# Icelandic slope beaked redfish
## *Sebastes mentella*

## GENERAL INFORMATION

Icelandic slope beaked redfish (*Sebastes mentella*) is a redfish species which is similar in appearance to golden redfish (*Sebastes norvegicus*). There are some characteristic features that distinguish those two species apart, and the depth is one of them, with Icelandic slope beaked redfish inhabiting deeper waters (>400 m). Around Iceland the species is mainly found in the warmer waters in the western, southern, and south-eastern parts of continental slope. Beaked redfish is a slow growing, long-lived, and late-maturing species.

Icelandic slope beaked redfish on the continental shelf and slope of Iceland (the Icelandic waters ecoregion, which is defined to be within the Icelandic 200 NM EEZ and includes ICES Division 5.a and part of ICES Subarea 14), is treated as distinct biological stock and management unit. Mainly fish larger than 30 cm are found in Icelandic waters. The East Greenland shelf is most likely the main nursery area for the Icelandic slope stock.

## SCIENTIFIC DATA

The Icelandic autumn survey (IS-SMH) on the continental shelf and slope in Icelandic waters covers depths down to 1500 m. Data on Icelandic slope beaked redfish are available from 2000–2022. The survey was not conducted in 2011.

The total biomass and abundance indices were highest in 2000 and 2001, declined in 2002 and have, since then, fluctuated at that level without clear trend (Figure 1). The biomass index of fish 45 cm and larger has, however, increased from the lowest value in 2007 to the highest one in 2021 (Figure 1). The abundance index of fish 30 cm and smaller (recruits) has been at very low level since 2007 and no fish smaller than 30 cm was observed in the 2021 and 2022 surveys (Figure 1).

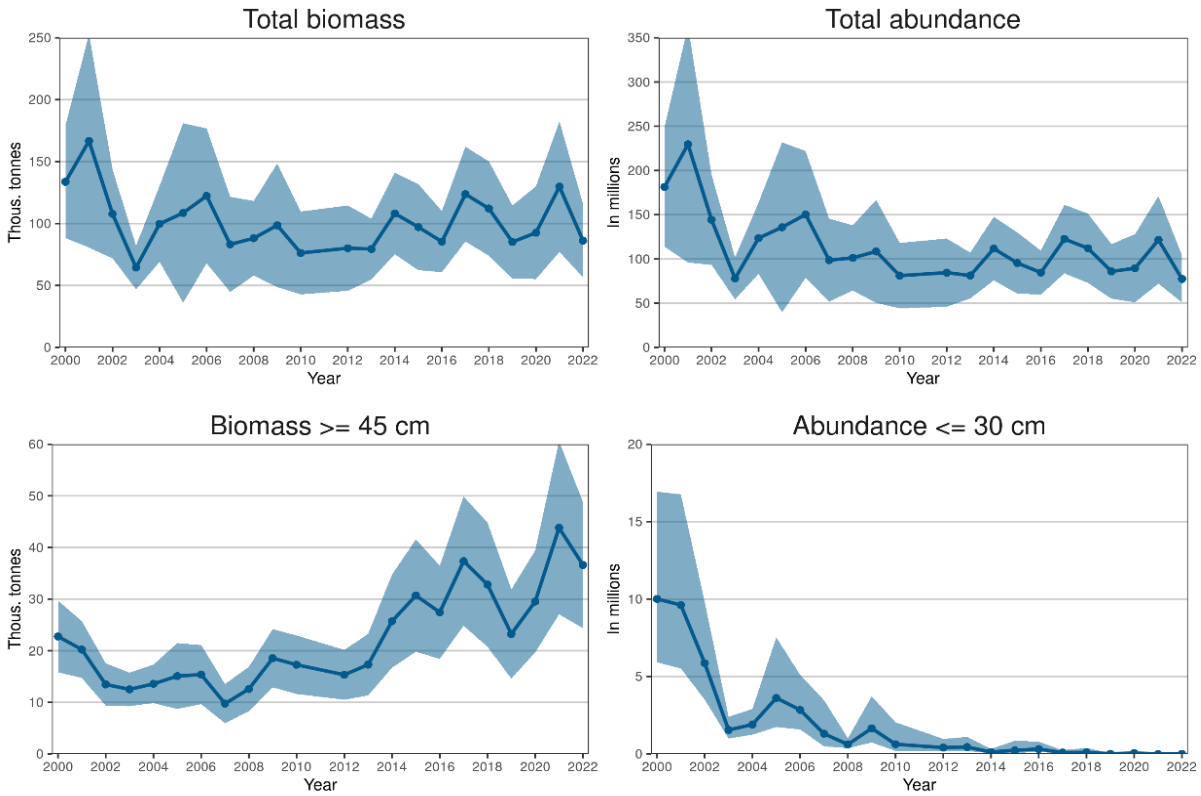


**Figure 1. Icelandic slope beaked redfish. Survey indices in the autumn survey in ICES Division 5.a 2000–2022. The survey was not conducted in 2011. The figure shows the total biomass index, total abundance index, biomass index of fish 45 cm and larger and abundance index of fish 30 cm and smaller.**

Icelandic slope beaked redfish from Icelandic autumn survey is caught along the south-east to the west slope of the Icelandic continental shelf (Figure 2) but is most abundant south-west along the Reykjanes ridge and west of Iceland (Figure 3). Icelandic slope beaked redfish is mainly caught at depths between 400–800 m (Figure 4).

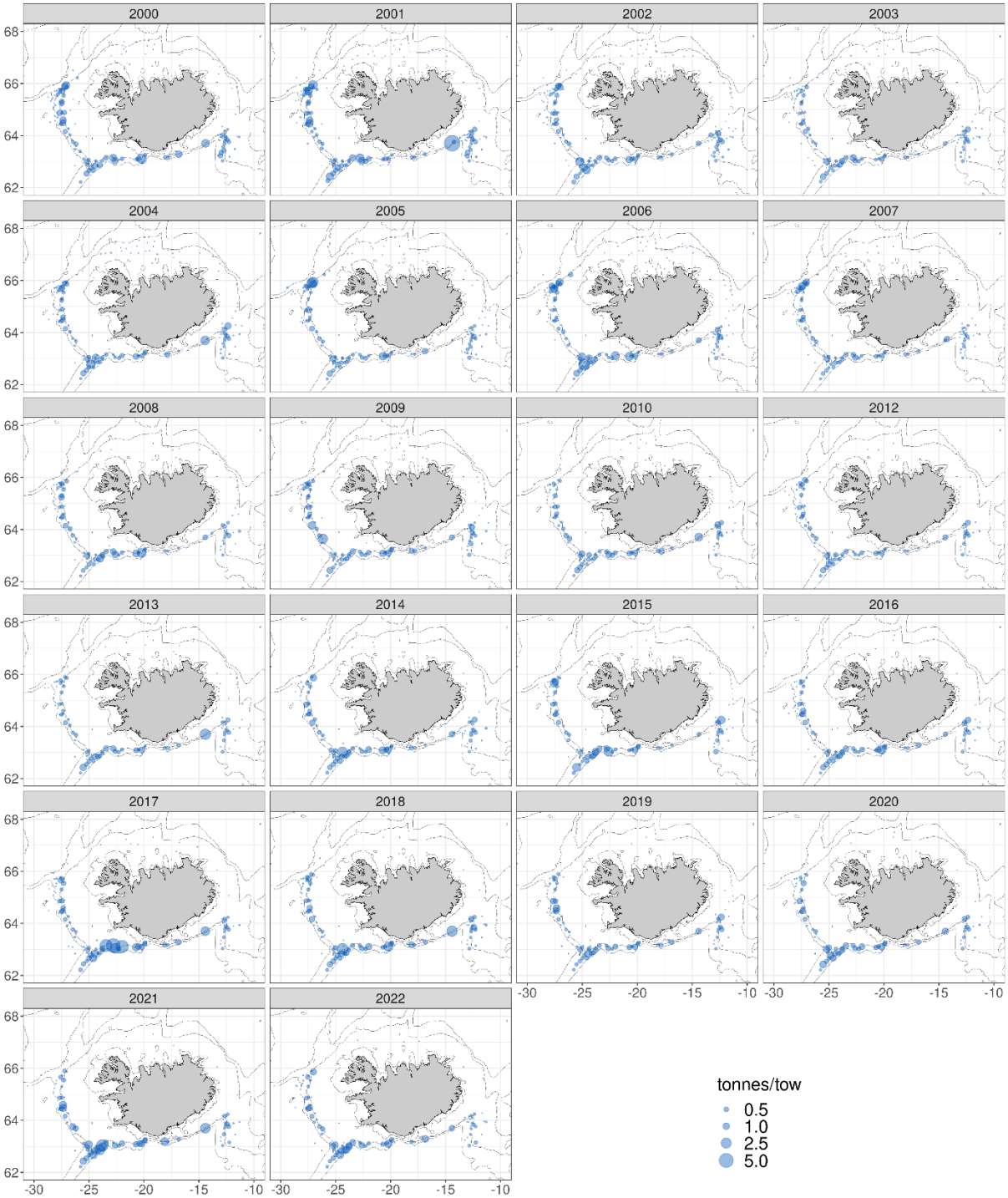


**Figure 2. Icelandic slope beaked redfish. Spatial distribution in the Icelandic autumn survey in 2000–2022. The survey was not conducted in 2011.**

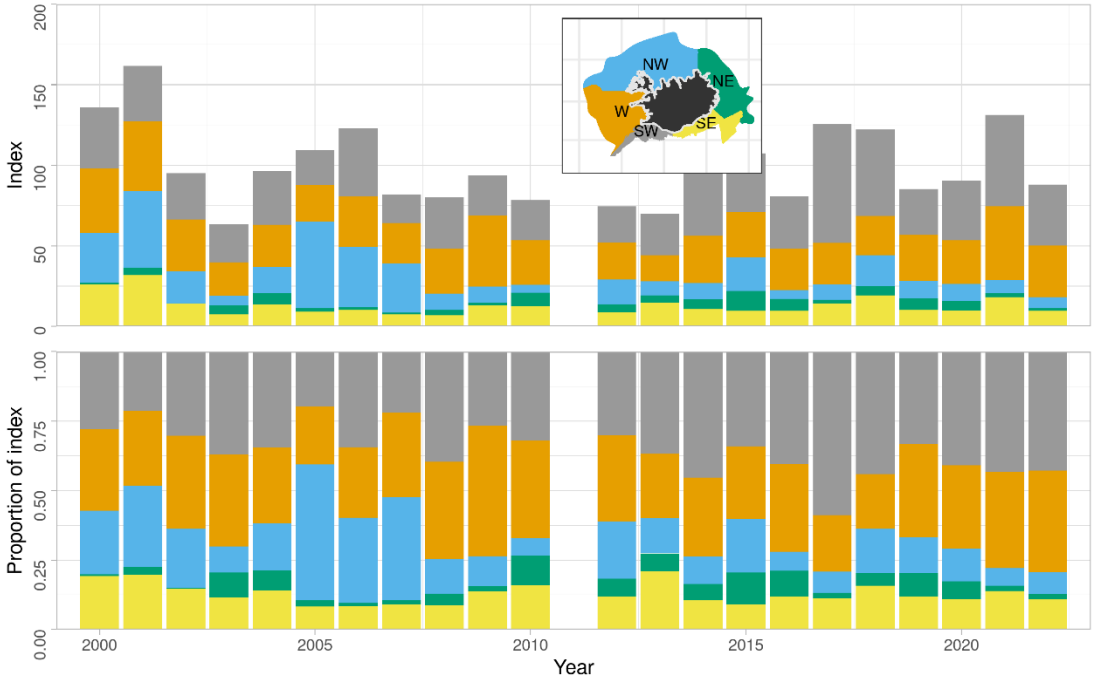


**Figure 3. Icelandic slope beaked redfish. Spatial distribution of the total biomass index from the Icelandic autumn survey 2000–2022. The survey was not conducted in 2011.**

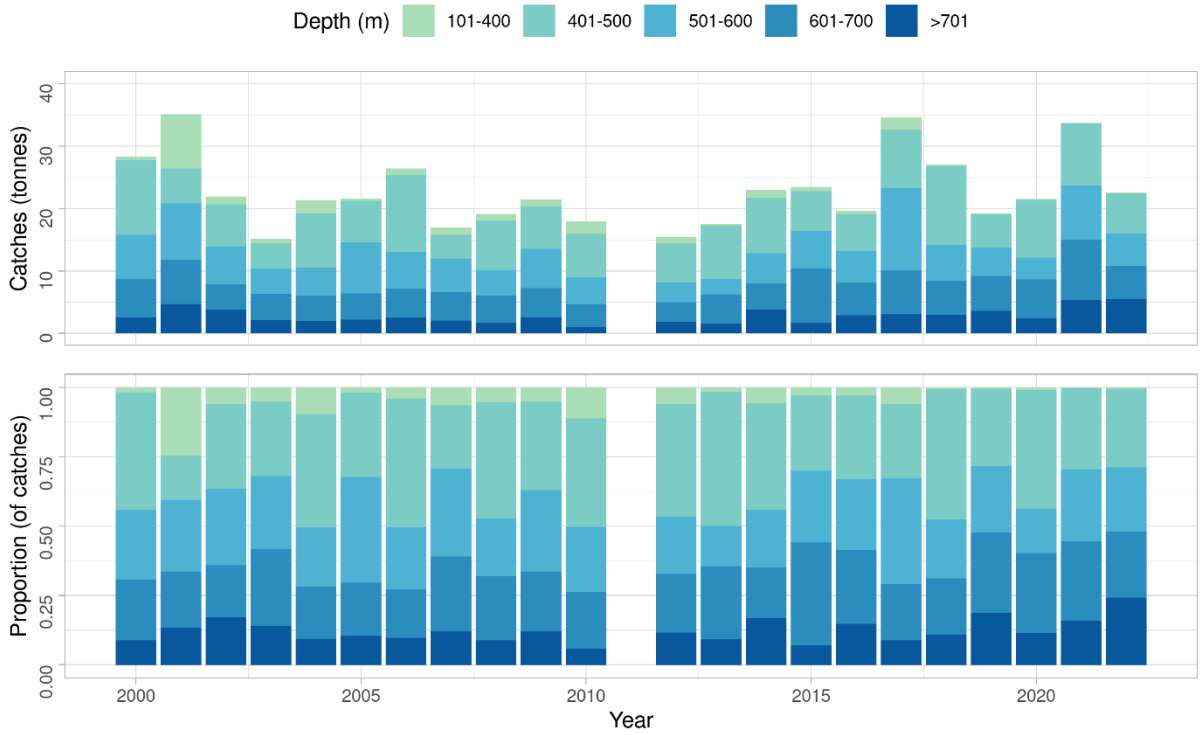


**Figure 4. Icelandic slope beaked redfish. Depth distribution of the catch from the Icelandic autumn survey 2000–2022. The survey was not conducted in 2011.**

The length of the Icelandic slope beaked redfish in the autumn survey is between 25 cm and more than 50 cm (Figure 5). Since 2000, the mode of the length distribution has shifted to the right or from 36–39 cm in 2000 to about 42–45 cm in 2012–2022. During this period the mean length of the fish caught has increased from 37.4 cm in 2000 to 43.5 cm in 2022. This is a large increase in mean length for a species which annual growth is around 1–2 cm and where very few individuals larger than 50 cm are observed. This confirms the recruitment failure.

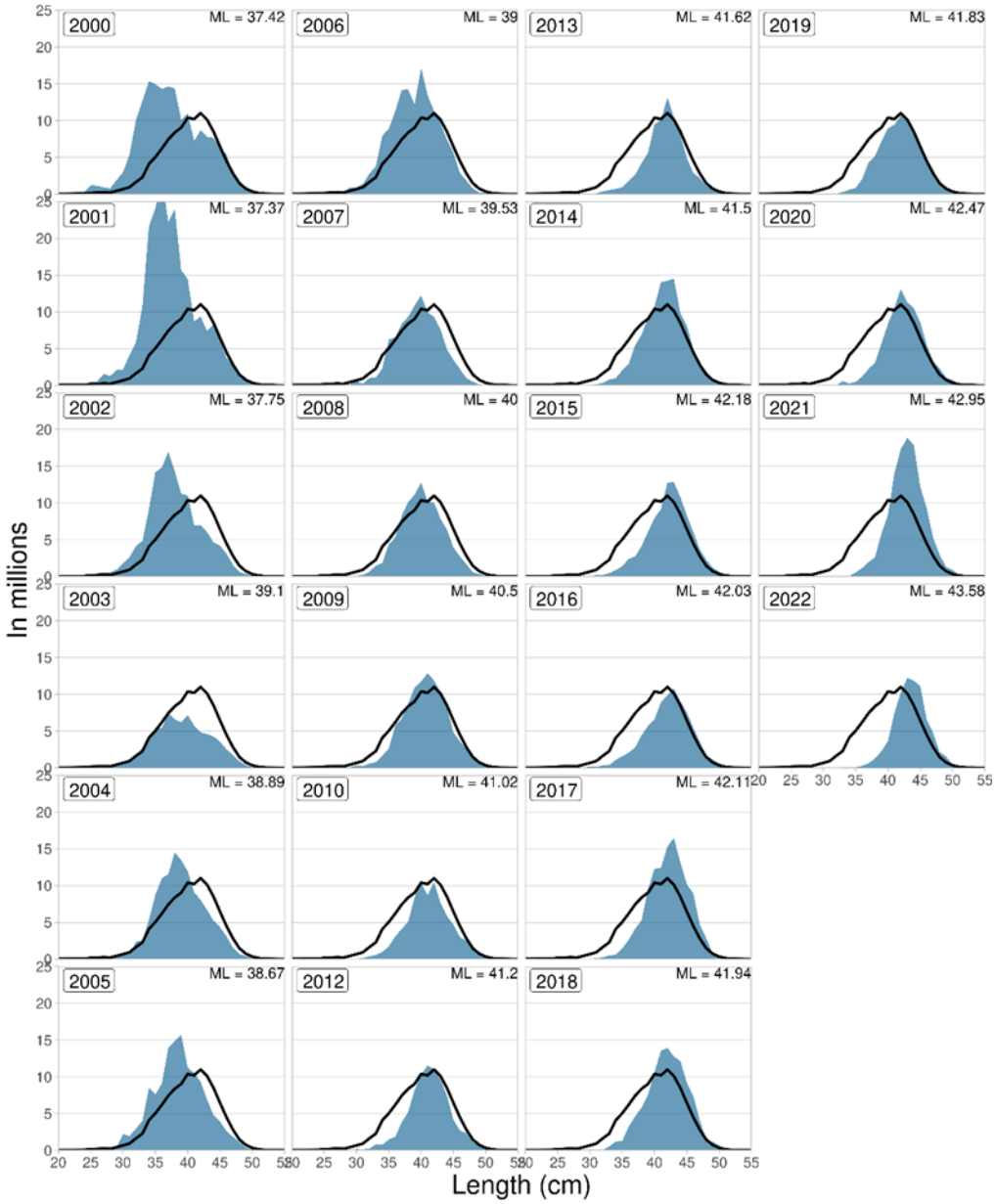


**Figure 5. Icelandic slope beaked redfish. Length disaggregated abundance indices (blue area) in the Icelandic autumn survey 2000–2022. No survey was conducted in 2011. The black line is the mean of 2000–2022.**

Otoliths from the autumn survey have been sampled since 2000 and otoliths from the 2000, 2006, 2009, 2010, 2017–2019 and 2021 surveys have been age read (Figure 6). The age reading shows that the stock consists of many cohorts and the age ranges from 5 to over 50 years. The 1985 and 1990 cohorts were large and were still relatively strong in the 2021 survey. No fish 10 years old and younger were observed in the 2021 survey, yet another indication of a recruitment failure.

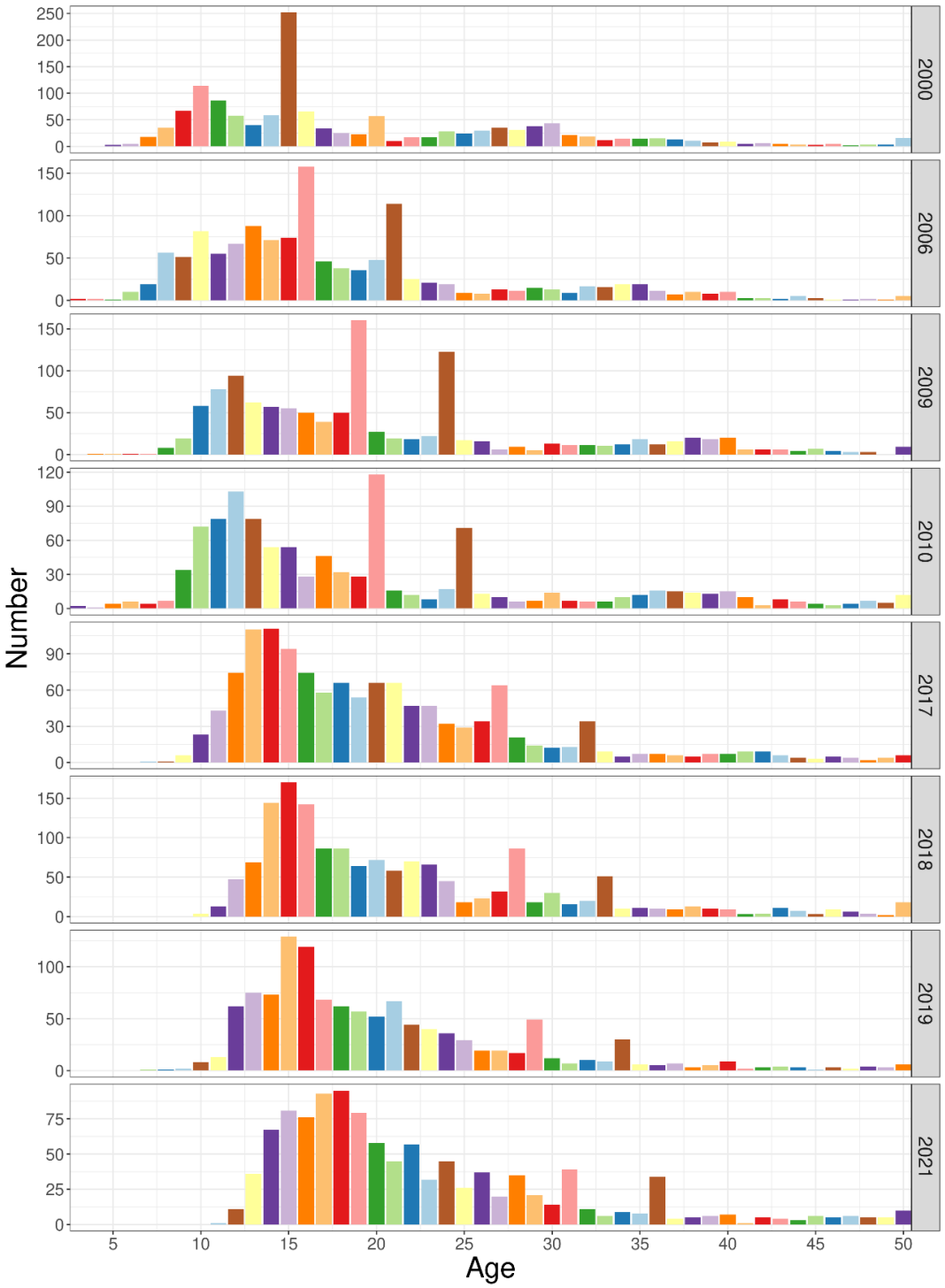


**Figure 6. Icelandic slope beaked redfish. Age distribution from the Icelandic autumn survey in 2000 (n = 1405), 2006 (n = 1304), 2009 (n = 1206), 2010 (n = 1101), 2017 (n = 1299), 2018 (n = 1568), 2019 (n = 1176), and 2021 (n = 1107. The age class 50 are the combined age-classes of 50 years and older.**

# INFORMATION FROM THE FISHING INDUSTRY

## LANDINGS

Total annual landings of Icelandic slope beaked redfish from the Icelandic Waters Ecoregion 1950–2022 are presented in Figure 7.

During the 1950–1977 period, before the extension of the Icelandic EEZ to 200 NM, Icelandic slope beaked redfish was mainly fished by West-Germany. The catches peaked in 1953 to about 87 000 t but gradually decreased to about 23 000 t in 1977. After the extension of the Icelandic EEZ in 1978 the fishery has almost exclusively been conducted by Icelandic vessels. Annual landings gradually decreased from 57 000 t in 1994 to 17 000 t in 2001 and were at that level until 2010. Annual landings in the years 2011–2022 were between 8 300 and 12 000 t. The total catch in 2022 were 9 457 t, a decrease of about 1 000 t from previous year.

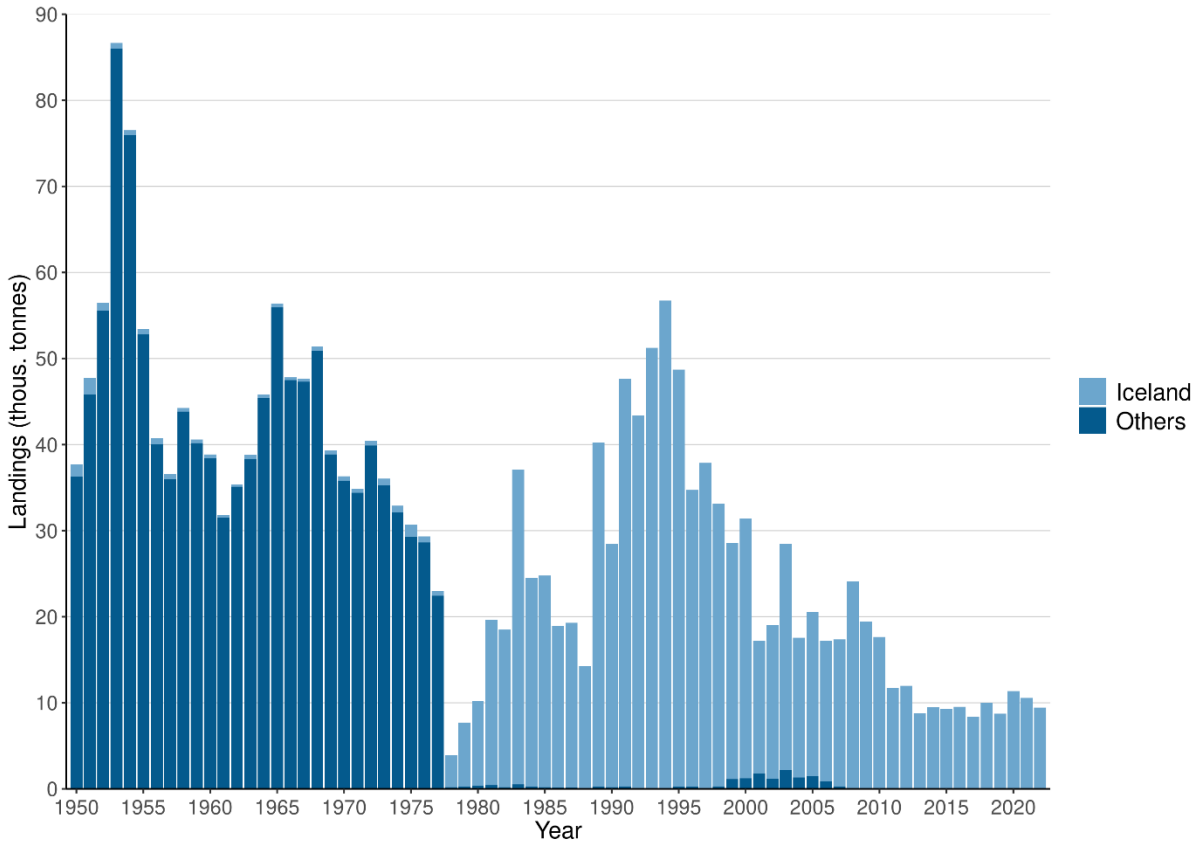


**Figure 7. Icelandic slope beaked redfish. Nominal landings (in tonnes) from Icelandic waters (ICES Division 5.a and Subarea 14) 1950–2022.**

## FISHERIES AND FLEETS

The fishery for Icelandic slope beaked redfish in Icelandic waters is a directed bottom trawl fishery along the shelf and slope southwest and west of Iceland at depths between 500 and 800 m (Figure 8). The total number of boats that account for 95% of fishery have been declining steadily (Figure 9). In 1995 about 50 vessels fished for the stock but were around 20 in 2022.

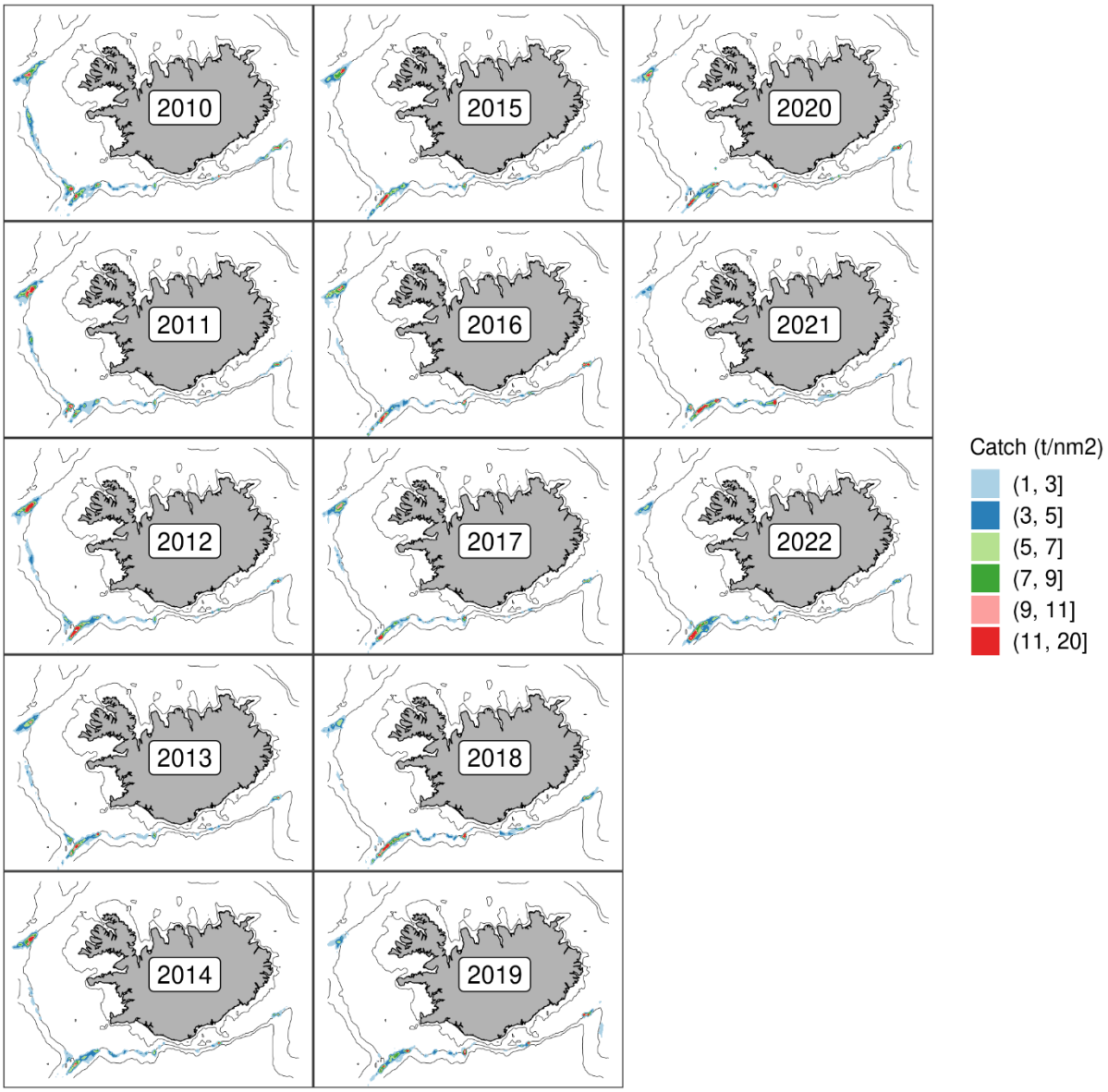


**Figure 8. Icelandic slope beaked redfish. Geographical location of the bottom trawl catches in Icelandic waters (ICES Division 5.a and Subarea 14) 2010–2022 as reported in logbooks of the Icelandic fleet. The black line indicates part of the management unit for the deep-pelagic redfish stock. The dotted line represents the 100, 500 and 1000 m isobaths.**

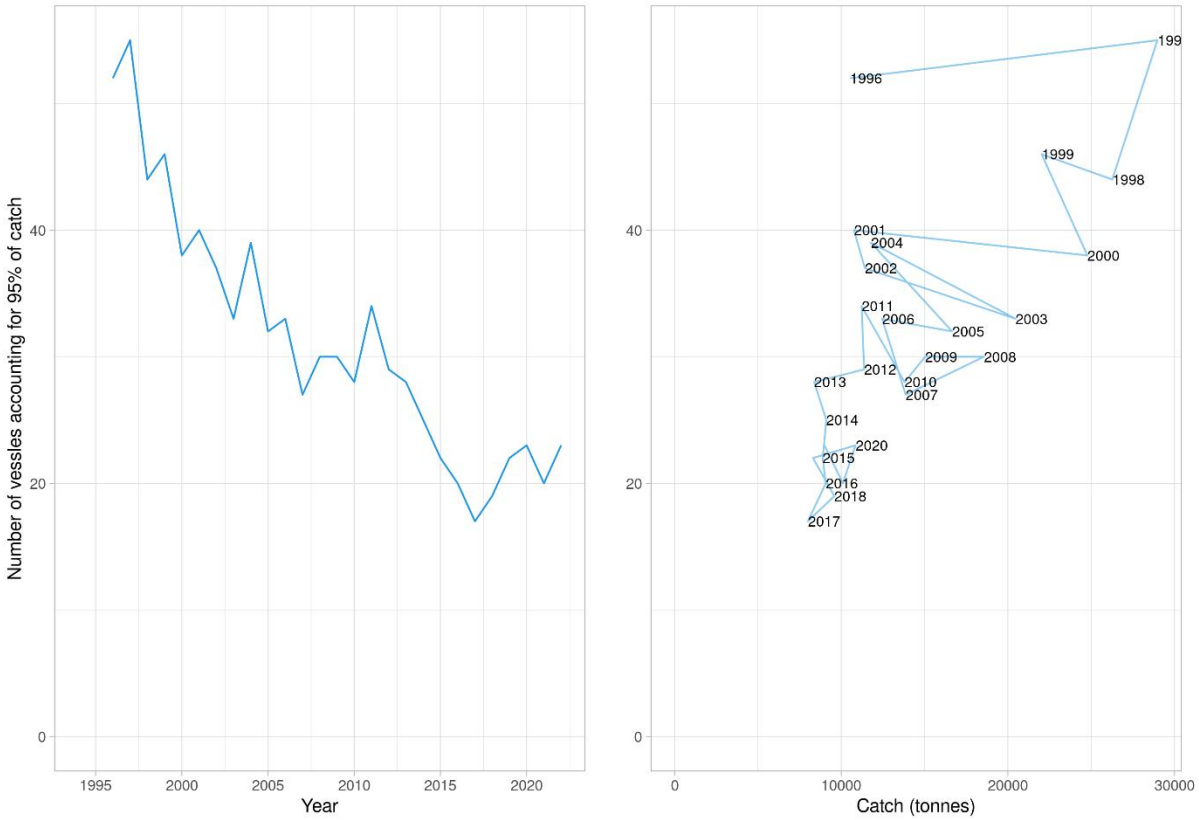


**Figure 9. Icelandic slope beaked redfish. Number of vessels (all gear types) accounting for 95% of the total catch annually since 1994. Left: Plotted against year. Right: Plotted against total catch. Data from the Directorate of Fisheries.**

## SAMPLING FROM THE COMMERCIAL FISHERY

Table 1 shows biological sampling from the catch of Icelandic slope beaked redfish in the Icelandic Waters ecoregion 2000–2022. Number of samples and the number of length measurements have decreased since 2012. Only seven samples were taken in 2022, and 241 individuals length measured which is considerably less than in previous years (Figure 10). The reason is reduced sampling effort of onboard observers from the Directorate of Fisheries. Very few samples were taken in the south-west fishing area in 2022 compared to previous three years (Figure 11).

**Table 1. Icelandic slope beaked redfish. Number of samples and number of fish length measured from the commercial catches 2000–2022.**

| Year | Samples | Measurements |
|---|---|---|
| 2000 | 202 | 42 253 |
| 2001 | 103 | 19 737 |
| 2002 | 179 | 32 864 |
| 2003 | 168 | 29 318 |
| 2004 | 140 | 22 309 |
| 2005 | 207 | 34 233 |
| 2006 | 256 | 40 261 |
| 2007 | 142 | 22 689 |
| 2008 | 200 | 33 880 |
| 2009 | 184 | 30 606 |
| 2010 | 168 | 28 463 |
| 2011 | 138 | 21 239 |
| 2012 | 68 | 11 118 |
| 2013 | 64 | 9 468 |
| 2014 | 93 | 15 380 |
| 2015 | 58 | 9 089 |
| 2016 | 92 | 13 715 |
| 2017 | 57 | 10 453 |
| 2018 | 26 | 4 787 |
| 2019 | 41 | 7 676 |
| 2020 | 27 | 5 408 |
| 2021 | 23 | 4 005 |
| 2022 | 7 | 241 |

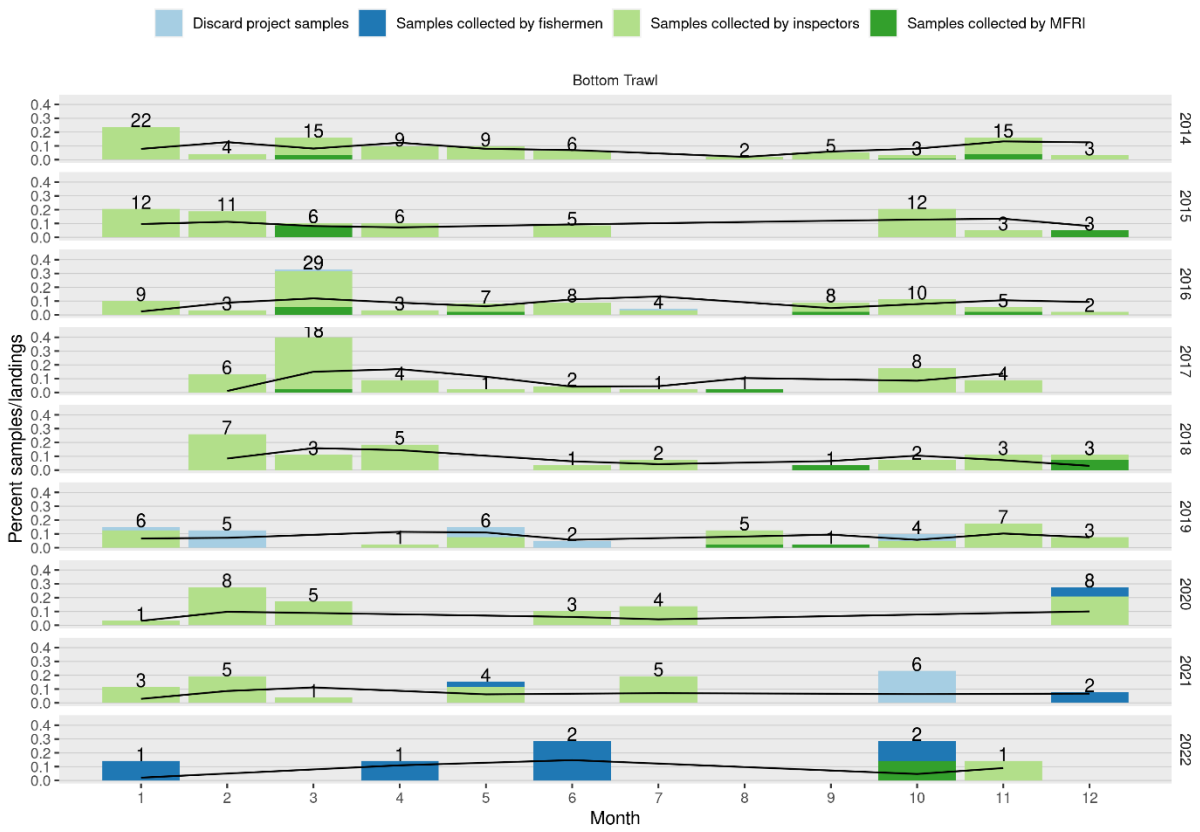


**Figure 10. Icelandic slope beaked redfish. Ratio of samples by month (blue bars) compared with landings by month (solid black line) 2014–2022. Numbers of above the bars indicate number of samples by year and month.**

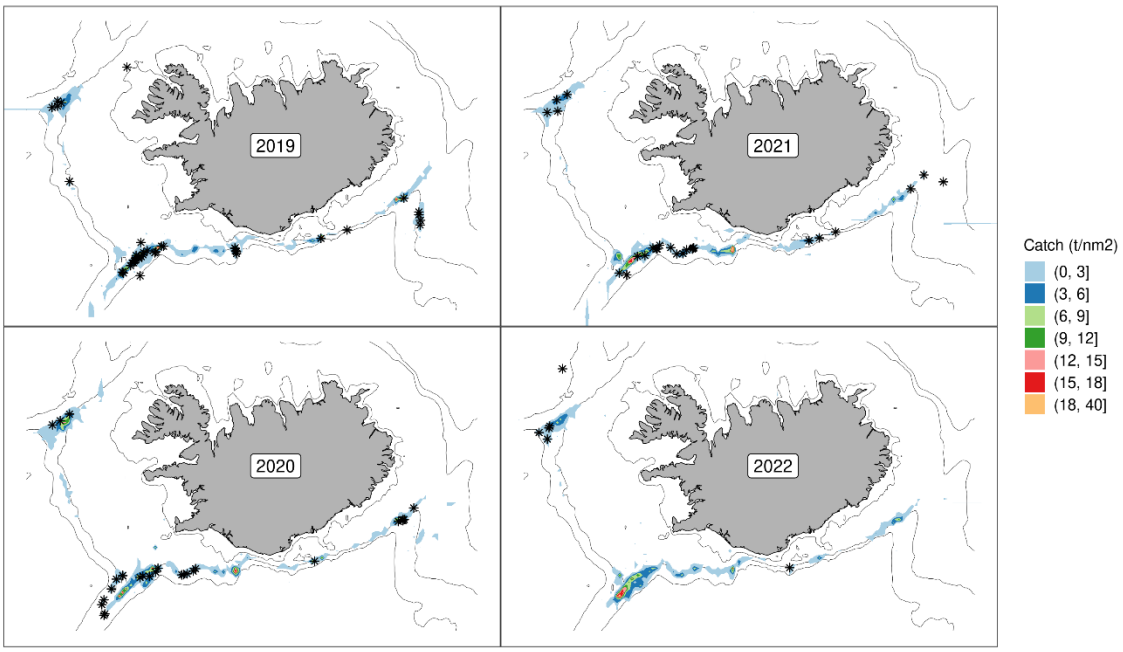


**Figure 11. Icelandic slope beaked redfish. Fishing grounds in the years 2019–2022 as reported in logbooks (contours) and positions of samples taken from landings (asterisks) by year.**

## LENGTH DISTRIBUTION FROM THE COMMERCIAL CATCH

Length distributions of Icelandic slope beaked redfish from the bottom trawl fishery show an increase in the number of small fish in the catch in 1994 compared to previous years (Figure 12). The peak of about 32 cm in 1994 can be followed by approximately 1 cm annual increase in 1996–2002. The length distribution in 2004–2022 peaked around 39–42 cm. The length distribution of Icelandic slope beaked redfish from the pelagic fishery, where available, showed that in most years the fish was on average bigger than taken in the bottom trawl fishery (Figure 12).

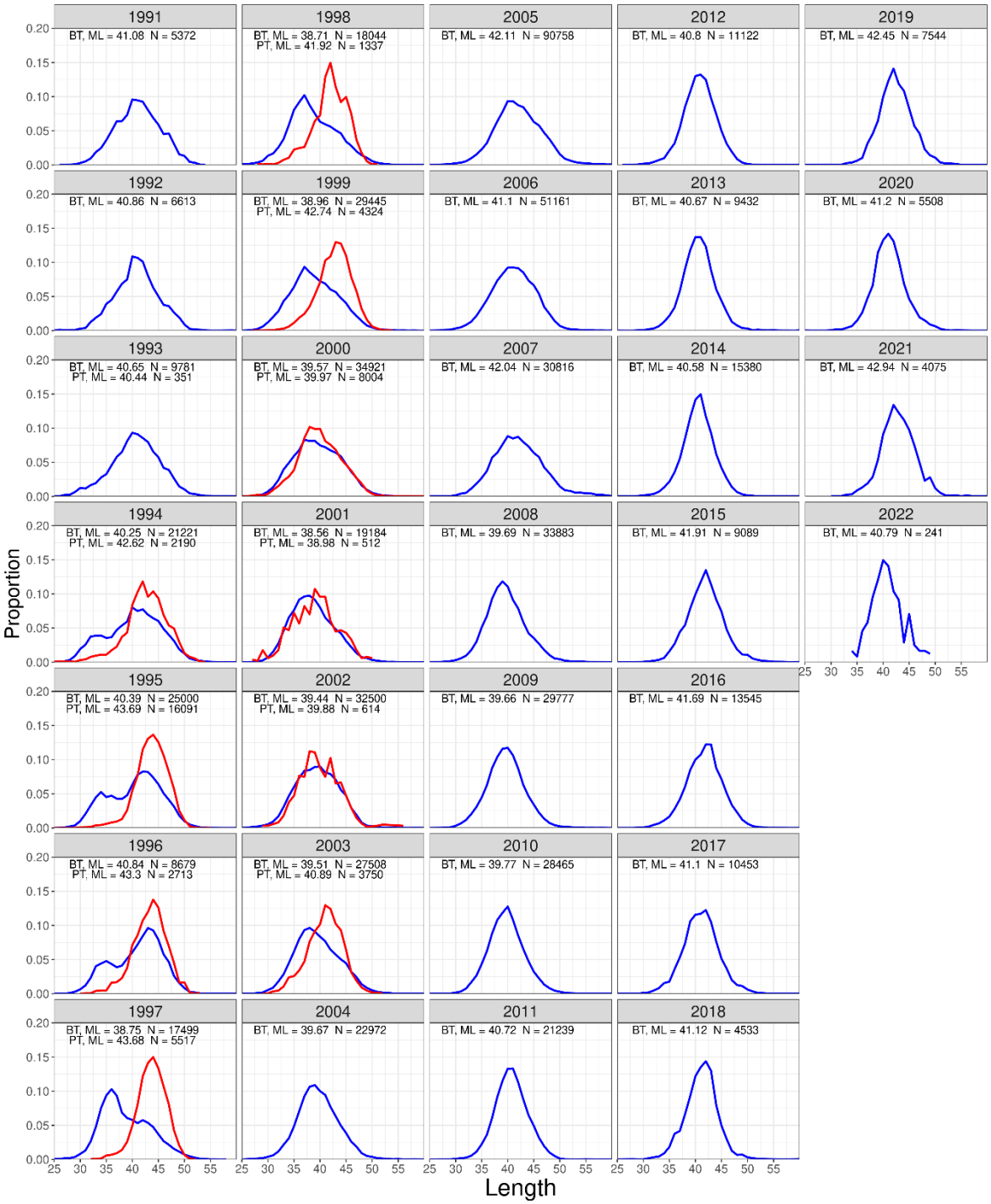


**Figure 12. Icelandic slope beaked redfish. Length distributions from the Icelandic commercial landings taken with bottom trawl (blue line) and pelagic trawl (red line) in Icelandic waters (ICES Division 5.a and Subarea 14) 1991–2022.**

## CATCH PER UNIT EFFORT

Trends in non-standardized CPUE (kg/hour) and effort (thousand hours fished) are shown in Figure 13. CPUE of tows where more than 50% and 80% of the catch was Icelandic slope beaked redfish gradually decreased from 1978 to a record low in 1994. Since then, CPUE has been steadily increasing and was in 2020 and 2021 at the highest level observed in the time series. From 1991 to 1994, when CPUE decreased, the fishing effort increased significantly. Since then, effort has decreased and is now at a similar level as in 1980. CPUE and effort data were not available for 2022.

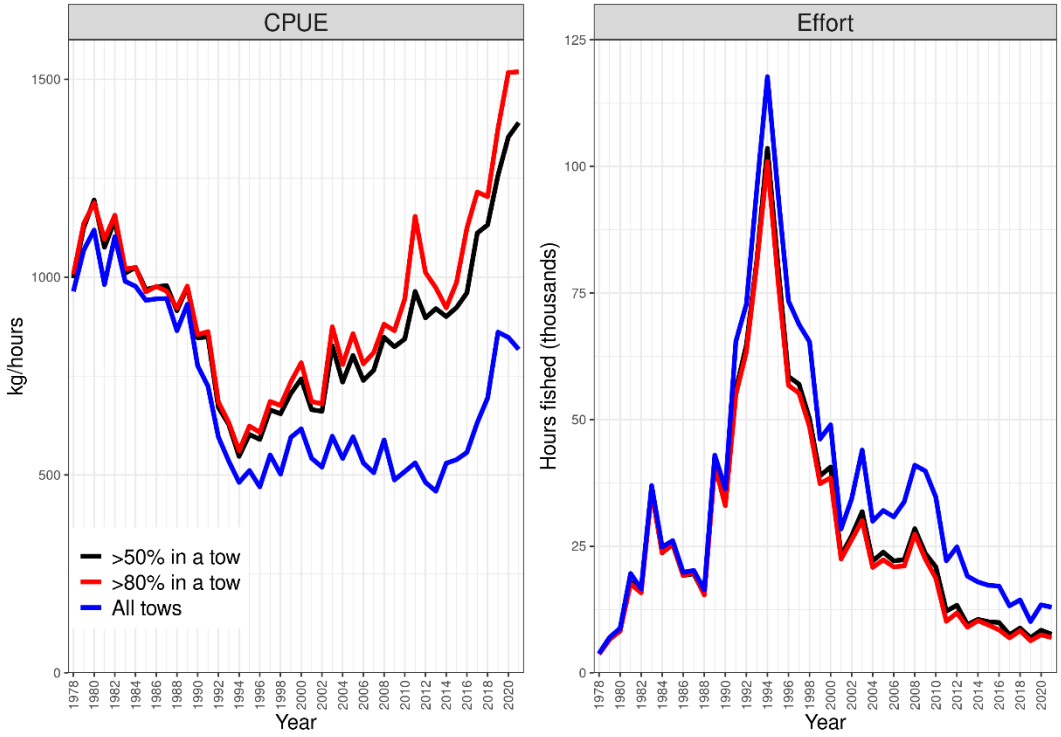


**Figure 13. Icelandic slope beaked redfish. CPUE and effort from Icelandic trawlers 1978–2021 where beaked redfish catch composed at least 50% of the total catch in each haul (black line), 80% of the total catch (red line) and in all tows where beaked redfish was caught (blue line). The data for 2022 was not available.**

## DISCARD

Although no direct measurements are available on discards, it is believed that there are no significant discards of Icelandic slope *S. mentella* in the Icelandic redfish fishery.

## ANALYTICAL ASSESSMENT

The stock was benchmarked in 2023 (ICES, 2023) and is now assessed as a category 1 stock using an age- and length-based assessment model (Gadget). During the meeting the reference points were defined.

### MATURITY

Maturity-at-age are shown Figure 14. Males mature at earlier age than females. Most of the fish is mature at age around 20 years old.

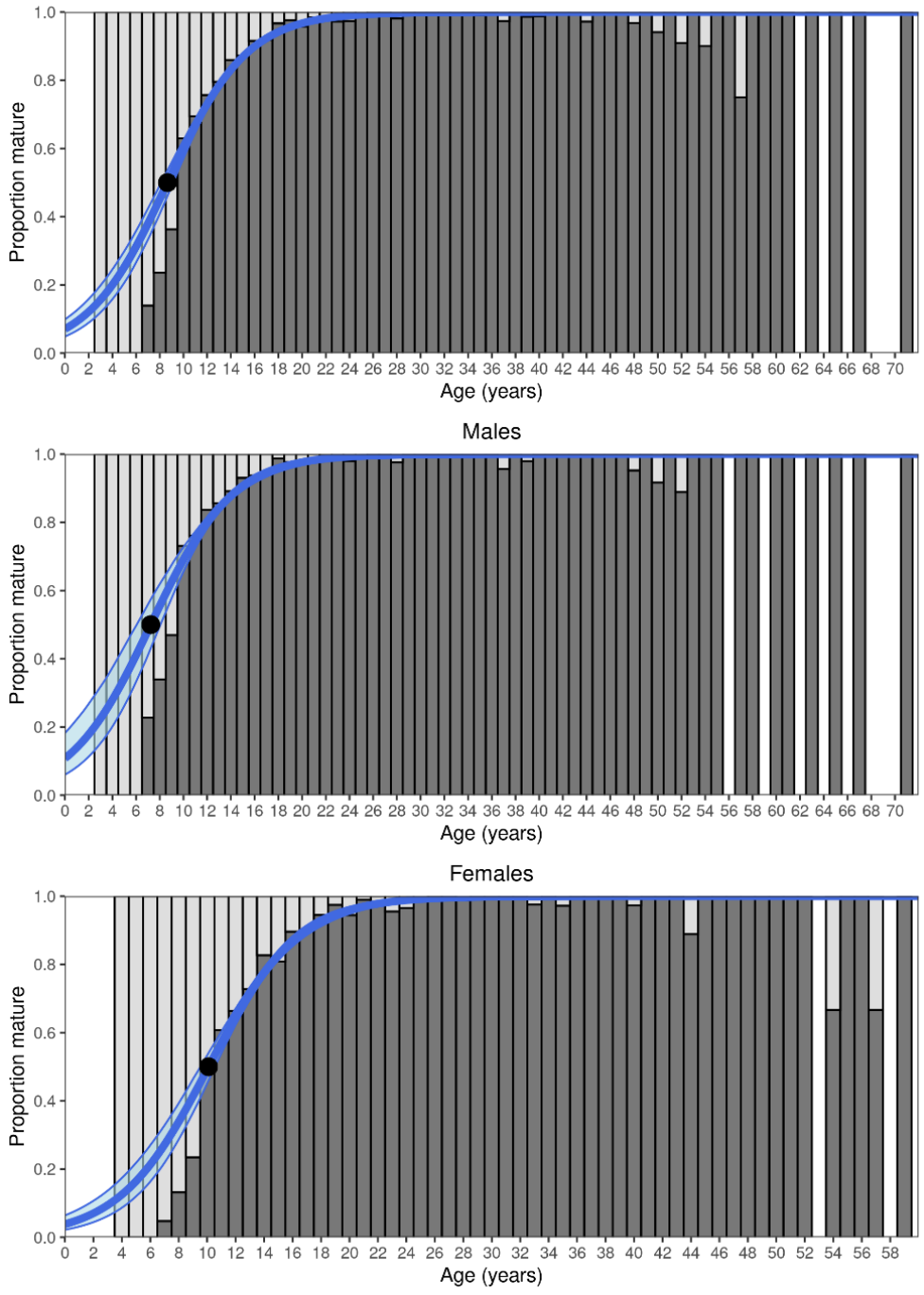


**Figure 14. Icelandic slope beaked redfish. Maturity at age in the Autumn survey of both sexes combined (top), males (middle) and females (bottom) 2000–2022. All years combined. The blue line indicates the maturity curve and the black point age at which 50% is mature.**

## NATURAL MORTALITY

Natural mortality $M$ for long-lived species is considered low. In the assessment model presented here, $M$ was set as 0.05.

## ASSESSMENT

### DATA

The model uses multiple disparate datasets. The input data includes:

- Length disaggregated survey indices from the Autumn Survey IS-SMH (2000–2022, excluding 2011).
- Length distributions from the Icelandic commercial bottom trawl fleet (1975–2022).
- Landings per 6-month period from Iceland (1975–2022).
- Age-length distributions from the Autumn Survey.
- Maturation data from the Autumn survey.

An overview of the input data and their annual availability is shown in Figure 15.

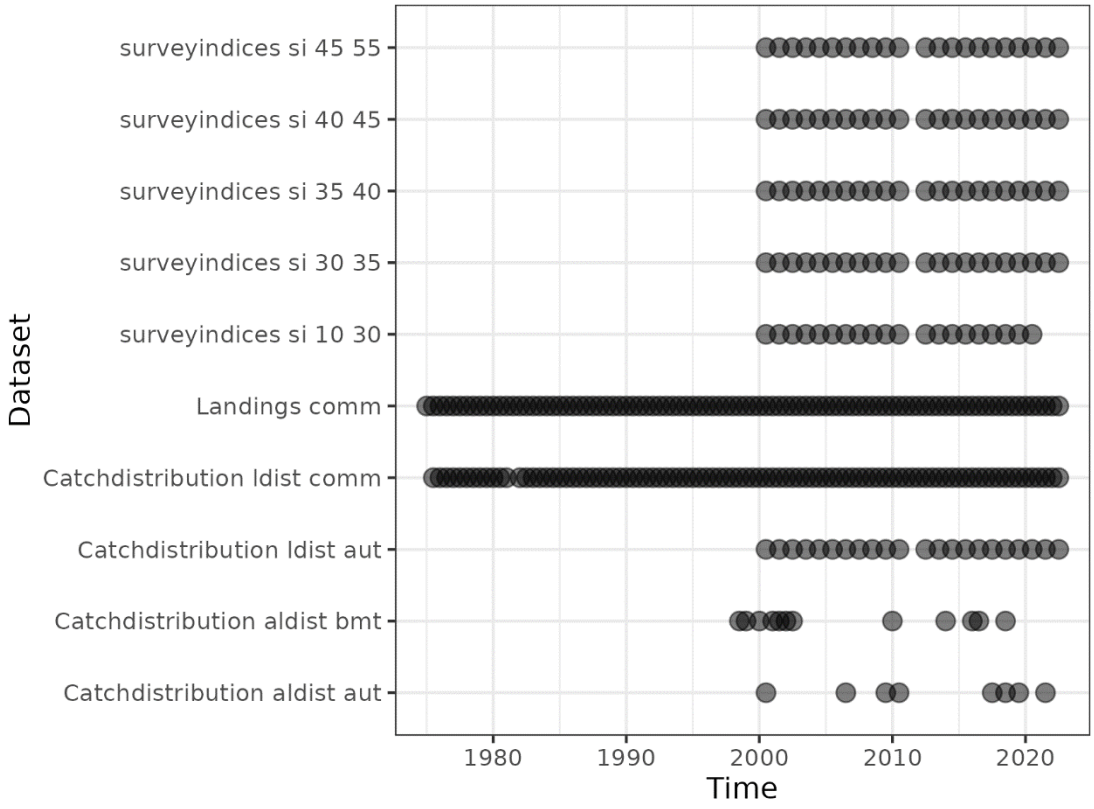


**Figure 15. Icelandic slope beaked redfish. Overview of the datasets used in the Gadget model and when they are available.**

### MODEL SETTINGS

- The model runs from 1975 to 2023. Each year is divided into two 6-month time-steps.
- Two sub-stocks are modelled:
    - An immature stock that has an age range of 3–20 years.
    - A mature stock that has an age range of 5–50 years.
- The oldest age is treated as a plus group (50 years and older).
- Movement from the immature stock to mature stock occurs via:

  - Maturation (using a length-based ogive)
  - Ageing (20-year-old fish automatically move to the mature stock at the end of the year).
- Modelled length ranged from 5–60 cm (with no mature individual 50 cm). Each length group was 1 cm.
- Recruitment to the immature stock occurs at age 3.
- The length increments in the survey were 10–30 cm, 30–35 cm, 34–40 cm, 41–45 cm, and 46–55 cm (in total five length bins).
- One commercial fleet (bottom trawl).

## MODEL PROCESSES

- Natural mortality:
  - Natural mortality, $M_a$, fixed at 0.05 for all ages. The value chosen was based on settings in other redfish stocks.
- Growth:
  - Length-based Von Bertalanffy growth function, k, $L_\infty$, informed by age–length frequencies.
  - Parameter β of the beta-binomial distribution controlling the spread of the length distribution.
  - Maximum length group growth was set to 5 cm per timestep.
  - Length-weight relationship αs, βs, were fixed based on the means of log-linear regression of Autumn survey data.
- Maturity:
  - The logistic length-based maturity ogive αm, l50 was estimated from Autumn survey data.
- Recruitment:
  - Annual recruitment occurs in the first timestep, one parameter per year, Ry, and y ∈ (1970, 2020).
  - Recruitment scalar, Rc, is multiplied against all Ry to help optimization.
  - Mean length at recruitment, l0, is estimated.
  - Length at recruitment has a CV of 0.1, based on Autumn survey.
- Initial population:
  - Total initial abundance of both stocks, N0, is estimated.
  - Initial numbers-at-age calculated via $N0,a = N0 \times e-a(Ma+F0)$
  - The additional mortality parameter $F0$ determines the steepness of the initial numbers-at-age reflecting previous effects of fishing (estimated).
  - Initial numbers-at-age is subsequently split between stocks using an age-based ogive. The age at which 50% of the stock was mature, $a50$, was estimated from the Autumn survey data and was fixed in the model, the alpha parameter of the ogive $\alpha a$ was estimated.
  - Initial mean length at age were based on the Von Bertalanffy growth function (see above).
  - Variance in initial length at age was fixed and based on length distributions obtained in the autumn survey for each stock.
- Fleet operation:
  - Two fleets: commercial bottom trawl and Autumn survey fleet.

- Logistic fleet selection, αf, l50; one set for each of the fleets (Autumn survey or Commercial).

## LENGTH-WEIGHT RELATIONSHIP

The conversion from length to weight uses the following formula:

$$W_l = \alpha * l^{\beta}$$

In the model, the alpha and beta parameters are fixed and estimated from biological information collected during the Icelandic autumn survey. The observed values and estimated relationship are shown in Figure 16.

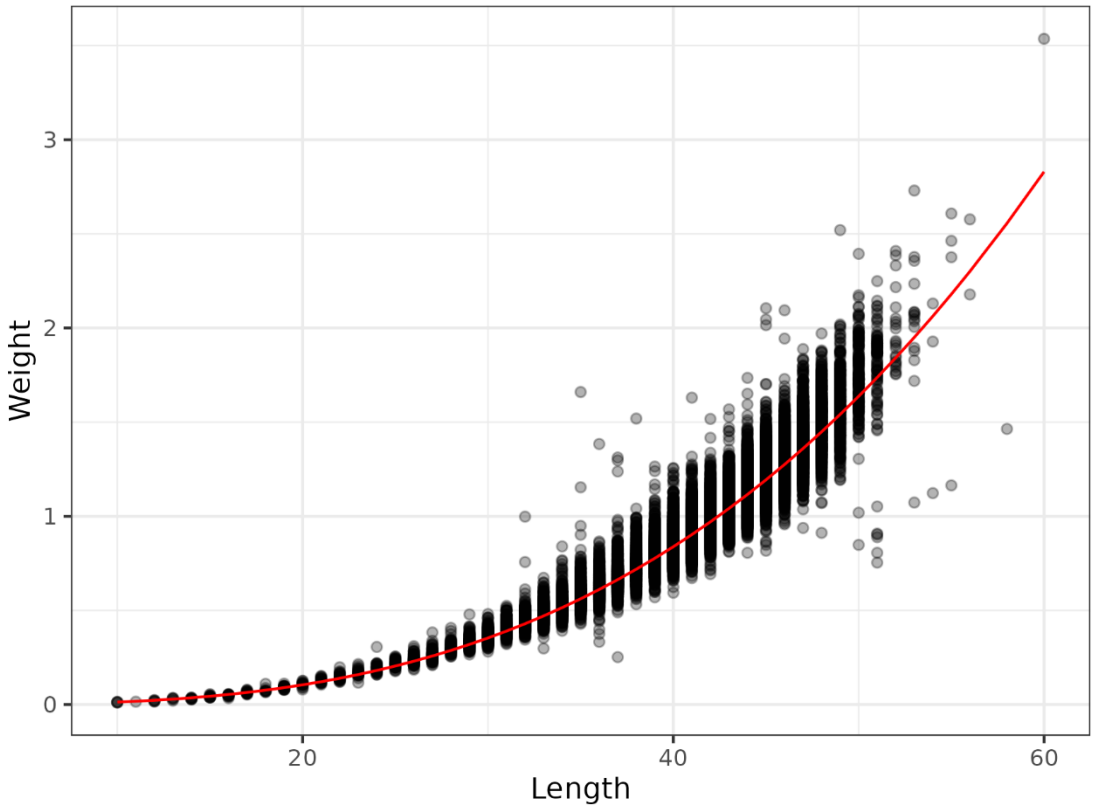


**Figure 16. Icelandic slope beaked redfish. Observed length–weight relationship (dots) and the fitted relationship (red line).**

## DIAGNOSTICS AND MODEL FIT

Survey indices can be variable for the Icelandic slope beaked redfish due to its tendency to be influenced by a few very large hauls. The index data used as input here are the total raw numbers of fish caught (within length slices) in the entire autumn survey. Although they are expected to represent the entire stock, they are also expected to be highly variable because no treatment or data pre-processing has been performed to reduce this variability. This variability is reflected in the model's fit to the survey index data (Figure 17). In general, the model appears to follow the stock trends historically, although abundance is underestimated from 2000 to 2003 for the 10–30 cm, 30–35 cm, and 35–40 cm length groups. The terminal estimates do not deviate from the observed value for the for any of the length groups (Figure 17).

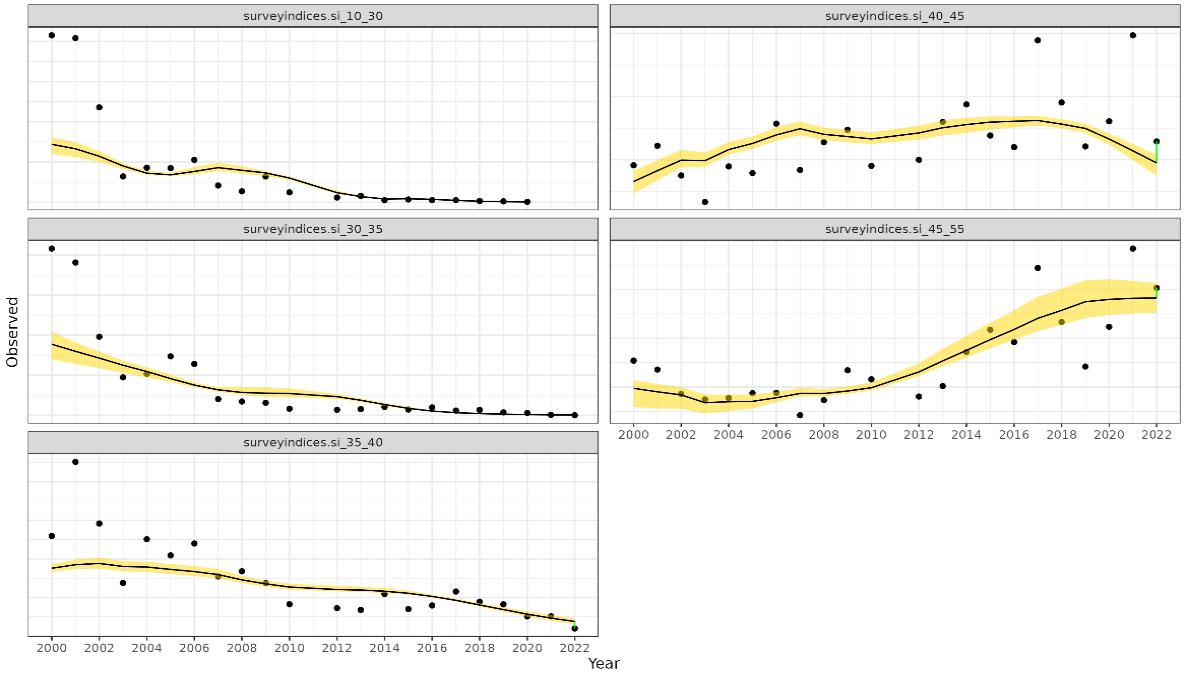


**Figure 17. Icelandic slope beaked redfish. Autumn survey index number fits (lines) to data (points). The yellow ribbon shows the 90% confidence intervals. The vertical green lines highlight the difference between the observed and predicted values in the terminal year.**

## LENGTH AND AGE DISTRIBUTION

The model estimated catch composition is illustrated in Figure 18 to Figure 21, with corresponding residual plots for each catch composition component shown in Figure 22. The model fits both length distributions good (Figure 18 and Figure 20), although in some years, it is noticeable that the model is not capturing the peaks (ca. 40–45 cm fish) in the Autumn survey data (see 2012 to 2015 in Figure 18). The fits to the age distribution data from the autumn survey show that the fit is not particularly good for the oldest ages (30+) where the model underestimates these ages (Figure 19). Furthermore, the model overestimates certain age classes which can be followed through years, first in 2009 as 12-19 years old fish and then again in 2017 and 2018 as 20–28 years old fish. The fit to the commercial age-length distributions is worse; however, this is likely because there are few age readings in each time step (Figure 21). There are no discernible patterns in the residuals for any of the catch composition components (Figure 22).

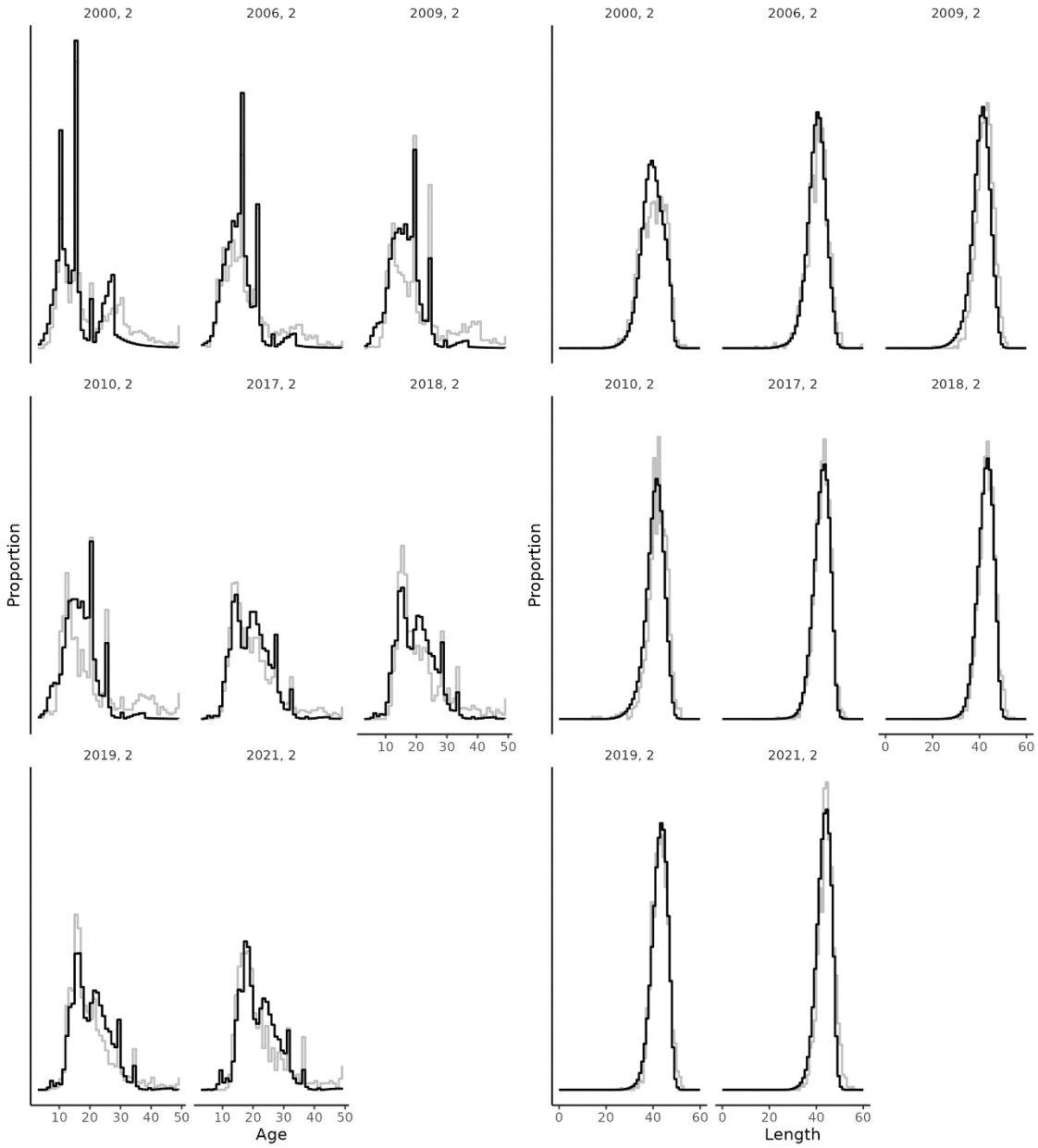


**Figure 18. Icelandic slope beaked redfish. Comparison of autumn survey age distribution fits between model fits (black) and data (grey). Labels indicate the year and step of data sampled and model comparison.**

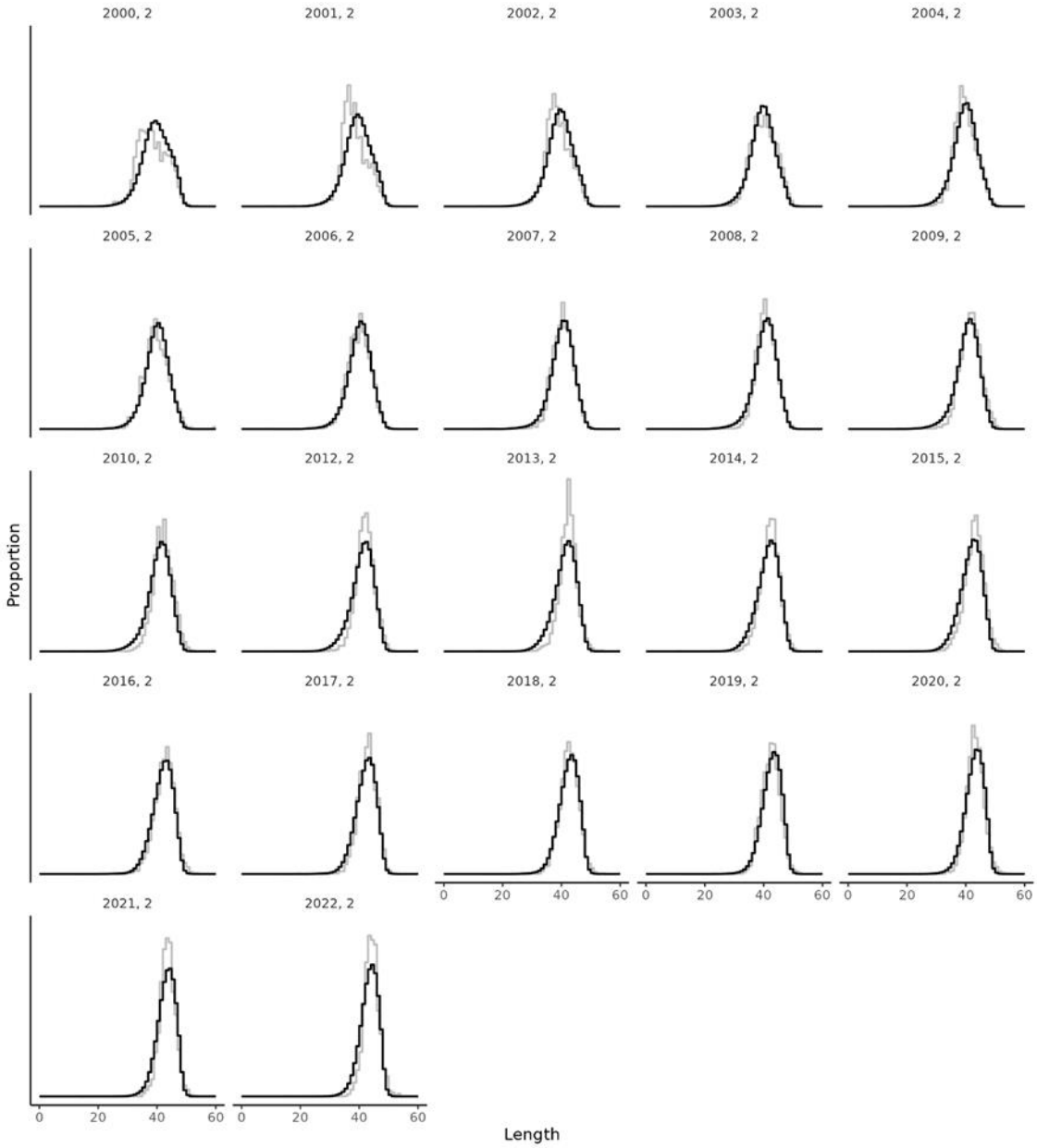


**Figure 19. Icelandic slope beaked redfish. Comparison of autumn survey length distribution fits between model fits (black) and data (grey). Labels indicate the year and step of data sampled and model comparison.**

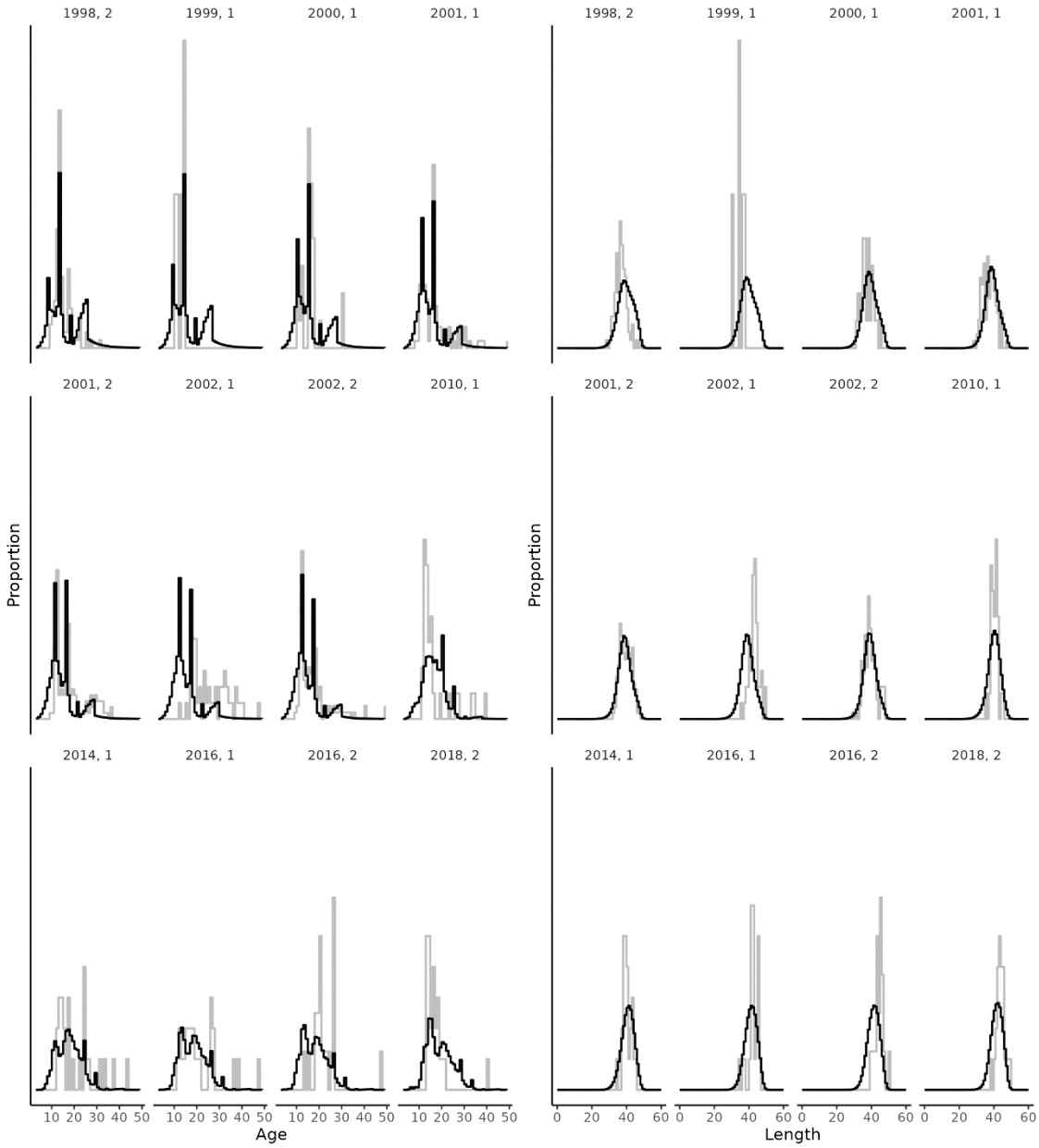


**Figure 20. Icelandic slope beaked redfish. Comparison of commercial sample age-length distribution fits between model fits (black) and data (grey). Labels indicate the year and step of data sampled and model comparison.**

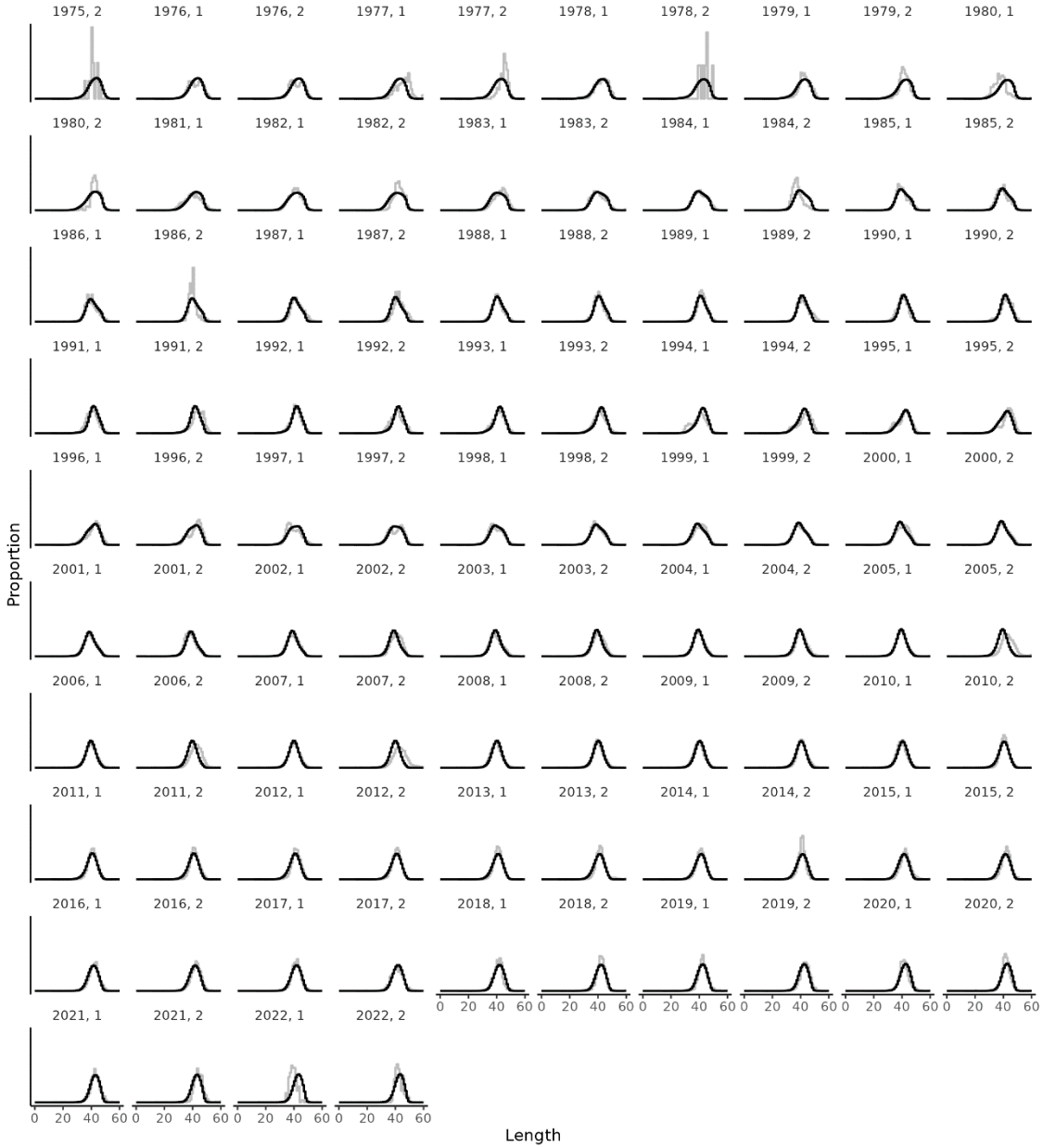


**Figure 21. Icelandic slope beaked redfish. Comparison of commercial sample length distribution fits between model fits (black) and data (grey). Labels indicate the year and step of data sampled and model comparison.**

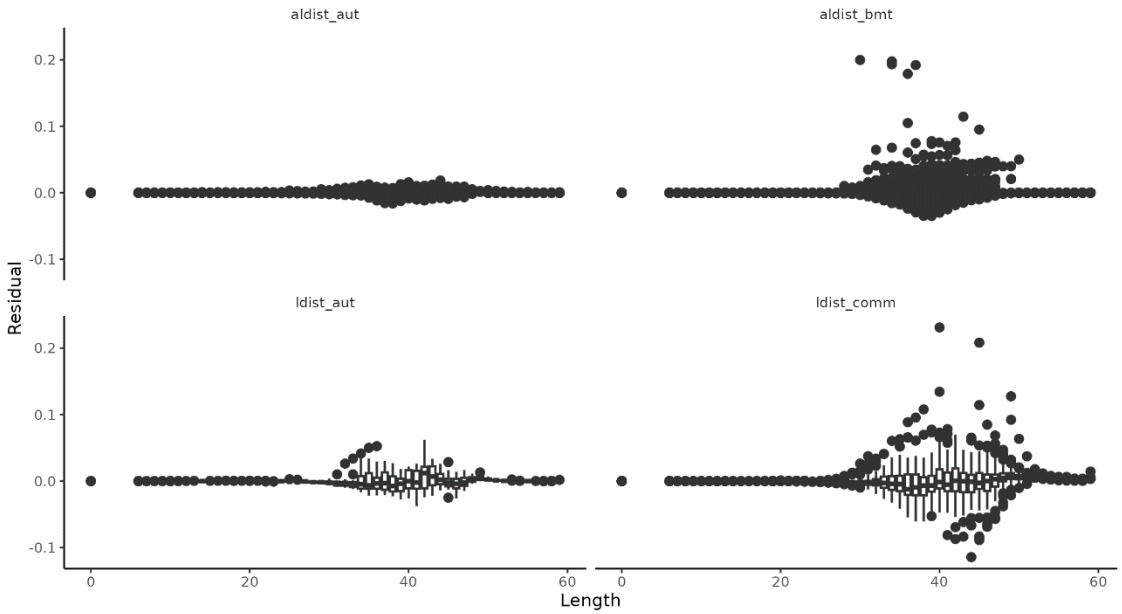


**Figure 22: Icelandic slope beaked redfish. Model residuals for each catch composition likelihood component.**

## GROWTH

For the Autumn survey, the growth patterns predicted by the model closely follow the observed growth from approximately age 10 onwards; however, prior to age 10, growth is underestimated (Figure 23). This noticeable shift is consistent between years suggesting that allowing for age specific variation in growth will improve the model. The model also fits the growth data from the bottom trawl consistently, although a similar trend of underestimating the growth rate in the younger ages is also apparent in 2001 and 2002 (Figure 24). This suggests that the model is overestimating the recruitment length, although it should be noted that (1) the age-length data is sparser for the younger ages, and (2) that because the stock does not enter the fishery until later ages, the beta-binomial length update will have created plausible standard deviations in the length at age by that time.

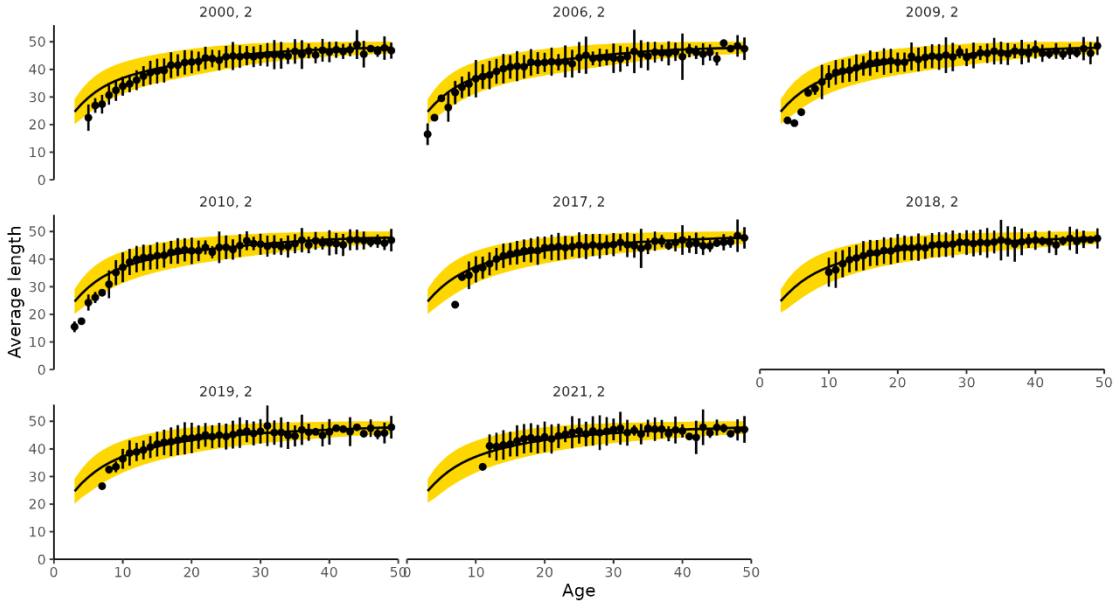


**Figure 23. Icelandic slope beaked redfish. Model growth estimations for the Autumn survey. Yellow bands and the black line show where the mean and 90% confidence intervals of the of model predictions, whereas the points and error bars show the mean and 90% confidence intervals of the data.**

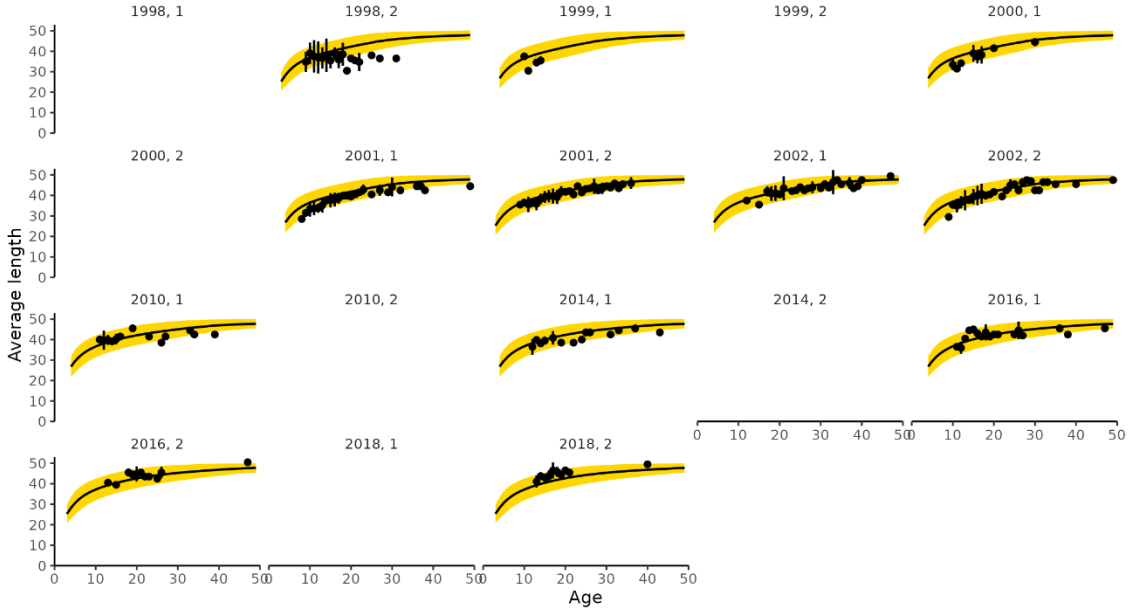


**Figure 24. Icelandic slope beaked redfish. Model growth estimations for the commercial fleet. Yellow bands and the black line show where the mean and 90% confidence intervals of the of model predictions, whereas the points and error bars show the mean and 90% confidence intervals of the data.**

## MATURATION

The model's fit to the maturation data is shown in Figure 25.

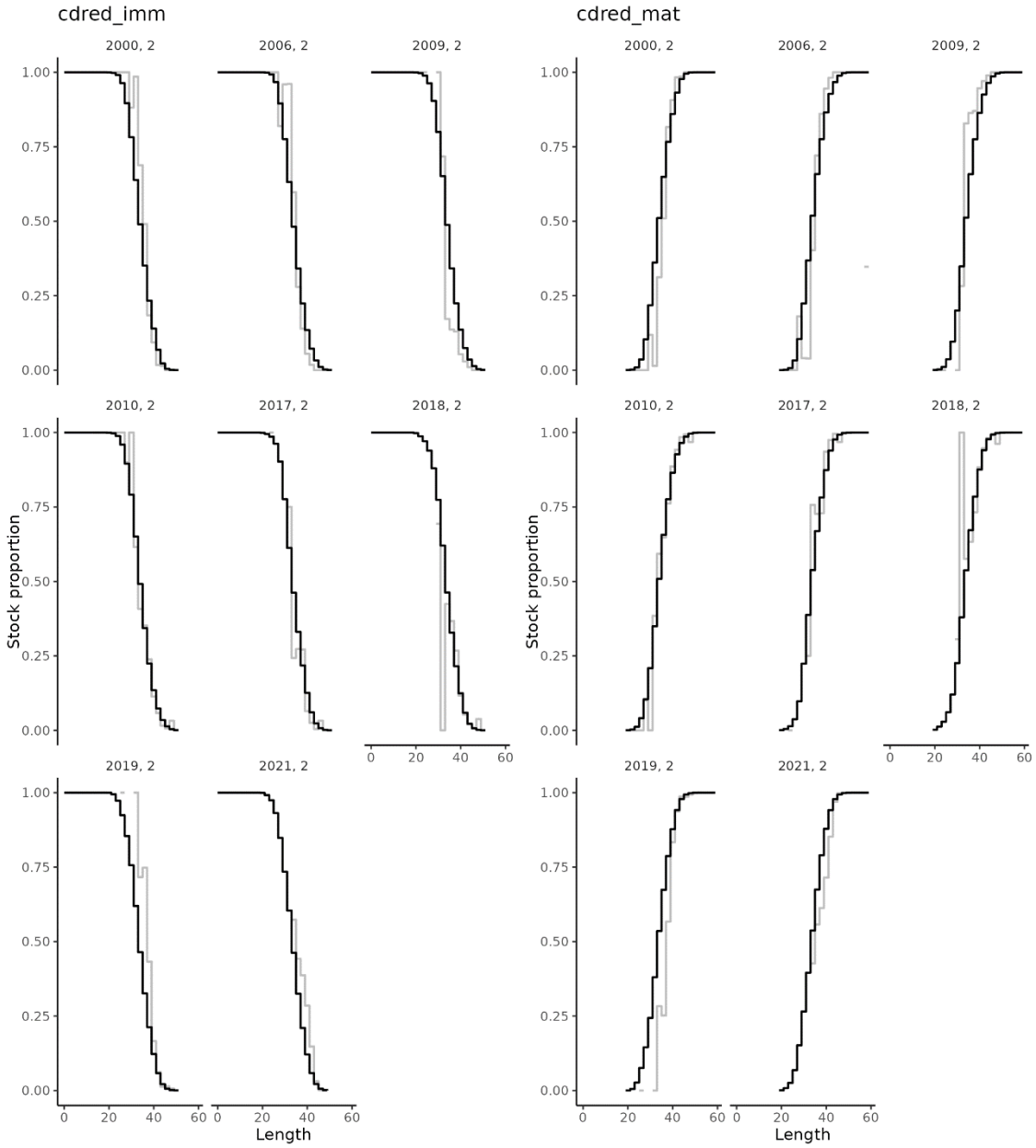


**Figure 25. Icelandic slope beaked redfish. Observed (grey lines; Autumn survey) and estimated (black lines) proportions for the immature (left, cred_imm) and mature (right, cred_mat) sub-stocks per length interval.**

## FLEET SELECTIVITY

Estimated length-based selection by fleet is shown in Figure 26.

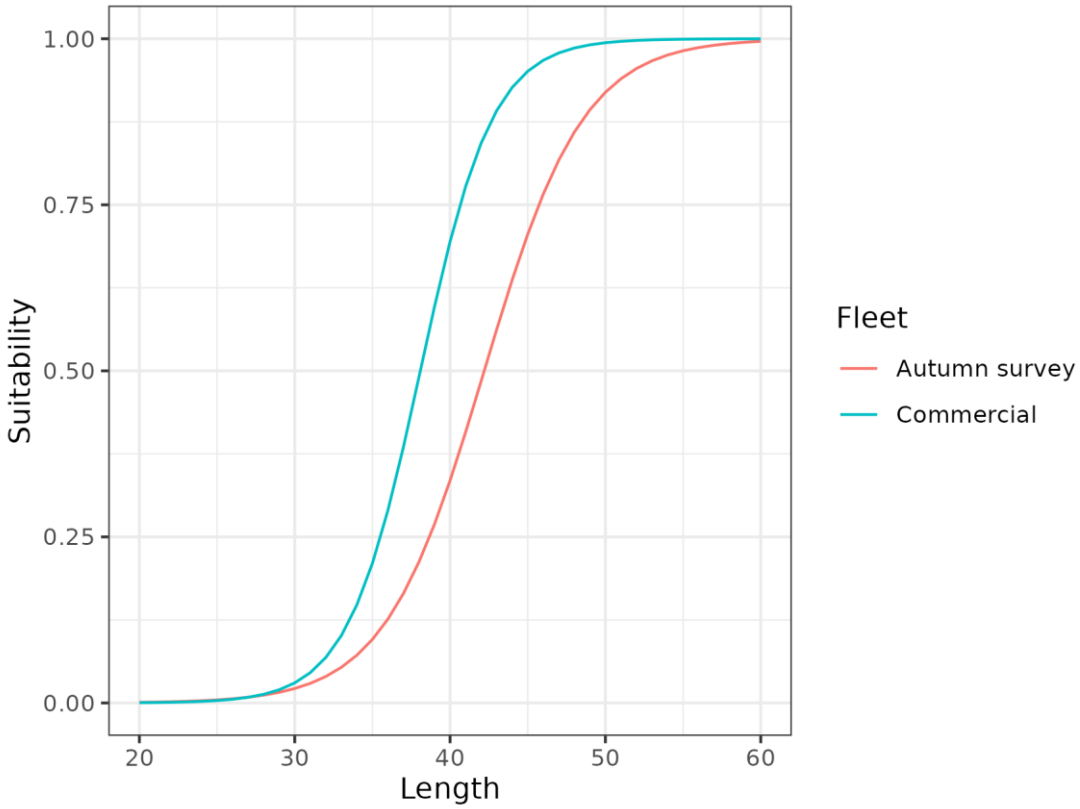


**Figure 26. Icelandic slope beaked redfish. Selection (suitability) by length for the autumn survey and commercial bottom trawl fleet.**

## MODEL RESULTS

Annual output from the final model is shown in Figure 27. A steep decline in the spawning stock is seen from the late 1980s to the early 2000s. This is followed by a period of stability in the 2000s and a gradual decline in the 2010s. The SSB is currently at its lowest point in the time-series. Since a recruitment spike in 2003, annual recruitment has also steadily declined, and furthermore, since 2010 recruitment has remained at exceptionally low values resulting in a declining total stock size and a stock composition that is increasingly dominated by older, mature fish. Fishing mortality has declined since the 1990s and was fairly stable around 0.9 from 2013–2019 and 1.1 from 2020–2022.

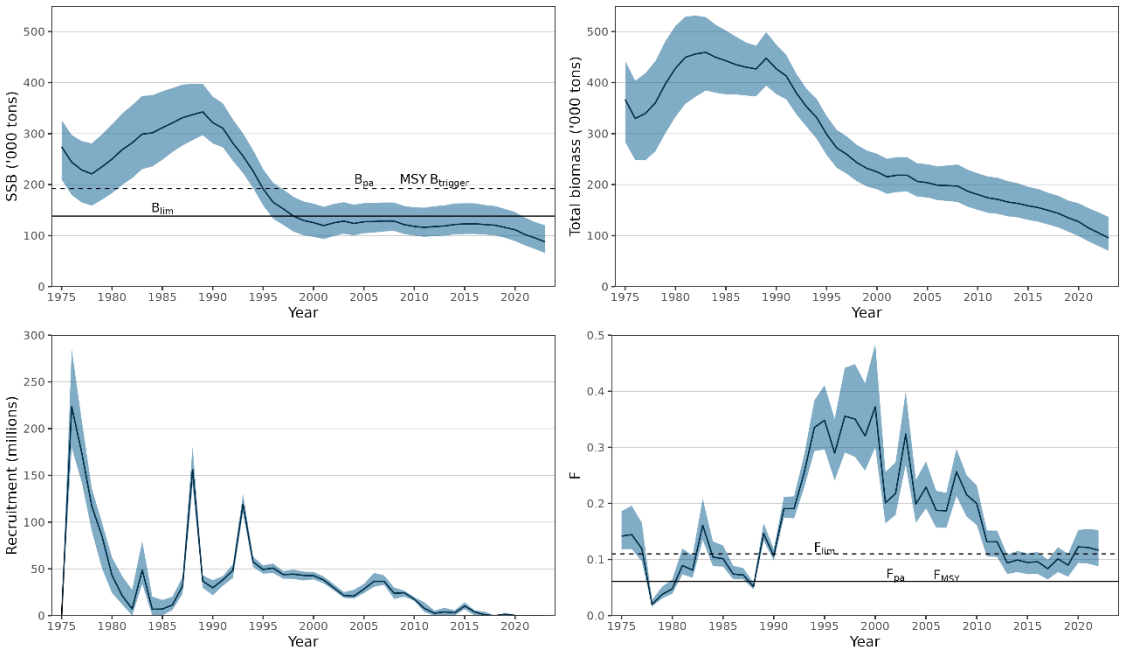


**Figure 27. Icelandic slope beaked redfish. Summary from the assessment.**

## RETROSPECTIVE ANALYSIS

The analytical retrospective analysis is shown in Figure 28. An upward revision in biomass (and thus downward revision in F) occurs from the 2nd peel onwards. The revision is larger in the third, fourth and fifth peels. As this trend is consistent, it suggests uncertainty in the model output; however, it should be noted that the larger revisions also coincide with the removal of age data. Notably, the last three years of age data from the Autumn survey are removed in the 3rd, 4th, and 5th peels (see Figure 18).

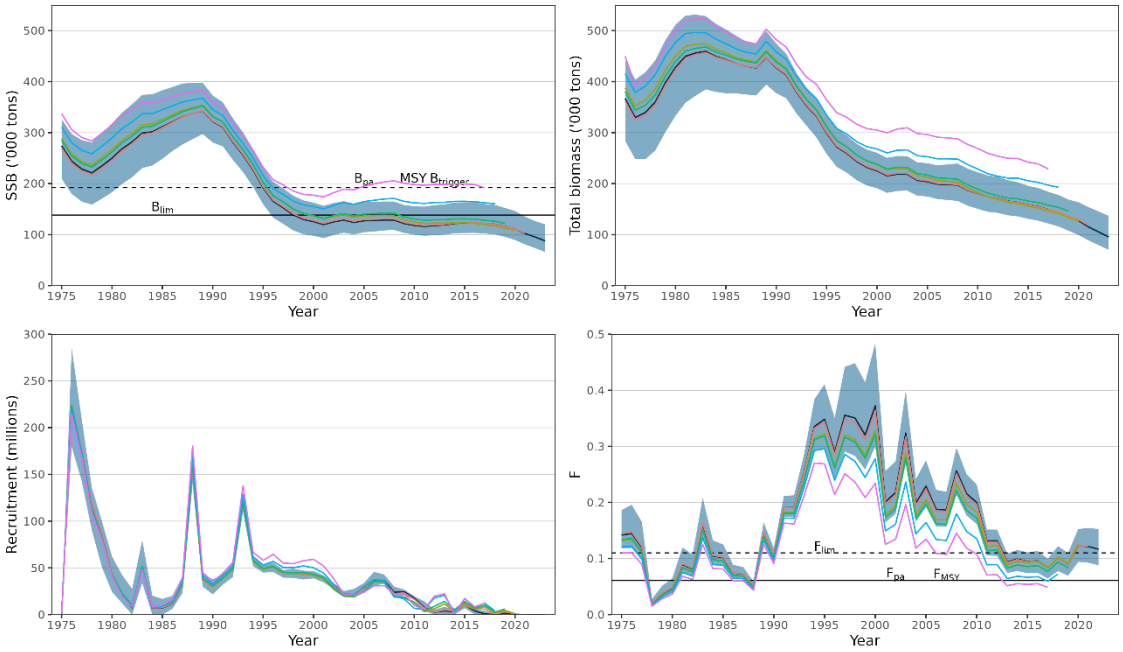


**Figure 28. Icelandic slope beaked redfish. Retrospective plots illustrating stability in model estimates over a 5-year 'peel' in data. Results of spawning stock biomass, fishing mortality F, and recruitment (age 3) are shown.**

### CONCLUSION

Overall, the gadget model presented here captures the overall trends in the data and offers a significant improvement over the current category 3 'survey trend' empirical rule used in assessments. The main issues identified with the model, for instance, the consistent trend in the analytical retrospective analysis, and the fits to the age-length distributions (particularly to younger ages) will likely improve as more age data becomes available in the coming years.

## REFERENCE POINTS

In line with ICES technical guidelines, the MSY $B_{trigger}$ is set as $B_{pa}$ because this is the first time the reference points are evaluated. Maximum sustainable yield is estimated to be obtained at an F of 0.093. $F_{p05}$, i.e., the maximum F that has less than 5% chance of going below $B_{lim}$ when the advice rule is applied, is 0.061. This value is less than FMSY, therefore the suggested $F_{target}$ is set to $F_{p05}$ = 0.061.

**Table 3: Icelandic slope beaked redfish. Reference points from stochastic simulations.**

| Framework | Reference points | Value | Technical basis |
|---|---|---|---|
| MSY approach | MSY $B_{trigger}$ | 192 119 t | $B_{pa}$ |
| | $F_{MSY}$ | 0.061 | Stochastic simulations. |
| Precautionary approach | $B_{lim}$ | 138 257 t | Median SSB for 2000–2005 |
| | $B_{pa}$ | 192 119 t | $B_{lim} * exp(1.645 * sigma)$ |
| | $F_{lim}$ | 0.110 | Equilibrium F that will maintain SSB above $B_{lim}$ with a 50% probability |
| | $F_{pa}$ | 0.061 | F, when ICES AR is applied, leading to P(SSB > $B_{lim}$) = 0.05 |

## STATE OF THE STOCK

The North-Western Working Group concludes that the state of the stock is at a low level. Since 2007, survey estimates of have consistently shown very low abundance of pre-fishery juveniles (< 30 cm). This raises concerns about the productivity of the stock. Without substantial recruitment biomass levels will likely continue to decline.

## SHORT TERM FORECAST

Maturity, growth, and the length-weight relationship in the forecast are based on the processes estimated within the model. Similarly, the commercial fleet selectivity is the same as estimated by the model. Intermediate catch is equal to the leftover of the current fishing year (January-August) and for September-December $F=F_{MSY}$. Recruitment in the forecast is the average of the last five years (2019–2023).

**Table 4: Icelandic slope beaked redfish. Values in the forecast and for the interim year.**

| Variable | Value | Notes |
|---|---|---|
| F (2023) | 0.0506 | Based on assumed catch in 2023 |
| SSB (2024) | 84 522 | Short-term forecast; tonnes |
| $R_{age\ 3}$ (2023) | 0 | From the assessment; millions |
| $R_{age\ 3}$ (2024) | 0 | Resampled from the years 2019–2023; millions |
| Total catch (2023) | 4242 | Sum of expected landings; tonnes |

**Table 20.6. Icelandic slope beaked redfish. Annual catch scenarios. All weights are in tonnes.**

| Basis | Total catch (2024) | F (2024) | SSB (2025) | % SSB change* | % advice change** |
|---|---|---|---|---|---|
| ICES advice basis | | | | | |
| MSY | 0 | 0 | 86 673 | 2.5 | -100 |
| Other scenarios | | | | | |
| $F_{sq} = F_{2022}$ | 3637 | 0.117 | 81 119 | -4 | -43 |

## UNCERTAINTIES IN THE ASSESSMENT AND FORECAST

Only the fishable biomass of the stock is found in Icelandic waters and recruitment comes most likely from East Greenland. Connection of the Icelandic slope stocks with the stocks found in East Greenland (Chapter 21) and the deep pelagic stock (Chapter 18) is not known. Currently, little age data is available, therefore, when years are removed in the retrospective analysis the model results substantially. We anticipate reduced uncertainty when more age data are added.

## COMPARISON WITH PREVIOUS ASSESSMENT AND FORECAST

This is the first time that the stock is assessed as a category 1 stock.

## BASIS FOR ADVICE

ICES MSY approach agreed during the WKBNORTH meeting (ICES 2023).

## MANAGEMENT CONSIDERATIONS

Beaked redfish is a slow growing, late maturing deep-sea species and is therefore considered vulnerable to overexploitation and advice must be conservative.

## REGULATIONS AND THEIR EFFECTS

There are no explicit management for Icelandic slope beaked redfish. The species is managed under the ITQ system.

## REFERENCES

ICES. 2023a. Benchmark workshop on Greenland halibut and redfish stocks (WKBNORTH). ICES Scientific Reports. 5:33. https://doi.org/10.17895/ices.pub.22304638