

STARRY RAY – TINDASKATA

Amblyraja radiata

GENERAL INFORMATION

Starry ray is by far the most abundant elasmobranch species in Icelandic waters. It has a widespread distribution over the Icelandic shelf and upper slope in depths from 20 to 1000m but is most common at 30-200 m. In Icelandic surveys the starry ray is rarely caught larger than 70 cm but is most commonly caught at 30-50 cm. Reproduction is believed to occur to some extent throughout the year, however mainly during summer season.

THE FISHERY

Starry ray is abundant in Icelandic waters and is a common bycatch in variety of fishing gears. The increased landings since the 1990s are related to an increased retention, compensating for a lower abundance of *D. batis* complex. Catches of starry ray are taken all around Iceland but mostly within the Faxaflói area (Figure 1). Landings are mainly reported from the longline fishery (Figure 2). Reported landings have increased from 500 tonnes in 2007 to more than 1700 tonnes in 2012. Thereafter, landings declined and in 2017 there is an abrupt decline to 700 tonnes. A large proportion of the landings is for local consumption. There is a strong seasonality in landings; most landings are reported from September to November each year (Figure 3).

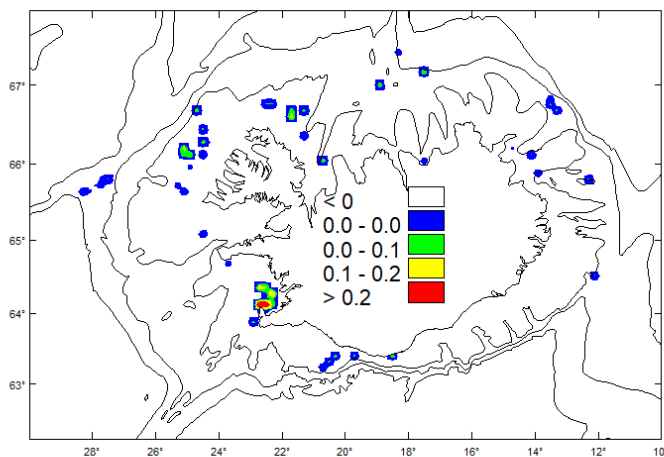


Figure 1. Starry ray. Geographical distribution of the Icelandic fishery in 2017.

Mynd 1. Tindaskata. Útbreiðsla veiða á Íslandsmiðum 2017 samkvæmt afladagbókum.

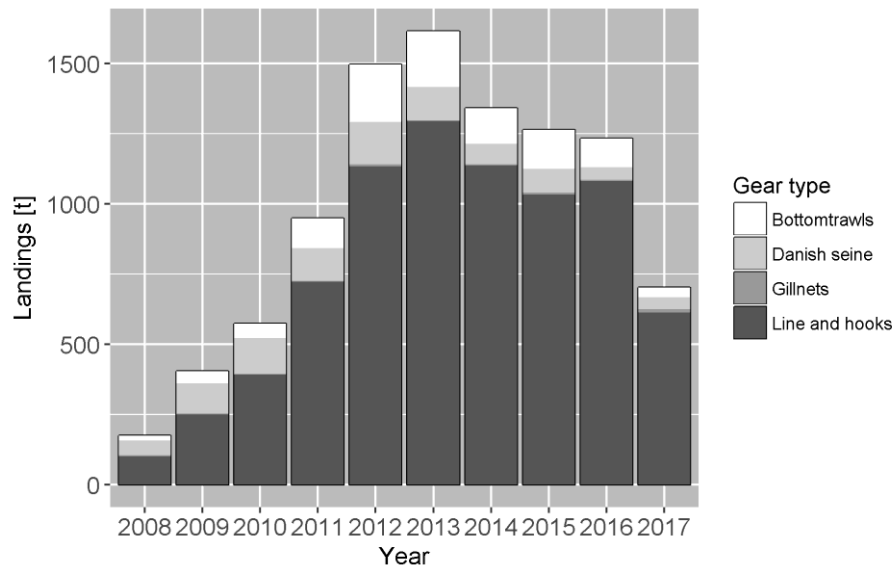


Figure 2. Starry ray. Landings by fishing gear.

Mynd 2. Tindaskata. Landanir skipt eftir veiðarfærum.

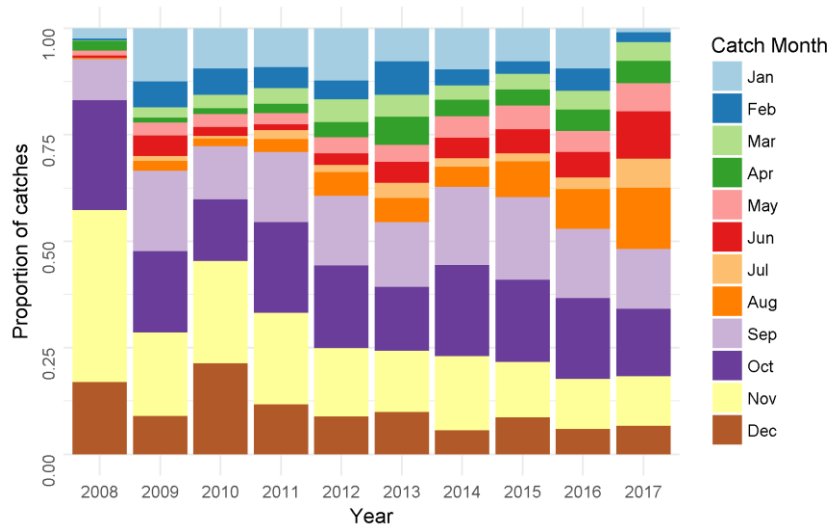


Figure 3. Starry ray. Proportion of monthly catch to each year.

Mynd 3. Tindaskata. Hlutfallslegur mánaðarlegur afli á ári.

SURVEY DATA

DISTRIBUTION IN ANNUAL MFRI SURVEYS

Starry ray is a frequent catch in MFRI spring and autumn surveys. Seasonal differences in distributional patterns have been noted, with starry ray much less abundant on the shelf during autumn survey than in spring survey. In the spring survey (IS-SMB) starry ray is found at 86% of all stations taken in the survey, but at about 50% of stations taken during the autumn survey (IS-SMH) (Figure 4).

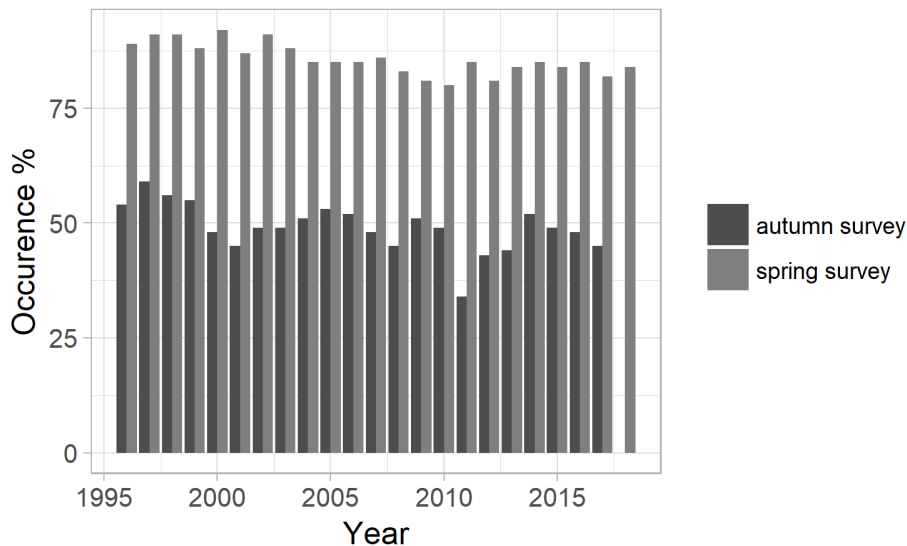


Figure 4. Starry ray. Frequency (occurrence at % stations) in spring survey (IS-SMB) and autumn survey (IS-SMH).

Mynd 4. Tindaskata. Tíðni tindaskötu (hlutfall af fjölda stöðva) í stofnmælingu að vori og stofnmælingu að hausti

In MFRI groundfish surveys starry ray is most abundant in the N and the NW (Figures 5a/b, 6 and 7). In the spring survey there is a high abundance on the shelf off N-Iceland and in near-shore area in the south and southeast (Figure 5 a). In the autumn survey, the main distribution is on the shelf break and starry ray is almost absent from the southern area.

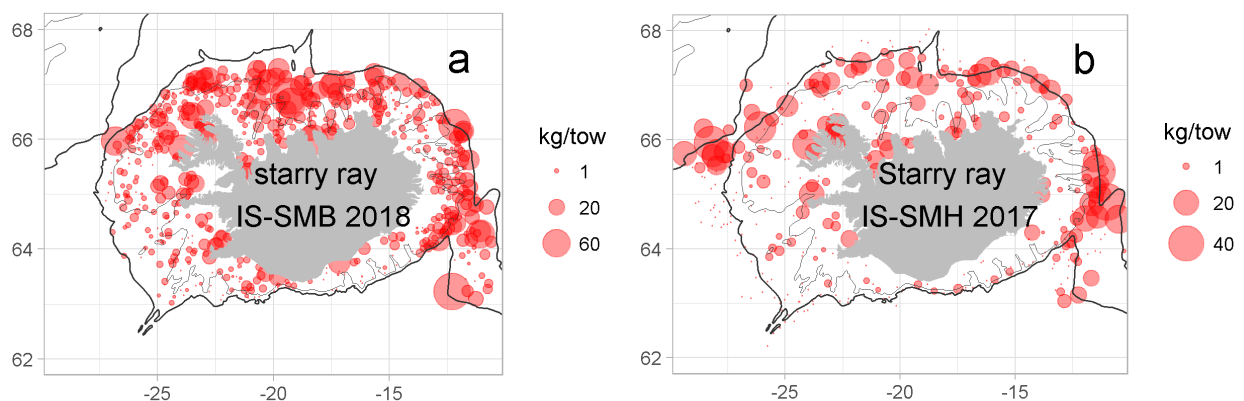


Figure 5. Starry ray Spatial distribution in a) the spring survey (IS-SMB) and b) the autumn survey (IS-SMH).

Mynd 5. Tindaskata. Útbreiðsla í stofnmælingum botnfiska a) að vori 2018 og b) að hausti 2017.

Starry ray is a frequent bycatch in several other MFRI surveys. The oceanic shrimp survey is conducted during summer off N-Iceland and coastal shrimp survey occurs at various time periods in fjords and near coastal areas and starry ray is widely distributed within the survey areas (Figure 6 a). Similarly, starry ray is a frequent bycatch in the gillnet survey occurring early spring each year (Figure 6 b).

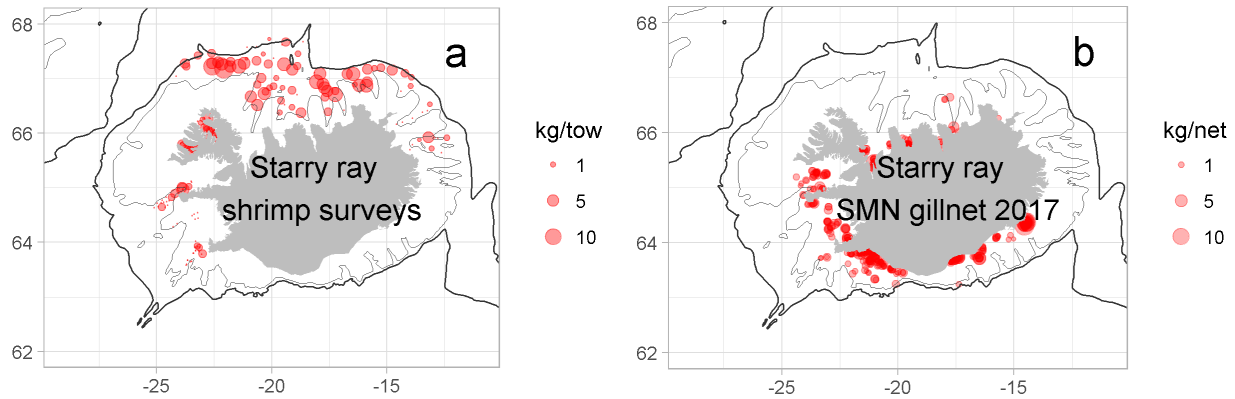


Figure 6. Starry ray. Spatial distribution in a) coastal and oceanic shrimp surveys (IS-SMR) and b) the gillnet survey (IS-SMN).

Mynd 6. Tindaskata. Útbreiðsla í a) stofnmælingum rækju (innfjarðar og úthafsrækju leiðangrar) 2017 og b) í neta ralli (IS-SMN) 2018.

Estimates of total biomass of starry ray in the IS-SMB have declined over the survey period (1985-2018) and are now half of the biomass reported from the 1980's, mostly due to decline in the NW and the NE area (Figure 7). The proportion of biomass divided by area has remained relatively stable over the time period. In the autumn survey (IS-SMH) the total biomass is less than in the IS-SMB and the biomass is spread over a wider area (Figure 8). In recent years, the total estimated biomass has been below the long-term average, but the decline is smaller than observed in the spring survey.

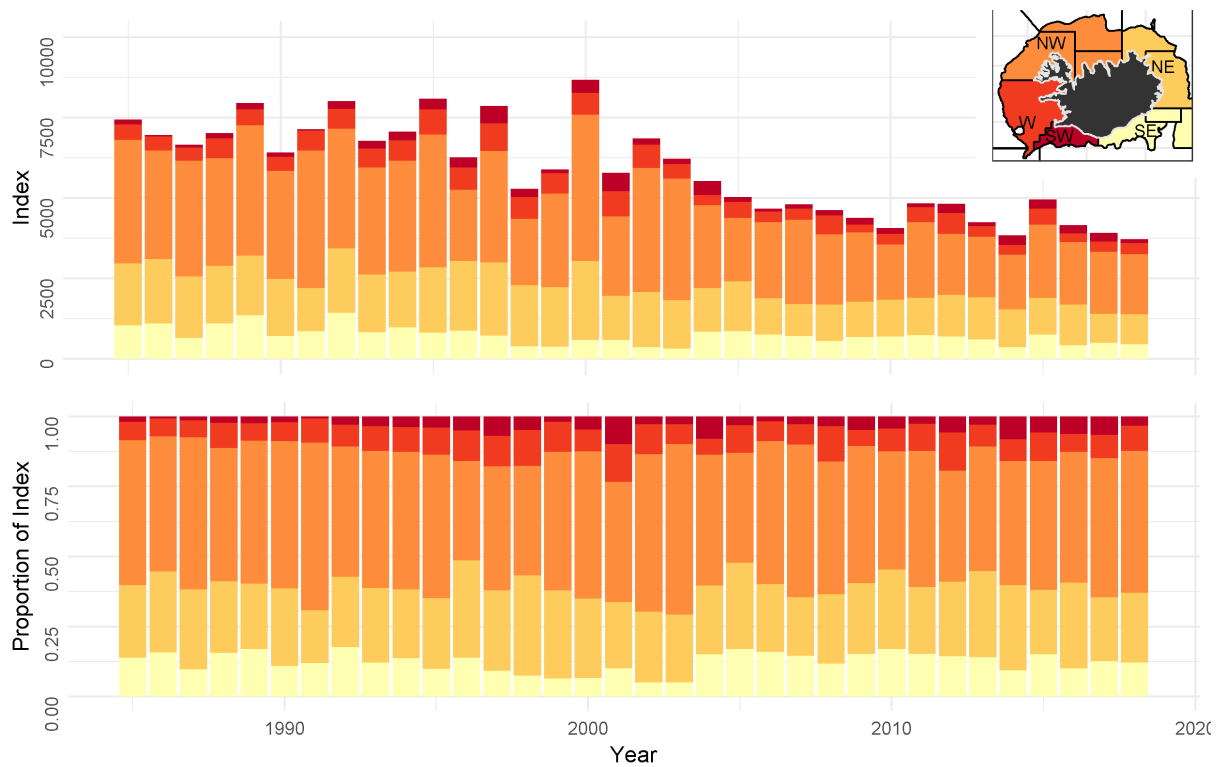


Figure 7. Starry ray. Spatial distribution of catch from the spring survey (IS-SMB) since 1985.

Mynd 7. Tindaskata. Svæðaskipt útbreiðsla í stofnmælingu botnfiska að vori frá 1985.

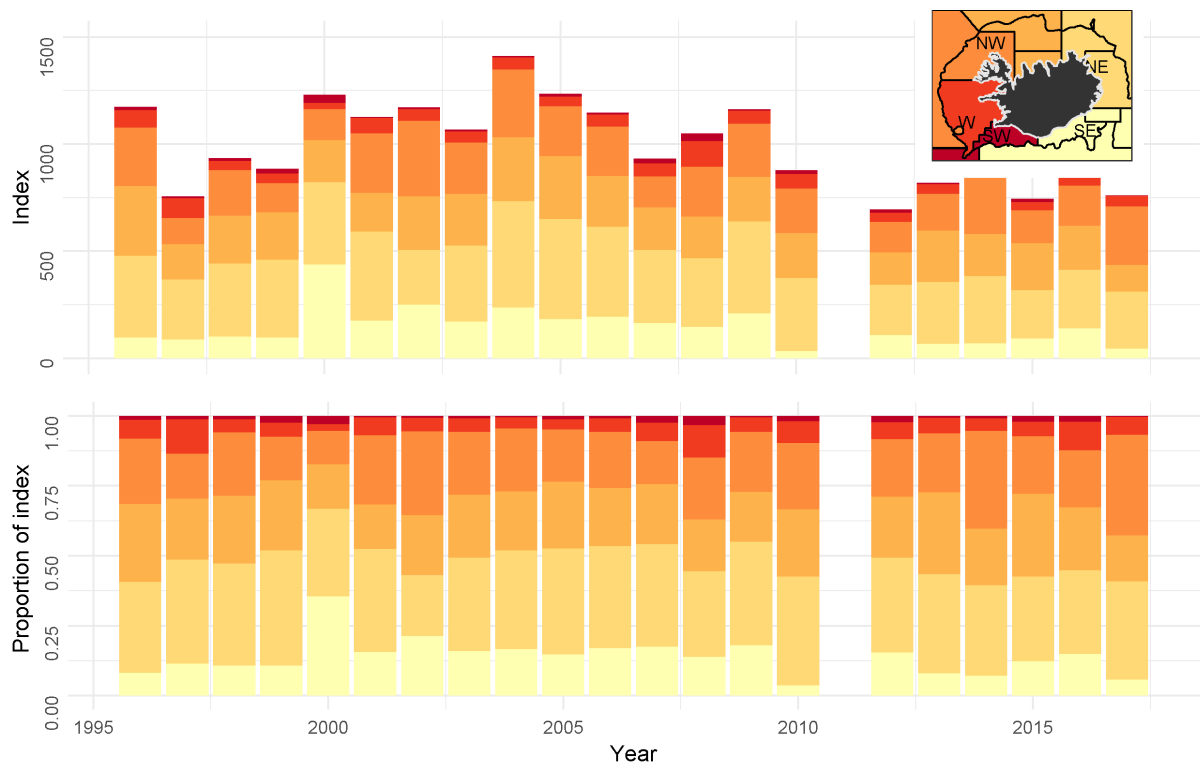


Figure 8. Starry ray. Spatial distribution of catch from the autumn survey (IS-SMH) since 1996.

Mynd 8. Tindaskata. Svæðaskipt útbreiðsla í stofnmælingu botnfiska að hausti frá 1996.

LIFE HISTORY INFORMATION

Survey information on length distribution indicate the majority of specimens are <60 cm L_T . Mean size varies from 37 to 49 cm depending on surveys (Figure 9). In IS-SMB, IS-SMH and IS-SMR, the length distribution is negatively skewed as the proportion of large fish decreases quite abruptly (Figures 9-11).

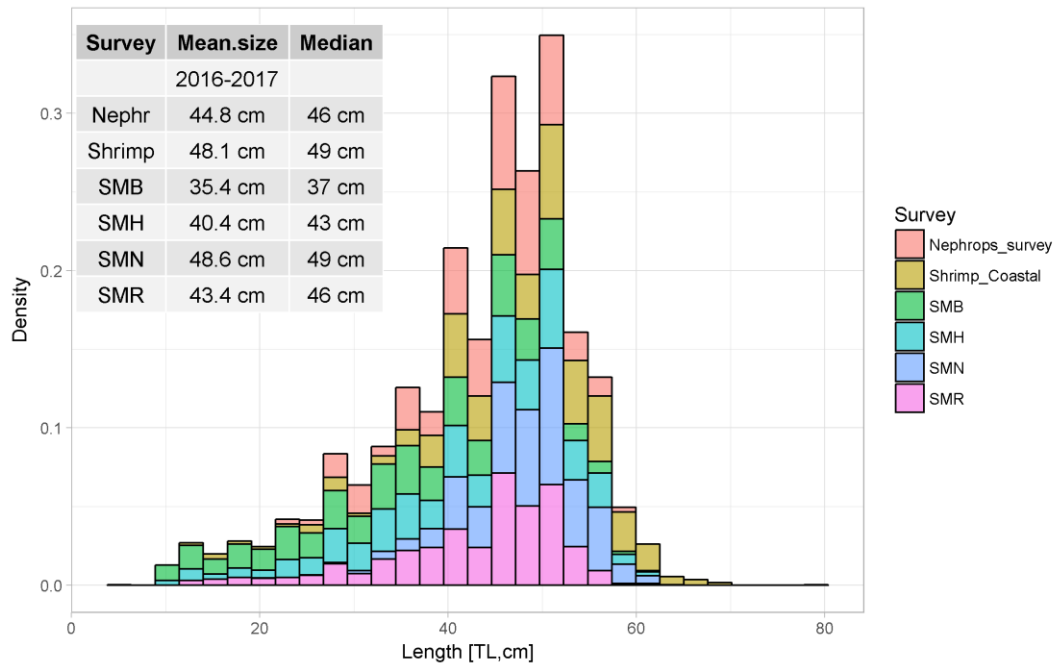


Figure 9. Starry ray. Length distributions in several MFRI surveys 2016-2017. SMB: spring survey, SMH: autumn survey, SMN: Gillnet survey, SMR: Oceanic shrimp survey. All surveys use various form of bottom trawls except SMN.

Mynd 9. Tindaskata. Lengdardreifingar í ýmsum leiðöngrum Hafrannsóknastofnunar 2016-2017. Nephrops_survey: Stofnmæling humars, Shrimp_Coastal: Stofnmæling innfjarðarrækju, SMB: Stofnmæling að vori, SMH: stofnmæling að hausti, SMN: Stofnmæling þorsks með þorskanetum, SMR: Stofnmæling úthafsækju.

The mean length in spring survey is the lowest in all six surveys and considerably smaller than mean length in the autumn survey (overall mean 36.9 and 41.5 respectively). The proportion of larger fish decreases quite abruptly after reaching 50 cm L_T (Figure 7 and 8). In the spring survey, the mean length has decreased from 38 cm (average 1996-1998) to 36 cm (average 2016-2018) (Figure 10). On the other hand, in autumn survey the mean length has varied (from 38cm to 43 cm L_T) over the time period since 1996 without any specific direction (Figure 11).

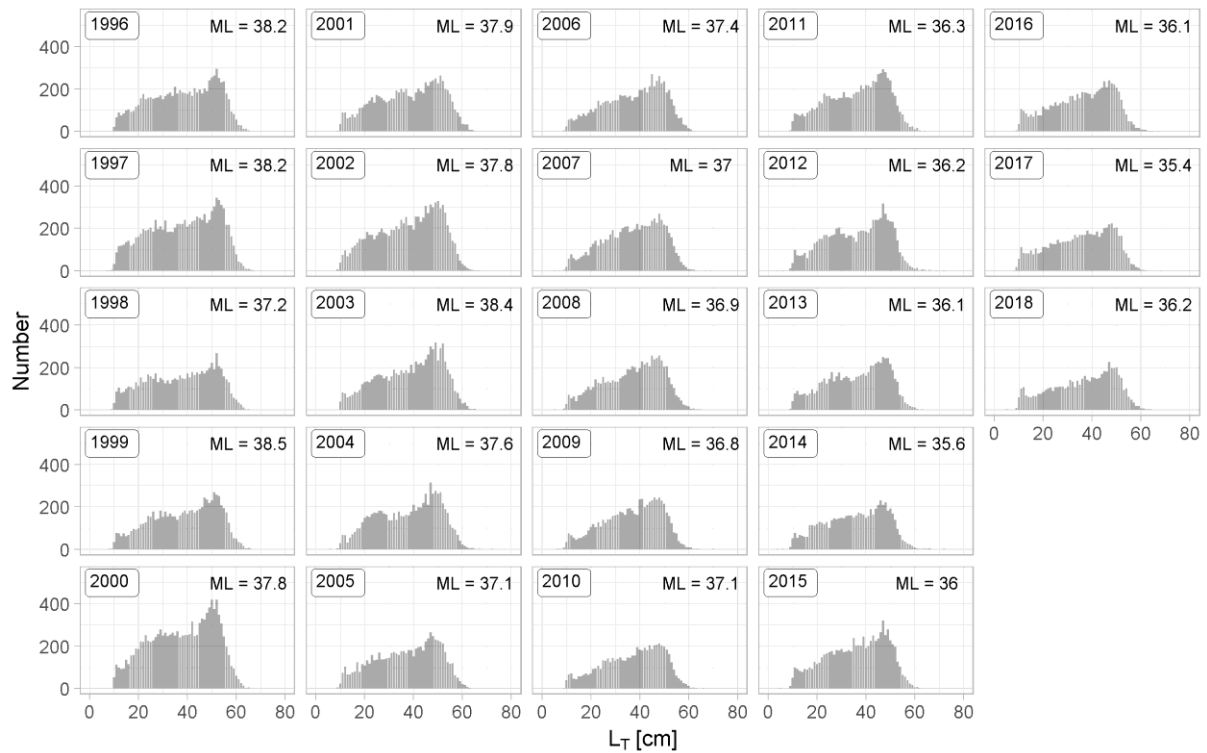


Figure 10. Starry ray. Length distributions in spring survey (IS-SMB) since 1996. Mean length (cm) is indicated for each year (upper, right).

Mynd 10. Tindaskata. Lengdardreifing úr stofnmælingu botnfiska að vori frá 1996.

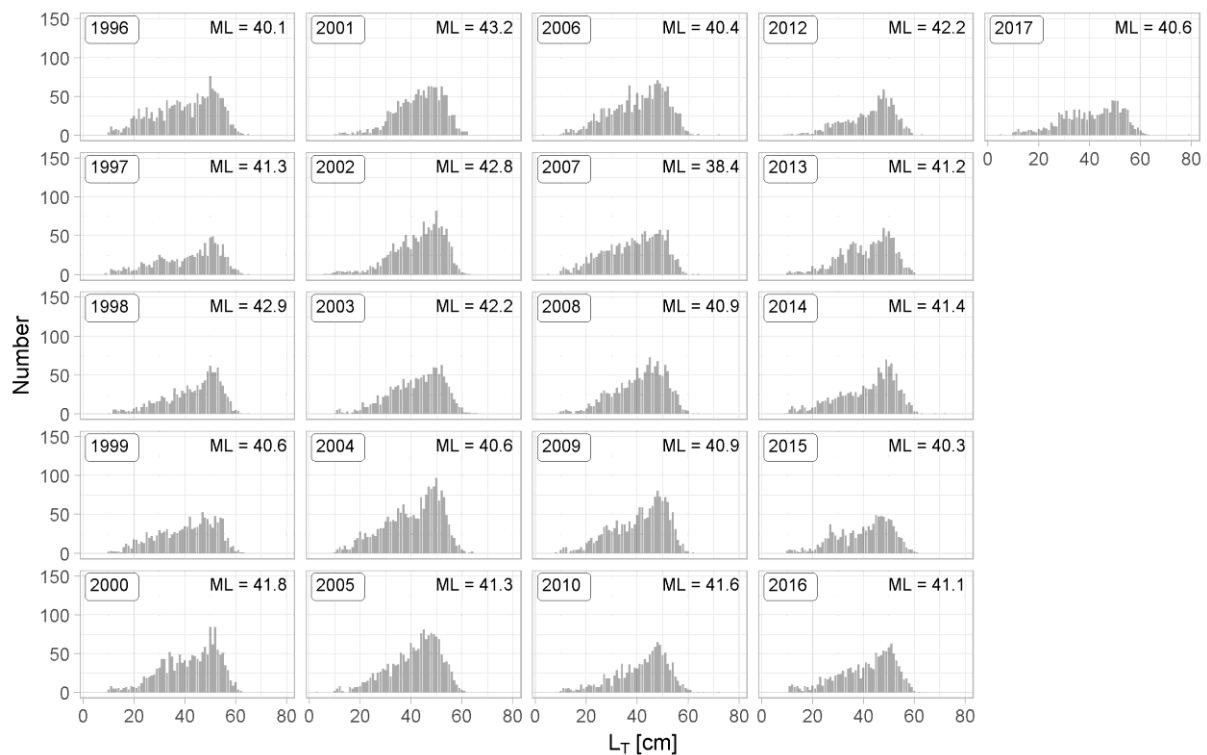


Figure 11. Starry ray. Length distributions in autumn survey (IS-SMH) since 1996. Mean length (cm) is indicated for each year (upper, right).

Mynd 11. Tindaskata. Lengdardreifing úr stofnmælingu botnfiska að hausti frá 1996.

The sex ratio is 1:1 in the spring survey but in the autumn survey ratio is skewed towards females (male female ratio 1:1.57). Males are on average larger than females (40.5 cm and 38.8 cm respectively).

Data on maturity is sampled in autumn survey allowing for calculations of maturity ogives. Length-at-50%-maturity (L_{50}) is 42.9 cm and 41.0 cm L_T for males and females respectively (Figure 12).

Anecdotal information suggests that starry ray undertakes seasonal migrations related to egg-laying activity. Recently, both surveys have started to sample data on egg case distribution, but trawl survey data may provide useful information on catches of viable skate egg cases and/or nursery grounds.

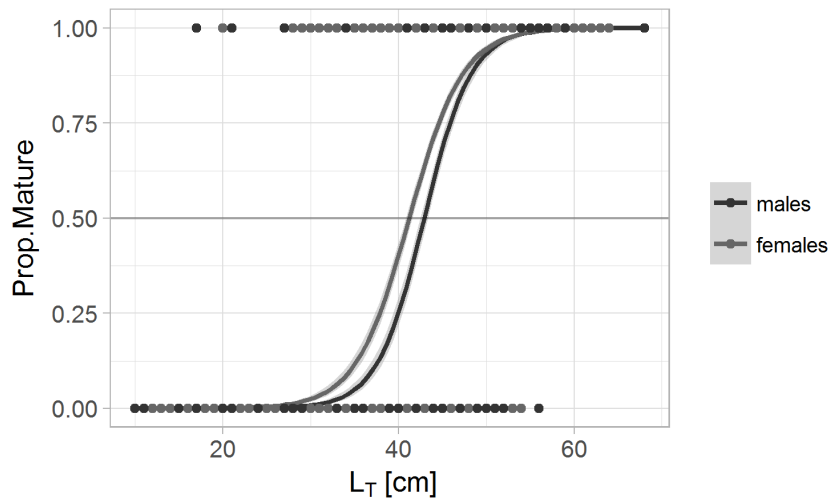


Figure 12. Starry ray. Length at maturity. Males: $L_{50}=42.9$ cm T_L , $L_{95}=51.1$ cm T_L . Females: $L_{50}=41.0$ cm T_L , $L_{95}=50.0$ cm T_L .

Mynd 12. Lengd við kynþroska. Hængar: $L_{50}=42.9$ cm T_L , $L_{95}=51.1$ cm T_L . Hrygnur: $L_{50}=41.0$ cm T_L , $L_{95}=50.0$ cm T_L .

Figure 10 shows both an index of juvenile abundance of starry ray smaller than 20cm, and trends in various biomass indices in the spring and autumn survey. Estimated biomass in IS-SMB has decreased from 20000 tonnes (average 1985-1997) to 15700 tonnes (average 1998-2016). Decreasing trend is in particularly prominent for large fish (>50cm) in years 1993-2008. Estimated biomass of juveniles (<21cm) appears to be stable despite large variations in years 2003-2013 and increasing trend since 2013 is noted.

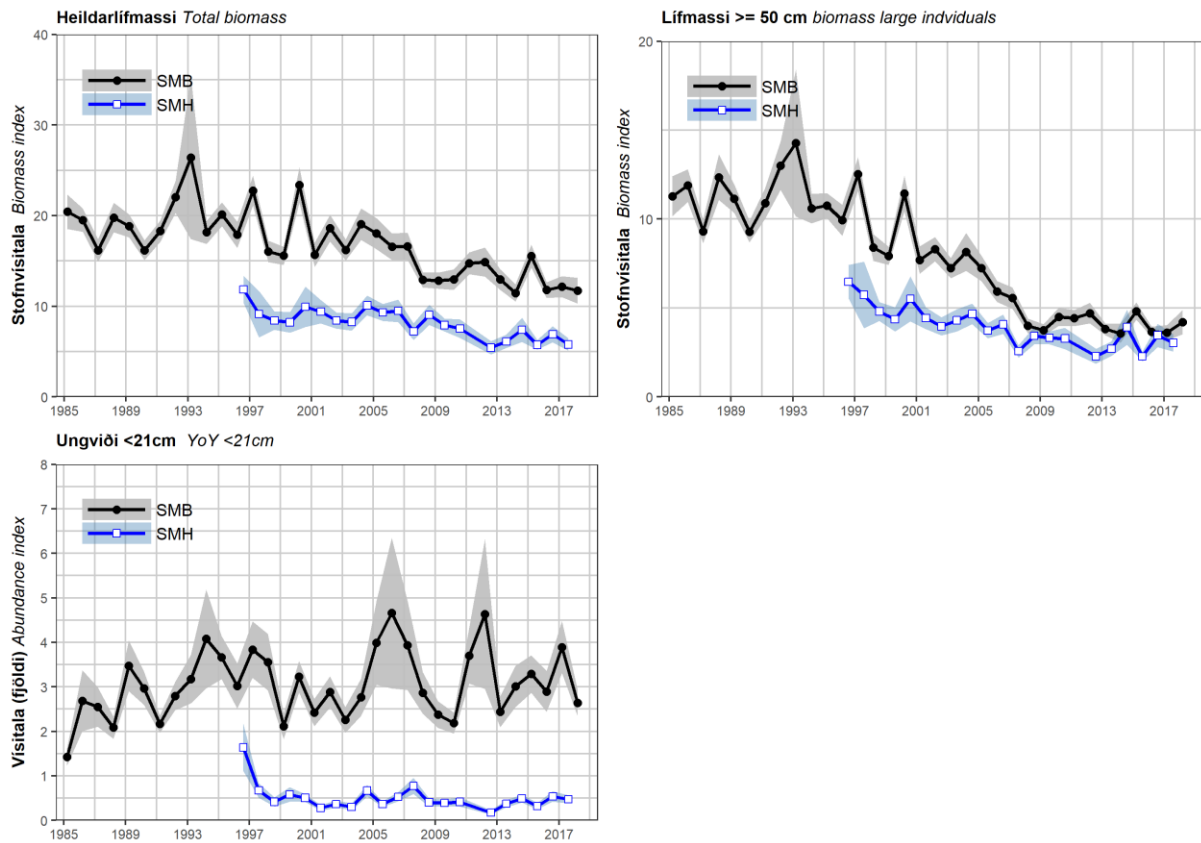


Figure 13. Starry ray. Biomass and abundance estimates showing total biomass (upper, left), biomass estimates of large individuals (upper, right) and juvenile abundance estimates (<21cm) (lower, left), from the spring survey (SMB, grey) and autumn survey (SMH, blue)

Mynd 13. Tindaskata. Afli, lífmassavísitala fiska stærri en 50cm og nýliðunavísitala (<21cm) úr stofnmælingu botnfiska að vori (gráir ferlar) og úr stofnmælingu botnfiska að hausti (bláir ferlar).