE, log-transformed) from the Icelandic trawler fleet in 5a. 95% CI indicated. Effort data are not available from 2022.

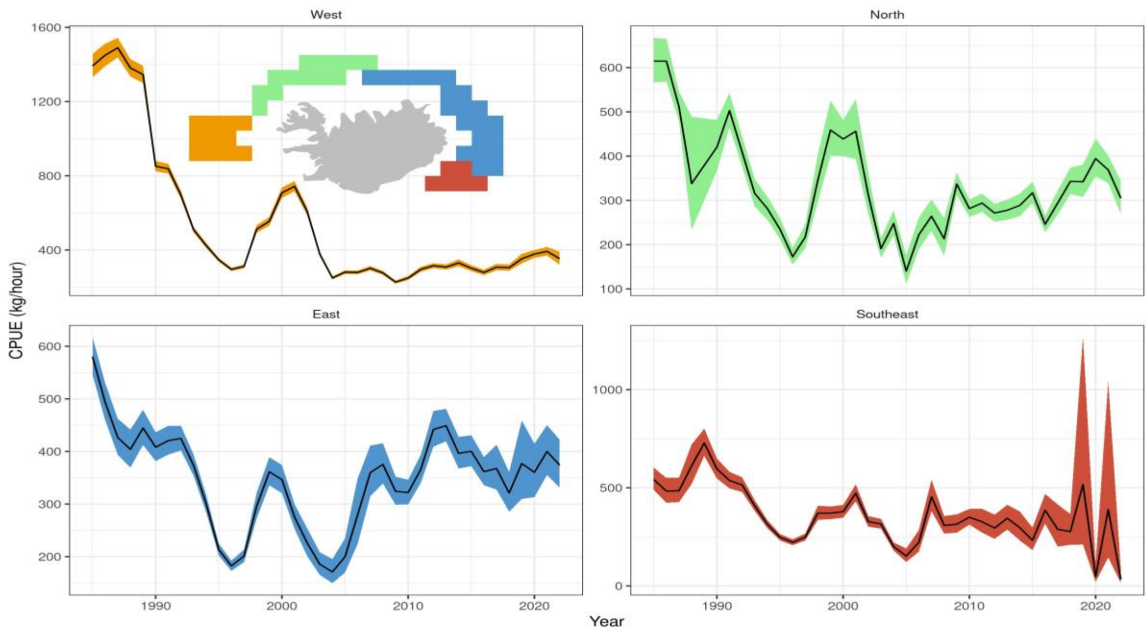

Figure 9: Greenland halibut. Catch per unit effort (CPUE) from the Icelandic trawler fleet in 5a, split by area indicated by the overlayed figure of Iceland. 95% CI indicated.

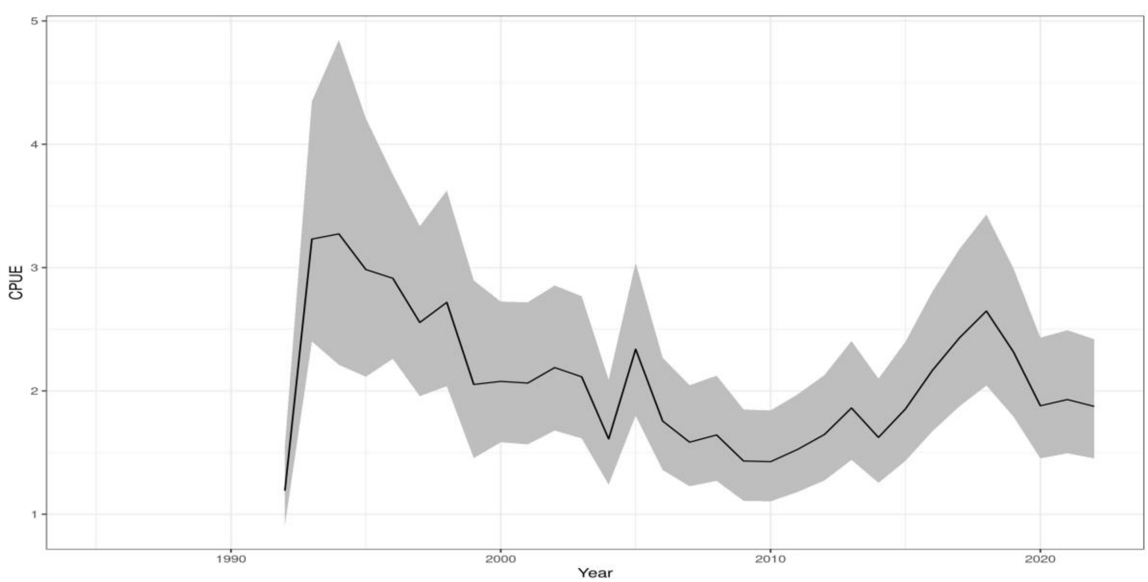

Figure 10: Greenland halibut. Standardised estimates of CPUE from trawl catches east of Greenland (area 12 and 14). 95% confidence interval is indicated with gray shading.

SAMPLING FROM GREENLAND HALIBUT LANDINGS

AREA 5A

In general sampling is considered good from commercial catches in Icelandic waters from the main gears (gillnets, longlines and trawls). The sampling does seem to cover the spatial and seasonal distribution of catches (see Figures 12 and 11). In 2020 sampling effort was reduced substantially, on-board sampling in particular, due to the COVID-19 pandemic. This reduction in sampling is, however, considered not to substantially affect the assessment of the stock in the short term. Sampling is planned to resume to previous levels in 2023.

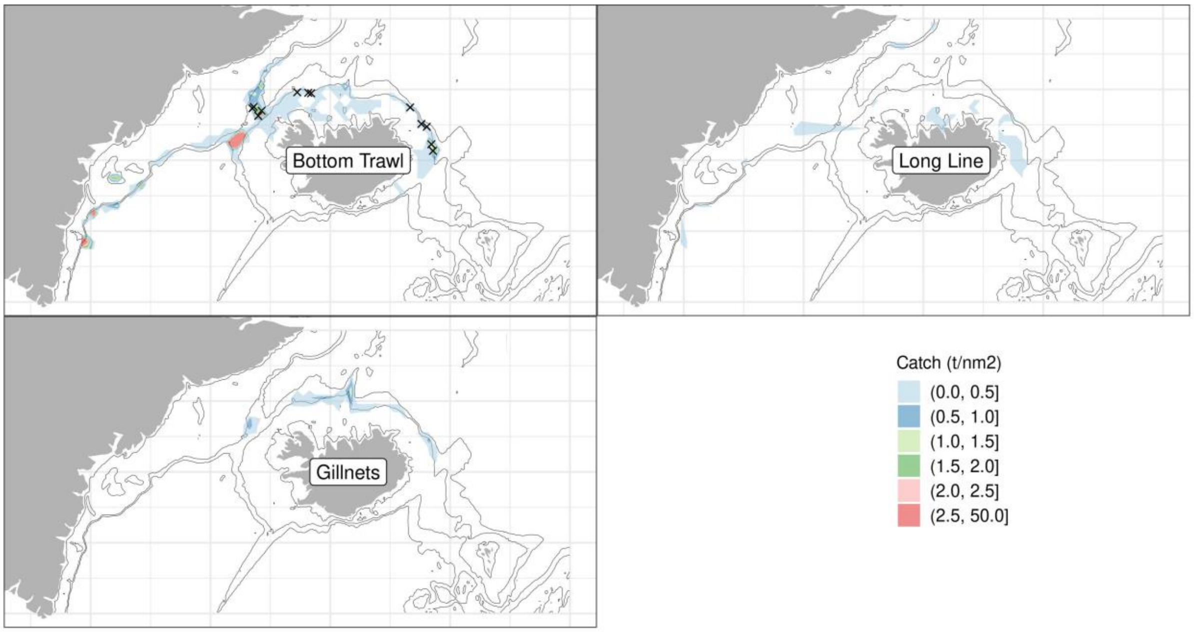

Figure 11: Greenland halibut. Fishing grounds in 2021 as reported in logbooks and positions of samples taken from landings (asterisks). Note that sampling locations are only available from Icelandic sources.

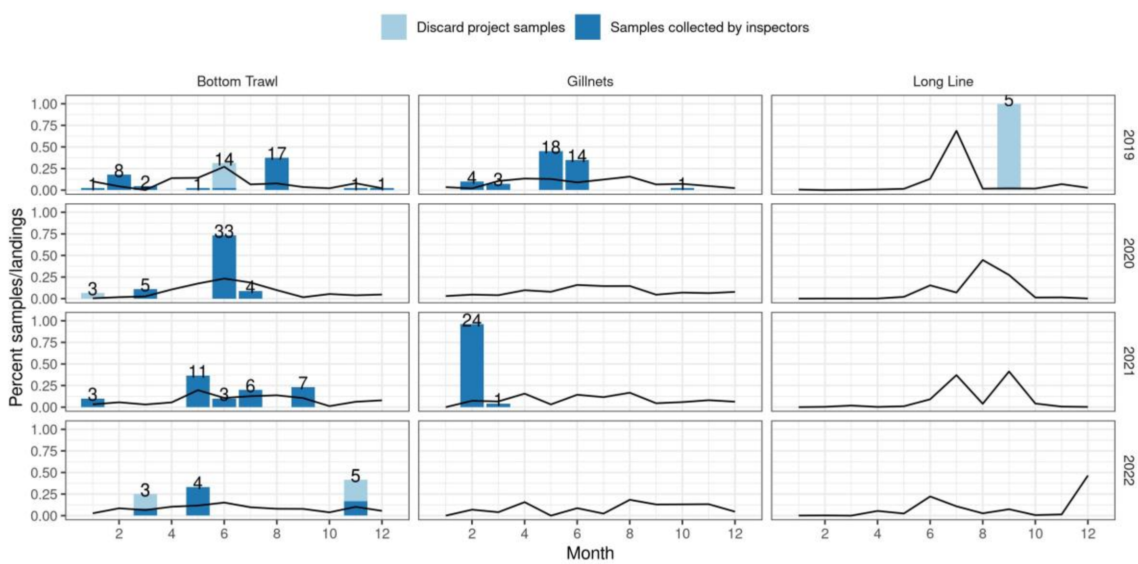

Figure 12: Greenland halibut. Ratio of samples by month (blue bars) compared with landings by month (solid black line) split by year and main gear types. Numbers of above the bars indicate number of samples by year, month, and gear. Each sample typically consists of 50 fish.

The bulk of the length measurements in Icelandic waters are from the three main fleet segments, i.e. trawls, longlines and gillnets. The number of available length measurements by gear has fluctuated in recent years in relation to the changes in the fleet composition.

Length distributions from the main fleet segments are shown in 13. The sizes caught by the main gear types (bottom trawl and gillnets) appear to be fairly stable, primarily catching halibut in the size range between 40 and 80 cm. Gillnets tend to catch slightly larger fish, while shrimp trawl appears to catch juvenile halibut when present in Icelandic waters.

The observed proportion of catches by sex are shown in Figure 14.

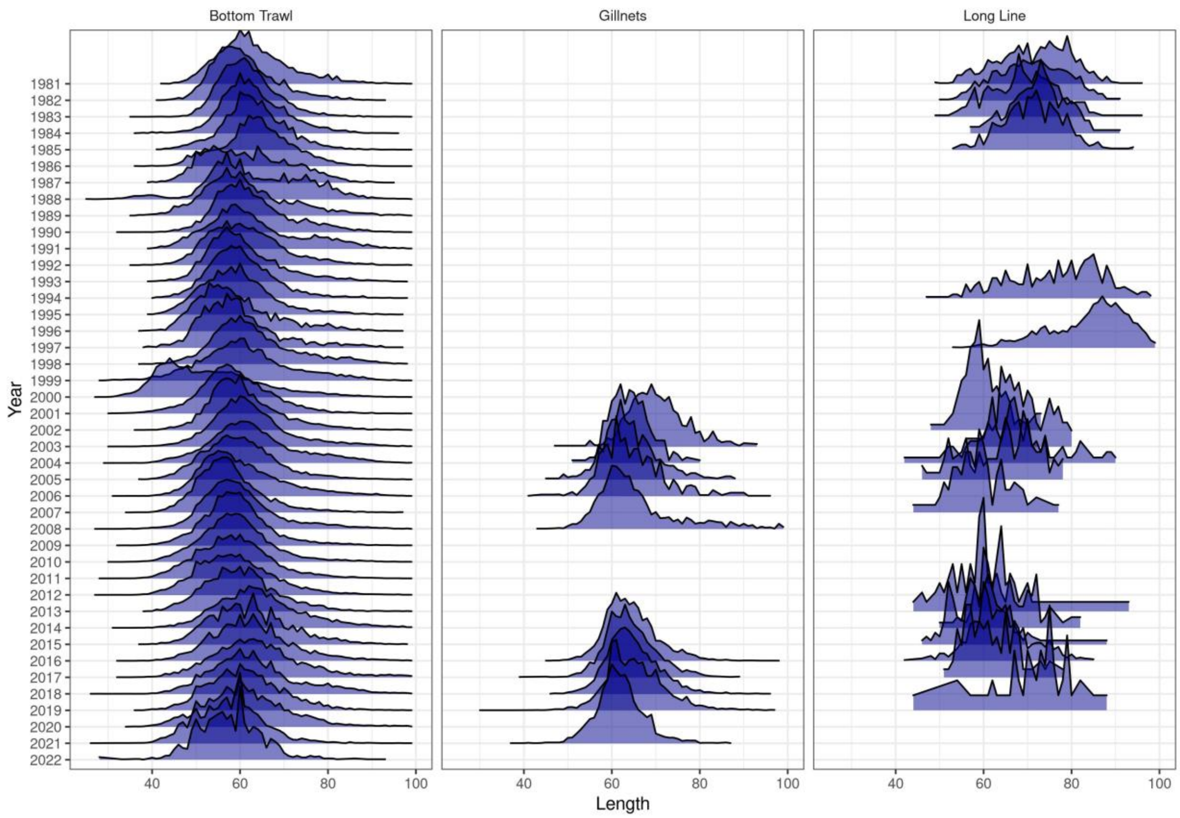

Figure 13: Greenland halibut. Commercial length distributions by gear and year.

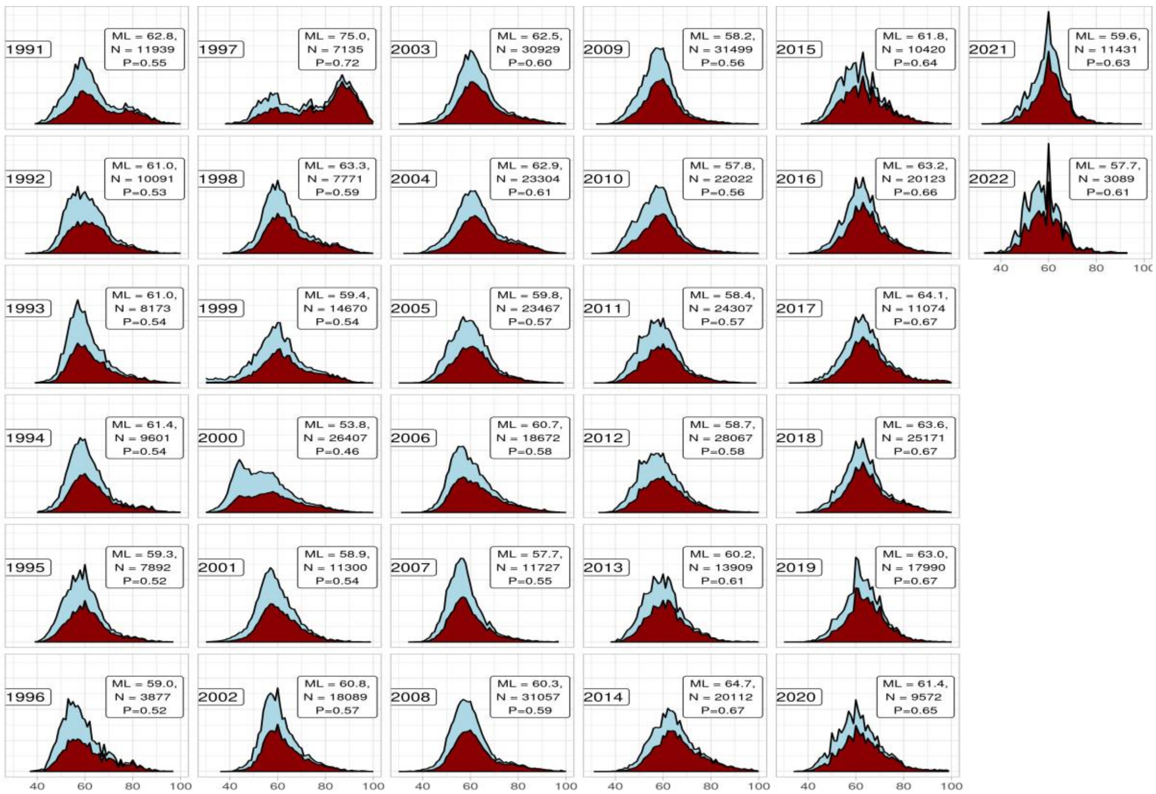

Figure 14: Greenland halibut. Aggregated commercial length distributions by sex and year.

AREA 5B (FAROESE WATERS)

Samples from landed catch are from gillnets and trawl.

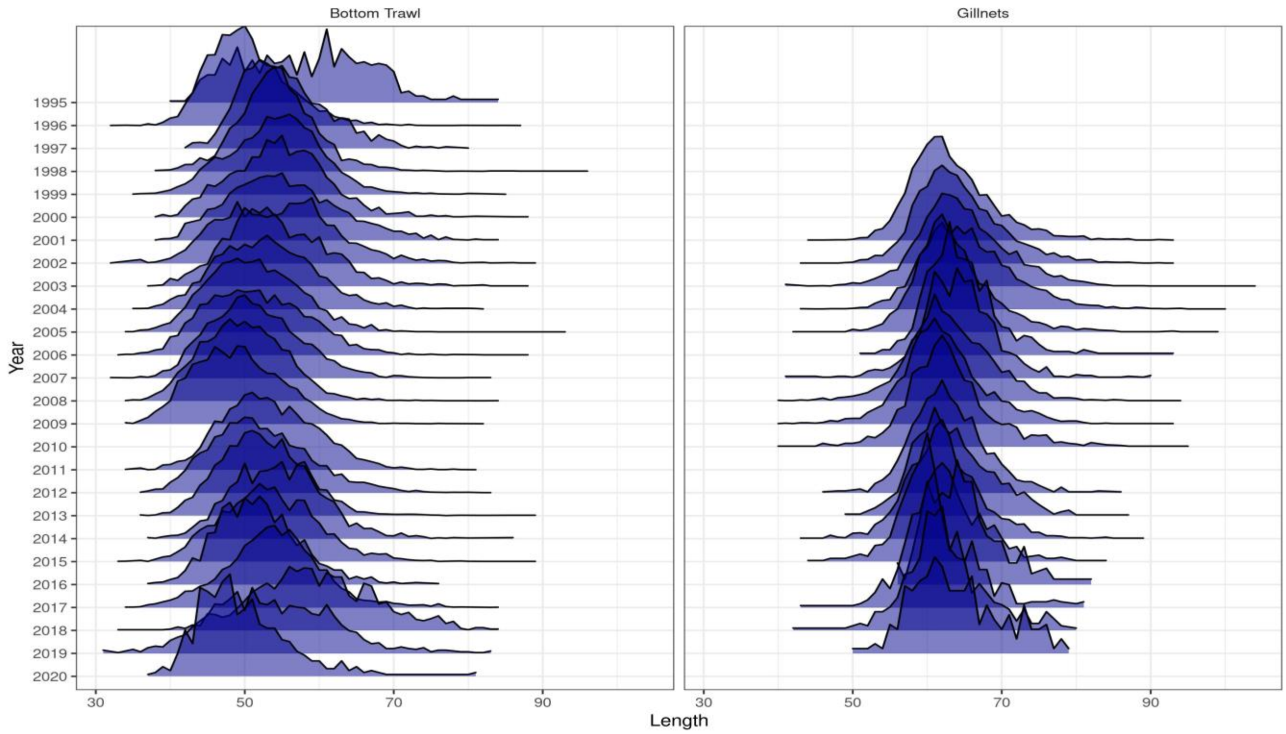

Figure 15: Greenland halibut. Commercial length distributions by gear and year from Faroese waters.

AREAS 12 AND 14 (EAST GREENLAND)

Samples from landed catch are from longlines and trawl.

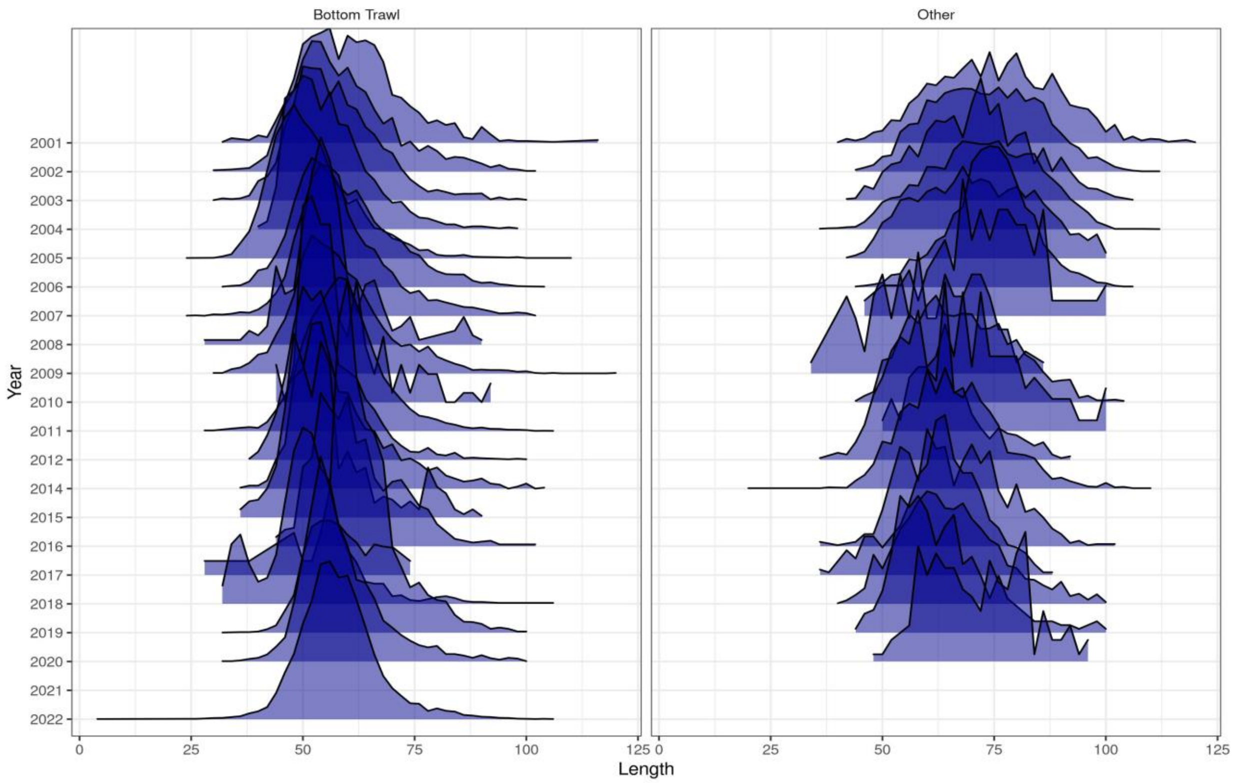

Figure 16: Greenland halibut. Commercial length distributions by gear and year from Greenlandic waters.

OTHER AREAS

No samples are available and reported catches have been negligible in recent years.

BY-CATCH AND DISCARD

The Greenland halibut trawl fishery is mostly a clean fishery with little by-catches. Eventual by- catches are mainly redfish and cod. Southeast of Iceland the cod fishery and a minor Greenland halibut fishery are coinciding spatially. In East Greenland where fishery is located on the steep slope, fishing grounds for cod and redfish are close to the Greenland halibut fishing grounds, but nevertheless the catches from single hauls are clean catches of Greenland halibut.

The mandatory use of sorting grids in the shrimp fishery in Iceland since the late 1980s and in Greenland since 2002 was observed to have reduced by-catches considerably. Based on few samplings in 2006–2007, scientific staff observed by-catches of Greenland halibut to be less than 1% compared to about 50% by weight observed before the implementation of sorting grids (Sünksen, 2007). No information has since been available but the fishery in Division 14b generally report discard rates less than 1% by weight in logbooks.

SURVEY INFORMATION

Three surveys are conducted in the distribution area of Greenland halibut; in East Greenland (14.b), in Icelandic waters (5.a) and in Faroese waters (5.b). The total surveyed area is provided in Figure 17. The two surveys in 5.a and 14.b are combined to one index and used as biomass index input for the assessment model. Since the Greenland survey in 14.b has not been conducted since 2016, the index from 2016 are used onwards. The distribution of the historic catch rates from the two surveys are provided in Figure 18.

The Icelandic autumn groundfish survey (hereafter autumn survey) was commenced in 1996. The autumn survey was not conducted in 2011. Spatial distribution and abundance in recent years are shown in Figures 17 and 18 while Figure 19 shows trends in various biomass indices, and a recruitment index based on abundance of Greenland halibut ≤ 40 cm. Survey length distributions are shown in Figure 20. In the recent years, Greenland halibut were mainly caught on the continental slope southeast, north, and northwest of the country (Figure 18).

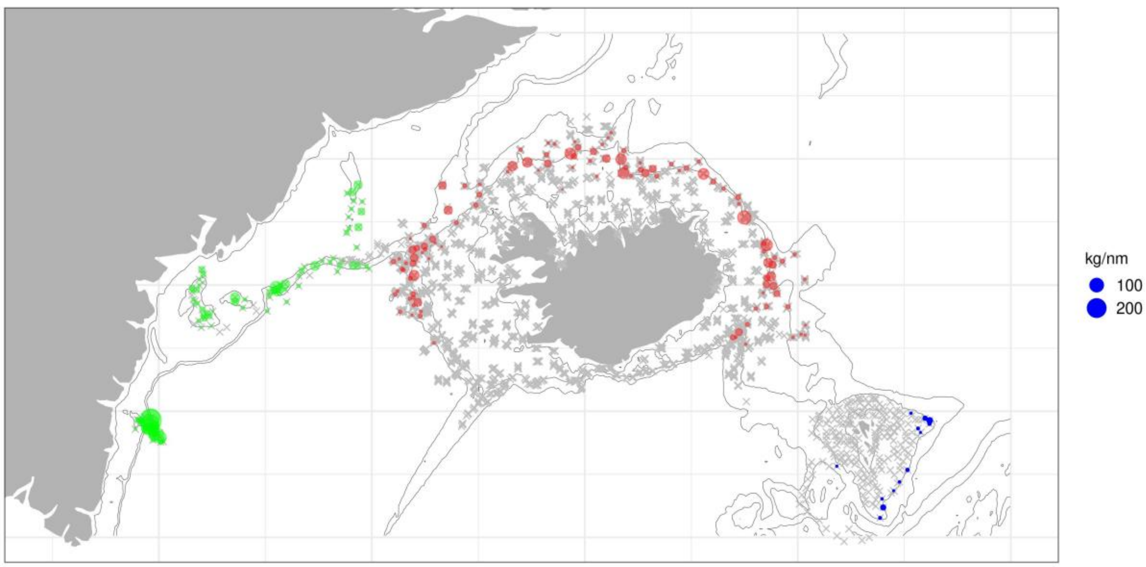

Figure 17: Greenland halibut. Spatial distribution of Greenland halibut in the Icelandic autumn survey (red), Greenlandic Greenland halibut survey (green) and Faroese surveys (blue). Size of the points indicates catch at the location, grey crosses the stations were no halibuts were observed.

Since the survey was commenced in 1996, the distributional pattern has remained quite stable, with the greatest biomass index in the northeast and northwest. Since 1996, biomass index in the west has been steadily decreasing, while increasing in the southeast (Figure 18).

Biomass indices for the total stock of Greenland halibut and Greenland halibut larger than 40 cm (harvestable part of the stock), that are based on the combined Icelandic and Greenlandic autumn surveys, showed an increase from 1996-2001. After peaking in 2001, indices dropped but increased steadily from 2004 till 2017 when the stock started to decrease (Figure 19). The same holds for the index of Greenland halibut larger than 60 cm. The index of juvenile abundance (<40 cm) has fluctuated between years, peaking in 2002 but remained low in the past six years (Figure 19). Since 2016 the East Greenland area has not been surveyed, and for the indices the values from 2016 are used for the years after that.

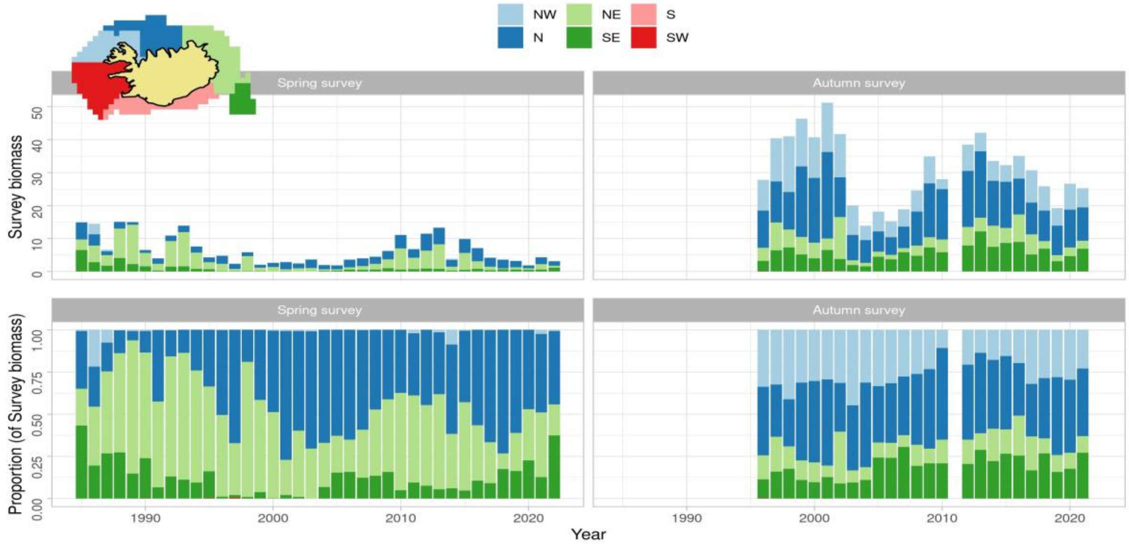

Figure 18: Greenland halibut. Spatial distribution of the biomass index from the spring and autumn surveys. Note that the autumn survey extends into deeper waters.

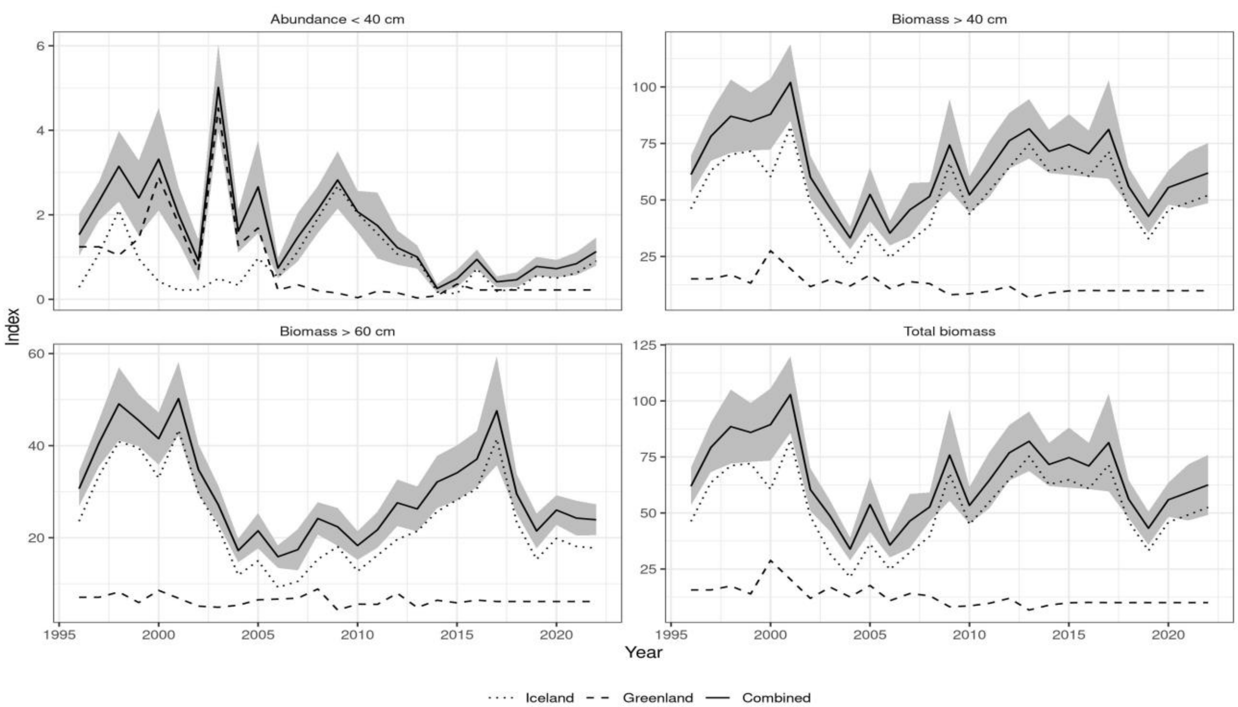

Figure 19: Greenland halibut. Indices from Iceland (smaller dots) Greenland (larger dots) and combined (straight line) with 95% CI indicated. Harvestable biomass indices (>40 cm) (upper right), juvenile abundance indices (<40 cm) (upper left), biomass indices of larger ind. (>60 cm) (lower left) and total biomass indices (lover right).

Length distributions from the survey show a similar trend as in landed catch. Females tend to be larger than males and in greater abundance. The average length for females fluctuates from 51-61 cm throughout the years when males fluctuate from 50-59 cm. The length distribution has been gradually increasing since 2010, and in 2019, the mean length of males and females was 54.3 and 59.0 cm, respectively.

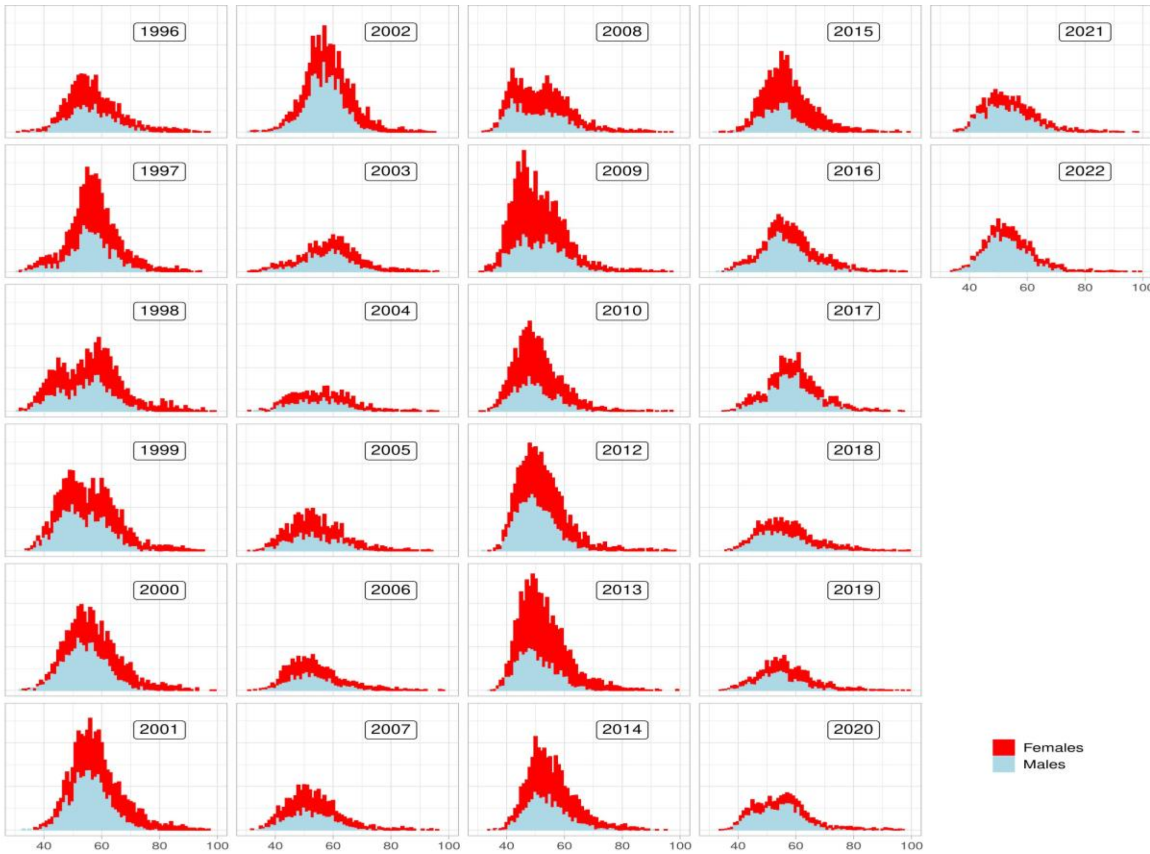

Figure 20: Greenland halibut. Length distribution of females and males from the autumn survey since 1996.

Age distribution of the sexes of Greenland halibut from the autumn survey 2015-onwards show that the greatest proportion males are between 9 and 10 years old and range between 4-16 years. The greatest proportion of females are 11-13 years old and range from 3 to 22 years (Figure 21).

It is worth noting that aging recently resumed after a long period where otoliths were sampled but not age read. Recent advances in age reading techniques suggested that older age reading methods used previously were biased and thus older age-readings are not considered representative of the age structure in the population. Further, otoliths sampled prior to 2015 were not stored in a manner compatible with the newer age-reading method. It is therefore uncertain whether data on the historic age structure will ever be available.

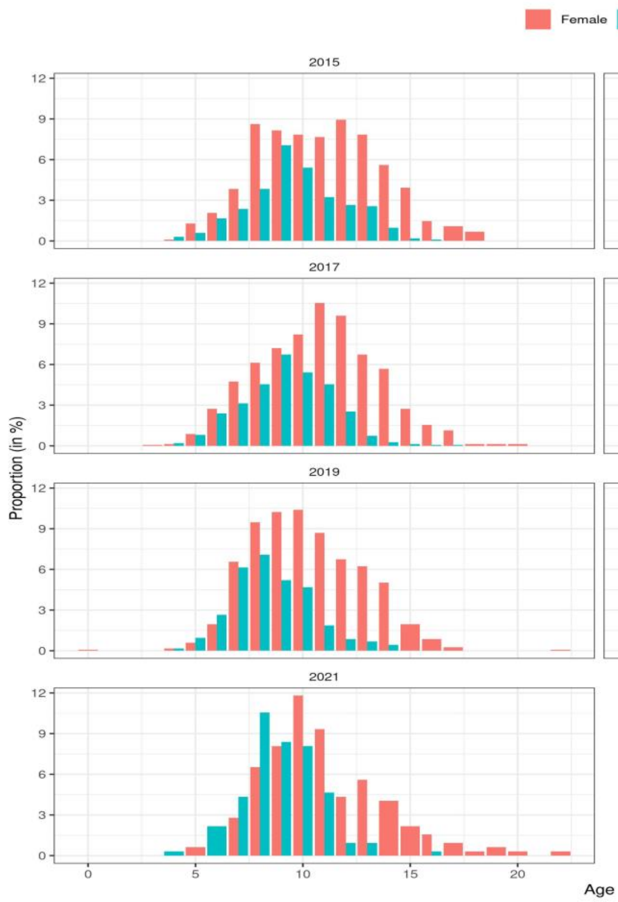

Figure 21: Greenland halibut. Proportion by age from the autumn survey from 2015.

According to the length distribution by age of Greenland halibut, it reaches 60 cm at the roughly the age of 12 on the average (Figure 22). The growth of Greenland halibut appears to be similar between the sexes, while female exhibit larger variability in size. It is noteworthy that males tend to be on average smaller in the catches than females, even though both sexes seem to have similar mean length at age. This may suggest differences in behaviour of the sexes, such as catchability with respect to gear and/or natural mortality.

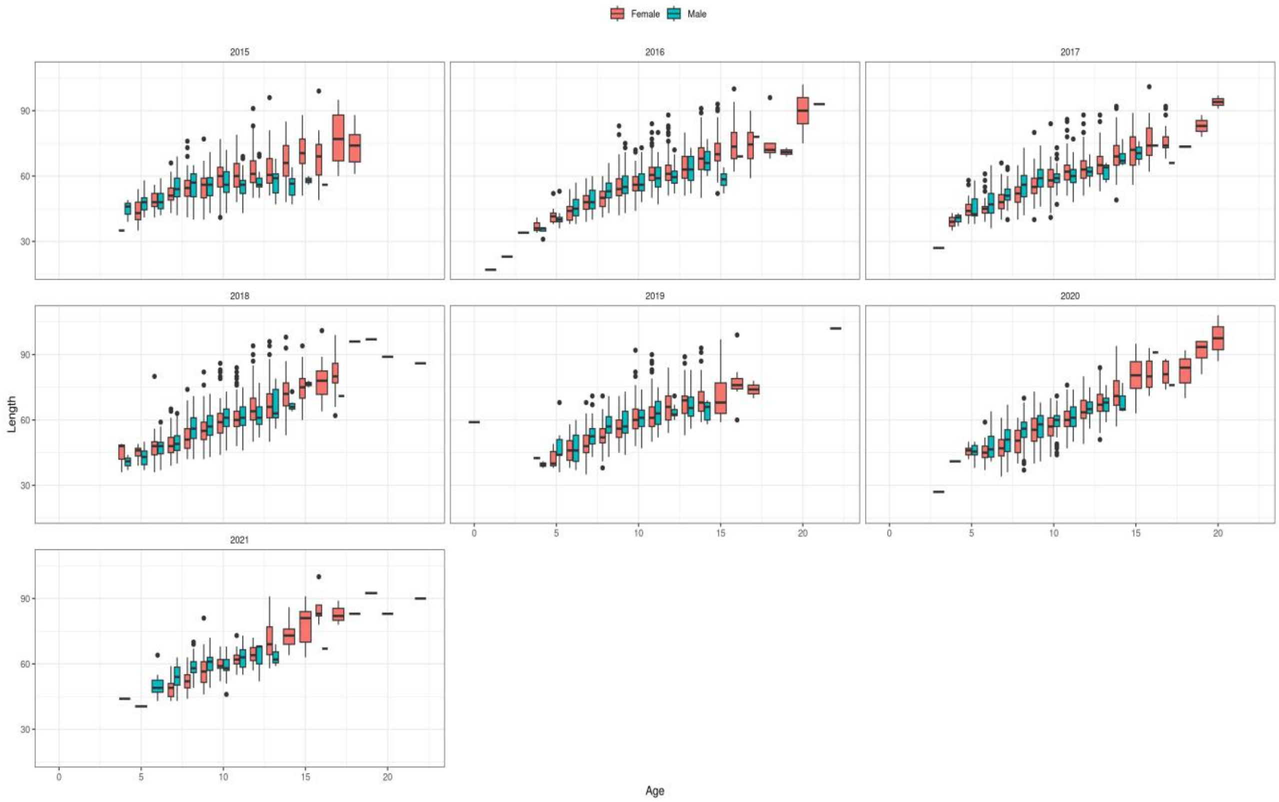

Figure 22: Greenland halibut. Distribution of length at age by sex from the autumn survey.

FAROESE SURVEY

The annual Greenland halibut survey in Faroese waters was started in 1995. The samples taken using a commercial trawl and the survey design varies between years. The average tow time has increased steadily from an average of 3 hours in 1995 to nearly 7.5 hours in 2020.

Aging resumed in 2015 and information is available from four years (2015 to 2017 and 2021). Preliminary results from an aging workshop on Greenland halibut otoliths suggest that further calibration between labs is needed to ensure that they are appropriate (Windsland pers. comm).

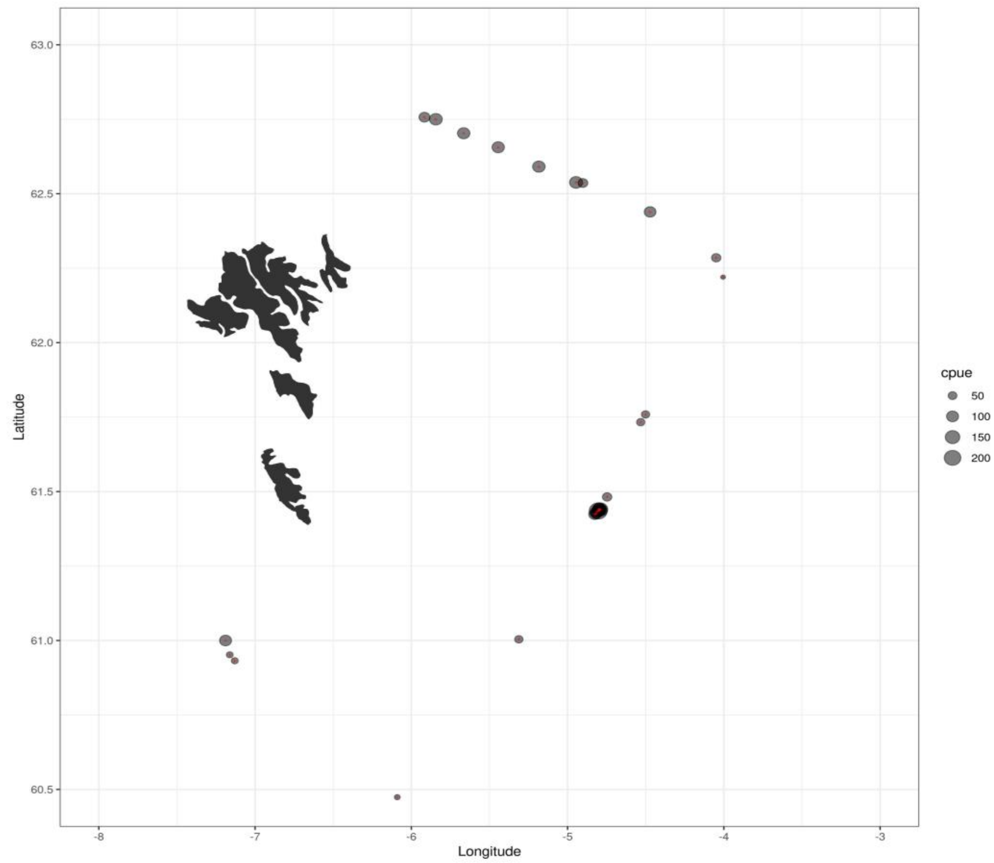

Figure 23: Greenland halibut. Stations in the Faroese Greenland halibut survey in 2018.

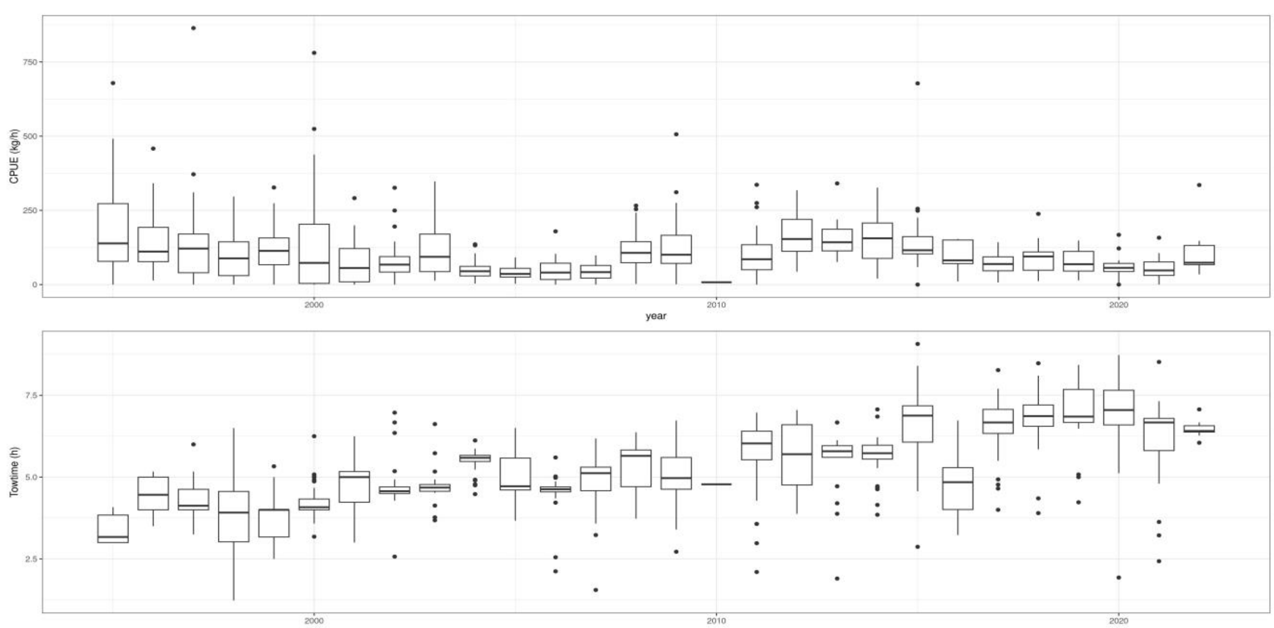

Figure 24: Greenland halibut. Boxplot of the catch per unit effort (top panel) and towtime (bottom panel) by year in the Faroese survey.

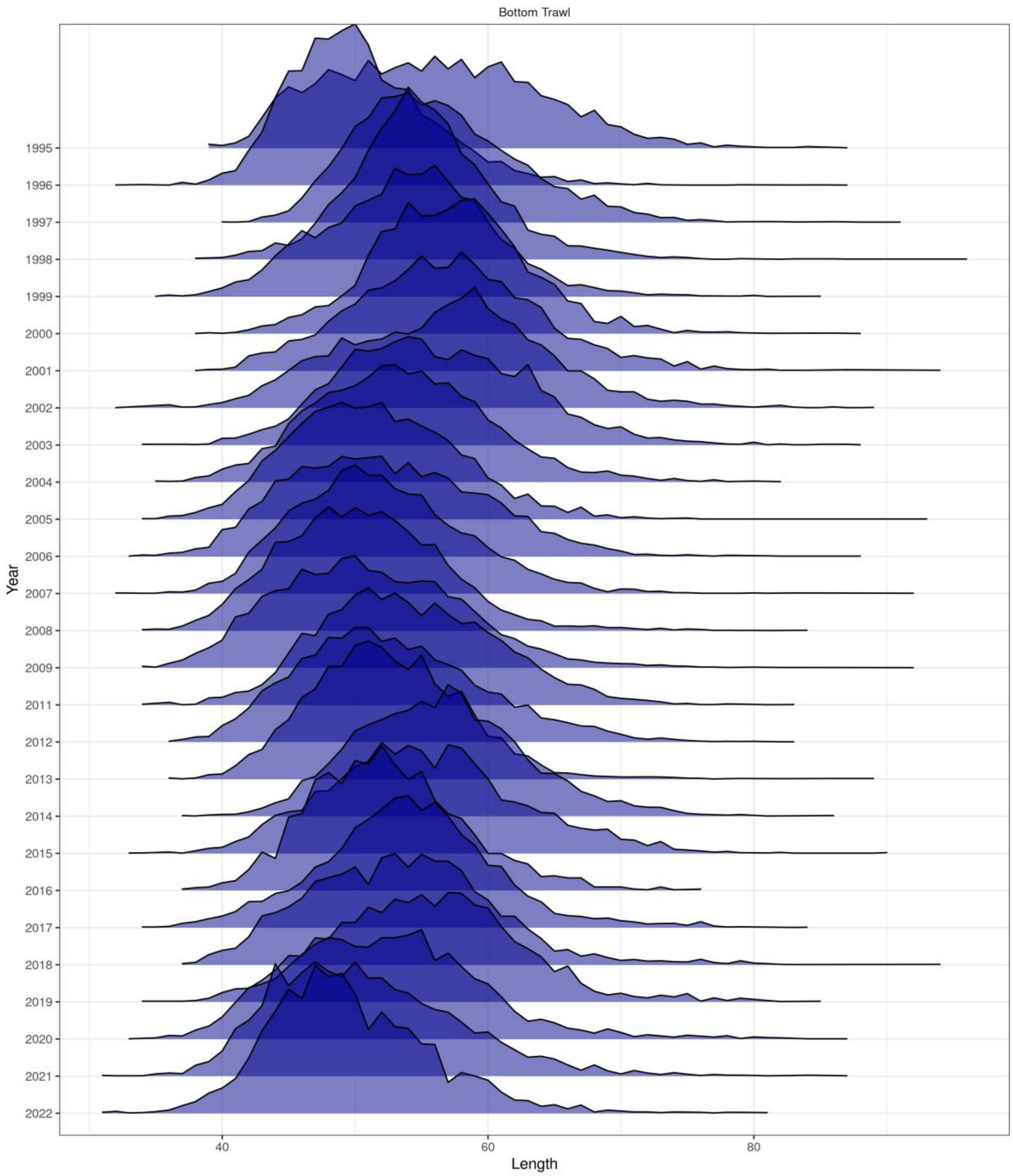

Figure 25: Greenland halibut. Observed length distribution from the Faroese survey.

MATURITY DATA

Information on maturity for Greenland halibut is sparse, and the maturity scale used in the surveys is considered to be imprecise. A gonadosomatic index (GSI) value above 1% is considered be a good indicator of maturity (Kennedy pers. comm). Information on gonad size is available from the Icelandic autumn survey (fig. 26). Work has started to update the maturity scale used in the survey.

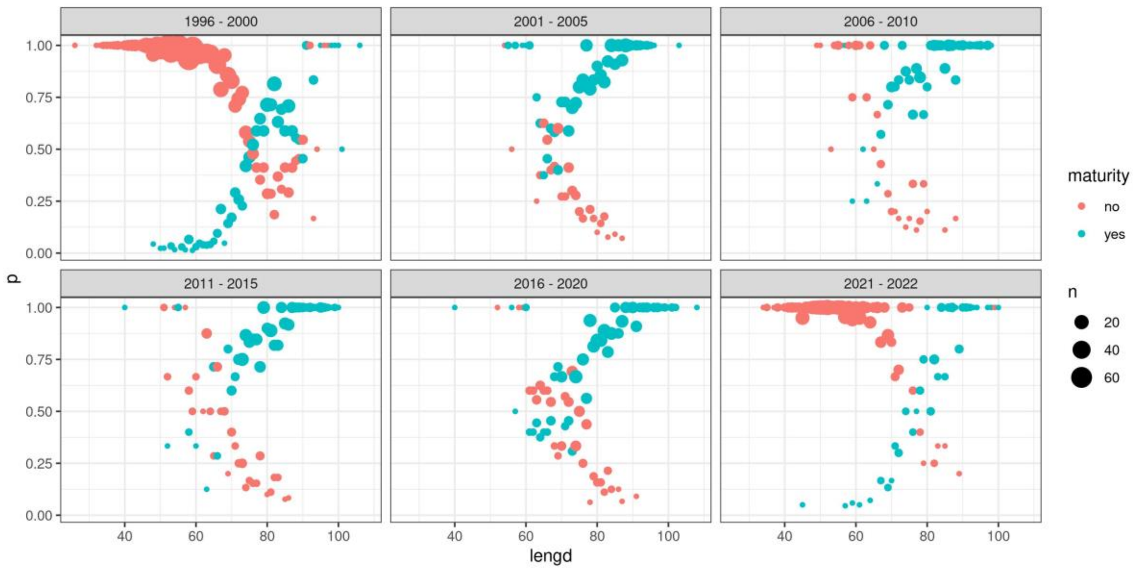

Figure 26: Greenland halibut. Observed proportion female mature by length the Icelandic autumn survey based on GSI >1%.

STOCK ASSESSMENT

The stock was benchmarked in 2023 (WKBNORTH) where the basis for advice was changed and reference points were updated. The approved assessment is an age–length based assessment model (GADGET) incorporating available data on the population dynamics. An overview of the settings are listed below:

- Start year 1985
- Two timesteps, equal in length, within the year
- Age range: 1 to 20^{+}
- Size range: 4 – 100 cm, 1 cm length groups
- Growth:
- Length based Von Bertalanffy size update (k, L_{∞})
- Beta-binomial size dispersal with a maximum length group growth set as 15 cm (β)
- Length – weight relationship estimated externally
- Natural mortality set as 0.15
- Initial population and recruitment
- Annual recruitment occurs in the first timestep, one parameter per year R_y.
- Mean length and standard deviation at recruitment is estimated
- Initial population at age is set as $S \times \pi_a \times e^{-a(M_a+\hat{F})}$
- Initial mean length at age is defined using the Von B growth curve, and initial numbers at length are dispersed assuming a normal distribution around the mean length with a fixed CV.
- Fishing split by fleet:
- 6 fleets, 1 survey, 3 bottom trawl (Greenland, Iceland and Faroese), gillnet and longlines in Iceland
- Logit selectivity for each fleet (α_f, $l_{50,f}$)
- Maturity at length estimated externally based on autumn survey samples

- Likelihood functions:
- Survey indices are fit assuming that $\log(I) = \alpha + \beta\log(\hat{I})$, where I and $\hat{I}$ are observations and model predictions respectively. α and β are estimated using linear regression.
- Composition data are assumed randomly sampled and fit using sums of squares of proportions
- Uncertainties are estimated using a spatial bootstrap for the composition data and simulated survey indices based on estimated survey CV.

INPUT DATA

The Gadget assessment of Greenland halibut relies on a number of disparate datasets, ranging from survey indices from the autumn survey, landings by gear and area, and catch composition data from the various fleets that target Greenland halibut. An overview is shown in figure 27.

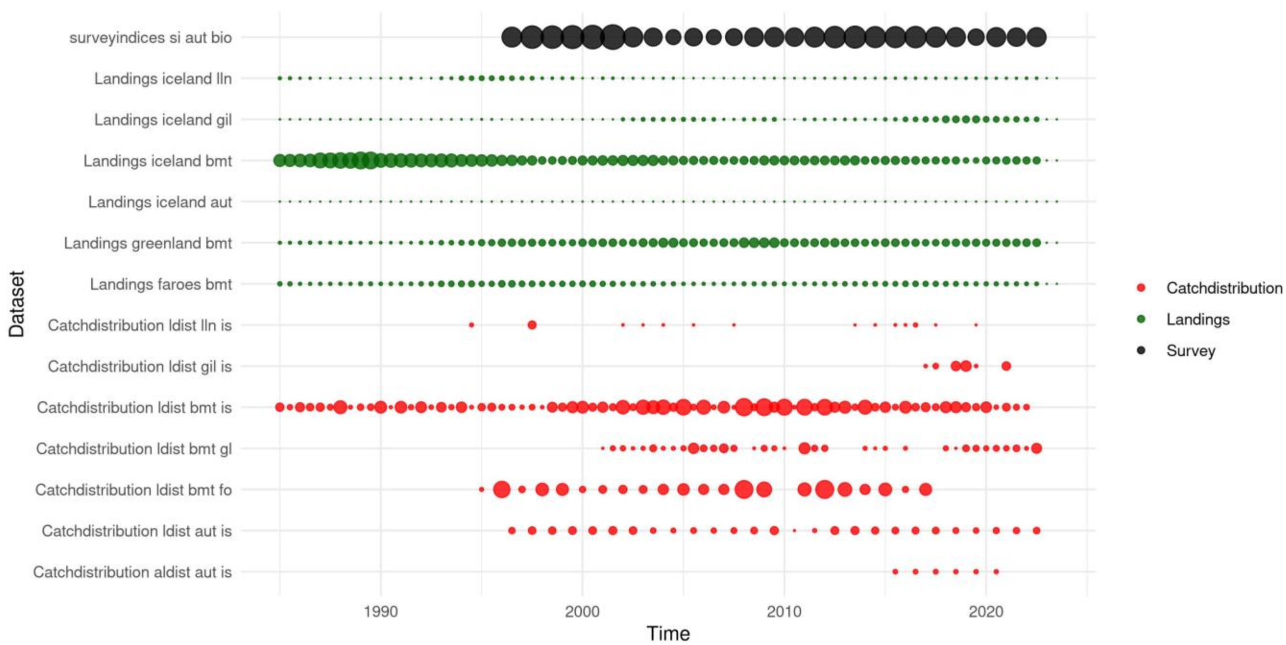

Figure 27: Greenland halibut. Overview of the datasets used and when they are available.

The model fit to the observed biomass index from the combined Iceland and Greenland autumn survey is shown in Figure 28. The model appears to capture the main trends in the index, although in order to do that a non-linear relationship between the model biomass and the observed survey biomass is assumed.

The model estimated catch composition is illustrated in fig. **Error! Reference source not found.** to fig. 36, with residual plot shown in fig. 37. In general the fit is best to the autumn survey data. Other datasets that have had fairly consistent sampling through the years, such as the bottom trawl samples, show no discernible patterns in the residuals, with the Icelandic bottom trawl and gillnet samples exhibit the lowest deviation in residuals. Observed longline size distributions, however, are fairly inconsistent from year to year and the model seems therefore to have higher propensity to ignore that dataset.

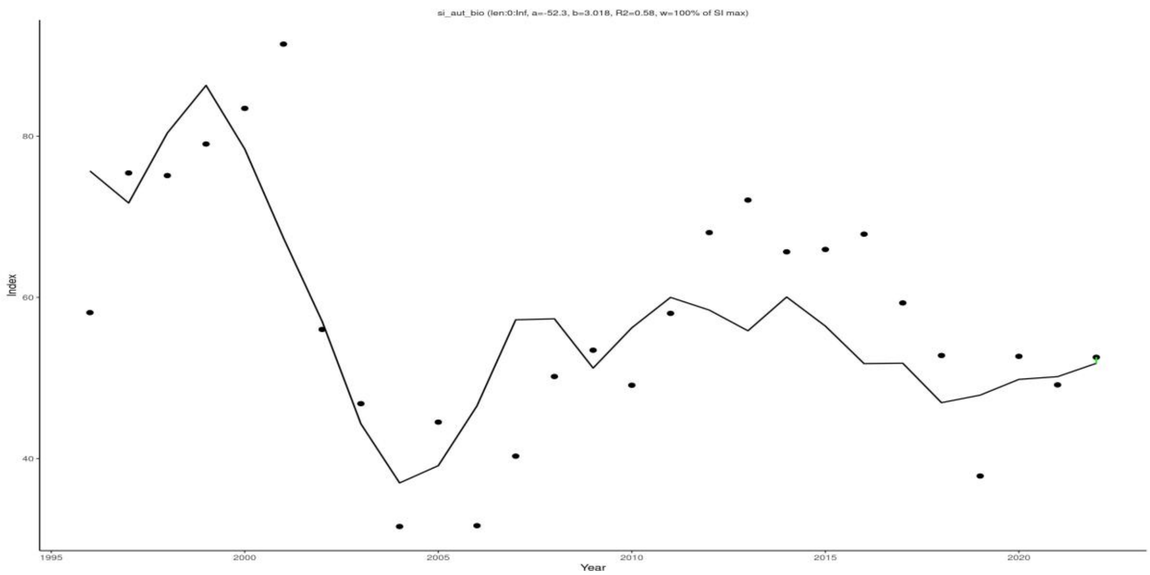

Figure 28: Greenland halibut. Observed survey index (dots) compared to the fitted model (solid line).

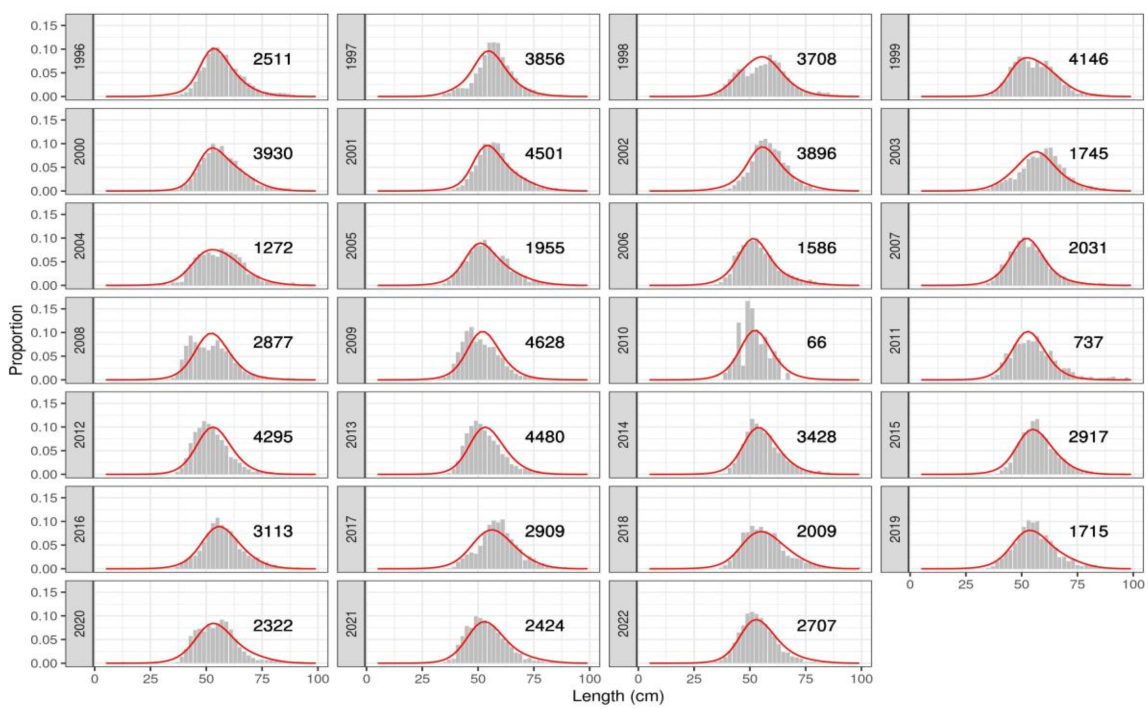

Figure 29: Greenland halibut. Comparison of the observed and estimated size distribution from the autumn survey catches. Observations are shown as grey bars while the estimated proportions by a red line. Number of fish sampled by year is indicated on each panel.

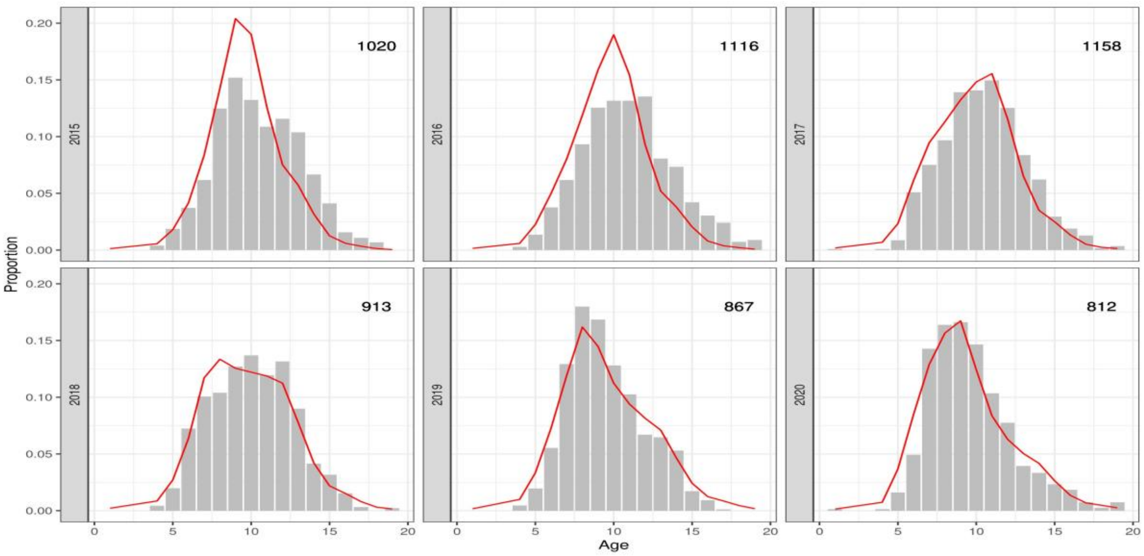

Figure 30: Greenland halibut. Comparison of the observed and estimated age distribution from the autumn survey catches. Observations are shown as grey bars while the estimated proportions by a red line. Number of fish sampled by year is indicated on each panel.

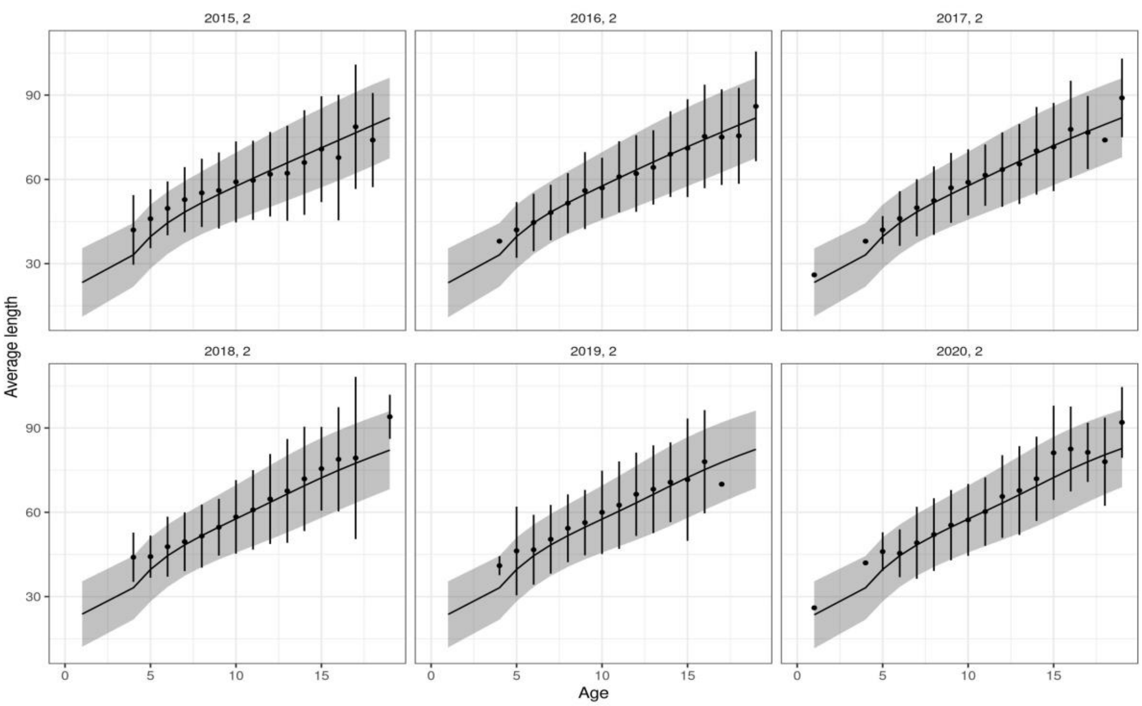

Figure 31: Greenland halibut. Comparison of the estimated growth from the assessment model to the observed values from the Icelandic autumn survey.

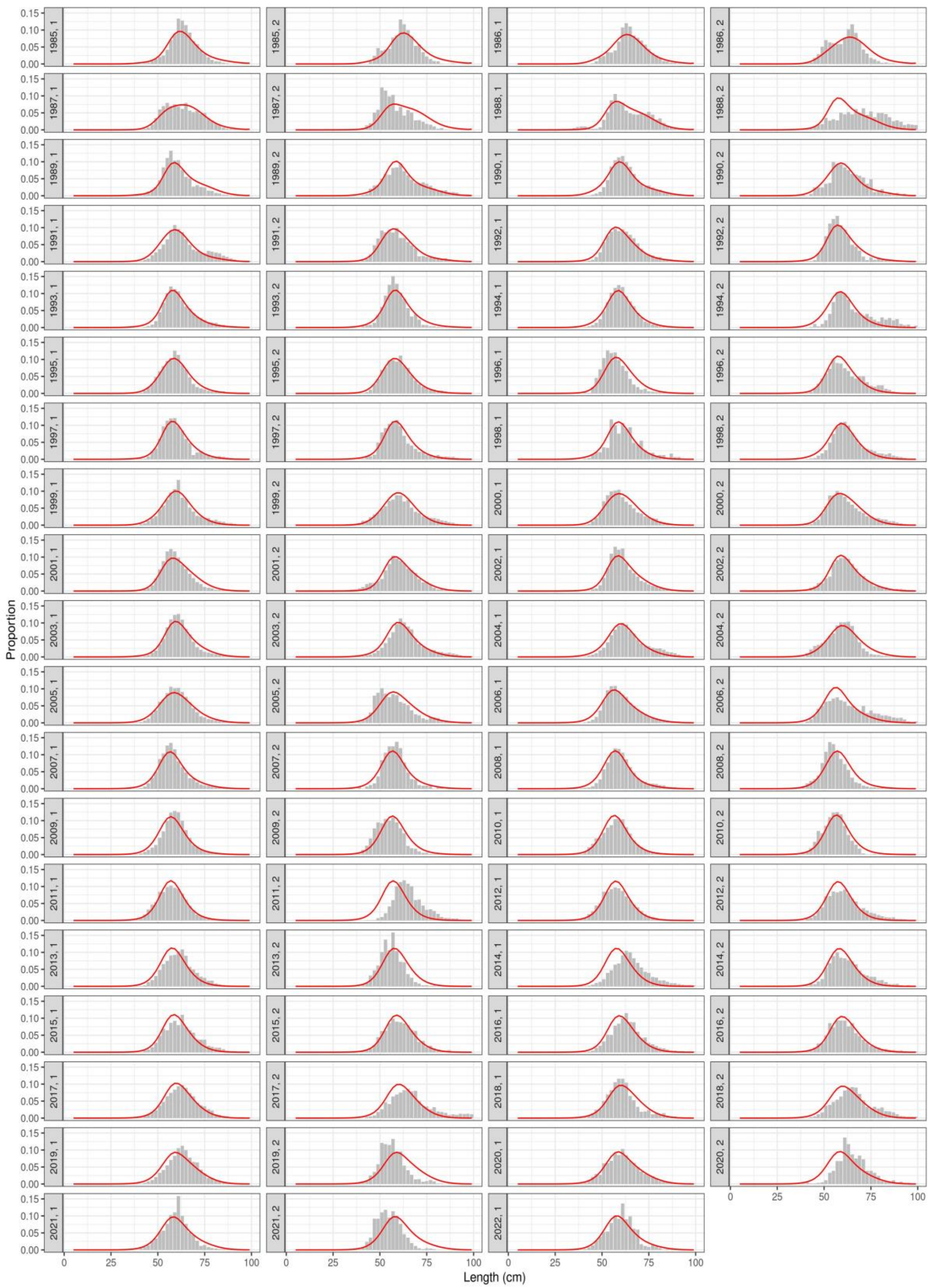

Figure 32: Greenland halibut. Comparison of the observed and estimated size distribution from the commercial bottom trawl catches in Iceland. Observations are shown as grey bars while the estimated proportions by a red line.

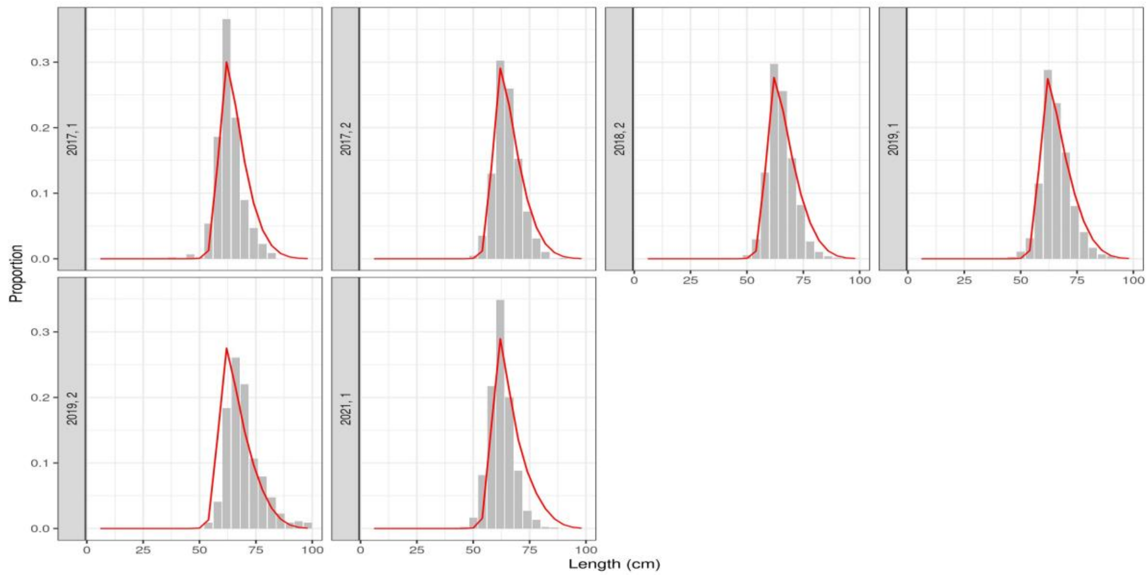

Figure 33: Greenland halibut. Comparison of the observed and estimated size distribution from the commercial gillnet catches in Iceland. Observations are shown as grey bars while the estimated proportions by a red line.

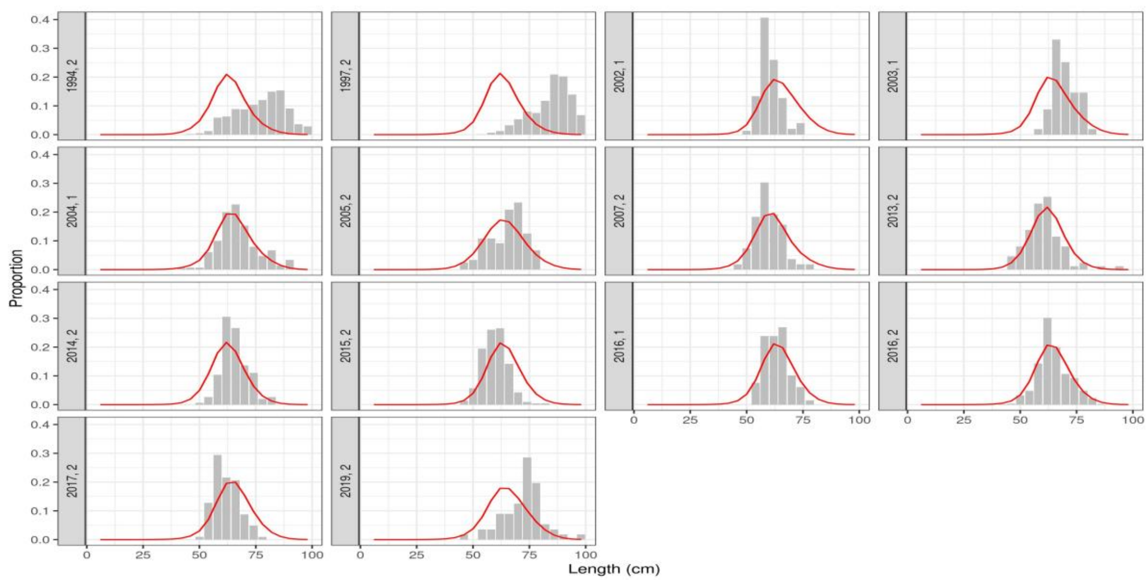

Figure 34: Greenland halibut. Comparison of the observed and estimated size distribution from the commercial longline catches in Iceland. Observations are shown as grey bars while the estimated proportions by a red line.

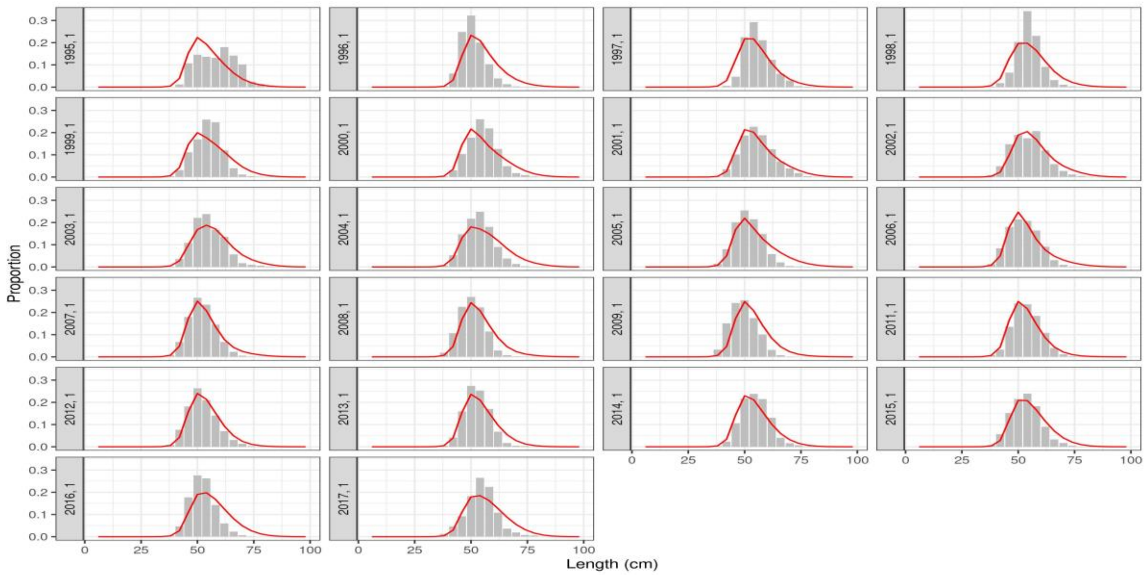

Figure 35: Greenland halibut. Comparison of the observed and estimated size distribution from the commercial bottom trawl catches in Faroe Islands. Observations are shown as grey bars while the estimated proportions by a red line.

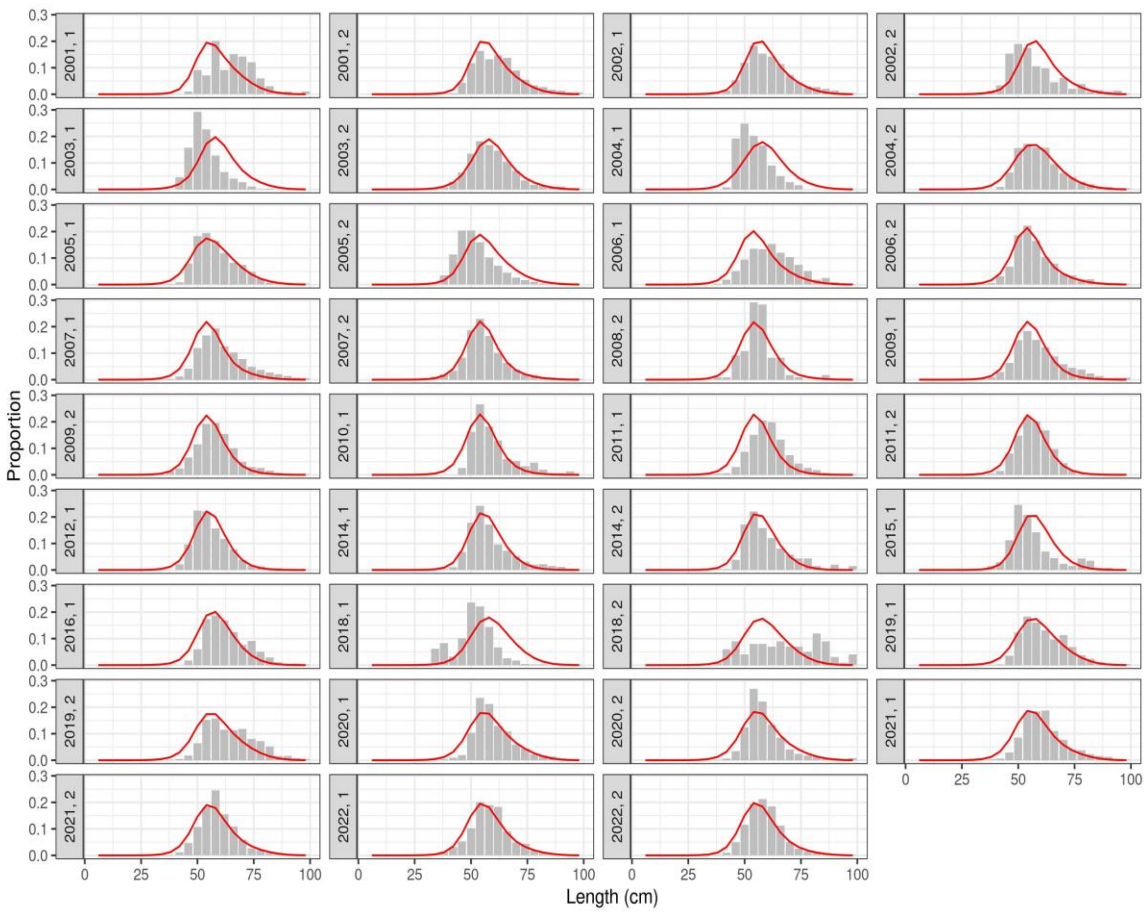

Figure 36: Greenland halibut. Comparison of the observed and estimated size distribution from the commercial bottom trawl catches in Greenland. Observations are shown as grey bars while the estimated proportions by a red line.

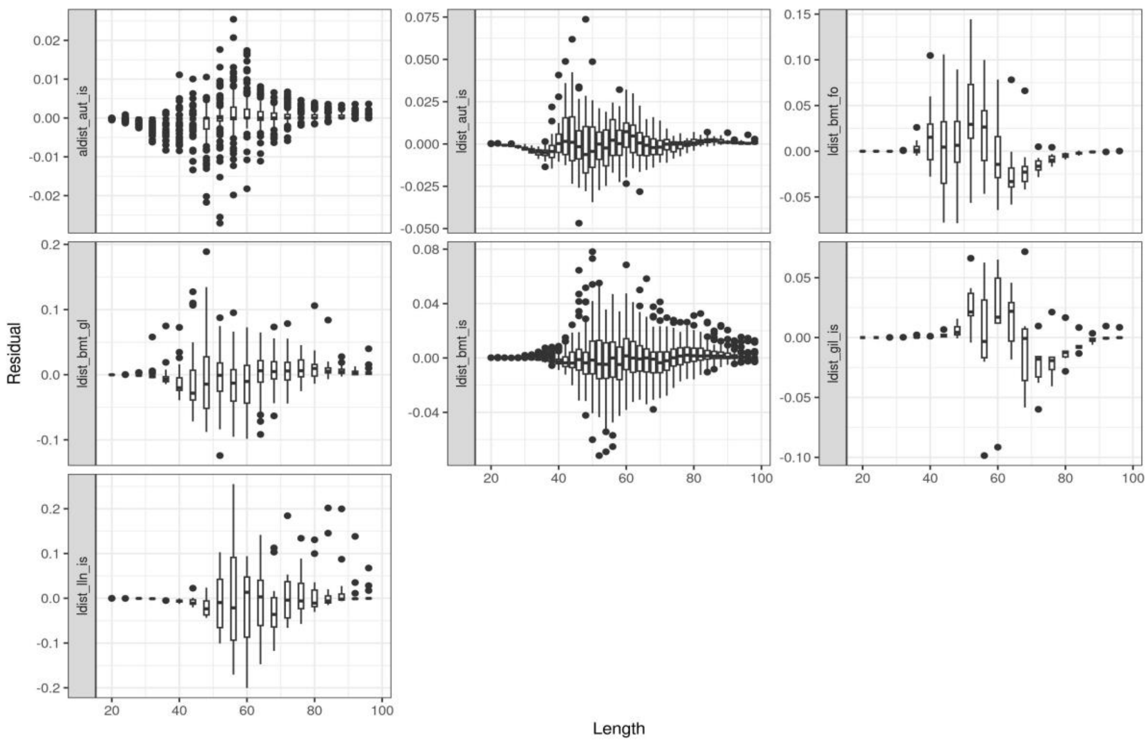

Figure 37: Greenland halibut. Model residuals by catch composition likelihood components.

MODEL RESULTS

The results from the model are shown in 38. The total and spawning stock biomass are estimated to have decreased since its highest value at the start of the model period and reached its lowest point in SSB around 2005. Fishing mortality appears to fluctuate without trend. Analytical retrospective analysis is shown in 39. The recruitment is estimated to fall outside the uncertainty bounds in the current assessment, suggesting that little information is available on the recruitment at age 1. In the absence of data, the recruitment estimates are estimated close to previous year estimates (random walk constraint).

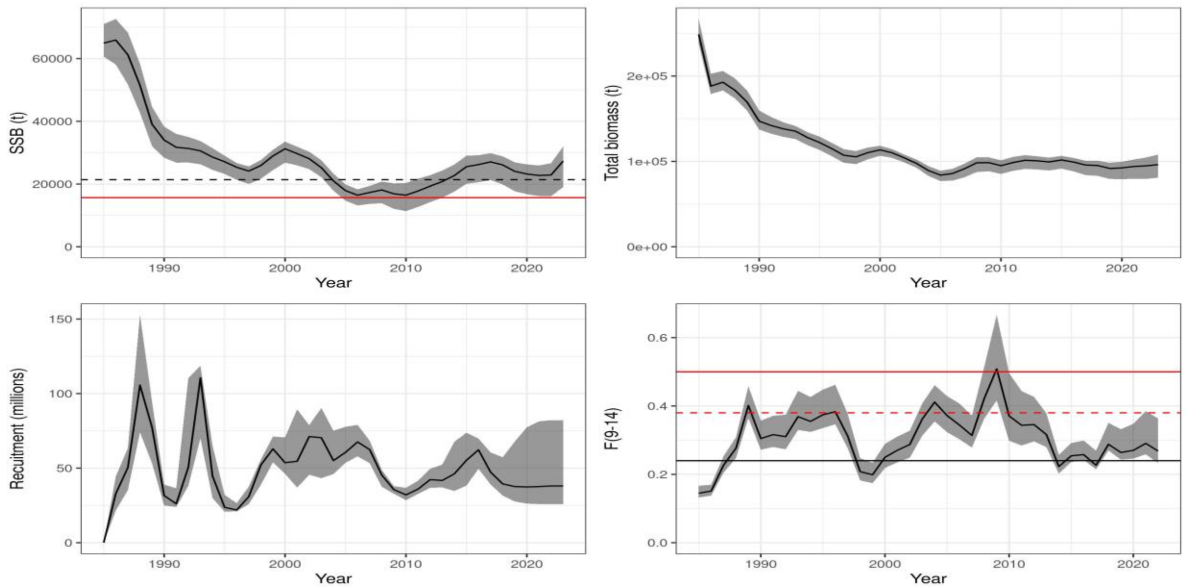

Figure 38: Greenland halibut. Estimates of total stock biomas, spawning stock biomass, fishing mortality and recruitment from the best model. Black line represents the point estimates and yellow ribbon the 90% confidence intervals.

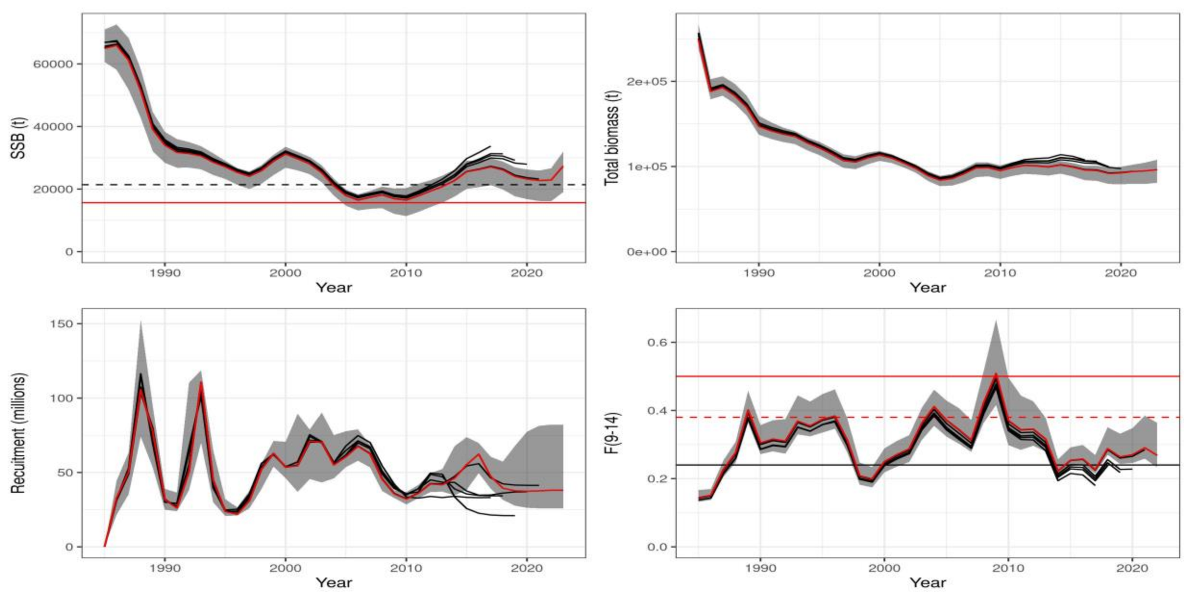

Figure 39: Greenland halibut. Analytical retrospective estimates of total stock biomas, spawning stock biomass, fishing mortality and recruitment from the best model. Colored lines represent the peeled point estimates and yellow ribbon the 90% confidence intervals.

Estimated selection by fleet is shown in 40. The estimated selectivity ranges considerably, with the Faroese bottom trawl fleet catching the smallest fish while longline and gillnet boats in Iceland the largest. The Greenlandic and the autumn survey catch similar sizes.

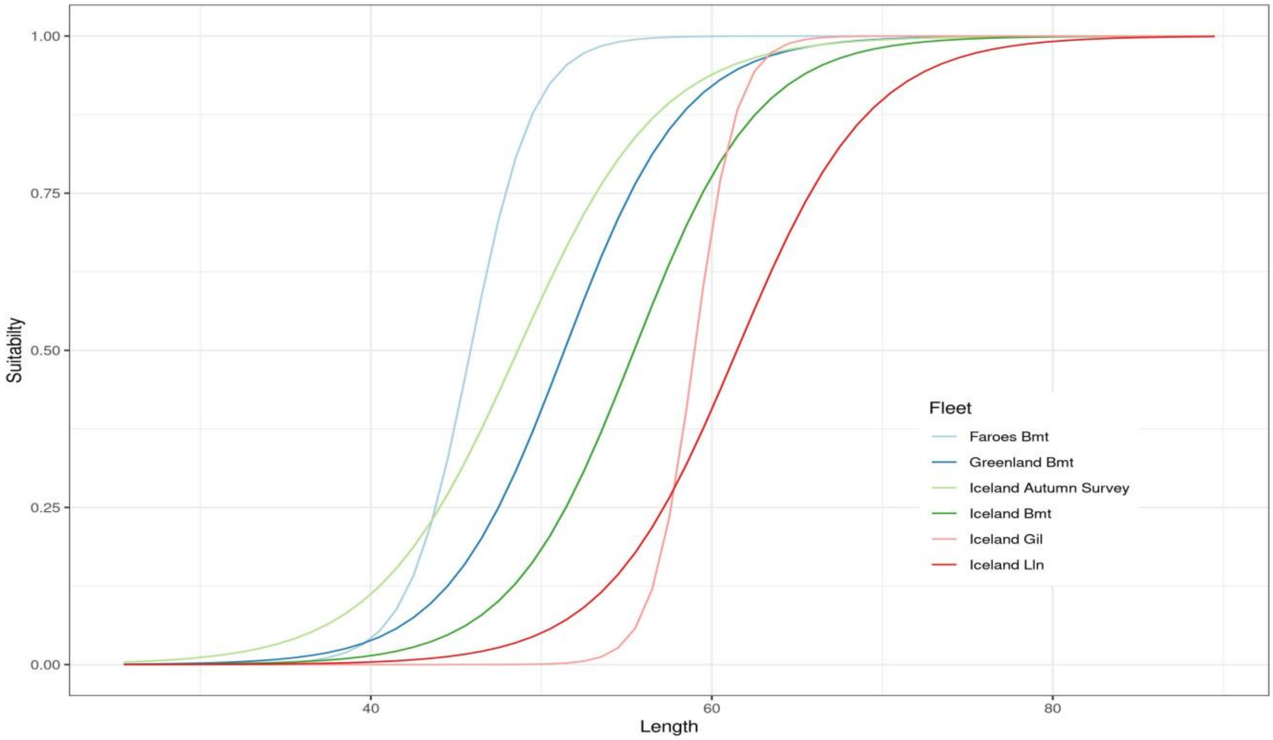

Figure 40: Greenland halibut. Estimated selection functions by fleet.

CONCLUSIONS

Overall, the gadget model presented here captures the overall trends in the data, and in spite of minor mis-fits the model is usable for assessing the stock and to base advice to managers.

In a complicated such as the gadget model that has many parameters and many data-sets of varying quality it is to be expected that there may be problems with some parameters and fit to some data-sets.

The main problem encountered when building the model during the benchmark were strong year factors in the autumn survey. Although fitting to a single survey seems improve the retrospective estimates it does cause some concern. However as more age data becomes available in the coming years it is expected that this issue would be easier to reconcile within the model.

SHORT TERM PROGNOSIS

Short-term forecasts for Greenland halibut are done in Gadget using the settings described below.

- F and M before spawning: NA
- Weight-at-age in the stock: GADGET uses a weight–length relationship and von Bertalanffy growth (no weights-at-age are supplied to GADGET)
- Weight-at-age in the catch: GADGET uses a weight–length relationship and von Bertalanffy growth (no weights-at-age are supplied to GADGET)

- Exploitation pattern:
- Landings: logistic selection-at-length by fleet, with parameters estimated within GADGET. Catch proportions by fleet are assumed fixed based on last three years.
- Intermediate year assumptions: status quo F (F in 2022).
- Stock–recruitment model used: Constant, based on last years age 1 recruitment estimate.
- Catch scenarios: F=Fmsy, F=0 and F=Fsq

The results of the prognosis are shown in table 17.5.1.

MANAGEMENT

Available biological information and information on distribution of the fisheries suggest that Greenland halibut in East Greenland, Iceland and Faroe Islands might be separated into subpopulations but that they do mix between these. Recent information of tagging experiments in the Barents Sea suggests high mixing between the Barents Sea and Iceland and also connectivity to West Greenland. This connectivity is not accommodated for in the present assessment.

Figure 41 shows the Icelandic national TAC, and catches since the 1991/1992 fishing year. In 2014, the Greenland and Iceland entered a five-year bilateral agreement to limit the fishing pressure of the Greenland halibut stock in East-Greenland, Iceland and Faroes to F_{msy}. According to this agreement 56.4% of the TAC was allocated to Iceland and 37.6% to Greenland. This agreement is no longer in place; however, Iceland and Greenland have followed the agreement when setting TACs 2019. Other countries, notably the Faroe Islands were not party to this agreement.

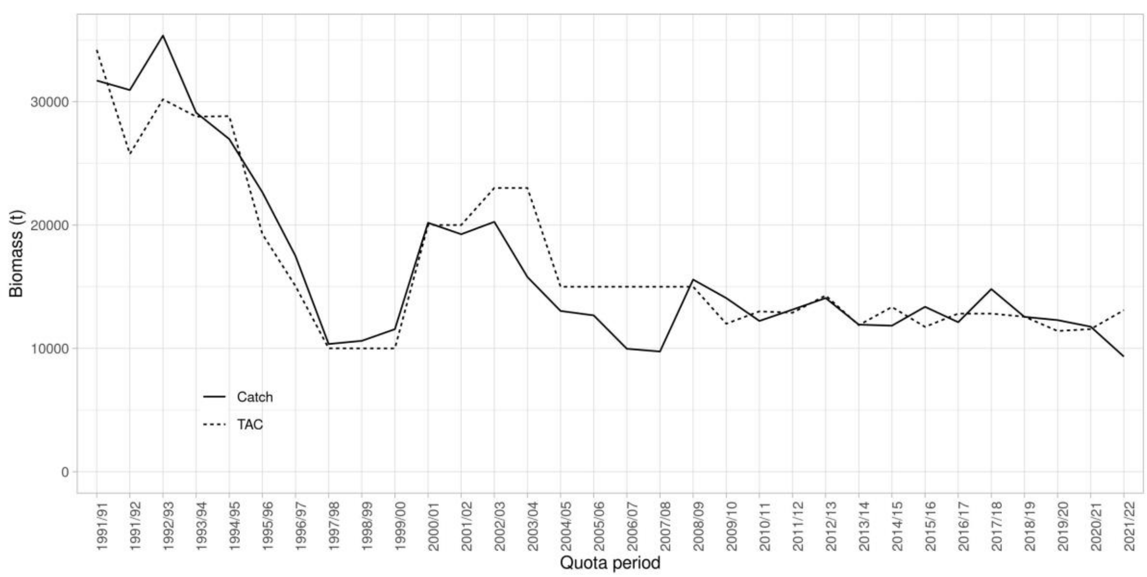

Figure 41: Greenland halibut. Recommended Icelandic national total allowable catch (TAC) compared with catches in Icelandic waters.

In recent fishing years, landings have been similar to the advised TAC. Figure 42 shows the net transfers in the Icelandic ITQ-system since 1991. In this period, transfers to Greenland halibut from other species (positive values) and transfers from Greenland halibut to other species (negative values) have fluctuated. Since 2002/03, transfers have been negative, apart from 2009/10 and the past two fishing years, when a small amount was transferred to Greenland halibut quota.

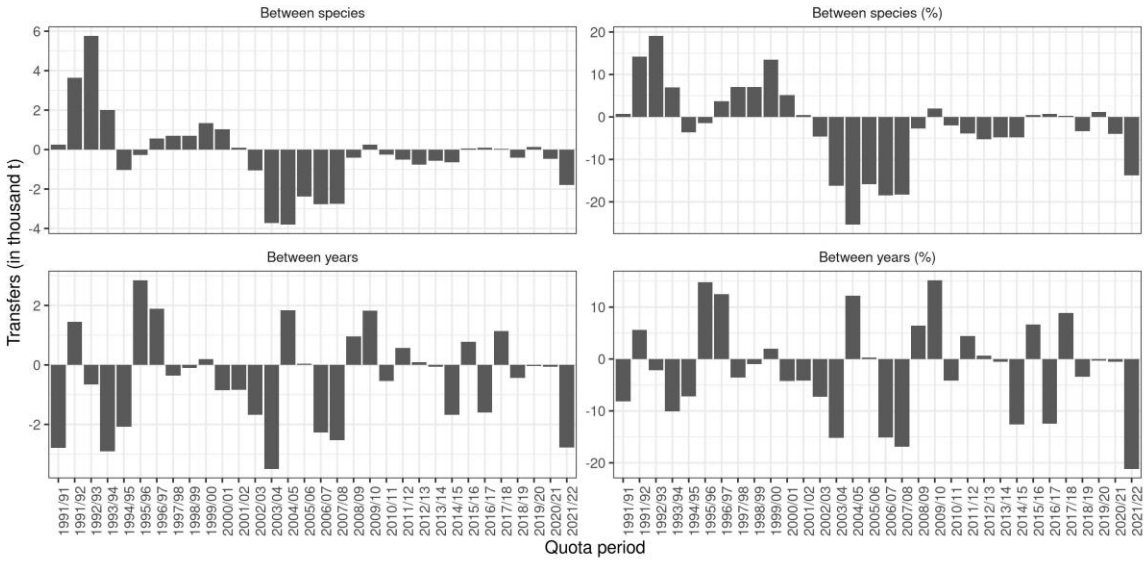

Figure 42: Greenland halibut. Net transfers of quota to and from Greenland halibut in the Icelandic ITQ system by fishing year. Between species (upper): Positive values indicate a transfer of other species to Greenland halibut, but negative values indicate a transfer of Greenland halibut quota to other species. Between years (lower): Net transfer of quota for a given fishing year.

DATA CONSIDERATION AND ASSESSMENT QUALITY

The fishery for Greenland halibut in the vast stock area from East Greenland to west of the British Isles is conducted by an international fleet and catch recordings are therefore dependent on reporting from many nations. Even though it is believed that reporting is reliable the many data sources do not always agrees. In example logbook information, reporting's to national authorities, data submissions to ICES, Eurostat and FAO often deviate and there are difficulties associated with choosing what is believed to be the correct number. Even data within ICES do not agree even though the source is the same, namely EuroStat. Thus ICES Catch data set 2006-2020 has huge deviations from its database 1950-2010 in its 5 overlapping years. An effort has been made to correct obvious deviations back in time, but this work is expected to continue and revisions of historic catch data are therefore foreseen. For the forthcoming years logbook data that agrees with reporting on catch from quota will superimpose other official reporting.

With the change to an age and length-based assessment more requirements will be put on biological sampling and sampling from the fisheries. This is especially the case for SA 14 (East Greenland) where sampling have been inadequate so far. Ageing of Greenland halibut ceased for many of the marine institutes in Greenland, Iceland, Faroe Island and Norway around 2000 due to reading difficulties and lack of intercalibration. A new method has been agreed upon and cooperation between institutes has been initiated on age calibration. With respect to this stock Iceland has now progressed so far that an ALK is available for the 6 previous years. The Greenland institute of Natural Resources has also initiated age reading.

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